The Farm Management Handbook 2022/23

Editor

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SAC Consulting

October 2022

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Foreword

Just when it appeared that the society was beginning to return to some form of normality in the wake of the COVID-19 pandemic, February 2022 saw Russian forces invade Ukraine, triggering turmoil in gas and energy markets around the world, and raising concerns over food security. The Russian invasion of Ukraine has hit the agricultural sector hard, most notably because of the high level of reliance on Russian gas for energy requirements in western European economies.

The conflict in Ukraine has also produced serious knock-on consequences for agricultural supply industries, such as the fertiliser trade. Due to the rising cost of energy, UK fertiliser manufacturing has contracted. As a result, fertiliser prices quoted for spring 2022 were typically three to four times higher than one year earlier, depending on the exact month of purchase.

Whilst farm input costs have increased like never before, ex-farm prices for milk, beef and lamb have also risen sharply. As a result, some of the gross margins contained in the 2022/23 handbook have changed significantly from those in previous editions.

Concerns around climate change remain and the agricultural sector is very much committed to do whatever it can to work towards Scotland's climate change obligations. Nonetheless, food security has come to the fore during 2021/22 and the focus on food security has been amplified further by events in Ukraine and the risk of lower grain exports from Ukraine. Given rising inflation and the current 'cost of living crisis', the focus around food security looks set to continue throughout 2022/23 and beyond. Let's hope that the newly formed UK government gives food security a high priority going forwards.

The SAC Farm Management Handbook is a budgeting book. The Handbook is an annual publication - more regular market and input cost data are provided at www.fas.scot under '*Publications*'. Enterprise budgets are expressed to gross margin level. The fixed costs of an individual business should also be considered when preparing forward budgets as they can have a significant impact on the profitability and/or success of a business.

The 43rd edition of the Farm Management Handbook, produced with the support of the Scottish Government's SRDP Farm Advisory Service (FAS), provides a comprehensive and up-to-date source of information for all involved in the assessment and planning of farm and rural businesses. The Handbook could not be produced without the help of colleagues and friends throughout the industry. This help, and indeed all comments and suggestions, are very much appreciated.

Alastair Beattie
October 2022

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Contents

Enterprise Budgeting

The Farm Management Handbook is designed to provide guidelines in preparing forward budgets.

Output
Output is based on anticipated sales prices (adjusted for replacement costs where required) plus enterprise specific subsidies (as applicable). Livestock output prices are based on market forecasts while crop output prices are based on forward sales values for 2023 as set in summer 2022.

All non enterprise specific subsidies, e.g. Basic Payment Scheme (BPS) and Less Favoured Area Support Scheme (LFASS) are excluded from the enterprise gross margins. These subsidies are regarded as whole farm income therefore should be included in whole farm gross margin budget calculations. See Rural Aid Schemes section (page 467) for more information on subsidies.

Variable costs
Variable costs (e.g. feed, seed, fertiliser, vet and medicine and sprays) are specific to an enterprise and vary in proportion to the size of the enterprise. Enterprise gross margins will vary considerably between individual businesses due to differing land quality, climate, production system, yields, prices and managerial abilities. All variable costs are based on projected prices for the year ahead, set in summer 2022.

Gross margins
A gross margin is **not** a profit figure. No account is taken of "fixed" or "overhead" costs such as labour, power and machinery, property upkeep, rent or finance charges.

The gross margin of an enterprise is:

OUTPUT

less

VARIABLE COSTS

Enterprise performance levels are expressed on a per head basis and, for land using enterprises, on a per hectare (acre) basis. It is also assumed that the enterprise is in a “steady state” where, for instance, the size of a dairy herd is the same at the start and end of the year.

The gross margin data represents good technical performance at estimated prices for 2022/23 but should not be regarded as industry standards or targets, nor should it be used as actual data for compensation purposes. That is, these are indicative margins that should be customised to the specific requirements of the user.

Fixed costs
Fixed costs (e.g. labour, machinery, general overheads and finance) are costs that cannot readily be allocated to a specific gross margin. Fixed costs are generally unaffected by small changes in enterprise size but can vary from year to year. As a result, they are often referred to as overhead or indirect costs. Depreciation (for property and machinery) is also considered as a fixed cost and it is useful to keep this separate to allow a broad assessment of the capital investment needs of a business. If actual fixed costs are not available for a particular farm type, the figures in the Whole Farm Data section (page 445) can be used.

Rounding
Because of rounding, individual items may not add to sub-totals or totals.

Remember! The gross margins are indicative and are not industry standards or targets. Care should therefore be taken when comparing actual results with values in the handbook or when using this information for budgeting purposes. Data should be adjusted to reflect local physical differences and changes in price.

Should you require assistance in using the Handbook, please contact your local SAC Consulting office. For contact details see Contacts section (page 535).

Crop Inputs

Introduction

Crop inputs such as fertilisers, organic manures, lime and sprays all have a quantifiable value on farm. This section provides information that many of the crop gross margins and grassland and forage crop cost of production data refer to and include.

Fertiliser

Fertiliser levels used in the enterprise data are intended only as a guide for budgeting purposes and should not be regarded as a recommendation. In practice, many factors affect the level of N, P_2O_5 and K_2O required by a specific crop, including previous cropping policy, the quantity of organic manures being used and soil nutrient status. Budgeted N levels will require adjustment for Nitrate Vulnerable Zone (NVZ) Action Programme regulations.

Fertiliser prices used are based on typical prices paid in autumn 2022. Fertiliser costs used in the gross margins are shown in the table below.

	Fertiliser Price	Nutrient Cost
Nitrogen (Ammonium Nitrate)	£840.00 /t	£2.43/kg N
Phosphate (Triple Super Phosphate)	£925.00 /t	£2.01/kg P2O5
Potassium (Muriate of Potash)	£765.00 /t	£1.28/kg K2O

All gross margins assume nutrients are derived from purchased fertiliser and applied to soils at moderate P and K status. Nutrient inputs for crops should be adjusted for applied organic nutrients which can reduce costs.

Lime

No charge for share of lime is included in the variable costs of arable, grassland and forage crops. Costs for lime will vary significantly depending on type (e.g. calcium, magnesium), distance from source, type of haulage (artic or 8 wheeler) and spreading contractor's charges. An appropriate annual maintenance charge (including delivery and application) to be included in individual margins could be calculated to suit specific farm practice using the example below:

Cost	Rate	Frequency of application	Annual charge
£35/t	3.7t/ha	4 years	£32.34/ha

For more information on lime see SRUC Technical Note 656.

Slurry and Manure

Use of slurries or manures has not been considered in the enterprise data but organic manures are a valuable source of major nutrients (N, P_2O_5 and K_2O), secondary nutrients, trace elements and organic matter.

When planning inorganic fertiliser applications for crops and grassland, the total crop requirement should be adjusted to account for any use of slurries and manures.

The following table is an estimated value based on the total nutrients present in the stored slurry and manure prior to application to land.

Manure Type	DM (%)	Total plant nutrient	kg/t or kg/m^3	£/kg	Total value (£/t or £/m3)
Cattle FYM (Fresh)	25	N	6.0	2.43	14.61
		P_2O_5	3.2	2.01	6.43
		K_2O	8.0	1.28	10.20
					31.24
Cattle Slurry	6	N	2.6	2.43	6.33
		P_2O_5	1.2	2.01	2.41
		K_2O	3.2	1.28	4.08
					12.82
Sheep FYM (Fresh)	25	N	7.0	2.43	17.04
		P_2O_5	3.2	2.01	6.43
		K_2O	8.0	1.28	10.20
					33.68
Pig FYM (Fresh)	25	N	7.0	2.43	17.04
		P_2O_5	6.0	2.01	12.07
		K_2O	8.0	1.28	10.20
					39.31
Pig Slurry	4	N	3.6	2.43	8.77
		P_2O_5	1.8	2.01	3.62
		K_2O	2.4	1.28	3.06
					15.44
Layer manure	35	N	19.0	2.43	46.26
		P_2O_5	14.0	2.01	28.15
		K_2O	9.5	1.28	12.11
					86.53
Broiler/turkey litter	60	N	30.0	2.43	73.04
		P_2O_5	25.0	2.01	50.27
		K_2O	18.0	1.28	22.95
					146.27

Availability to crops of the nutrients in organic manures will be significantly altered by the timing and method of application, and other factors including temperature, rainfall and crop growth stage and health. For further guidance on the use of organic manures, refer to SRUC Technical Note 650.

Nutrient Planning

Using the information below, total quantities of slurries and manures produced on farm can be calculated.

Livestock	Typical volume of excreta produced	
	m^3/day	m^3/wk
Dairy Cow (annual milk yield > 9,000l)	0.064	0.45
Dairy Cow (annual milk yield 6,000-9,000l)	0.053	0.37
Dairy Cow (annual milk yield < 6,000l)	0.042	0.29
Dairy Heifer (13 months to first calf)	0.040	0.28
Dairy Heifer (3 to 13 months)	0.020	0.14
Beef Cow (> 500kg)	0.045	0.32
Beef Cow (≤ 500kg)	0.032	0.22
Steer/heifer (over 25 months)	0.032	0.22
Steer/heifer (13 to 25 months)	0.026	0.18
Cattle (3 to 13 months)	0.020	0.14
Bull beef (over 3 months)	0.026	0.18
Calf (up to 3 months)	0.007	0.05
Sow (130 to 225kg) & litter	0.011	0.08
Maiden Gilt (90 to130kg)	0.006	0.04
Breeding Boar (66 to 150kg)	0.006	0.04
Breeding Boar (over 150kg)	0.008	0.06
Weaner (7 to 31kg)	0.001	0.01
Grower (31 to 66kg) - dry fed/liquid fed	0.004/0.007	0.03/0.05
Finisher (66kg to slaughter) - dry fed/ liquid fed	0.006/0.010	0.04/0.07
Ewe (> 60kg)	0.005	0.04
Ewe (≤ 60kg)	0.003	0.02
Lambs (6 months to tupping)	0.002	0.01
Goat	0.003	0.02
Breeding deer	0.006	0.04
Other deer	0.003	0.02
Horse	0.024	0.17
Laying Hens (per 1000, up to 17 wks)	0.040	0.28
Laying Hens (per 1000 caged, > 17 wks)	0.120	0.84
Laying Hens (per 1000 free range, > 17 wks)	0.091	0.64
Broilers (table, per 1000)	0.120	0.84
Broiler (breeders, per 1000, up to 25 wks)	0.040	0.28
Broiler (breeders, per 1000, > 25 wks)	0.120	0.84
Turkeys (per 1000, male)	0.160	1.12
Turkeys (per 1000, female)	0.120	0.84
Ducks (per 1000)	0.100	0.70

When calculating quantities of slurries and manures as part of a farm waste management plan, adjustments for livestock numbers, housing periods and collection of contaminated water and bedding (e.g. straw and sawdust) will be required.

For further information on nutrient planning refer to Nitrate Vulnerable Zones guidance and SRUC Technical Notes 633, 649, 650, 651, 652, 655, and 668 or Nutrient Management Guide (RB209).

For more information on NVZ's across the UK, see:

Scotland -
www.gov.scot/Topics/farmingrural/Agriculture/Environment/NVZintro

England -
https://www.gov.uk/guidance/nutrient-management-nitrate-vulnerable-zones

Wales -
https://gov.wales/cross-compliance-nitrate-vulnerable-zones-smr-1-2014

Northern Ireland -
https://www.daera-ni.gov.uk/articles/nitrates-directive

Planet Scotland

PLANET Scotland is a software system designed to help farmers improve their financial and environmental performance through better use of organic and bagged fertilisers. It has been specially developed to take Scottish soils, cropping and growing conditions into account. This practical approach to nutrient management aims to give farmers a real win:win and, with the increasing focus on reducing emissions that contribute to climate change, could also help farms reduce their carbon footprint and so benefit both the business and the wider environment.

PLANET stands for Planning Land Application of Nutrients for Efficiency and the Environment and this outlines the approach that the software takes. Farmers and growers in NVZs will already be familiar with this planning approach and PLANET Scotland will allow NVZ farmers to use information produced by PLANET as part of their NVZ record keeping as well as benefiting from all of PLANET's other features. It will also integrate with standard desktop agronomy packages and therefore will only require key data to be entered once. In addition to fertiliser application, the software will also help with farm gate nutrient balances and with planning slurry storage requirements.

The software is available free of charge to all Scottish farmers and growers and to their consultants. There is a programme of workshops, on-line and PC-based training packages including video material, a helpline for IT and technical enquiries, and a dedicated website available to help users. To find out more, see www.planet4farmers.co.uk.

Residual Values of Fertilisers, Manures and Lime

Many fertilisers and manures have a residual value that needs to be calculated as part of a farm valuation or when a farm transfers between owners or tenants.

Estimates of the residual value of manures can be obtained by a feeding stuff calculation or by calculation of nutrients in manure (FYM) or slurry. The following valuations are based on information taken from SRUC Technical Notes on fertilisers as noted on page 7. Valuers must show discretion in the values used and to vary the values used according to the standard of husbandry, previous cropping, the state of drainage and the effectiveness of crop protection. Values are given in respect to growing seasons, not calendar years.

Compensation for manures using the residual values of feeding stuffs

Residues of feeding stuffs fed to livestock will be recovered in manures or slurries thus giving these organic manures a specific value. The values of nutrients in purchased feeds or feeds produced on the farm which are retained in farmyard manures or slurries can be calculated using the figures in the following table.

Feeding stuff	Average % in feeding stuff			Compensation value (£) per tonne of food consumed	
	N	P_2O_5	K_2O	Before 1 growing season	After 1 growing season
Soya bean meal or cake	6.99	1.50	2.68	32.94	16.47
Rapeseed meal or cake	5.77	2.33	1.55	21.85	10.92
Beans	4.53	1.03	1.39	18.08	9.04
Peas	3.52	1.15	1.14	14.94	7.47
Fish meal	10.50	7.63	1.03	25.70	12.85
Wheat	1.75	0.65	0.47	6.57	3.29
Barley	1.78	0.79	0.52	7.20	3.60
Oats	1.48	0.67	0.52	6.84	3.42
Maize	1.42	0.60	0.37	5.29	2.65
Bran & other offals of wheat	2.54	2.36	1.49	18.55	9.27
Maize gluten 60%	9.68	0.58	0.12	9.92	4.96
Brewers' & distillers' grain (wet)	1.07	0.23	0.02	1.31	0.66
Brewers' and distillers' grain (dried)	3.42	1.03	0.06	4.42	2.21
Hay	1.49	0.51	2.16	22.39	11.19

Feeding stuff	Average % in feeding stuff			Compensation value (£) per tonne of food consumed	
	N	P_2O_5	K_2O	Before 1 growing season	After 1 growing season
Dried grass	2.80	0.73	2.92	30.97	15.48
Grass silage	0.69	0.19	0.79	8.31	4.16
Wheat straw	0.54	0.15	1.07	10.83	5.41
Barley straw	0.58	0.22	1.53	15.32	7.66
Oat straw	0.46	0.18	1.82	17.96	8.98
Straw treated with ammonia	0.96	0.18	1.22	12.65	6.32
Swedes	0.15	0.06	0.24	2.48	1.24
Turnips	0.19	0.08	0.20	2.15	1.07
Potatoes	0.30	0.09	0.58	5.88	2.94
Dried sugar beet pulp (molasses)	1.55	0.15	1.92	19.82	9.91
Pot ale syrup	2.52	2.26	1.25	16.15	8.07
Molasses (sugar cane)	0.65	0.20	3.42	33.44	16.72
Compound cakes & meals for each 1% crude protein	0.16	0.08	0.06	0.78	0.39
Feed additives containing urea for each 1% crude protein	0.16	0.00	0.00	0.14	0.07

For further feeding stuffs see PLANET (www.planet4farmers.co.uk).

The calculation of nutrients in FYM or slurry from feeding stuffs depends on the following principles:

a) The proportions of nutrients present in FYM and slurry will under ideal conditions be 35% for N, 45% for P_2O_5 and 75% K_2O.
b) Where storage conditions are sub-optimal then these percentages should be reduced by up to half.
c) For slurry the percentage given in a) for N should only be used for spring or summer application. For autumn and winter application the allowances should be reduced by 2/3 and 1/3 respectively.

An example calculation for the value of FYM taken from the nutrients from a feeding stuff is shown in the table overleaf:

e.g. residual value of one tonne of barley fed to livestock.

Plant Nutrient	kg/t	£/kg	Total £/t	%	Value of FYM (£/t) Before 1 growing season	After 1 growing season
N	17.8	2.43	43.34	35	15.17	7.58
P_2O_5	7.9	2.01	15.89	45	7.15	3.57
K_2O	5.2	1.28	6.63	75	4.97	2.49
			65.86		27.29	13.64

In calculating the value of manures, instances occur where records of the feeds fed to livestock are not available. In this case the value of stored farmyard manure or slurry can be estimated on the basis of the average nutrient content as shown in the following tables whilst also considering, in the case of slurry, the season of application.

Residual value of fertilisers and manures

The current value of the major plant nutrients, the principal forms used in agriculture, and proportions available for use over time for which compensation can be estimated is detailed in the following table:

Source		Proportion of applied plant nutrients available for crop use after (growing season) 1	2	3
N	(a) Inorganic fertilisers, dried blood, dried poultry manure and liquid digested sludge	nil	nil	nil
	(b) Other organic manures	1/5	1/10	nil
P_2O_5	All fertilisers and manures	1/2	1/4	1/8
K_2O	All fertilisers and manures	nil	nil	nil

Storage and application principals, as per those stated in the previous section, will affect the value of manures. In the following examples, the proportion of nutrients available in the three growing seasons following application as a compound fertiliser (for example 20:10:10), fresh cattle FYM and cattle slurry, are valued.

e.g. application of 1 tonne of 20:10:10 compound fertiliser.

Plant Nutrient	kg/t	£/kg	Total £/t	Value of fertiliser (£/t) after (growing season) 1	2	3
N	200	2.43	486.96	nil	nil	nil
P_2O_5	100	2.01	201.09	100.54	50.27	25.14
K_2O	100	1.28	127.50	nil	nil	nil
			815.54	100.54	50.27	25.14

e.g. application of 1 tonne of fresh cattle FYM.

Plant Nutrient	kg/t	£/kg	Total £/t	Value of organic manure (£/t) after (growing season) 1	2	3
N	6.0	2.43	14.61	2.92	1.46	nil
P_2O_5	3.2	2.01	6.43	3.22	1.61	0.80
K_2O	8.0	1.28	10.20	nil	nil	nil
			31.24	6.14	3.07	0.80

e.g. application of 1 tonne of fresh cattle slurry.

Plant Nutrient	kg/m^3	£/kg	Total £/t *	Value of organic manure (£/t) after (growing season) 1	2	3
N	2.6	2.43	4.22	0.84	0.42	nil
P_2O_5	1.2	2.01	2.41	1.21	0.60	0.30
K_2O	3.2	1.28	4.08	nil	nil	nil
			10.71	2.05	1.03	0.30

* N adjustment for winter application timing.

Residual value of lime

The loss of lime from soils varies over time and for specific field circumstances (e.g. soil type, annual rainfall, high use of nitrogen) however, the average rate of loss from the soil is equivalent to about 0.35 tonnes of calcium oxide (CaO) per hectare per annum.

Considering this, there is a residual value for lime applications which may be useful when valuing farm assets in a farm valuation or a farm transfer between owners or tenants.

Compensation for lime residues should be based on the neutralising value (NV) of the lime applied, normally reduced by 0.35 tonnes of calcium oxide per hectare or by one-seventh, whichever is the greater for each growing season since the time of application. Compensation for lime should be calculated on the basis of the current price (delivered and spread) for the residual quantity.

An appropriate calculation of residual quantity of liming materials is set out in the following table:

Quantity applied (NV %) t/ha	CaO equiv. applied t/ha	Annual loss of CaO equivalent t/ha	Residual quantity of CaO equivalent (t/ha) after (growing season) 1	2	3	4	5	6	7
7.0 (50%)	3.50	$^1/_7$(0.50)	3.0	2.5	2.0	1.5	1.0	0.5	nil
4.4 (46%)	2.02	0.35	1.67	1.32	0.97	0.62	0.27	nil	nil

Pesticide Use

For each of the arable and potatoes gross margins, and the grassland and forage crops variable cost data, pesticides (including herbicides, insecticides, fungicides, nematicides and plant growth regulators where applicable) are included as appropriate for each crop. Pesticide programs are from independent agronomists.

Pesticide product prices used are only an indication of industry prices and do not account for volume/group discounts and regional variances. Agronomy fees (not included in gross margins and variable cost data) can range from £10/ha for spring cropping to £13/ha for winter cropping.

Read the label before you buy and use pesticides safely. Care must be taken to choose a brand of a pesticide product which has been authorised for use on the crop it is intended to spray. Not all brands of a particular pesticide are authorised for the same uses or crops. Be on the lookout for counterfeit pesticides.

A full list of pesticides can be found in The UK Pesticide Guide 2022 and on www.plantprotection.co.uk.

The use of pesticides is controlled under the Food and Environment Protection Act 1985, and subsequent EU Regulations. All EU regulations were transferred into GB legislation on 1st January 2021.

Anyone who uses plant protection products or adjuvants must register as a professional user according to the 2020 regulations (Professional plant protection products (PPPs): register as a user - GOV.UK (www.gov.uk)). Anyone who uses a pesticide must take “reasonable precautions” to protect human health or the environment. Anyone with the need to use a professional pesticide product in the course of their business or employment may not use that pesticide or give instruction to others on the use of that pesticide unless they have received adequate instruction, training, and guidance in the correct use of that pesticide. They must hold a Chemicals Regulation Directorate (CRD) recognised Certificate of Competence unless they are working under the direct supervision of someone who holds a certificate (i.e. they are being trained). Those

previously operating under 'grandfathers rights' (i.e. born before 31 December 1964) must now also have a Certificate of Competence.

It is the responsibility of the purchaser of a professional pesticide product to ensure that the intended user holds a Certificate of Competence.

Those who hold a Certificate of Competence approved by the CRD for the safe application of pesticides can join the National Register of Spray Operators (NRoSO). The scheme ensures that operators participate in ongoing continuous professional development (CPD). UK quality assurance schemes such as Scottish Quality Crops generally require that the NRoSO membership number of the operator making spray applications to quality assured crops is recorded for each spray application.

Currently, the recognised Certificate of Competence for the use of pesticides are issued by the National Proficiency Tests Council (Tel: 024 7685 7300) and the Scottish Skills Testing Service (Tel: 0131 339 8739).

Quality assurance schemes, such as Scottish Quality Crops or Red Tractor Assurance, require that competence to advise on pesticide usage and to apply pesticides is demonstrated by evidence of appropriate training and qualifications, i.e. BASIS Professional Register numbers, Pesticide Application (PA) certificates or equivalent, and NRoSO membership details.

Off-label use

The product label does not cover every possible use of a pesticide product. Minor uses are often covered by an Extension of Authorisation for Minor Use (EAMU). Use of any chemical in accordance with an EAMU is entirely at growers' risk, and growers must obtain and read the appropriate document for that particular authorisation and the general Guidance Notes on off-label uses before using it (available at https://secure.pesticides.gov.uk/offlabels/search.asp).

Pesticides no longer authorised

Pesticide product authorisations may be reviewed, amended, suspended or revoked at any time. Several pesticides have been withdrawn from use. It is an offence to use a pesticide which is no longer authorised. To check if a pesticide product is still authorised, or is under revocation, take a note of the MAPP number from the label, then go to https://secure.pesticides.gov.uk/pestreg/ProdSearch.asp.

Arable

Introduction

Markets and price drivers

2022 will be remembered as the year when food security, so often taken for granted, came front and centre as war in Ukraine disrupted the supply chain logistics to importing countries. Markets were duly impacted through the spring of 2022 with sharp rises in futures values before falling once again to pre-conflict levels as the northern hemisphere harvest started with some degree of promise. Mid-year 2022 baseline cereal and oilseed prices continue to remain elevated over 2021 values and the outlook for the remainder of 2022 and into 2023 will reflect the uncertainties arising from recessionary threats to economies, inflationary pressures, the ongoing energy crisis, and the realisation that conflict in the Black Sea will unlikely recede any time soon. Underlying this current volatility, tight global supply persists, exacerbated by water deficits in regions such as Europe and the USA.

The Food and Agriculture Organisation's (FAO) forecast for global cereal production in 2022 is expected at 2,792 million tonnes and is 0.6 % short of the world output in 2021. The forecast for world wheat production in 2022 has been lowered only fractionally to 770.3 million tonnes, remaining 1.0% lower year-on-year. The marginally diminished outlook results from cuts to production forecasts for the European Union, where persisting dry weather has impaired yield prospects, and to a lesser degree for Argentina and Iraq. These downgrades more than outweigh improved harvest expectations in Canada and Australia, where conducive weather at planting time and remunerative prices are encouraging area expansions. Additionally, continued beneficial weather in the Russian Federation has lifted yield prospects of the winter crop and further reinforced the country's good production prospects in 2022 with an anticipated 40 million tonnes of exportable surplus from Russia predicted.

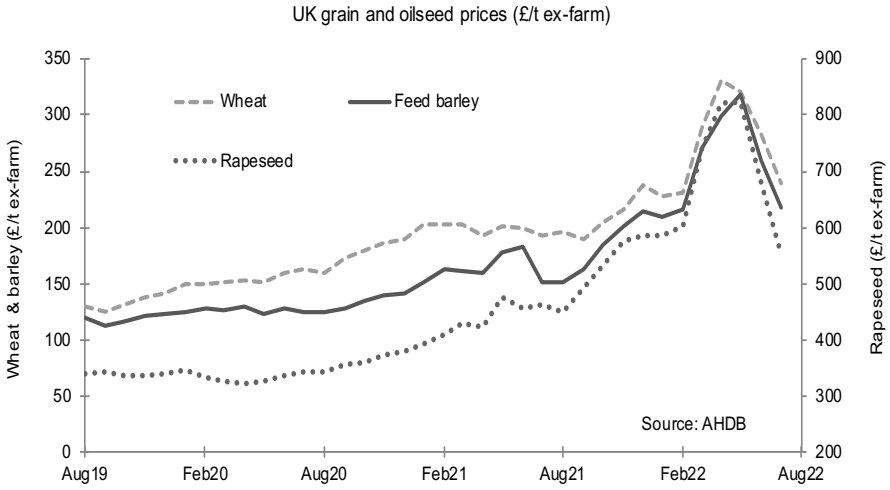
The forecast for world cereal utilization in 2022/23 is 2,797 million tonnes but is still 1.7mt (0.1%) below the 2021/22 level, mostly reflecting lower feed use.

At 854 million tonnes, FAO's forecast of world cereal stocks at the close of season in 2023 points to a year-on-year contraction of 0.6% (5.0mt). At this level, the global cereal stock-to-use ratio would fall from 30.7% in 2021/22 to 29.8% in 2022/23.

COCERAL sees the total grain crop in the EU-27+UK at 309.5 million tonnes, down from the 312.0mt harvested in 2021. Wheat production is expected at 143.0 million tonnes, down from last year's 143.9mt. The EU-27+UK 2022 barley production is forecast at 60.0 million tonnes, slightly up from 59.4mt last year. The EU-27+UK 2022 corn crop is now seen at 66.0 million tonnes (2021: 67.2mt).

COCERAL place UK cereal production in 2022 up 5% on 2021 - 1.14million tonnes higher at 23.84mt vs 22.70mt, with the gains mainly in

wheat and with barley output down. If achieved, this will make little difference to the UK's net position as a moderate net cereal importer. In Scotland, winter and spring cereal areas are expected to be little changed in 2022 meaning that the actual level of yield and quality achieved for both feed and malting markets will be an important driver of local prices.



A much-recovered wheat crop in 2021-22 significantly reduced the reliance on imported maize, mostly from Ukraine despite a smaller barley harvest and corresponding decline in feed barley usage. The current crop outlook suggests wheat will once again account for over half of UK feed usage, followed by barley, and the UK will remain an importer of maize, albeit below the already reduced level of 2021-22. Given the situation in Ukraine, this may present an opportunity for imports from other regions.

The ethanol sector remains the most interesting dynamic in the UK's food, seed and industrial sector, buoyed by the UK government's rollout of E10 fuel from September 2021. Vivergo, a previously closed facility that processes wheat, has undergone a phased reopening in 2021-22, while the other of the UK's two facilities, Ensus, is understood to have increased production and continued to switch back to processing mainly domestic feed quality wheat after a price driven switch to imported maize in 2020-21. Both operations are expected to have the ability to be fully operational in 2022-23 meaning a forecast increase in the use of grain in the bioethanol sector.

Livestock feed followed by milling, malting, distilling and exports are the main UK markets for wheat and barley. In Scotland, the whisky sector uses around half of total Scottish grain output.

The UK produces about 1 million tonnes of oats annually with usage dominated by the oat milling sector. Use as an animal feed depends on

comparative barley price for ration inclusion. Oats have a high fibre content which is useful for ruminant diets and horses but not suitable for poultry.

UK oilseed rape production is now only in the region of 1 million tonnes and close to a 20-year low. An increasing reliance is being placed on imported oilseed (equating to half of UK production), meal and oil. This year's weather is helping to produce a good crop of rape in the EU and in Australia and Canada and as seasonal supply increases, pressure on prices in the UK will intensify. EU production for 2022/23 is expected to reach 18.5 million tonnes, a lift of 10% on last year's crop.

Marketing

Achieving a satisfactory grain price is essential for profitable cereal production. Grain and oilseed producers benefit from well-developed futures markets which make for transparent pricing and enable crops to be bought and sold up to two years ahead of harvest. Given that prices readily swing to over £100/t between seasons, arable farmers should consider spreading sales to achieve a satisfactory average. It is essential that arable farmers set their own target prices based on their costs and margin requirements.

Premium crops such as malting barley and milling oats are generally grown on contract as there can be little or no spot trade at harvest, particularly in Scotland. Contract conditions vary widely but will require that specific standards are attained such as moisture, germination, nitrogen levels and screenings. Many contracts offer growers flexibility in the pricing, through use of min-max or LIFFE wheat futures as a base.

Margins

Crop returns are highly sensitive to the yield and market price. Differences in fixed costs, particularly machinery, can have the greatest impact on profitability while variations in input costs such as fertiliser and sprays are relatively small between farms. Higher straw prices in the north and west can result in a good return from straw than in otherwise more marginal cereal cropping areas. Straw prices have been strong in recent years boosting returns across Scotland.

Variety choice

Crop varieties should be selected to match the farm conditions, the chosen agronomic strategy and intended end use, in Scotland for example 90% of wheat grown is for distilling requiring soft endosperm characteristics. Feed markets are less demanding but may require some parameters to be met such as minimum specific weight. For home use other characteristics such as straw length can be important. Premium markets such as malting barley and milling wheat have very specific requirements and growers need to refer to the lists of approved varieties.

See links overleaf to relevant market and variety information:

Scottish varieties:

https://pure.sruc.ac.uk/en/publications/scottish-recommended-lists-for-cereals-202122

UK recommended varieties; https://ahdb.org.uk/rlcomments

Malting requirements and varieties; www.ukmalt.com/

Milling requirements; www.nabim.org.uk/wheat/wheat-varieties/

Subsidies and support
For details of the latest subsidy arrangements see the Rural Aid Scheme section on page 467.

Wheat - Winter

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 230 kg/ha (1.83 cwt/acre).

(b) Fertiliser

200 : 67 : 83 kg/ha N : P_2O_5 : K_2O (160 : 54 : 66 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides Autumn residual herbicide to control annual meadow grass and broad leaved weeds and one herbicide in spring.

Fungicides Four fungicide applications at GS25-30, GS31-32, GS39 and GS59 to cover eyespot, septoria and head diseases, including growth regulation.

Additional treatments to the basic programme could include:

Take all	£180/t for seed treatment.
Mildew	£15.83/ha
Aphids	£6.43/ha
Wild oats	£28.90/ha
Slugs	£10.92/ha
Annual meadow grass	£24.38/ha per application.
Black grass	£37.90/ha (spring control).
Bromes	£39.93/ha
Desiccant	£17.00/ha

(d) Other crop expenses

For baling straw, costs for net wrap at 70-80p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £35/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £15-20/t. Prices are subject to change at short notice. Treatment costs exclude grain processing and straw tubelining (see pages 380-381 for these costs).

Wheat - Winter

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	6.0	(2.4)	8.0	(3.2)	10.0	(4.0)
Straw yield: t/ha (t/acre)	3.2	(1.3)	4.2	(1.7)	5.2	(2.1)
OUTPUT			**£/ha (acre)**			
Grain @ £260/t*	1,560		2,080		2,600	
Straw @ £60/t	192		250		312	
	1,752	(709)	2,330	(943)	2,912	(1,178)
VARIABLE COSTS						
Seed @ £550/t	127		127		127	
Fertiliser	728		728		728	
Sprays	145		145		145	
Other expenses	12		15		19	
	1,012	(409)	1,015	(411)	1,019	(412)
GROSS MARGIN	740	(300)	1,315	(532)	1,893	(766)
GRAIN PRICE SENSITIVITY						
£240 /t	620	(251)	1,155	(467)	1,693	(685)
£275 /t	830	(336)	1,435	(581)	2,043	(827)
£290 /t	920	(372)	1,555	(629)	2,193	(887)

* Feed price (milling premium £15-40/t, biscuit premium £5-15/t)

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Wheat - Spring

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 220 kg/ha (1.75 cwt/acre).

(b) Fertiliser

150 : 52 : 71 kg/ha N : P_2O_5 : K_2O (136 : 42 : 57 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides One application for spring germinating broadleaved weeds.

Fungicides Two applications for leaf diseases at GS31-32 and GS39-49.

Additional sprays to the basic programme could include:

Mildew £18.50/ha

Wild oats £22.66/ha

Desiccant £17.00/ha

(d) Other crop expenses

For baling straw, costs for net wrap at 70-80p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £35/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £15-20/t. Prices are subject to change at short notice. Treatment costs exclude grain processing and straw tubelining (see pages 380-381 for these costs).

Wheat - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	4.5	(1.8)	6.5	(2.6)	8.5	(3.4)
Straw yield: t/ha (t/acre)	2.5	(1.0)	3.6	(1.4)	4.7	(1.9)
OUTPUT			**£/ha (acre)**			
Grain @ £260/t*	1,170		1,690		2,210	
Straw @ £60/t	149		215		281	
	1,319	(534)	1,905	(771)	2,491	(1,008)
VARIABLE COSTS						
Seed @ £560/t	123		123		123	
Fertiliser	560		560		560	
Sprays	60		60		60	
Other expenses	9		13		17	
	752	(304)	756	(306)	760	(308)
GROSS MARGIN	567	(230)	1,149	(465)	1,731	(700)
GRAIN PRICE SENSITIVITY						
£240 /t	477	(193)	1,019	(412)	1,561	(632)
£275 /t	634	(257)	1,246	(504)	1,858	(752)
£290 /t	702	(284)	1,344	(544)	1,986	(804)

* Feed price (milling premium £15-40/t, biscuit premium £5-15/t)

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Barley - Winter

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 220 kg/ha (1.75 cwt/acre). Alternatively, hybrid 6 row sown at 145 kg/ha (1.16cwt/ac). Conventional seed price used.

(b) Fertiliser

180 : 67 : 83 kg/ha N : P_2O_5 : K_2O (144 : 54 : 66 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides Autumn residual herbicide to control annual meadow grass and broad leaved weeds and one herbicide in spring.

Fungicides Three fungicide applications at GS25-30, GS31 and GS49 for rhynchosporium, mildew and other leaf diseases.

Additional sprays to the basic programme could include:

Wild oats £28.33/ha

Aphids £6.43/ha

Desiccant £17.00/ha

(d) Other crop expenses

For baling straw, costs for net wrap at 70-80p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £35/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £15-20/t. Prices are subject to change at short notice. Treatment costs exclude grain processing and straw tubelining (see pages 380-381 for these costs).

Barley - Winter

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	6.0	(2.4)	7.5	(3.0)	9.0	(3.6)
Straw yield: t/ha (t/acre)	3.3	(1.3)	4.1	(1.7)	5.0	(2.0)
OUTPUT			**£/ha (acre)**			
Grain @ £230/t*	1,380		1,725		2,070	
Straw @ £65/t	215		268		322	
	1,595	(645)	1,993	(807)	2,392	(968)
VARIABLE COSTS						
Seed @ £515/t	113		113		113	
Fertiliser	679		679		679	
Sprays	107		107		107	
Other expenses	12		15		18	
	911	(369)	914	(370)	917	(371)
GROSS MARGIN	684	(276)	1,079	(437)	1,475	(597)
GRAIN PRICE SENSITIVITY						
£210 /t	564	(228)	929	(376)	1,295	(524)
£245 /t	774	(313)	1,191	(482)	1,610	(652)
£260 /t	864	(350)	1,304	(528)	1,745	(706)

* Feed price (malting price approx. £10-20/t higher)

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Barley - Spring

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 190 kg/ha (1.51 cwt/acre).

(b) Fertiliser

130 : 52 : 71 kg/ha N : P_2O_5 : K_2O (104 : 42 : 57 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides Post emergence herbicide to control broadleaved weeds.

Fungicides Two applications at GS31 and GS45 for rhynchosporium, mildew and other leaf diseases.

Additional sprays to the basic programme could include:

Mildew £13.63/ha

Wild oats £22.66/ha

Aphids £6.43/ha

Desiccant £17.00/ha

(d) Other crop expenses

For baling straw, costs for net wrap at 70-80p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £35/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £15-20/t. Prices are subject to change at short notice. Treatment costs exclude grain processing and straw tubelining (see pages 380-381 for these costs).

Barley - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	4.0	(1.6)	5.5	(2.2)	7.5	(3.0)
Straw yield: t/ha (t/acre)	2.1	(0.8)	2.9	(1.2)	3.9	(1.6)
OUTPUT			**£/ha (acre)**			
Grain @ £230/t*	920		1,265		1,725	
Straw @ £65/t	135		186		254	
	1,055	(427)	1,451	(587)	1,979	(801)
VARIABLE COSTS						
Seed @ £510/t	97		97		97	
Fertiliser	512		512		512	
Sprays	59		59		59	
Other expenses	8		10		14	
	676	(273)	678	(275)	682	(276)
GROSS MARGIN	379	(154)	773	(312)	1,297	(525)
GRAIN PRICE SENSITIVITY						
£210 /t	299	(121)	663	(268)	1,147	(464)
£245 /t	439	(178)	855	(346)	1,409	(570)
£260 /t	499	(202)	938	(380)	1,522	(616)

* Feed price (malting price approx. £15-50/t higher)

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Oats - Winter

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 190 kg/ha (1.51 cwt/acre).

(b) Fertiliser

140 : 53 : 104 kg/ha N : P_2O_5 : K_2O (112 : 42 : 83 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides	Autumn residual herbicide to control annual meadow grass and broad leaved weeds and one herbicide in spring.
Fungicides	Two sprays for mildew and crown rust at GS31 and GS49 including growth regulation.

(d) Other crop expenses

For baling straw, costs for net wrap at 70-80p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £35/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £15-20/t. Prices are subject to change at short notice. Treatment costs exclude grain processing and straw tubelining (see pages 380-381 for these costs).

Oats - Winter

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	5.0	(2.0)	7.5	(3.0)	9.0	(3.6)
Straw yield: t/ha (t/acre)	3.2	(1.3)	4.7	(1.9)	5.7	(2.3)
OUTPUT			**£/ha (acre)**			
Grain @ £180/t*	900		1,350		1,620	
Straw @ £60/t	189		284		340	
	1,089	(441)	1,634	(661)	1,960	(793)
VARIABLE COSTS						
Seed @ £520/t	99		99		99	
Fertiliser	580		580		580	
Sprays	73		73		73	
Other expenses	11		17		21	
	763	(309)	769	(311)	773	(313)
GROSS MARGIN	326	(132)	865	(350)	1,187	(480)
GRAIN PRICE SENSITIVITY						
£160 /t	226	(91)	715	(289)	1,007	(408)
£195 /t	401	(162)	977	(395)	1,322	(535)
£210 /t	476	(193)	1,090	(441)	1,457	(590)

* Milling price

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Oats - Spring

PHYSICAL DATA

(a) Seed

Certified seed second generation (C2) sown at 190 kg/ha (1.51 cwt/acre).

(b) Fertiliser

100 : 53 : 104 kg/ha N : P_2O_5 : K_2O (80 : 42 : 83 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides Typical weed control for annual broadleaved weeds.

Fungicides Two sprays at GS25-30 and GS49 for mildew and crown rust including growth regulator.

(d) Other crop expenses

For baling straw, costs for net wrap at 70-80p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Additives can be used to preserve moist grain for feeding livestock. Cost will vary depending on product, length of storage period and moisture content at treatment. Alkaline grain treatments (for grain harvested at 16-22% moisture for long term storage), add £35/t. Propionic acid treatments (for grain harvested at 18-20% moisture for long term storage), add £15-20/t. Prices are subject to change at short notice. Treatment costs exclude grain processing and straw tubelining (see pages 380-381 for these costs).

Oats - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.5	(1.4)	5.0	(2.0)	6.5	(2.6)
Straw yield: t/ha (t/acre)	2.1	(0.8)	3.0	(1.2)	3.9	(1.6)
OUTPUT			**£/ha (acre)**			
Grain @ £180/t*	630		900		1,170	
Straw @ £60/t	126		180		234	
	756	(306)	1,080	(437)	1,404	(568)
VARIABLE COSTS						
Seed @ £535/t	102		102		102	
Fertiliser	483		483		483	
Sprays	62		62		62	
Other expenses	8		11		14	
	655	(265)	658	(266)	661	(268)
GROSS MARGIN	101	(41)	422	(171)	743	(300)
GRAIN PRICE SENSITIVITY						
£160 /t	31	(13)	322	(130)	613	(248)
£195 /t	154	(62)	497	(201)	840	(340)
£210 /t	206	(83)	572	(231)	938	(380)

* Milling price

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Triticale

PHYSICAL DATA

(a) Seed
230 kg/ha (1.83 cwt/acre).

(b) Fertiliser
180 : 52 : 71 kg/ha N : P_2O_5 : K_2O (144 : 42 : 57 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides	Pre-emergence application.
Fungicides	Two sprays at GS31 and GS39-45 including growth regulation.

(d) Other crop expenses
For baling straw, costs for net wrap at 70-80p/bale for large round straw bales average weight 200kg are included. Omit other expenses costs if selling straw in the bout.

Triticale

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	4.0	(1.6)	6.0	(2.4)	8.0	(3.2)
Straw yield: t/ha (t/acre)	2.6	(1.1)	3.9	(1.6)	5.2	(2.1)
OUTPUT			**£/ha (acre)**			
Grain @ £175/t	700		1,050		1,400	
Straw @ £55/t	143		215		286	
	843	(341)	1,265	(512)	1,686	(682)
VARIABLE COSTS						
Seed @ £595/t	137		137		137	
Fertiliser	633		633		633	
Sprays	63		63		63	
Other expenses	9		14		19	
	842	(341)	847	(343)	852	(345)
GROSS MARGIN	1	(0)	418	(169)	834	(337)
GRAIN PRICE SENSITIVITY						
£155 /t	- 79	-(32)	298	(121)	674	(273)
£190 /t	61	(25)	508	(206)	954	(386)
£205 /t	121	(49)	598	(242)	1,074	(435)

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm spot price at 15% moisture content and average quality. Straw sold baled, ex-farm price estimate for arable areas.

Oilseed Rape - Winter

PHYSICAL DATA

(a) Seed

Oil	45%
Seed rate	Hybrid - 4kg/ha : Conventional - 5kg/ha Conventional seed price used.

(b) Fertiliser

200 : 49 : 38 + 75 kg/ha N : P_2O_5 : K_2O + SO_3
(160 : 39 : 30 + 60 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides	Pre-emergence herbicide to control annual meadow grass and broadleaved weeds.
Fungicides	Autumn and spring fungicides for sclerotinia, light leaf spot or phoma.
Desiccation	Desiccation, including the use of a pod-sealant, has largely replaced swathing. If swathing is used over desiccation, reduce spray costs by £14.00/ha. For swathing costs see page 380.

Additional sprays to the basic programme could include:

Slugs	£11.00/ha per application.
Sclerotinia	£17.25/ha (high risk situations)
Rape winter stem weevil and pollen beetle	£7.65/ha
Volunteer cereals	£11.16/ha
Mayweed	£28.35/ha

(d) Other crop expenses

Assuming straw has been chopped. If baling, include costs for net wrap at 70-80p/bale for round straw bales, average weight 200 kg.

Oilseed Rape - Winter

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.0	(1.2)	4.0	(1.6)	5.0	(2.0)
Straw yield: t/ha (t/acre)	-	(0.0)	-	(0.0)	-	(0.0)
OUTPUT			**£/ha (acre)**			
Grain @ £555/t	1,665		2,220		2,775	
Straw @ £0/t	-		-		-	
	1,665	(674)	2,220	(898)	2,775	(1,123)
VARIABLE COSTS						
Seed @ £15/kg	75		75		75	
Fertiliser	634		634		634	
Sprays	171		171		171	
Other expenses	-		-		-	
	880	(356)	880	(356)	880	(356)
GROSS MARGIN	785	(318)	1,340	(542)	1,895	(767)
GRAIN PRICE SENSITIVITY						
£505 /t	635	(257)	1,140	(461)	1,645	(666)
£605 /t	935	(378)	1,540	(623)	2,145	(868)
£655 /t	1,085	(439)	1,740	(704)	2,395	(969)

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm price including oil bonus. An average oil content of 43% has been assumed resulting in a bonus of 4.5% above the base price. The oil bonus comprises a 1.5% increase in the price for every 1% rise in oil content above 40%.

Oilseed Rape - Spring

PHYSICAL DATA

(a) Seed

Oil	45%
Seed rate	5 kg/ha

(b) Fertiliser

100 : 28 : 22 + 40 kg/ha N : P_2O_5 : K_2O + SO_3
(80 : 22 : 18 + 32 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides Pre-emergence herbicide for problem weeds such as shepherds' purse.

Fungicides One spray to control pollen beetle.

Desiccation Desiccation has largely replaced swathing. If swathing is used over desiccation, reduce spray costs by £14.00/ha. For swathing costs see page 380.

Additional sprays to the basic programme could include:

Volunteer cereals	£11.16/ha
Sclerotinia	£39.85/ha
Pod sticker	£8.40/ha

(d) Other crop expenses

Assuming straw has been chopped. If baling, include costs for net wrap at 70-80p/bale for round straw bales, average weight 200 kg.

Oilseed Rape - Spring

GROSS MARGIN DATA

GROSS MARGIN DATA						
Grain yield: t/ha (t/acre)	1.8	(0.7)	2.5	(1.0)	3.0	(1.2)
Straw yield: t/ha (t/acre)	-	(0.0)	-	(0.0)	-	(0.0)
OUTPUT			**£/ha (acre)**			
Grain @ £555/t	999		1,388		1,665	
Straw @ £0/t	-		-		-	
	999	(404)	1,388	(562)	1,665	(674)
VARIABLE COSTS						
Seed @ £21/kg	105		105		105	
Fertiliser	328		328		328	
Sprays	69		69		69	
Other expenses	-		-		-	
	502	(203)	502	(203)	502	(203)
GROSS MARGIN	497	(201)	886	(359)	1,163	(471)
GRAIN PRICE SENSITIVITY						
£505 /t	407	(165)	761	(308)	1,013	(410)
£605 /t	587	(238)	1,011	(409)	1,313	(531)
£655 /t	677	(274)	1,136	(460)	1,463	(592)

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm price including oil bonus. An average oil content of 43% has been assumed resulting in a bonus of 4.5% above the base price. The oil bonus comprises a 1.5% increase in the price for every 1% rise in oil content above 40%.

Spring Field Beans

PHYSICAL DATA

(a) Seed

250 kg/ha (1.99 cwt/acre).

(b) Fertiliser

0 : 40 : 40 kg/ha N : P_2O_5 : K_2O (0 : 32 : 32 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides	Pre-emergence herbicide and control of annual meadow grass and broadleaved weeds.
Fungicide	Two applications to control chocolate spot and downy mildew.
Desiccation	Cost included.

(d) Other crop expenses

Additives can be used to preserve pulses for feeding livestock. Cost will vary depending on product used, length of storage period and moisture of pulses at treatment. For pulses harvested at 20% moisture for long term storage, add £9-13/t grain treated with propionic acid, excluding processing (see page 380 for processing costs).

Spring Field Beans

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	2.5	(1.0)	4.5	(1.8)	5.5	(2.2)
OUTPUT			**£/ha (acre)**			
Grain @ £280/t	700		1,260		1,540	
	700	(283)	1,260	(510)	1,540	(623)
VARIABLE COSTS						
Seed @ £565/t	141		141		141	
Fertiliser	144		144		144	
Sprays	140		140		140	
Other expenses	-		-		-	
	425	(172)	425	(172)	425	(172)
GROSS MARGIN	275	(111)	835	(338)	1,115	(451)
GRAIN PRICE SENSITIVITY						
£250 /t	200	(81)	700	(283)	950	(384)
£295 /t	313	(127)	903	(365)	1,198	(485)
£310 /t	350	(142)	970	(393)	1,280	(518)

Basis of data:

Sale price estimate 2023 harvest, November ex-farm price. Deductions for field beans, which do not meet minimum quality standards, can reduce the price considerably.

Spring Peas

PHYSICAL DATA

(a) Seed

250 kg/ha (1.99 cwt/acre).
White/Large Blue Compounding Pea

(b) Fertiliser

0 : 20 : 30 kg/ha N : P_2O_5 : K_2O (0 : 16 : 24 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Herbicides	A pre-emergence herbicide to control annual and broadleaved weeds.
Fungicide	Two sprays at flowering for downy mildew and botrytis control.
Insecticide	Aphid control.
Desiccation	A desiccant is included.

(d) Other crop expenses

Additives can be used to preserve pulses for feeding livestock. Cost will vary depending on product used, length of storage period and moisture of pulses at treatment. For pulses harvested at 20% moisture for long term storage, add £9-13/t grain treated with propionic acid, excluding processing (see page 380 for processing costs).

Spring Peas

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	2.5	(1.0)	4.0	(1.6)	5.5	(2.2)
OUTPUT			**£/ha (acre)**			
Grain @ £290/t	725		1,160		1,595	
	725	(293)	1,160	(469)	1,595	(645)
VARIABLE COSTS						
Seed @ £635/t	159		159		159	
Fertiliser	78		78		78	
Sprays	124		124		124	
Other expenses	-		-		-	
	361	(146)	361	(146)	361	(146)
GROSS MARGIN	364	(147)	799	(323)	1,234	(499)
GRAIN PRICE SENSITIVITY						
£260 /t	289	(117)	679	(275)	1,069	(433)
£305 /t	402	(163)	859	(348)	1,317	(533)
£320 /t	439	(178)	919	(372)	1,399	(566)

Basis of data:

Sale price estimate for 2023 harvest, November ex-farm price. Deductions for protein peas, which do not meet minimum quality standards, can reduce the price considerably. Bad weather at harvest can result in very high loss levels.

Cauliflower and Broccoli

PHYSICAL DATA

(a) System

Transplants grown in trays in glasshouses over winter are purchased and field planted from early March to late summer for harvest from June/July to November (or early spring the following year if overwintered cauliflower). Varieties, geographical location and use of crop covers dictate management, harvest timing and end market.

(b) Seed

	Cauliflower	Broccoli
Sowing rate	38,000 plants/ha	46,000 plants/ha

Cost varies with variety, disease resistance and target market.

(c) Fertiliser

	N	P_2O_5	K_2O
Cauliflower	290 kg/ha	100 kg/ha	175 kg/ha
Broccoli	250 kg/ha	100 kg/ha	175 kg/ha

Adjustments made for soil status where necessary. See page 4 for more information on nutrient planning.

(d) Sprays

Herbicides	Stale seed beds burnt off with glyphosate. Residual herbicide applied post transplanting.
Fungicides	Applications to control mildew, white blister, ring spot and alternaria.
Insecticides	For aphid and caterpillar control.
Trace elements	Boron, manganese, magnesium sulphate, molybdenum applications all may be required.

(e) Other crop expenses

Based on 1/5 of the grown area being under covers (i.e. nets, fleece or polythene).

(f) Irrigation

Irrigation can be necessary. These costs have not been included.

(g) Casual labour

These costs are not included. Using the data below a guide to cost could be calculated. Labour charged at £12.84/hr at rates below:

Operation	hr/ha
Transplanting	17
Harvest (fresh)	32
Harvest (florets)	20
Additional labour	17

Cauliflower and Broccoli

GROSS MARGIN DATA

	Cauliflower		Broccolli	
Yield: t/ha (t/acre):				
Processing	19.5	(7.9)	10.6	(4.3)
Heads	21.0	(8.5)	11.1	(4.5)
Average	20.3	(8.2)	10.9	(4.4)
OUTPUT		£/ha (acre)		
@ £460/t	8,970		-	
@ £690/t	-		7,314	
	8,970	(3,630)	7,314	(2,960)
VARIABLE COSTS				
Modules	1,140		736	
Fertiliser	1,130		1,033	
Sprays	283		283	
Other expenses	224		198	
	2,777	(1,124)	2,250	(911)
GROSS MARGIN	6,193	(2,506)	5,064	(2,049)
PRICE SENSITIVITY				
£450 /t	5,998	(2,427)	2,520	(1,020)
£525 /t	7,460	(3,019)	3,315	(1,342)
£600 /t	8,923	(3,611)	4,110	(1,663)
£675 /t	10,385	(4,203)	4,905	(1,985)
£750 /t	11,848	(4,795)	5,700	(2,307)
£825 /t	13,310	(5,386)	6,495	(2,628)

Basis of data:

Crops have target markets of fresh heads for supermarket fresh sales and floretted for processing (e.g. stews or freezer packs). An average for yield and price has been budgeted.

Prices are based on previous years averages, in season prices can be affected by regional availability, weather effects, customer demand and supermarket promotions.

Timothy - Hay, Greencut

PHYSICAL DATA

(a) System

As practised on the Carses of Stirling and Clackmannan.

(b) Yield

Average between 7 t/ha (2.8 t/acre) and 8 t/ha (3.2 t/acre) with some aftermath grazing (or alternatively round bale silage).

Price rises usually as the season progresses but hay also loses weight with storage - as much as 15% over a winter, depending upon the conditions of storage.

(c) Seed

Annual charge: assumes a 10-year sward life and that 'Basic' seed will be sown to keep open the option of a seed crop.

Seed rate: 13-18 kg/ha.

(d) Fertiliser

Standard practice would see only N applied annually, usually as sulphate of ammonia, supported by periodic dressings of phosphate and potash.

The fertiliser costs overleaf consider an application of the rates below.

See page 4 for more information on nutrient planning.

kg/ha (units/acre)	Average		Premium	
N	80	(64)	120	(96)
P_2O_5 (annual allocation)	40	(32)	50	(40)
K_2O	48	(38)	60	(48)

(e) Sprays

Annual nominal charge to cover a range of circumstances.

(f) Other crop expenses

Net wrap cost is costed on the basis of 5-6 round bales/t and assuming one roll of net will wrap 410 bales.

Timothy - Hay, Greencut

GROSS MARGIN DATA

Average yield: t/ha (acre)	7.0	(2.8)	8.0	(3.2)
OUTPUT		**£/ha (acre)**		
Hay (ex-field or early store) @ £110/t	770		880	
Aftermath grazing let @ £40/ha	40		40	
	810	(328)	920	(372)
VARIABLE COSTS				
Seed (annual charge)	11		11	
Fertiliser	336		469	
Sprays (annual charge)	5		5	
Other expenses	16		18	
	368	(149)	503	(204)
GROSS MARGIN	442	(179)	417	(168)

Stubble to Stubble Arable Operations

The costs of stubble to stubble operations for winter wheat, winter barley, spring barley and winter oilseed rape are illustrated below. These calculations should be adapted and adjusted for site specific circumstances.

Assumptions:

- Yield data taken from crop gross margins on pages 21, 25, 27 and 35.
- All straw is assumed to be baled.
- Contractors assumed to undertake all cultivation, sowing, crop maintenance, harvesting and carting to store. See pages 379-382 for contractor costs.
- Fuel cost itemised separately to contractors charges. Machinery fuel use (l/ha) and fuel cost on page 376-377.
- Drying costs based on costs on pages 382-383.

	Winter wheat	**Winter barley**	**Spring barley**	**Winter OSR**
Yield - grain (t /ha)	8.0	7.5	5.5	4.0
Yield - straw (t /ha)	4.2	4.1	2.9	-
Grain MC at harvest (%)	18	16	15	10
		£/ha		
Cultivation costs				
Plough and cultivate	121	121	121	121
Sow	44	44	44	44
Roll and destone	21	21	21	21
Spray	68	55	41	55
Fertilise	35	23	23	23
Fuel	89	85	82	85
	379	350	334	350
Harvest costs				
Harvest	96	96	96	94
Bale/stack	73	72	51	-
Carting	8	12	8	4
Dry grain	95	63	46	47
Fuel	29	25	22	15
	300	267	223	161
Total cost (£/ha)	**679**	**617**	**557**	**511**
Total cost (£/ac)	**275**	**250**	**225**	**207**
Cost per t grain (£/t)	**85**	**82**	**101**	**128**

Equivalent Grain Weights at Varying Moisture Contents

The formula for converting wet grain weight to dry grain weight is:

$$\text{Weight loss} = \frac{W_1 (M_1 - M_2)}{100 - M_2}$$

where: W_1 = starting weight of grain.
M_1 = starting moisture of grain.
M_2 = final moisture of grain.

This formula accounts only for weight change due to moisture loss only.

100t at Moisture Content %	Final moisture content %								
	20	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**
	Dried grain - t								
35	81.25	80.25	79.27	78.31	77.38	76.47	75.58	74.71	73.86
33	83.75	82.72	81.71	80.72	79.76	78.82	77.91	77.01	76.14
31	86.25	85.18	84.15	83.13	82.14	81.18	80.23	79.31	78.41
29	88.75	87.65	86.59	85.54	84.52	83.53	82.56	81.41	80.68
27	91.25	90.12	89.02	87.95	86.90	85.88	84.88	83.91	82.95
25	93.75	92.59	91.46	90.36	89.29	88.24	87.21	86.21	85.22
23	96.25	95.06	93.90	92.77	91.67	90.59	89.53	88.51	87.50
21	98.75	97.53	96.34	95.18	94.05	92.94	91.86	90.80	89.77
19	-	100.00	98.78	97.59	96.43	95.30	94.19	93.10	92.41
17	-	-	-	100.00	98.81	97.65	96.51	95.40	94.32
15	-	-	-	-	-	100.00	98.84	97.70	96.59

Further information on storage requirements for grain can be found on page 407, costs of grain storage are found on page 405, and costs of grain drying on page 382-383.

Futures and Options Markets

The futures markets offer a means to manage price risk in a wide range of agricultural commodities. In the UK, the most relevant markets are the UK LIFFE feed wheat futures (www.theice.com) and the Paris European Rapeseed futures and Milling Wheat futures (www.euronext.com). Contracts for futures (forward prices) and options (price insurance) are available in both of these markets. Further details on the market, lists of registered brokers and how to trade can be found at the website above.

On a global basis the most important agricultural futures market is the Chicago Board of Trade which offers contracts on wheat, maize, oats, soyabeans, soyameal and others, see www.cmegroup.com. AHDB Cereals and Oilseeds has detailed market information on their website and also provides a guide to price risk management, futures and options. See https://cereals.ahdb.org.uk/markets.aspx.

Potatoes

Introduction

Markets and Price Drivers

In May 2021, it was announced that AHDB Potatoes would be winding down. This means there is much less UK specific potato market information available. The potato market in the UK is split between seed, ware for fresh market, and ware for processing. The 2020/21 potato marketing season was dominated by significant disruption caused by the COVID-19 pandemic. The chipping and processing sectors are still recovering from the COVID-19 pandemic with lockdown measures being fully lifted in March 2022 having been enforced for almost two years in many areas. These sectors were worst affected by lockdown measures due to the closure of many hospitality venues and businesses.

Seed potato production was less affected by the pandemic but has been severely impacted by Brexit and the NI protocol. At the time of writing, seed potatoes grown in GB are prohibited for export to the EU.

Estimates of total planted area in GB is no longer available, however, SASA publish statistics for seed crops entered for inspection in Scotland. In 2022, the area of seed entered for inspection is 10,291ha, this is slightly less than 2021. In Northern Europe, the North-western European Potato Growers (NEPG) reported that across Belgium, Germany, France, and Netherlands, the total potato area has increased by 2%.

Ever-increasing costs of production and the increase in grain prices due to the Ukrainian war, could see a reduction in the number of farms growing potatoes as cereal prices make them a more attractive option notwithstanding the slight increase in hectarage in Northern Europe.

Consumer Trends

According to Defra (January 2022), the quantity of potatoes purchased by households in 2019/20 decreased by 1.4% from 2018/19. This continues the steady decline in retail sales of potatoes. In the last 15 years, the consumption of fresh potatoes in UK households has steadily decreased (Statista, February 2022). This is mirrored by the potato industry where the general feeling is that there is a decline in consumption of fresh potatoes. In 2019/20, the average UK consumer consumed 355g of fresh potatoes per week. In 2010, this figure was 501g and in 1974, when the data was first gathered by Defra, 1316g of fresh potatoes were consumed on average, per person, per week in the UK. Processed potatoes have gone the opposite way. In 1974, 119g of processed potatoes were consumed per person per week. In 2010, this had increased to 242g and by 2019/20, this rose to 256g (Source: Defra, Family Food Survey).

Previous research carried out by AHDB in 2018 found that one third of consumers do not enjoy cooking or have a basic to no level of culinary skills which could be one of the reasons for this reduction over time. Instead, consumers tend to look for quick and easy meals and according to AHDB, potatoes are perceived to be the third most convenient source

of carbohydrates behind pasta and rice (Source: AHDB: Latest Retail and Consumer Insights on Potatoes, 2019).

Potato Market Performance

As mentioned, without AHDB as a source for potato market information, it is difficult to comment on potato sales for 2021/22. Other sources indicate processed products are becoming more popular. Statista report that in general, the sale of processed and preserved potatoes has consistently increased in recent years. Crisps have seen a small increase in their sales value over the last decade while frozen potato products have increased notably. Last year, most retail sales of potatoes in GB came from crisps. This market has been rising steadily over the past decade, a trend which is expected to continue in years to come.

Marketing

Contracts have been a standard feature of the ware and processing market for a long time where factories need to procure supplies well in advance and ensure that their growers attain a sustainable price. The fresh market is more volatile and complex with some growers utilising cold storage facilities to lengthen their supply season with the prospect of higher free-buy prices later in the season. In seasons of oversupply in the market, contracts have become more popular where growers have tried to lock down a proportion of their crop for a known price. However, in a season of undersupply, growers will hold onto uncontracted stocks as long as possible to negotiate higher prices. Given the price volatility in the free-buy market, contracts are becoming more popular among fresh market growers, particularly for those who are forward planning, or obtaining capital from the bank to support business expansion.

The grower's hand is also strengthened in negotiations by producing potatoes free from damage, disease, and skin blemish, as aesthetics are a major selling point in the fresh potato sector.

The seed market is virtually all done on contract where growers multiply seed stocks in partnership with the seed houses. Seed potatoes must be entered into the SPCS (Seed Potatoes Classification Scheme), administered in Scotland by SASA and by APHA in England & Wales. Crops receive in-season inspections for diseases and faults. Growers must attain high standards of crop health, seed purity and hygiene, good yields of the correct size band and timely and accurate supply. Reputation and reliability will gain growers higher quality contracts.

Margins

Crop returns are highly sensitive to the net (packed out) yield achieved which also affects the price. Attention to crop health and damage minimisation are therefore critical. Seed costs are variable with growers looking to multiply their own seed where they can – certified seed at high grades has a premium. Fertiliser costs can be adjusted according to the market with savings on nitrogen and potassium for new, salad and seed potato growers. Sprays are relatively uniform across the board, but fewer

foliar applications are required for shorter season crops (seed and salads). The need for nematicides to combat Potato Cyst Nematode (PCN) is a significant outlay. Generally, there is limited scope to reduce pesticide inputs (particularly for late blight sprays). Differences in fixed costs, particularly machinery, have the greatest impact on overall profitability.

Variety Choice

The most important factor when selecting a potato variety is suitability for the end market. For crisps, tubers with good shape, high dry matter, resistance to damage and yellow flesh are required. For chips, oval tubers with good uniformity and low reducing sugar content are best. For the fresh packing market, taste and resistance to disease causing skin blemishes are important. Although there are many potato varieties available, buyers often have restricted lists which limits grower choice.

Maris Piper is still the most popular potato variety in the UK, both in terms of ware and seed production. This demand is mainly driven by consumer awareness and loyalty to the brand name 'Maris Piper' as it is familiar with many consumers and is an all-round cooking variety which can be boiled, chipped, or roasted equally well. Salad varieties such as Charlotte and Maris Peer are popular as they can be boiled within 20 minutes without peeling and chopping, which makes them competitive with pasta and rice.

Resistance to pests and diseases is becoming increasingly important due to the loss of key chemical active ingredients. The most valuable traits are resistance to PCN (which also helps to reduce the viable population of PCN in the field), blackleg, powdery scab, and late blight. Gross yield as with wheat and barley is not as important as net/sold yield is to potatoes. Emphasis is on quality over quantity in the pursuit of profitability.

Unfortunately, the end market drives producers to grow potato varieties with higher susceptibility to issues such as blight, PCN, common scab. There is also significant diversity amongst varieties in characteristics such as time of maturity and tuber numbers. For seed production, tuber numbers are a more important metric than gross yield.

Potatoes - Pre-Pack Salads

PHYSICAL DATA

(a) Seed

Nominal planting rate of 5 t/ha. Bought in seed. Variety e.g. Charlotte etc. Cost varies with variety and seed size.

(b) Fertiliser

90 : 170 : 110 kg/ha N : P_2O_5 : K_2O (72 : 136 : 88 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Seed treatment Seed treatment for Rhizoctonia. Assumption of 50% of the area treated with an in furrow fungicide for Blackdot control.

Herbicides Contact plus reduced rate residual herbicides applied pre-emergence.

Nematicide Assumption of 20% of area treated with reduced rate nematicide for free living nematode control.

Blight control 8-9 spray program including protectant, systemic, curative and tuber blight control chemicals. Cost may be higher in high blight pressure years.

Slug control 2 applications of slug pellets.

Desiccation Pulverizing followed by reduced rate chemical desiccation. For pulverising costs, see page 381.

(d) Other crop expenses

An average period of 6 months cold storage is included.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £13/hr (assumes lifting and grading done at the same time) at the rates below:

Operation		hr/ha
Lifting (by harvester)		20
Grading	low yield	25
	medium yield	38

Potatoes - Pre-Pack Salads

GROSS MARGIN DATA

Yield: t/ha (t/acre):		
Ware	37	(15.0)
Stockfeed	4	(1.6)
	41	(16.6)
OUTPUT	**£/ha (acre)**	
Ware @ £360 /t	13,320	
Stockfeed @ £30 /t	120	
	13,440	(5,439)
VARIABLE COSTS		
Seed @ £350/t	1,750	
Fertiliser	701	
Sprays	713	
Other expenses	1,808	
	4,972	(2,012)
GROSS MARGIN	8,468	(3,427)
WARE PRICE SENSITIVITY		
£75 /t	-2,077	-(841)
£150 /t	698	(282)
£200 /t	2,548	(1,031)
£250 /t	4,398	(1,780)
£300 /t	6,248	(2,529)
£375 /t	9,023	(3,652)

Potatoes - Maincrop Ware (Pre-Pack Bakers)

PHYSICAL DATA

(a) Seed

Planted at 2.4 t/ha (can range from 2.0-3.0 t/ha for 35-55 mm seed depending on variety). Bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

200 : 130 : 200 kg/ha N : P_2O_5 : K_2O (160 : 104 : 160 units/acre). See page 4 for more information on nutrient planning.

Reduce N by 33% for indeterminate varieties, e.g. Vales Sovereign.

(c) Sprays

Seed treatment	Seed treatment for rhizoctonia control. Assumption 50% of the area treated with in furrow fungicide for control of blackdot.
Nematicide	Assumption of 15-20% of area treated for free living nematode or PCN control.
Herbicides	Contact plus reduced rate residual herbicide tank mix.
Blight control	12 spray blight program for moderate blight pressure including protectant, systemic, curative and tuber blight protection chemicals.
Slugs control	2-3 applications.
Desiccation	2-3 spray chemical desiccation program.

(d) Other crop expenses

Costs for average cold storage period of 6 months are included.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £13/hr at the rates below:

Operation		hr/ha
Lifting (by harvester)		20
Grading (half the grading	low yield	55
done by regular labour)	high yield	70

Potatoes - Maincrop Ware (Pre-Pack Bakers)

GROSS MARGIN DATA

Yield: t/ha (t/acre):				
Bakers	16	(6.5)	24	(9.7)
Pre-pack	26	(10.5)	31	(12.5)
Outgrades	8	(3.2)	10	(4.0)
	50	(20.2)	65	(26.3)
OUTPUT		**£/ha (acre)**		
Bakers @ £290/t	4,640		6,960	
Pre-pack @ £170/t	4,420		5,270	
Outgrades @ £30/t	240		300	
	9,300	(3,764)	12,530	(5,071)
VARIABLE COSTS				
Seed @ £360/t	864		864	
Fertiliser	1,003		1,003	
Sprays	695		695	
Other expenses	2,205		2,867	
	4,767	(1,929)	5,429	(2,197)
GROSS MARGIN	4,533	(1,835)	7,102	(2,874)
WARE PRICE SENSITIVITY				
£50 /t	1,413	(572)	3,382	(1,369)
£130 /t	3,493	(1,414)	5,862	(2,372)
£210 /t	5,573	(2,255)	8,342	(3,376)
£290 /t	7,653	(3,097)	10,822	(4,380)

Note:

Many packers will split grade the pack size (e.g. 45/50-65/70 mm) from the baker (65/70-85 mm), paying a flat rate for all sizes above the 45/50 mm bottom riddle.

Potatoes - Maincrop Ware (Pre-Pack Premium Varieties)

PHYSICAL DATA

(a) Seed

Planted at 1.9 t/ha (varies with variety e.g. Maris Piper, Desiree, King Edward etc). Bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

180 : 130 : 200 kg/ha N : P_2O_5 : K_2O (144 : 104 : 160 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Seed treatment	Full rate seed treatment for rhizoctonia control. Treated with in furrow fungicide for control of blackdot.
Nematicide	Assumption of 15-20% of area treated for free living nematode or PCN control.
Herbicides	Contact plus reduced rate residual herbicides applied pre-emergence.
Blight control	12 spray blight program for high blight pressure including protectant, systemic, curative and tuber blight protection chemicals.
Slugs control	Comprehensive reduced dose season program.
Desiccation	3 spray chemical desiccation program.

(d) Other crop expenses

Average cold storage period of 6 months and sprout suppression are included.

(e) Irrigation

Irrigation may be applied in many circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £13/hr at the rates below:

Operation		hr/ha
Lifting (by harvester)		20
Grading (half the grading	low yield	55
done by regular labour)	high yield	70

Potatoes - Maincrop Ware (Pre-Pack Premium Varieties)

GROSS MARGIN DATA

Yield: t/ha (t/acre):				
Pre-pack	45	(18.2)	57	(23.1)
Outgrades	5	(2.0)	8	(3.2)
	50	(20.2)	65	(26.3)
OUTPUT		**£/ha (acre)**		
Pre-pack @ £220/t	9,900		12,540	
Outgrades @ £30/t	150		240	
	10,050	(4,067)	12,780	(5,172)
VARIABLE COSTS				
Seed @ £310/t	589		589	
Fertiliser	955		955	
Sprays	700		700	
Other expenses	2,430		3,159	
	4,674	(1,892)	5,403	(2,187)
GROSS MARGIN	5,376	(2,175)	7,377	(2,985)
WARE PRICE SENSITIVITY				
£50 /t	-2,274	-(920)	-2,313	-(936)
£100 /t	-24	-(10)	537	(217)
£150 /t	2,226	(901)	3,387	(1,371)
£200 /t	4,476	(1,811)	6,237	(2,524)
£250 /t	6,726	(2,722)	9,087	(3,677)

Potatoes - Maincrop Ware (Processing - Chips)

PHYSICAL DATA

(a) Seed

Planted at 3.0 t/ha with 35/55mm seed (varies depending on variety, e.g. Maris Piper, Markies, etc). Bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

180 : 130 : 300 kg/ha N : P_2O_5 : K_2O (144 : 104 : 240 units/acre). See page 4 for more information on nutrient planning.

Organic manures may be best avoided for processing crops – late and variable release of N could affect fry quality.

(c) Sprays

Seed treatment	None unless rhizoctonia infection present on seed.
Nematicide	Assumption of 15-20% of area treated for free living nematode or PCN control.
Herbicides	Contact plus reduced rate residual herbicides applied pre-emergence.
Blight control	12 spray blight program for high blight pressure including protectant, systemic, curative and tuber blight protection chemicals.
Slug control	Comprehensive reduced dose season program.
Desiccation	3 spray chemical desiccation program.

(d) Other crop expenses

Storage and sprout suppressant costs are included. Chip processing in Scotland is mainly for chip shops, so costs of bags need to be included (£9.00-9.50/t of crop for 25 kg bags).

(e) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £13/hr at the rates below:

Operation	hr/ha
Lifting (by harvester)	20
Grading (half the grading done by regular labour)	40

Potatoes - Maincrop Ware (Processing - Chips)

GROSS MARGIN DATA

	Off-field		Ex-store	
Yield: t/ha (t/acre):				
Ware	52	(21.0)	52	(21.0)
Stockfeed	5	(2.0)	5	(2.0)
	57	(23.1)	57	(23.1)
OUTPUT		£/ha (acre)		
Off-field @ £155/t	8,060		-	
Ex-store @ £200/t	-		10,400	
Stockfeed @ £30/t	150		150	
	8,210	(3,323)	10,550	(4,270)
VARIABLE COSTS				
Seed @ £300/t	900		900	
Fertiliser	1,082		1,082	
Sprays	668		668	
Other expenses	-		2,445	
	2,650	(1,072)	5,095	(2,062)
GROSS MARGIN	5,560	(2,251)	5,455	(2,208)
WARE PRICE SENSITIVITY				
£50 /t	100	(40)	- 2,345	-(949)
£110 /t	3,220	(1,303)	775	(314)
£170 /t	6,340	(2,566)	3,895	(1,576)
£230 /t	9,460	(3,828)	7,015	(2,839)
£300 /t	13,100	(5,301)	10,655	(4,312)

Note:

Prices quoted include typical bonus additions for good dry matter, low tuber count, good size (length), good fry colour and low defect levels.

Potatoes - Maincrop Ware (Processing - Crisps)

PHYSICAL DATA

(a) Seed

Planted at 3.0 t/ha. 35/55mm seed, varies depending on variety, e.g. Hermes, Saturna, Lady Rosetta, Lady Claire, etc. Bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

200 : 130 : 300 kg/ha N : P_2O_5 : K_2O (160 : 104 : 240 units/acre). See page 4 for more information on nutrient planning.

Organic manures may be best avoided for processing crops – late and variable release of N could affect fry quality.

(c) Sprays

Seed treatment	None unless rhizoctonia infection present on seed.
Nematicide	Assumption of 15-20% of area treated for free living nematode or PCN control.
Herbicides	Contact plus reduced rate residual herbicides applied pre-emergence.
Blight control	12 spray blight program for high blight pressure including protectant, systemic, curative and tuber blight protection chemicals.
Slug control	3 applications.
Desiccation	3 spray chemical desiccation program.

(d) Other crop expenses

Processing storage for a 4-month period and sprout suppressant costs are included.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £13/hr at the rates below:

Operation		hr/ha
Lifting (by harvester)		20
Grading (half the grading done by regular labour)	low yield	44
	high yield	55

Potatoes - Maincrop Ware (Processing - Crisps)

GROSS MARGIN DATA

	Off-field		Ex-store	
Yield: t/ha (t/acre):				
Ware	44	(17.8)	44	(17.8)
Stockfeed	4	(1.6)	4	(1.6)
	48	(19.4)	48	(19.4)
OUTPUT		£/ha (acre)		
Off-field @ £135/t	5,940		-	
Ex-store @ £170/t	-		7,480	
Stockfeed @ £20/t	80		80	
	6,020	(2,436)	7,560	(3,059)
VARIABLE COSTS				
Seed @ £360/t	1,260		1,260	
Fertiliser	1,131		1,131	
Sprays	693		693	
Other expenses	-		2,412	
	3,084	(1,248)	5,496	(2,224)
GROSS MARGIN	2,936	(1,188)	2,064	(835)
WARE PRICE SENSITIVITY				
£50 /t	- 804	-(325)	-3,216	-(1,301)
£110 /t	1,836	(743)	- 576	-(233)
£170 /t	4,476	(1,811)	2,064	(835)
£230 /t	7,116	(2,880)	4,704	(1,904)
£300 /t	10,196	(4,126)	7,784	(3,150)

Note:

Prices quoted include typical bonus additions for good dry matter, low tuber count, good size (length), good fry colour and low defect levels.

Potatoes - Seed (Low and High Number Varieties)

PHYSICAL DATA

(a) Seed

Planted at 4.8 t/ha (can range from 3.5-6.1 t/ha for 35/55 mm seed depending on variety and top riddle size on which daughter crop will be sold). Half bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

80 : 170 : 110 kg/ha N : P_2O_5 : K_2O (64 : 136 : 88 units/acre). See page 4 for more information on nutrient planning.

Reduce N by 25% for indeterminate varieties, e.g. Cara and Markies.

(c) Sprays

Seed treatment	Multipurpose seed treatment applied at grade plus reduced rate fungicide applied for rhizoctonia.
Nematicide	Assumption of no treatment applied. Application may be required in field and varieties at risk of spraing.
Herbicides	Contact plus reduced rate residual herbicides applied pre-emergence.
Blight control	8-9 spray program with protectant, systemic, curative and tuber blight protection products for moderate-high blight pressure.
Aphid control	Up to 8 applications.
Slug control	2 applications.
Desiccation	Pulverising followed by chemical desiccation. For pulverising costs, see page 381.

(d) Other crop expenses

SPCS field inspection fees, roguing and labels are included. Positive ventilation and cold storage. Other costs may include bags (£7.50-11.20/t of crop), chemical treatment at storage time and royalties (which will depend on variety).

(e) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £13/hr at the rates below:

Operation	hr/ha
Lifting (by harvester)	20
Grading (half the grading done by regular labour)	40

Potatoes - Seed (Low and High Number Varieties)

GROSS MARGIN DATA

	Low		High	
Yield: t/ha (t/acre): seed	25	(10.1)	35	(14.2)
Yield: t/ha (t/acre): ware	6	(2.4)	6	(2.4)
Yield: t/ha (t/acre): s/feed	2	(0.8)	2	(0.8)
	33	(13.4)	43	(17.4)
OUTPUT		£/ha (acre)		
Seed @ £285/t	7,125		-	
Ware @ £75/t	450		-	
Stockfeed @ £30/t	60		-	
Seed @ £250/t	-		8,750	
Ware @ £75/t	-		450	
Stockfeed @ £30/t	-		60	
	7,635	(3,090)	9,260	(3,747)
VARIABLE COSTS				
Seed @ £380/t	1,824		1,520	
Fertiliser	677		677	
Sprays	886		842	
Other expenses	2,602		3,362	
	5,989	(2,424)	6,401	(2,590)
GROSS MARGIN	1,646	(666)	2,859	(1,157)
SEED PRICE SENSITIVITY				
£150 /t	-1,729	-(700)	-641	-(259)
£250 /t	771	(312)	2,859	(1,157)
£300 /t	2,021	(818)	4,609	(1,865)

Potatoes - Dual Purpose (Seed and Ware)

PHYSICAL DATA

(a) Seed

Planted at 3.8 t/ha (can range from 3.5-5 t/ha for 35x55 mm seed depending on variety. Half bought in. Cost varies with variety, seed size and classification grade.

(b) Fertiliser

150 : 150 : 200 kg/ha N : P_2O_5 : K_2O (120 : 120 : 160 units/acre). See page 4 for more information on nutrient planning.

(c) Sprays

Seed treatment	Multipurpose seed treatment applied at grade plus reduced rate fungicide applied for rhizoctonia. Fungicide incorporated into soil on 50% area for powdery scab control.
Nematicide	Assumption of no treatment applied. Application may be required in field and varieties at risk of spraing.
Herbicides	Contact plus reduced rate residual herbicides applied pre-emergence.
Blight control	8-9 spray program with protectant, systemic, curative and tuber blight protection products for moderate blight pressure.
Aphid control	Up to 8 applications.
Slug control	2-3 applications.
Desiccation	Pulverising followed by chemical desiccation. For pulverising costs, see page 381.

(d) Other crop expenses

SPCS field inspection fees; roguing and labels and positive ventilation and cold storage are included. Other costs include bags (£7.50-£11.20/t of crop), chemical treatment at storage time and royalties, depending on variety.

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Labour charged at £13/hr as per labour rates on page 64 for low yields.

Potatoes - Dual Purpose (Seed and Ware)

GROSS MARGIN DATA

Yield: t/ha (t/acre): seed	22	(8.9)
Yield: t/ha (t/acre): ware	19	(7.7)
Yield: t/ha (t/acre): s/feed	4	(1.6)
	45	(18.2)
OUTPUT	**£/ha (acre)**	
Seed @ £250/t	5,500	
Ware @ £110/t	2,090	
Stockfeed @ £30/t	120	
	7,710	(3,120)
VARIABLE COSTS		
Seed @ £260/t	988	
Fertiliser	922	
Sprays	938	
Other expenses	3,469	
	6,317	(2,556)
GROSS MARGIN	1,393	(564)

WARE PRICE SENSITIVITY		
£50 /t	253	(102)
£110 /t	1,393	(564)
£170 /t	2,533	(1,025)
£230 /t	3,673	(1,486)

Grassland

Introduction

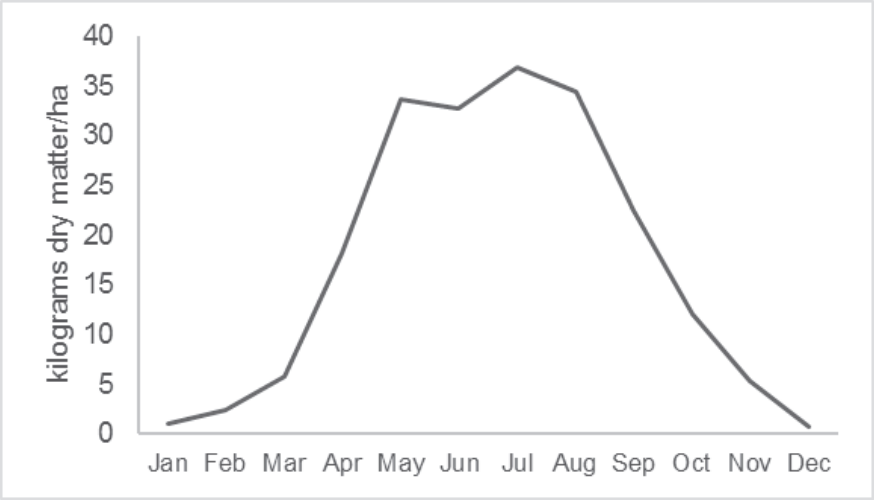
The rising costs of nitrogen (N) fertiliser is putting greater emphasis on getting the basics of grassland management right to capitalise on nitrogen fixation and improve nitrogen-use efficiency. This starts with correcting soil pH, Phosphorous (P) and Potassium (K) indices. Not only will this benefit the N uptake; it will also benefit clover production.

Checking soil structure to understand whether compaction remediation is required will benefit grass yield further and rotational grazing management methods can lead to more even distribution of dung and urine, improved species composition and increase utilisation of grazed grass. Targeted control of broadleaf weeds may also benefit grass yield.

If the grazing, silage, or hay area has less than 60% of the species you desire, a full reseed will benefit the nutritional quality of the pasture and the grass yield. Oversowing is another option if good seed-soil contact is likely and greater than 60% of desired species are present. Reduced cultivation methods could reduce cost, help keep nutrients in the soil and maintain soil quality. Variable success has been reported with these methods however, as the sown plant may struggle for light if not done well.

Grass yield can range from 1t dry matter (DM)/ha on hill ground to 20t DM/ha on good dairy land. Average grass yield is around 6t DM/ha on Scottish upland/lowland grazing livestock farms. Grass growth varies greatly from year-to-year, farm-to-farm and field-to-field but a general pattern taken from farmers measuring grass with SAC Consulting is shown below.

Average grass growth through the year on Scottish livestock farms



Potential dry matter yields (kgDM/ha) at different N levels/ha

kg N/ha	Yield (kgDM/ha)	Cow grazing days /ha	Stocking density (LU/ha)
0	3,000	240	0.46
75	4,200	335	0.64
125	5,500	439	0.84
175	7,000	559	1.07
250	8,000	639	1.23
310	10,000	799	1.53

The values in the previous table assume low clover content. Use the table below to account for clover contribution.

Accounting for clover: Clover Content (%DM)	Potential Nitrogen supply (kg N/ha)
20-30%	180
40%	240
50-60%	300

Analysis of grazed leafy grass often ranges from 15-25% DM, 10-12.5 megajoules of metabolizable energy (MJ ME)/kg DM and 12-26% crude protein – it is often as nutritious as concentrate feed. The cost per kg DM depends on the yield.

The variable cost data tables for grass, silage and hay provide the basis of the forage costs for the livestock enterprise gross margin figures.

The following practises improve margins based on grass management.

1. Optimising utilisation with good grazing management
2. Maintaining good soil health
3. Reseeding and rejuvenating the sward

Grazing systems defined

The following table illustrates the main grazing methods practised in Scotland.

	Grazing Interval	Rest Period*	Grass Height Targets		Grass Utilisation
			Entry	Exit	
Set stocking	over 1 week	NA	5-8cm		50%
Paddock grazing	0.5 days-1 week	15-30 days	8-10cm	5cm	65-80%
Mob grazing	0.5 days-3 days	40 days+	30cm+	10-20cm	30-50%

* Guide during the growing season, this should be flexible according to the growing conditions.

More information on mob grazing and rotational grazing is available in the following FAS New Entrants Factsheets:

- Mob Grazing with Beef Cattle: https://www.fas.scot/publication/mob-grazing-with-beef-cattle/
- Rotational Grazing: https://www.fas.scot/downloads/rotational-grazing/

Stocking rate

Stocking rate is expressed as grazing livestock units (see page 114 – Livestock section), GLU per effective (adjusted) hectare where:

- 2.5 GLU/ha (1 per acre) is very intensive (very high N input)
- 2.0 GLU/ha is intensive (high N input)
- 1.5 GLU/ha is semi intensive (moderate N input or high clover %)
- 1.0 GLU/ha is extensive (low N input/clover based)
- 0.5 GLU/ha is very extensive (very low/no N inputs)

Choice of seed mixtures

The seed mixture should be chosen using recommended varieties tested in Scotland by SRUC, England & Wales by NIAB-TAG or Northern Ireland by DAERA. Grass swards will contain mainly perennial ryegrass, white clover, and timothy. Varieties chosen should be compatible and chosen according to the farm system, the use of the ley (silage, hay, dual purpose), special requirements such as disease resistance and winter hardiness.

Inclusion of herbs such as Plantain and Chicory have proven benefits to animal performance but may not persist beyond three years in Scotland. Rotational grazing is recommended to make the most of these herbs. Red clover is another great addition to the mix due to its high N fixation (over 300 kg N/ha is possible) and nutritional quality.

Sward Improvement

Options for sward improvement range from full ploughing (reseeding/replacement) to oversowing (renovation). The approximate costs of different improvement methods are outlined in the table overleaf. These include variable costs as well as the cultivation costs.

Assumptions:

- A long-term seed mixture at full rate, 37kg/ha, for ploughing and direct drilling, and half rate, 18kg/ha, for oversowing.
- Fertiliser inputs are based on moderate P and K soil status. No fertiliser assumed for the over sow. pH is assumed to be ideal thus no cost for lime is included.
- Chemical costs for the destruction of the old sward prior to cultivation have been assumed for ploughing and direct drilling options. Other pesticides may be required for specific circumstances.

- Cultivation methods are assumed to be carried out by contractors. Contractor costs can be found on pages 379-382.
- Machinery fuel use (l/ha) and fuel cost on page 376-377.

	Plough	**Direct drill**	**Over sow**
Reliability	High	Mod/High	Moderate
Speed of improvement	Moderate	Moderate	Rapid
Loss of grass production	High	High	Low
		£/ha (acre)	
Variable costs			
Seed	196	196	95
Fertiliser	286	286	-
Sprays	31	31	-
	513 (208)	513 (208)	95 (39)
Cultivation costs			
Spray	14	14	-
Plough	71	-	-
Power harrow/subsoil	57	-	-
Harrow	-	-	26
Roll and destone	20	-	-
Sow	38	56	38
Roll	24	24	24
Fertilise	12	12	-
Fuel cost	91	30	19
	326 (132)	135 (55)	107 (43)
Total costs	839 (340)	648 (262)	202 (82)
No. of years per cultivation	*7*	*7*	*7*
Total cost per annum	**120** (49)	**93** (37)	**29** (12)

Preserved Grass Production Costs

The table on the following page shows the cost of producing preserved grass as silage or hay.

Assumptions:

- Yield and N fertiliser are outlined on pages 78 and 80.
- Establishment costs based on figures on pages 72-73.
- Annual variable costs are based on variable cost data (less annual share of seed) shown on pages 79 and 81.
- Annual production costs are assumed to be carried out by contractors. Contractor costs can be found on pages 379-382.
- Machinery fuel use (l/ha) and fuel cost on page 376-377.
- Other crop expenses for ensiled silage are based on using plastic sheets. For baled silage, this includes net wrap and plastic wrap as described on page 79. For hay, the cost for net wrap is included in the annual variable costs.
- Land rent and maintenance or a finance charge associated with a silage clamp have not been included in the calculations.
- Yield potential will vary and no account has been taken for wastage in the preserved state and at feeding.

Cost of producing preserved grass as silage or hay

	Silage 1 cut ensiled	**Silage** 1 cut bales	**Hay** 1 cut bales
N fertiliser use (kgN/ha)	125	125	125
Yield (t FW/ha)	20	20	6
Yield (t DM/ha)	6	6	5
Bale weight (round 4' x 4' - kg)	-	650	250
		£/ha	
Establishment costs (annual share)	120	120	120
Annual variable costs	405	405	574
Annual production costs			
Spray	14	14	14
Fertiliser	12	12	12
Mow	27	27	27
Rake	18	-	41
Lift, cart and clamp crop	125	-	-
Bale, wrap and stack	-	218	40
Other crop expenses	3	108	-
Fuel	70	32	41
	269	410	175
Total cost per annum (£/ha)	**794**	**935**	**869**
Cost per t FW (£/t)	**40**	**47**	**145**
Cost per t DM (£/t)	**132**	**156**	**170**
Cost per bale (£/bale)	**-**	**30**	**36**

Grassland - Grazing

PHYSICAL DATA

(a) System

Assume a 7-year sward life.

Establishment costs described on pages 72-73.

(b) Yield

See pages 70-72 for the dry matter yield and stocking rate (LU/ha) assumptions for varying Nitrogen application rates.

(c) Seed

A nominal annual charge (assume a 7-year sward life, for longer leys reduce the annual charge accordingly):

Mixture	£/ha
One year	110-145
Two-three years	120-180
Four-six years	130-185
Permanent	140-195

(d) Fertiliser

See page 4 for more info on nutrient planning.

	kg/ha (units/acre)/annum									
N	0	(0)	75	(60)	125	(100)	175	(140)	250	(200)
P_2O_5	0	(0)	10	(8)	15	(12)	20	(16)	30	(24)
K_2O	0	(0)	15	(12)	15	(12)	20	(16)	30	(24)

(e) Sprays

A nominal annual charge (assume a 7-year sward life, for longer leys reduce the annual charge accordingly) to cover a herbicide during establishment, followed by a herbicide to control a broader range of perennial weeds, such as docks, thistles, and nettles.

Grassland - Grazing

VARIABLE COST DATA

Fertiliser kg N/yr	0	(0)	75	(60)	125	(100)	175	(140)	250	(200)
VARIABLE COSTS *					**£/ha (acre)**					
Seeds	23		23		23		23		23	
Fertiliser	0		222		354		492		707	
Sprays	13		13		13		13		13	
Other expenses	-		-		-		-		-	
	36	(15)	258	(104)	390	(158)	528	(214)	743	(301)

FERTILISER PRICE SENSITIVITY (+/-)

10 p/kg N	0	(0)	7	(3)	12	(5)	17	(7)	25	(10)
10 p/kg P_2O_5	0	(0)	1	(0)	1	(0)	2	(1)	3	(1)
10 p/kg K_2O	0	(0)	1	(0)	1	(0)	2	(1)	3	(1)

* The cost per tonne of dry matter grown depends on yield and should also include a share of reseeding costs (contractor/machinery upkeep/fuel). Cost will also depend on the response to nitrogen (see page 70), and grazing utilisation.

Grassland - Silage and Aftermath Grazing

PHYSICAL DATA

(a) System

Assume a 7-year sward life.

Establishment and harvest costs are described on pages 72-73 and 75.

(b) Yield

Settled silage (kg fresh weight) at 25%DM.

Fertiliser N kg/ha (units/acre)/annum	70	(56)	130	(104)	250	(200)	310	(248)
Silage t/ha (t/acre)								
1st cut	20	(8.1)	20	(8.1)	25	(10.1)	20	(8.1)
2nd cut	-	-	10	(4.0)	15	(6.1)	16	(6.5)
3rd cut	-	-	-	-	-	-	16	(6.5)
Total	20	(8.1)	30	(12.1)	40	(16.2)	52	(21.0)

Apportionment - the following yield ratios are suggested:

Silage	50	80	80	95
Aftermath	50	20	20	5

(c) Seed

A nominal annual charge (assume a 7-year sward life, for longer leys reduce the annual charge accordingly):

Mixture	**£/ha**
One year	110-145
Two-three years	120-180
Four-six years	130-185
Permanent	140-195

(d) Fertiliser

Neither P_2O_5 nor K_2O is assumed for aftermaths, although their use would be recommended subject to nutrient management planning. See page 4 for more info on nutrient planning.

Silage cuts	**kg/ha (units/acre)/annum**							
For silage	**One**		**Two**		**Two**		**Three**	
N	70	(56)	100	(80)	220	(176)	310	(248)
P_2O_5	34	(27)	51	(41)	68	(54)	88	(70)
K_2O	120	(96)	180	(144)	240	(192)	312	(250)
For aftermath								
N	0	(0)	30	(24)	30	(24)	-	-

Grassland - Silage and Aftermath Grazing

VARIABLE COST DATA

VARIABLE COST DATA

Fertiliser kg N/ha (units/acre)/annum	70	(56)	130	(104)	250	(200)	310	(248)
Silage cuts	One		Two		Two		Three	
VARIABLE COSTS				**£/ha (acre)**				
Seeds	23		23		23		23	
Fertiliser	392		649		1,051		1,330	
Sprays	13		13		13		13	
Other expenses	-		-		-		-	
	428	(173)	685	(277)	1,087	(440)	1,366	(553)
FERTILISER PRICE SENSITIVITY (+/-)								
10 p/kg N	7	(3)	13	(5)	25	(10)	31	(13)
10 p/kg P_2O_5	3	(1)	5	(2)	7	(3)	8	(3)
10 p/kg K_2O	12	(5)	18	(7)	24	(10)	31	(13)

(e) Sprays

A nominal annual charge (assume a 7-year sward life, for longer leys reduce the annual charge accordingly) to cover a herbicide during establishment, followed by a herbicide to control a broader range of perennial weeds, such as docks, thistles and nettles.

(f) Other crop expenses

Heavy duty silage covers cost approximately £2.20/m^2 (7-10 year lifespan). Associated gravel bags cost approximately £1.75/bag. Silage sheets cost approximately £0.25/m^2 for top sheets and £0.45/m^2 for wall liners. Clamp film is approximately £0.11/m^2. If baling, include costs for net wrap at 50-77p/bale for large round bales and bale wrap at £4.50/bale depending on number of layers of net and wrap and size of bales.

The use of an inoculant will typically add £1.30-1.70/t depending on the product chosen and its rate of application.

Grassland - Hay and Aftermath Grazing

PHYSICAL DATA

(a) System

Assume a 7-year sward life.

Establishment and harvest costs are described on pages 72-73 and 75.

(b) Yield

Fertiliser N kg/ha units/acre)/annum	80 (64)	140 (112)	180 (144)
Hay t/ha (t/acre)	5 (2.0)	6 (2.4)	7 (2.8)
Aftermath (cow grazing days)	125	140	180

Apportionment - a yield ratio of 75 : 25, hay : aftermath should be used.

To prevent heating in store, aim to bale hay at 15-20% moisture and leave to stand in field until heating ceases.

(c) Seed

A nominal annual charge (assume a 7-year sward life, for longer leys reduce the annual charge accordingly):

Mixture	**£/ha**
One year	110-145
Two-three years	120-180
Four-six years	130-185
Permanent	140-195

(d) Fertiliser

Neither P_2O_5 nor K_2O is assumed for aftermaths, although their use would be recommended subject to nutrient management planning. See page 4 for more info on nutrient planning.

		kg/ha (units/acre)/annum					
For hay	N	80	(64)	80	(64)	80	(64)
	P_2O_5	30	(24)	35	(28)	42	(34)
	K_2O	90	(72)	108	(86)	126	(101)
For aftermath	N	-	-	60	(48)	100	(80)

(e) Sprays

A nominal annual charge (assume a 7-year sward life, for longer leys reduce the annual charge accordingly) to cover a herbicide during establishment, followed by a herbicide to control a broader range of perennial weeds, such as docks, thistles and nettles.

(f) Other crop expenses

Net wrap cost is costed on the basis of 5-6 round bales/t and assuming one roll of net will wrap 410 bales.

Grassland - Hay and Aftermath Grazing

VARIABLE COST DATA

Fertiliser kg N/ha (units/acre)/annum	80	(64)	140	(112)	180	(144)
VARIABLE COSTS			**£/ha (acre)**			
Seeds	23		23		23	
Fertiliser	370		549		683	
Sprays	13		13		13	
Other expenses	10		12		14	
	416	(168)	597	(242)	733	(297)
FERTILISER PRICE SENSITIVITY (+/-)						
10 p/kg N	8	(3)	14	(6)	18	(7)
10 p/kg P_2O_5	3	(1)	3	(1)	5	(2)
10 p/kg K_2O	9	(4)	11	(4)	13	(5)

Forage Crops

Introduction

Home-grown forage crops offer high yielding alternatives to grass, but establishment cost and time out of pasture production must be considered. Yield, quality, and utilisation are key to cost-effective forage crop production. Increasing the amount of grazed forage in the diet reduces reliance on expensive purchased feed and aids with filling the forage gap in the winter months.

Forage crops can be useful in both arable and grazing rotations; they make a good break crop between grass-to-grass re-seeds and provide time to correct deficiencies in pH, P and K, soil compaction and weed control. They can also be used as a pioneer crop in uncultivated areas.

Crops can be either full season crops or catch crops. To ensure high DM yields and to justify the cost of production and length of time taken out of production a full season crop should be grown on good land with full cultivations and correct agronomy. A catch crop can be grown after silage, wholecrop cereal or early harvested cereals to give a bonus crop of forage and allow an early re-seed the following spring.

Wholecrop silage

Wholecrop silage can provide a high-starch, high-fibre feed, replacing some or all of the grass silage in the ration. As it is high yielding, production costs per kilogram of dry matter (DM) are competitive with other forages. Although the crude protein can be lower, unless using a legume or a cereal-legume mix. The earlier harvest reduces risk of bad weather at harvest time and provides time for winter cropping.

Brassicas and root crops

Brassica and beet crops such as kale, forage rape, rape/kale hybrids, fodder beet, grazing turnips, swedes and stubble turnips provide nutritious, cost-effective feeds. Out-wintering on brassicas and beet crops can extend the grazing season and allow for more animals to be kept, with minimal extra infrastructure investment.

Leafy forage crops are generally high in protein while roots/bulbs are higher in energy. Fodder beet is the highest energy yielding crop, allowing high stocking densities – some farmers will manage over 100 ewes per hectare for around two and a half months (Jan – Mar).

Forage brassica and root crops should only be fed to livestock up to 70% of the total DM intake and a grass runback and drier lying area with fresh water should always be provided. Livestock should be transitioned slowly and carefully on to forage crops to allow rumen adaption. Another source of forage should be supplied, for example straw for dry cows, silage or hay for more productive stock. For lamb finishing, concentrates can help balance the diet. Correct mineral/trace element supplementation is important when feeding forage crops.

The use of an electric fence is advisable to encourage stock to eat the whole crop evenly for high utilisation and to ensure the ration has an adequate mix of energy and protein.

It is important to assess the yield of the crop (by cutting and weighing several 1m^2 sections) and then accurately working out the area the group of stock require each day. To assess the yield, make a frame that is 1m^2 and cut several representative samples of the crop. Place the sample in a bag and weigh using a spring balance. Multiply the average of your samples by 10,000 to give a fresh weight per hectare then again by the DM% (from the following tables - overleaf) to give DM yield/ha. The crop can then be rationed to the stock based on their nutritional requirements, taking into account the likely utilisation % and any other forages provided.

The yield for fodder beet is assessed differently and will depend on the width of the rows. If the rows are 45cm apart, then measure 5.5 metres along a drill, if they are 50cm apart, then measure 5 metres along a drill. Lift the whole plant (bulb and leaf) from both sides of the area measured, lifting 2 rows of beet at either 5m or 5.5 metres length (depending on row width). Weigh the leaf and the bulb separately. Repeat this over 5 different sample areas, to sample 25m^2 in total. Calculate the total fresh weight of the bulb and leaf over the 5 sites. Multiply this by 400 and divide by 1,000 to get the tonnes of fresh weight per hectare. Then multiply this figure by the dry matter (bulb ~15%, leaf ~10%) to calculate the tonnes of dry matter/ha. Dry matter analysis is recommended to understand the actual values for the crop.

Forage Crop Technical Data

The following tables provide technical data that can be used in conjunction with the variable cost data for all the crops illustrated later in the section.

Variable costs include seed, chemical and fertiliser as per variable cost data for each crop. Costs of establishment are not included and will vary enormously depending on previous cropping, nutrients in the soil, whether it is a full season or catch crop and past experience of the various methods of establishment. Machinery costs on pages 379-382 can be referred to for typical ploughing, cultivation and drilling costs.

	Kale	Forage rape	Kale/rape hybrid	Chicory
Sown	May- Jul	Apr- Aug	Apr-Aug	May-Jul
Utilised	July-Mar	Aug- Dec	Jun-Jan	Mar-Nov
Variable cost (£/ha)	554	328-456	318-554	275
Grazings	1	1	1-2	Several
DM (%)	15-17	10-14	12-15	12
ME (MJ/kgDM)	10.5	10.5	10.5	12
CP (%)	14-17	19-20	18-19	18
% utilisation	80	80	80	70
Av DM yield (t/ha)	7.5	4.5	6	10
Cow graze days/ha [1]	1,260	756	1,008	1,680
ha/50 cows/100days [1]	4.0	6.6	5.0	3.0
Lamb graze days/ha [2]	6,000	3,600	4,800	7,000
ha/250 lambs/100days [2]	4.2	6.9	5.2	3.6

	Swede	Turnips	Stubble turnips	Fodder beet
Sown	Mar-May	Apr- Jun	May-Sept	Mar-May
Utilised	Oct-Apr	Sep-Apr	Aug-Dec	Oct-May
Variable cost (£/ha)	275	309	511	865
Grazings	1 or lifted	1	1	1
DM (%)	11-15	12-15	12-15	13-16
ME (MJ/kgDM)	12.5	10.5	10.5	13
CP (%)	10-11	17-18	17-18	6-8
% utilisation	80	80	80	80
Av DM yield (t/ha)	8	5	4	15
Cow graze days/ha [1]	1,600	840	672	-
ha/50 cows/100days [1]	2.6	4.6	7.9	-
Lamb graze days/ha [2]	6,400	4,000	3,200	12,000
ha/250 lambs/100days [2]	3.9	6.3	7.8	2.1

[1] Cows getting 50MJ/day from crop and the rest from other forage.
[2] Lambs allowed 1kg DM/day of crop.

The nutritional qualities shown above represent an average; crops vary, and it is advised to analyse high value crops for dry matter, Metabolisable Energy (ME) and protein to ensure appropriate allocations are being made.

Dry cow wintering example - A herd of dry suckler cows require 75MJ/hd/day ME. On a diet of kale and straw, 50MJ is expected to come from kale. At 7.5tDM/ha, 10.5ME and 80% utilisation each m^2 of kale will

contain 6.3 MJ. Therefore, the herd of 50 cows require 397m^2 of kale per day.

Ewe grazing example - 100 ewes are given an allowance of 1kg DM of forage rape per head/day. With a yield of 4.5tDM/ha and utilisation of 80%, the group will require 278m^2/day or approximately 0.19ha (0.5 acres) per week.

Preserved Forage Crop Technical Data and Production Costs

The following table shows the cost of preserving forage crops including arable silage, forage maize and wholecrop wheat.

Assumptions:

- All crops ensiled.
- Yield potential will vary depending on site, timing, weather conditions and wastage at feeding.
- For breakdown, see variable cost data for each individual crop.
- Establishment and production costs based on contractor charges on pages 379-382, and fuel use (l/ha) and fuel cost on page 376-377.
- Total cost per annum does not include land rent and maintenance or finance charge associated with a silage clamp. The true cost will be higher due to wastage.

	Arable silage pea/ cereal mix ensiled	**Forage maize** under plastic ensiled	**Wholecrop ferm'd** winter wheat ensiled	**crack'd** winter wheat ensiled
Yield (t FW/ha)	30	40	25	15
Yield (t DM/ha)	8	15	10	12
ME (MJ/kgDM)	10	10.5	10.5	10.5
CP (%)	16	9	9.5	9.5
		£/ha		
Variable costs	722	512	913	1,097
Establishment costs				
Plough	71	71	71	71
Sow	65	151	65	65
Roll and de-stone	20	20	20	20
Fuel	84	84	84	84
	240	326	240	240
Production costs				
Spray	14	14	41	41
Fertilise/Slurry/FYM	12	17	35	35
Lift, cart and clamp crop	170	172	170	170
Other crop expenses	3	3	3	3
Fuel	32	71	39	39
	231	276	288	288
Total cost per annum (£/ha)	**1,193**	**1,113**	**1,441**	**1,625**
Cost per t FW (£/t)	**40**	**28**	**58**	**108**
Cost per t DM (£/t)	**149**	**74**	**144**	**135**

Forage Peas and Pea/Cereal Mixtures (Arable Silage)

PHYSICAL DATA

(a) System

Forage peas (sown Mar-Jun) are grown as a catch crop to be grazed *in situ*, zero-grazed or ensiled/baled (harvested at flowering when pods have formed but not yet filled and wilted for 1-2 days). Peas can be grown alone, or in mixtures with barley or oats and undersown with grass for arable silage. Peas are highly palatable to livestock so must be introduced gradually and monitored to prevent bloat. Total production costs including establishment and harvest are described on page 88.

(b) Yield (in 12-16 weeks)

	Fresh t/ha (t/acre)	Dry matter t/ha (t/acre)
Forage peas	20-30 (8-12)	6-8 (2.4-3.2)
Arable silage	20-35 (8-14)	6-10 (2.4-4.0)

(c) Seed rates (kg/ha)

Forage peas:		Arable silage undersown with grass:	
direct drill	125	peas	40-60
(broadcast	150)	cereal	60-80
		total	100-140

Seed mixtures cost (p/kg):	
Cereal	38.3
Peas	57

(d) Fertiliser – kg/ha (units/acre)

	Forage peas		Undersown arable silage at sowing		after harvest	
N	0	(0)	40-60	(32-48)	50	(40)
P_2O_5	50	(40)	90	(72)	25	(20)
K_2O	50	(40)	90	(72)	25	(20)

Apportionment of the cost of fertiliser in the seed bed and the residual value of nitrogen to the subsequent crop may be justified. See page 4 for more information on nutrient planning.

(e) Sprays

Pre emergence herbicide for forage peas can be used. There are no broad-spectrum post emergence herbicides available for this crop. Varietal tolerance to a proposed spray should be ascertained.

A silage additive (£1.00-£1.60 per tonne silage – depending on the product chosen and its rate of application) is recommended for silages with a high pea content.

Forage Peas and Pea/Cereal Mixtures (Arable Silage)

VARIABLE COST DATA

	Forage Peas		Arable silage undersown	
VARIABLE COSTS		£/ha (acre)		
Seed	98		75	
Fertiliser	164		647	
Sprays	-		-	
Other expenses	-		-	
	262	(106)	722	(292)
FERTILISER PRICE SENSITIVITY (+/-)				
10 p/kg N	0	(0)	10	(4)
10 p/kg P_2O_5	5	(2)	11	(4)
10 p/kg K_2O	5	(2)	13	(5)

Forage Maize

PHYSICAL DATA

(a) System

Forage maize is ensiled and the clamp should be monitored for overheating. Introduce gradually into the animal's diet, ensuring there is an adequate source of long fibre in the ration and protein supplementation is essential. Contractor costs for establishment and harvest are described on page 88.

(b) Yield

	Without plastic	With plastic
Fresh (t/ha)	40	50
DM (t DM/ha)	12	15

(c) Seed

Target established plant density 100,000 plants/ha; sow at 15% above target plant density. Do not sow too early (soil temperature 8-10ºC, 10 cm depth for 7 days).

(d) Fertiliser

	kg/ha	(units/acre)
N	120	(96)
P_2O_5	60	(48)
K_2O	165	(132)

Maize sown under plastic will have no placement fertiliser and will rely on nutrients from slurry only. See page 4 for more information on nutrient planning.

(e) Sprays

Pre-emergence herbicide, then later before 8 leaf stage (without plastic).

In some years, slugs can be a problem.

Forage Maize

VARIABLE COST DATA

	Without plastic		With plastic	
VARIABLE COSTS		£/ha (acre)		
Seed	196		196	
Fertiliser	623		-	
Sprays etc.	80		80	
Other expenses	-		236	
	899	(364)	512	(207)
FERTILISER PRICE SENSITIVITY (+/-)				
10 p/kg N	12	(5)	-	
10 p/kg P_2O_5	6	(2)	-	
10 p/kg K_2O	17	(7)	-	

Whole Crop Cereal - Winter Wheat

PHYSICAL DATA

(a) System

Whole cropping of wheat provides an alternative feed to silage providing a good source of starch and fibre. The crop can be harvested at various growth stages creating different products. Additives can be used for improving preservation and feed quality. For example grain moisture >45% (soft dough, soft cheese) fermented whole crop, grain moisture 30% (hard cheese) crimped grain or urea treated whole crop and <30% treated and processed whole crop. See page 20 for more detail on growing winter wheat.

(b) Yield

	Fermented whole crop	Cracked whole crop
Fresh (t/ha)	29	14
DM (t DM/ha	10	12

(c) Seed

Certified seed second generation (C2) sown at the rate of 220 kg/ha.

(d) Fertiliser

See page 4 for more information on nutrient planning.

	kg/ha	(units/acre)
N	200	(160)
P_2O_5	67	(54)
K_2O	83	(66)

(e) Sprays

Herbicides Autumn residual herbicide to control annual meadow grass and broad leaved weeds.

Fungicides Two applications at GS31-32 and GS39 for eyespot, leaf diseases (e.g. septoria).

For sprays against other hazards see page 20.

(f) Other crop expenses

Fermented whole crop wheat can be made successfully without an additive, but the use of additives can improve aerobic stability. Additive costs range from £1.00-£1.60 per tonne - depending on the product chosen and its rate of application. Refer to page 88 for other crop expenses such as plastic covers.

Whole Crop Cereal - Winter Wheat

VARIABLE COST DATA

	Fermented whole crop		Cracked whole crop	
VARIABLE COSTS	£/ha (acre)			
Seed @ £455/t	100		100	
Fertiliser	728		728	
Sprays etc.	85		85	
Other expenses	-		184	
	913	(369)	1,097	(444)
FERTILISER PRICE SENSITIVITY (+/-)				
10 p/kg N	20	(8)	20	(8)
10 p/kg P_2O_5	6	(2)	6	(2)
10 p/kg K_2O	8	(3)	8	(3)

Rye for Early Grazing

PHYSICAL DATA

(a) System

A catch crop of winter rye sown after early harvested cereal (Sep/Oct) and followed by light grazing at the end of the calendar year and subsequent cropping.

(b) Yield

Can be variable but, given early sowing, dry matter yields of up to 0.75t DM/ha in autumn and 2.25t DM/ha in spring can be achieved. Total dry matter yields up to 5.5t DM/ha can be achieved.

Forage rye can provide early spring grazing for 15-20 cows or 50-60 sheep per hectare over a three-week period.

(c) Seed

Rate – 185 kg/ha.

Early sowing is important, but it is often difficult to obtain good viable seed in August or early September.

(d) Fertiliser

See page 4 for more information on nutrient planning.

	kg/ha (units/acre)					
	Seed bed		**Early spring**		**Total**	
N	-	-	80	(64)	80	(64)
P_2O_5	30	(24)	-	-	30	(24)
K_2O	30	(24)	-	-	30	(24)

Rye for Early Grazing

VARIABLE COST DATA

VARIABLE COSTS	£/ha (acre)	
Seed	100	
Fertiliser	293	
Sprays etc.	-	
Other expenses	-	
	393	(159)

FERTILISER PRICE SENSITIVITY (+/-)		
10 p/kg N	8	(3)
10 p/kg P_2O_5	3	(1)
10 p/kg K_2O	3	(1)

Kale

PHYSICAL DATA

(a) System

System involves strip grazing behind an electric fence (to reduce crop wastage), allowing at least 3m of space per cow and a runback including hay/straw and water. Kale can be fed as part of a catch crop mixture which includes kale, stubble turnips and forage rape.

The advantages of kale include winter hardiness and a prolonged utilisation period of the crop. Some varieties are early maturing and others are late.

(b) Yield

	Fresh		DM t/ha	(t/acre)
Autumn kale	70	(28.3)	8	(3.2)
Winter kale	50	(20.2)	7	(2.8)

Strip-grazed, a suitable daily allowance per cow (3 hr grazing) would be 47kg FW, including 20% wastage.

(c) Seed

Rate (direct drilled ungraded seed) – 4.0 kg/ha.

Seed treated with neonicotinoid which is still approved for animal feed, game and seed.

(d) Fertiliser

	kg/ha	(units/acre)
N	160	(128)
P_2O_5	50	(40)
K_2O	170	(136)

Fertiliser rates will vary greatly with circumstances. Assume following grass, greater N requirements if following harvested crops. Some farmers may also choose to top dress some of the N. See page 4 for more information on nutrient planning.

(e) Sprays

Herbicides Stale seed bed and a pre-emergence herbicide.

Slugs Slug pellets may be broadcast or drilled with the seed.

Flea Beetle Insecticide may be required.

Kale

VARIABLE COST DATA

VARIABLE COSTS	£/ha	(acre)
Seed	76	
Fertiliser	432	
Sprays etc.	46	
Other expenses	-	
	554	(224)

FERTILISER PRICE SENSITIVITY (+/-)		
10 p/kg N	12	(5)
10 p/kg P_2O_5	2	(1)
10 p/kg K_2O	7	(3)

Forage Rape & Hybrids

PHYSICAL DATA

(a) System

Grazed system which must be introduced gradually with an area of runback with alternative forage, e.g. grass/hay/straw, as well as free access minerals and water.

There are several hybrids (rape/kale) on the market which are quick to establish and can be utilised within 10-12 weeks after sowing. They offer the benefit of early grazing in summer/autumn if other forage supplies are limited.

Sown with Italian ryegrass provides additional feed, grazing forage after the rape has been utilised and ensilaging opportunity.

(b) Yield

Total dry matter yield of approximately 4.5t DM/ha. About 50 lambs/ha (20 lambs/acre) (starting weight approx. 27 kg) will finish off rape, with a suitable 'run back' on to grass or stubble.

(c) Seed

	kg/ha	(lb/acre)
Drilled	6	(5.3)
Direct drilled/broadcast	8	(7.1)

These rates will need to be varied with soil condition.

Seed cost – £4.70/kg.

Inclusion of 10 kg Italian ryegrass would add approx. £22.50/ha to the cost.

(d) Fertiliser

	kg/ha (units/acre)	
	Drilled/broadcast	Direct drilled
N	100 (80)	140 (112)
P_2O_5	25 (20)	25 (20)
K_2O	35 (28)	35 (28)

Catch crops after early potatoes would require less fertilisers. See page 4 for more information on nutrient planning.

(e) Sprays

Burn off land pre-drilling for direct drilled crops only.

Insecticide for flea beetle may be required.

Forage Rape & Hybrids

VARIABLE COST DATA

	Broadcast		Drilled		Direct drilled	
VARIABLE COSTS			£/ha (acre)			
Seeds	38		28		38	
Fertiliser	290		290		387	
Sprays etc.	-		-		31	
Other expenses	-		-		-	
	328	(133)	318	(129)	456	(185)
FERTILISER PRICE SENSITIVITY (+/-)						
10 p/kg N	8	(3)	8	(3)	12	(5)
10 p/kg P_2O_5	2	(1)	2	(1)	3	(1)
10 p/kg K_2O	3	(1)	3	(1)	4	(2)

Stubble Turnips

PHYSICAL DATA

(a) System

Grazed system which must be introduced gradually with an area of run-back with alternative forage e.g. grass/hay/straw as well as free access to minerals and water. Strip grazing is preferred to reduce wastage.

It can be grown with other brassicas e.g. rape, which would offer an element of protection for the stubble turnip from frost prior to grazing.

(b) Yield

Can be highly variable particularly affected by date of sowing; but drilled crops sown in early July can finish 50-70 lambs/ha (20-28 lambs/acre) (starting weight approx. 27kg), although often requiring cereal supplementation to do so. Total dry matter yield approximately 4t DM/ha.

(c) Seed

Seed rates can be varied to alter the proportions of leaf to bulb.

	kg/ha	(lb/acre)
Direct drilled	3.6	(2.7-5.4)

Seed cost – £7.50/kg

(d) Fertiliser

These rates are variable, higher N rates increase the leaf to bulb ratio. See page 4 for more info on nutrient planning.

	kg/ha	(units/acre)
N	50	(40)
P_2O_5	25	(20)
K_2O	50	(40)

(e) Sprays

Burn off land pre-drilling for direct drilled crops only.

Insecticide for flea beetle may be required.

Stubble Turnips

VARIABLE COST DATA

	Drilled		Direct drilled	
VARIABLE COSTS		£/ha (acre)		
Seed	27		27	
Fertiliser	484		484	
Sprays etc.	-		31	
Other expenses	-		-	
	511	(207)	542	(219)
FERTILISER PRICE SENSITIVITY (+/-)				
10 p/kg N	9	(4)	9	(4)
10 p/kg P_2O_5	10	(4)	10	(4)
10 p/kg K_2O	5	(2)	5	(2)

Swedes and Turnips

PHYSICAL DATA

(a) System

The crop allows for two feeding systems, strip grazing by use of electric fencing or lifting and storing in a clamp. Roots must be clean and undamaged to prevent the risk of fungal disease in storage.

(b) Yield

	Swedes				Turnips			
	Fresh		DM		Fresh		DM	
	roots, t/ha (t/acre)							
Average	75	(30.4)	8.0	(3.2)	60	(24.3)	5.0	(2.0)
Premium	100	(40.5)	9.5	(3.8)	80	(32.4)	7.5	(3.0)

In addition, turnips will yield 15 to 30 t leaf/ha (1.5 to 3.0 t DM).

(c) Seed

Swede seed graded, dressed and precision sown (15 cm spacing) at 0.4 kg/ha and treated with neonicotinoid which remains approved for swede.

Turnip at 5kg/ha, untreated seed as neonicotinoid treatment not now approved.

Seed cost (£/kg):

Swedes – graded	100
Turnips – treated	14.80

(d) Fertiliser

See page 4 for more info on nutrient planning.

	Swedes		Turnips	
	kg/ha (units/acre)			
N	90	(72)	90	(72)
P_2O_5	200	(160)	200	(160)
K_2O	150	(120)	125	(100)

(e) Sprays

Pre-emergence herbicide for annual grass and broad-leaved weeds.

Insecticide for flea beetle may be required.

Swedes and Turnips

VARIABLE COST DATA

	Swedes		Turnips	
VARIABLE COSTS		£/ha (acre)		
Seed	40		74	
Fertiliser	211		211	
Sprays etc.	24		24	
Other expenses	-		-	
	275	(111)	309	(125)
FERTILISER PRICE SENSITIVITY (+/-)				
10 p/kg N	4	(2)	4	(2)
10 p/kg P_2O_5	3	(1)	3	(1)
10 p/kg K_2O	5	(2)	5	(2)

Multi-Species Sward

PHYSICAL DATA

(a) System

Ley incorporating various grasses, herbs and legumes such as chicory, plantain and white clover. The herbs may not last much beyond three years but ryegrass and clover should remain. The crop is best utilised in a rotational grazed system. Around five days longer rest period and greater residuals required compared with ryegrass and white clover swards. No winter grazing. The crop should be rested, typically by mid-September in year of establishment and by November thereafter. Additional animal health benefits should also be considered.

(b) Yield

Variable, better in warmer soils. A crop suitable for over 40 lambs/ha (16 lambs/acre) is possible in year of establishment (year 1). Adopt a restricted grazing period in year one. 15-30 ewes and twins/ha (6-12 ewes and twins/acre) can be grazed in years 2 and 3, typically from June, and lambs during that autumn.

(c) Seed

Rate – 10 kg/ha.

Sow into a fine, warm and firm seedbed by early June.

Seed costs: Cost annualised over an assumed three year rotation.

(d) Fertiliser

	kg/ha	(units/acre)
N	50	(40)
K_2O	25	(20)
P_2O_5	25	(20)

Little or no fertiliser is required where established on a prime site using white clover as a companion crop. See page 4 for more info on nutrient planning.

(e) Sprays

An annual charge to cover pre-drilling stale seed bed preparation.

Otherwise, few clover-safe herbicides available for use. Poor competitor so good establishment is critical. Only topping should be carried out to control tall weeds post-emergence.

Multi-Species Sward

VARIABLE COST DATA

VARIABLE COSTS	Direct drilled £/ha (acre)	
Seed	60	
Fertiliser	204	
Sprays etc.	11	
Other expenses	-	
	275	(111)

FERTILISER PRICE SENSITIVITY (+/-)		
10 p/kg N	5	(2)
10 p/kg P_2O_5	2	(1)
10 p/kg K_2O	2	(1)

Fodder Beet

PHYSICAL DATA

(a) System

Fodder beet can be grazed behind an electric fence or harvested and fed as chopped or whole. If harvesting the crop, try to minimise soil contamination. It has a large yield potential, for a palatable, digestible feed for animals through the winter. This crop is not a brassica.

Transition of animals on and off the crop requires careful consideration, especially that of cattle *(continued on next page).

(b) Yield

	Roots - t/ha (t/acre)			
	Fresh		DM	
Average	60	(24.3)	10	(4.0)
Premium	90	(36.4)	14	(5.7)

In addition, fodder beet will yield 35 t leaf/ha (3 to 4 t DM); as winter progresses this may die off with frost and snow damage.

(c) Seed

Pelleted monogerm seed precision drilled at 15 cm spacing in 55 to 65 cm rows (approx. 3-4 kg/ha). Treated seed is available at a premium cost.

(d) Fertiliser

	kg/ha	(units/acre)
N	100	(80)
P_2O_5	60	(48)
K_2O	150	(120)

Potash level may be reduced to 75 kg/ha where agricultural salt (400 kg/ha) is applied.

All or part of the nutrient requirement can be satisfied with slurry or FYM. See page 4 for more info on nutrient planning.

(e) Sprays

Pre-emergence broad leaved weed control and then up to four post emergence applications at low rates.

Fodder Beet

VARIABLE COST DATA

VARIABLE COSTS	£/ha (acre)	
Seed	180	
Fertiliser	555	
Sprays etc.	130	
Other expenses	-	
	865	(350)

FERTILISER PRICE SENSITIVITY (+/-)		
10 p/kg N	10	(4)
10 p/kg P_2O_5	6	(2)
10 p/kg K_2O	15	(6)

* Cattle should be transitioned over 21 days, starting with 1kg DM per animal per day until all cattle are eating bulbs readily, then increase by 1kg DM every two days until they start to leave some beet behind.

Ensure animals have received vaccinations for clostridial infections prior to grazing the crop, as beet can increase the chance of such infections due to the high sugar load in the intestines

Red Clover

PHYSICAL DATA

(a) System

Red clover-ryegrass mixtures provide a good silage crop whilst offering high quality aftermaths for finishing lambs. Up to 300g per day growth rate is possible for weaned lambs grazing red clover. Not suitable for winter grazing or intense autumn grazing.

Phyto-oestrogens affect ewe fertility so avoid grazing 6 weeks either side of tupping and limit grazing replacement ewe lambs on red clover as there is some evidence that it affects reproductive tract development.

(b) Yield

	t/ha (t/acre)	
	Fresh	**DM**
Average	37	10
Premium	56	15

(c) Seed

For a high red clover sward:

15kg/ha (6kg/acre) red clover
5kg/ha (2kg/acre) grass seed

Spring sowing at 10-15mm depth when soil temperatures exceed 10°C works best.

(d) Fertiliser

	kg/ha	**(units/acre)**
N	0	(0)
P_2O_5	70	(56)
K_2O	70	(56)

P and K application should be guided by recent soil analysis. Clover require higher pH than grasses, target 6-6.5. Nitrogen application is not required. See page 4 for more information on nutrient planning.

(e) Sprays

Do not use residual herbicides on previous crops that could affect germination of clover.

Red Clover

VARIABLE COST DATA

VARIABLE COSTS	£/ha (acre)	
Seed @ £8.9/kg	158	
Fertiliser	230	
Sprays etc.	-	
Other expenses	-	
	388	(157)

FERTILISER PRICE SENSITIVITY (+/-)		
10 p/kg N	0	(0)
10 p/kg P_2O_5	7	(3)
10 p/kg K_2O	7	(3)

Livestock

Livestock Units

	Livestock units		Livestock units
Dairy cows	1.00	**Ewes and ewe replacements** [3]	
Dairy bulls	0.65	Hill Ewes	0.06
Beef cows	0.75	Upland Ewes	0.08
Beef bulls	0.65	Lowland Ewes	0.11
Heifers in calf (rearing)	0.80	Rams	0.08
Other cattle [1]		**Lambs**	
0-12 months	0.34	Store lambs <1 year	0.04
12-24 months	0.65	Breeding ewe hoggs:	
Over 24 months [2]	0.80	6 months – 1 year	0.06
Horses	0.80	Other sheep > 1 year	0.08

[1] excluding intensive beef systems

[2] reduced in proportion to time animal on farm

[3] excluding suckling lambs

Notes

1. A Livestock Unit is usually defined in terms of feed requirements. The ratios in the table above are based on metabolisable energy requirements, with one unit being considered as the maintenance of a mature 625 kg Friesian cow and the production of a 40-45 kg calf, and 4,500 litres of milk at 36 g/kg of butterfat and 86 g/kg solids-not-fat.
2. To calculate the stocking density of grazing livestock allowances should strictly be made for variation in output, e.g., yield per cow or liveweight gain per head, and also for quantities of non-forage feed consumed by each category of stock.
3. To calculate the total livestock units on a farm reduce in proportion the time animals are on farm within any year. The appropriate livestock units should be multiplied by the monthly average livestock numbers, except in the case of lambs and purchased stores where throughput should be used.
4. Because of the range in breed and type of animal within any one category (e.g. Friesian and Jersey dairy cows), the results obtained from the use of these figures must be interpreted with care.
5. Livestock units used by the Scottish Government for calculating stocking densities as part of eligibility for subsidy schemes differ slightly. See page 467 for more detail.

Basis of data: Defra, '*Definitions of Terms used in Agricultural Business Management' (Mar 2010)*.

Livestock Traceability

Cattle – current situation
All cattle are required to have a 'passport'. Without a passport, cattle cannot be slaughtered for human consumption.

Cattle are required to be double tagged. Beef calves must have both tags fitted within 20 days of birth. Dairy calves must have one tag fitted within 36 hours of birth and the second tag fitted within 20 days of birth. **NOTE**: For all calves born in Scotland, births must be registered with ScotMoves+ (www.scoteid.com) within **7 days of tagging** and within 27 days of birth. Lost or illegible tags (including those with backs or fronts missing), must be replaced within 28 days of discovery.

Deaths must be reported and passports returned within 7 days. If the animal is over 24 months of age, it must be tested for BSE.

When an animal moves from one holding to another, both off and on movements should be recorded in the holding register within 36 hours of the movement taking place. For further guidance see www.scoteid.com.

An on-farm record must be retained for all cattle on the holding. All dairy births (within 7 days), any other calf (within 30 days), deaths (within 7 days) and movements (within 48 hours) all need to be recorded in farm records. These records must be retained for a 10-year period. A copy of a herd register can be downloaded at www.fas.scot/downloads/sample-blank-herd-register-bovine-animals/.

In Scotland, links between holdings no longer apply. To keep cattle you must register each holding that you use (owned, rented, or seasonally rented) with ScotMoves (http://www.scoteid.com/). Cattle moving to and from the different holdings (location codes) within a business must be recorded with ScotMoves within 48 hours of moving. This can be done by email, online, telephone/fax, paper or by using software packages. The keeper must be registered as a keeper of cattle at the receiving holding and no more than one keeper can be registered on that holding. Full details including possible exemptions can be found at www.scoteid.com.

Cattle tagging EID changes
A new anticipated European standard for Low Frequency (LF) cattle tags, once adopted, means that tags must be WYSIWYG (What You See Is What You Get) compatible, exactly like our current LF sheep tags.

However, the current UK cattle numbering system is incompatible with the new standard and it therefore will have to be changed when it is adopted by the UK.

Due to the complications of the new LF cattle tag standard, progress towards its implementation on a UK basis has been slow.

In Scotland, Ultra-High Frequency (UHF) tagging is the preferred technology as it has many advantages. The technology is cheaper, they are WYSIWYG compatible, they can be read singly or in batches at a greater distance, they don't interfere with LF tags, and they can be encoded with information.

Currently, ScotEid UHF tags are voluntary and available as part of a pilot scheme being tested on farms and through abattoirs. They are available only as a UHF secondary tag.

At present, until there is an agreed UK position on cattle renumbering for LF, Scottish cattle keepers have two options: to use current LF non-WYSIWYG tags and readers or to voluntarily use ScotEID UHF WYSIWYG tags.

It is likely that LF will be compulsory at some point in the future for all UK cattle, whilst Scotland is most likely to mandate UHF, cattle due to their advantages over LF. It is therefore conceivable that dual tagging will therefore be required in some form in the future for Scottish cattle.

Sheep

To keep sheep, you must register each holding that you use (owned, rented or seasonally rented) with your local Rural Payments and Inspections Directorate (RPID) office. It is compulsory for all Scottish sheep born after 31 December 2009 to be tagged with an Electronic Identifier (EID) before they leave the holding of birth (unless under a concession) or are 9 months old, whichever comes first.

There are three types of tag that can be used:

- Slaughter Tags (a single EID tag with a flock mark and no visible individual identifier).
- A matching set of double tags with individual identifiers, one of which must be an EID tag.
- An EID bolus and black ear tag.

All sheep that are to be sold or slaughtered by the time they are one year old can be identified with any one of the above tags (tag types must not be mixed). However, the most common type for sheep under 12 months old are slaughter tags for store and finished lambs.

Any animals kept beyond 12 months of age must have a matching set of double tags with individual numbers – one an EID tag. Any slaughter tagged animals that are to remain on the holding after they are a year old, must be upgraded (provided they are completely traceable) by removing the slaughter tag and replacing with a matching set of double tags with individual identifiers one of which must be an EID tag on or before they are one year old. These must be recorded in the replacement register.

A record of identification must be kept in the flock records with the date the animals were EID tagged and their individual number if double tagged or flock number if slaughter tagged. Batch recording can be used.

Any homebred sheep losing their tags must have them replaced within 28 days of discovery. If they are on the holding of birth you can use your existing double tags one of which must be EID. If the sheep are not on the holding of birth, then red replacement EID tags must be used. The exception to this is upgrading bought in ewe lambs that can be upgraded to your own existing tags provided they are fully traceable. Replacement tags must be recorded in the flock records.

Flock books should include a section on identification and replacements and a continuous record must be kept. The register must be retained for three years. A holding register (orange book) is downloadable from the Farm Advisory Service website www.fas.scot/downloads/blank-flock-register/.

Records for all on/off movements, identification and replacement of tags must be completed in the register within 48 hours. An annual flock inventory must be completed usually with the December Census.

All sheep movements in Scotland must be reported to SAMU (Scottish Animal Movements Unit) within 3 days. Any EID animals moving through Scottish Critical Control points (markets, abattoirs etc) are logged and uploaded to the ScotEID database. These movements can form part of your records. The ScotEID website (www.scoteid.com) is a source of information on tagging rules and regulations as is Scottish Government's own website at www.gov.scot/Topics/farmingrural/Agriculture/animal-welfare/IDtraceability/SheepandGoats

Goats
The rules for goats are identical to sheep except the EID component is not compulsory and tattoos can be used.

Deer
To keep deer, you must register each holding that you use (owned, rented or seasonally rented) with your local Rural Payments and Inspections Directorate (RPID) office. Deer must be identified as required by the Tuberculosis (Deer) Order 1989 (as amended) before moving on or off a holding and before a TB test (unless under 16 weeks old).

The owner/keeper must complete a movement declaration found at:
www.gov.scot/Topics/farmingrural/Agriculture/animal-welfare/Diseases/MovementRestrictions/ExemptHTML

The movement declaration must be retained on the premises of departure for six months.

Pigs

To keep pigs you must register your holding with the local RPID office and obtain a County Parish Holding (CPH) number for every holding that you use within 30 days of when pigs are first kept. You must also contact your local Animal Health Office (AHPA) to register as a keeper of pigs and also to obtain a pig herdmark. All pigs born on your holding must be identified before leaving the holding of birth by an eartag or a permanent tattoo (either on the ear or a slapmark on the shoulder). See www.gov.scot/publications/pig-identification-registration-guidance-keepers-scotland/.

If under 12 months old, a temporary mark (paint) can be used for farm to farm movements only. For all movements to a show or exhibition, for breeding purposes, to a semen collection centre or, intra-community trade or export or under a walking licence, all pigs must also have an eartag or a tattoo with the herd mark and a unique individual identification number) not a slapmark. A slapmark, eartag or tattoo can be used for movement to a market or slaughterhouse. All replacement tags must be cross referenced in the holding register.

Movements must be notified either prior to leaving the holding or on the day of the move. This can be done electronically through www.scoteid.com or by telephone or in writing to the ScotEID information Centre. The receiving keeper must check and confirm receipt of pigs within 3 days of their arrival. The movements also need to be noted in the holding register within 48 hours of the move. These records must be kept for a minimum of 3 years and once a year, the pigs on the holding must be recorded. ScotEID can be used for this. Rules for movements between England, Wales and Northern Ireland, and for imports and exports can be found at: www.gov.scot/publications/pig-identification-registration-guidance-keepers-scotland/pages/5/

Poultry

Following the Avian Influenza (Preventative Measures) (Scotland) Order 2007, any person keeping more than 50 poultry must register as a keeper. This can be done through www.gov.uk/poultry-registration-scotland, by post, telephone or email. Movement records must be kept for poultry and/or eggs. Where the breeding, laying or broiler flock has more than 250 birds, salmonella testing records must be kept.

All livestock movements

All movements of cattle, sheep, goats and other ruminating animals (except camelids) and swine are subject to a standstill period (unless an exemption applies). This period of standstill, in effect, does not permit the movement of any animal to a market if it has been presented at a market within the previous 13 days (20 for pigs), or an English or Welsh market within the previous 6 days (20 for pigs), except any animal

marketed in a livestock market in any of the Scottish island areas. Many exemptions apply and they can be found at: www.gov.scot/Topics/farmingrural/Agriculture/animal-welfare/Diseases/MovementRestrictions/ExemptHTML

Animal Health Planning

Livestock health planning is an effective tool to improve health, welfare and productivity. It is farm specific and it should be led by the farmer and be done in conjunction with the farm vet, supported by nutritionist and other consultants. While health planning is a mandatory requirement for farm assurance scheme standards, it will only bring real efficiency improvements to the farm's livestock systems if it is a dynamic approach to managing health and productivity rather than a document that is produced once per year.

Dynamic health planning involves continuous improvement of the livestock's health and production and requires regular and on-going engagement with the farm vet and other consultants as required during key parts of the production cycle. Areas that need intervention will be identified and actions agreed and prioritised to get the most out of the livestock system.

During the dynamic health planning meetings, the farmer and the people involved should:

1. **Set targets** - the targets should be specific, realistic and measurable e.g. "I want to wean 92 calves at 230kg".
2. **Identify risks** - the risks that can prevent a farmer from achieving the targets set should be identified e.g., what can go wrong with calving? A plan for every risk to prevent this happening should be in place.
3. **Monitor** - the data required for monitoring the progress on the specific targets set should be captured, analysed and reviewed regularly. The monitoring process will enable the farmer and his/her vet and consultants to implement actions on time to prevent things going wrong.
4. **Review** - the review of the outcome of the targets at the end of the e.g. weaning period will demonstrate whether those targets have been achieved. Not all targets will be achieved but knowing the cause of this failure will enable a better understanding of their livestock's system and lead to improvement each year.

Many farmers and vet practices have devised their own health planning system, which reflects the needs for their situation. Health planning does not have to be computer-based but the advantage of a programme run on the web is that all livestock information is kept in one place and is easily accessed at any time.

SRUC Veterinary Services has developed two health planning services for farmers, vets and advisers. The SAHPS is an online platform that facilitates data recording, communication between farmers, vets and advisers and the creation of beef/sheep health plans. Additionally, the associated data-capturing app, which is compatible with SAHPS, allows farmers to record events as they occur and upload them to SAHPS/CTS in real time. Currently, this facility is only available for cattle.

The development and maintenance of SAHPS and the supporting app have been funded by the Scottish Government. Both are free to Scottish veterinary practices and farmers. They are also available to veterinary practices and farmers in England and Wales on a chargeable basis. For registration or further information please visit www.sahps.co.uk

In 2021, key performance data taken from SAHPS highlighted the following:

		Lower quartile	Upper quartile
Cattle Herds	Calves Weaned	70%	91%
	Barren Cows	26%	9.0%
Sheep Flocks	Lambs Weaned	106%	164%
	Barren Ewes	10%	3%

Premium health schemes

Health schemes offer a framework that helps farmers to establish the status of certain livestock diseases in their herds and flocks, and provide guidance for prevention, reduction, eradication, and certification of freedom from those diseases. The farm vet can advise the farmer on Health Scheme options, the diseases that he/she needs to focus on and suggest a programme of testing and management to control those diseases. The level of assurance for buyers looking to eliminate disease risk, for farmers wishing to minimise the impact of disease in their herd/flock and for farmers wishing to export to countries that have achieved eradication of disease(s) are among the reasons that a farmer will consider joining a Health Scheme. SRUC Veterinary Services offer the Premium Cattle Health Scheme (PCHS) and the Premium Sheep and Goat Health Scheme (PSGHS). Diseases covered by these schemes are:

PCHS

- Bovine Virus Diarrhoea (BVD)
- Leptospirosis
- Infectious Bovine Rhinotracheitis (IBR)
- Johne's Disease
- Neospora
- Bovine TB (England & Wales)

PSGHS

- Maedi Visna (MV)
- Caprine Arthritis Encephalitis (CAE)
- Johne's Disease
- Enzootic Abortion of Ewes (EAE)
- Scrapie

In addition to the livestock Health Schemes mentioned overleaf, SRUC Veterinary Services offer the Premium Assured Strangles Scheme (PASS) supported by the British Horse Society (BHS). The PASS aims to prevent and eliminate Strangles from infected yards and to offer a national control programme to reduce the risk of Strangles for horses overall.

For more information on all the above health schemes visit at www.SRUC.ac.uk/vets

Veterinary medicine records
If you are the keeper of food producing animals or treat farm animals intended for human consumption, you must keep records for 5 years from the date of treatment, or disposal of the veterinary medicine products. They must include:

- A record of the proof of purchase or, where medicines were not bought, documentary evidence of how they were acquired.
  - ✓ name and batch number of the product
  - ✓ date of purchase
  - ✓ quantity purchased
  - ✓ name and address of the supplier
- A record of all veterinary medicine products administered to the animals, including those administered by the vet.
  - ✓ name and batch number of the product
  - ✓ date of administration
  - ✓ quantity administered
  - ✓ identification of the animal treated
  - ✓ withdrawal period
  - ✓ name of person/vet that administered the product
- A record of the disposal of all veterinary medicine products that have not been used for animal treatment.
  - ✓ date of disposal
  - ✓ quantity disposed
  - ✓ method and place of disposal

It is compulsory to retain all the above information for 5 years whether or not the animal has been sold, slaughtered or died. All records must be durable, permanent, and made available for inspection on request by an authorised person. The records may be kept electronically.

Nutritive Values and Relative Values (£) of Feedingstuffs

The feedingstuffs tables overleaf are provided as a general guide and should be used with care. Each foodstuff has been attributed a specific nutritive value and often this will vary, e.g. the nutritive value of draff (see page 123). The relative values of the feedingstuffs are also affected by the rationing situation.

The relative values for ruminants are calculated on an ME (metabolisable energy) and CP (crude protein) basis using barley and rapeseed meal as standard reference foods. The relative values for pigs are calculated on a NE (net energy) and Dig Lys (digestible lysine) basis, using barley and hipro soya as standard reference foods.

If the relative value of a foodstuff is higher than the price then it is good value for money. For ruminants, this does not take into account other characteristics of the feedstuff, for example, the high digestible undegradable protein (DUP) content of soya bean meal for ewes in late pregnancy or digestible fibre properties of sugar beet pulp. For pigs, relative value does not take into account the content of other amino acids and for both types of animal the negative characteristics such as low palatability.

Nutritive values of feedingstuffs-ruminants

	Dry matter (g/kg)	ME (MJ/kg DM)	CP (g/kg DM)
Rapeseed meal	900	12.0	400
Barley	860	13.2	115
Hay (average)	850	8.6	85
Hay (good)	860	9.2	100
Silage (average)	240	10.6	130
Silage (good)	240	11.2	140
Barley straw	860	6.3	35
Oats	870	12.0	100
Wheat	860	13.6	115
Maize	860	13.8	95
Brewers grains (draff)	230	11.1	200
Wheat dark grains	900	13.5	340
Maize dark grains	900	14.0	317
Maize gluten (20%)	880	12.9	220
Soya bean meal (47%)	890	13.3	530
Potatoes	210	13.3	90
Swedes	105	14.0	90
Molassed sugar beet feed	890	12.5	100

Relative values (£) of feedingstuffs-ruminants

				£/t		
RAPESEED MEAL		350			400	
BARLEY	200	250	300	200	250	300
Hay (average)	110	140	160	115	145	160
Hay (good)	130	150	180	135	160	180
Silage (average)	47	54	63	48	57	65
Silage (good)	50	56	65	50	60	67
Barley straw	60	80	110	60	85	105
Oats	173	220	264	175	220	262
Wheat	205	260	312	206	259	310
Maize	200	257	316	198	255	312
Brewers grains (draff)	57	62	70	62	67	73
Wheat dark grains	340	360	380	375	395	416
Maize dark grains	330	355	380	360	387	416
Maize gluten (20%)	257	290	323	275	308	341
Soya bean meal (47%)	430	425	420	490	485	478
Potatoes	45	60	72	45	58	72
Swedes	24	31	38	24	31	38
Molassed sugar beet feed	187	235	285	185	235	284

Nutritive values of feedingstuffs-pigs

	NE (MJ/kg as fed)	Dig Lys (g/kg as fed)
Hipro soya bean meal	8.4	26.6
Barley	9.6	2.8
Oats	8.0	3.0
Wheat	10.5	2.5
Wheat feed	7.7	4.6
Wheat bran	6.2	4.0
Maize	11.1	1.8
Wheat dark grains	9.3	5.6
Maize gluten (20%)	7.0	4.0
Peas	9.7	12.5
Beans	8.6	12.8
Molassed sugar beet feed	6.6	2.9
Molasses	7.0	0.1
Biscuit waste	11.7	2.5
Rapeseed meal	6.5	14.0

Relative values (£) of feedingstuffs-pigs

				£/t		
HIPRO SOYA BEAN MEAL		350			450	
BARLEY	200	250	300	200	250	300
Oats	171	212	252	173	213	255
Wheat	215	270	326	214	269	324
Wheat feed	177	213	249	182	218	259
Wheat bran	145	173	202	150	178	211
Maize	221	281	342	218	278	336
Wheat dark grains	215	258	301	221	264	313
Maize gluten (20%)	160	193	226	164	197	234
Peas	272	305	338	292	325	378
Beans	254	280	306	275	301	349
Molassed sugar beet feed	145	177	210	147	179	214
Molasses	132	172	212	128	168	204
Biscuit waste	237	300	362	235	298	359
Rapeseed meal	223	235	247	248	260	297

Gestation Table

Date of service	Births due Cow	Ewe	Hind	Sow	Date of service	Births due Cow	Ewe	Hind	Sow	Date of service	Births due Cow	Ewe	Hind	Sow
01-Jan	12-Oct	30-May	19-Aug	24-Apr	**06-May**	15-Feb	03-Oct	23-Dec	28-Aug	**08-Sep**	20-Jun	05-Feb	27-Apr	31-Dec
06	17	04-Jun	24	29	**11**	20	08	28	02-Sep	**13**	25	10	02-May	05-Jan
11	22	09	29	04-May	**16**	25	13	02-Jan	07	**18**	30	15	07	10
16	27	14	03-Sep	9	**21**	02-Mar	18	07	12	**23**	05-Jul	20	12	15
21	01-Nov	19	8	14	**26**	07	23	12	17	**28**	10	25	17	20
26	06	24	13	19	**31**	12	28	17	22	**03-Oct**	15	02-Mar	22	25
31	11	29	18	24	**05-Jun**	17	02-Nov	22	27	**08**	20	07	27	30
05-Feb	16	04-Jul	23	29	**10**	22	07	27	02-Oct	**13**	25	12	01-Jun	04-Feb
10	21	09	28	03-Jun	**15**	27	12	01-Feb	07	**18**	30	17	06	09
15	26	14	03-Oct	8	**20**	01-Apr	17	06	12	**23**	04-Aug	22	11	14
20	01-Dec	19	8	13	**25**	06	22	11	17	**28**	09	27	16	19
25	06	24	13	18	**30**	11	27	16	22	**02-Nov**	14	01-Apr	21	24
02-Mar	12	30	19	24	**05-Jul**	16	02-Dec	21	27	**07**	19	06	26	01-Mar
07	17	04-Aug	24	29	**10**	21	07	26	01-Nov	**12**	24	11	01-Jul	06
12	22	09	29	04-Jul	**15**	26	12	03-Mar	06	**17**	29	16	06	11
17	27	14	03-Nov	9	**20**	01-May	17	08	11	**22**	03-Sep	21	11	16
22	01-Jan	19	8	14	**25**	06	22	13	16	**27**	08	26	16	21
27	06	24	13	19	**30**	11	27	18	21	**02-Dec**	13	01-May	21	26
01-Apr	11	29	18	24	**04-Aug**	16	01-Jan	23	26	**07**	18	06	26	31
06	16	03-Sep	23	29	**09**	21	06	28	01-Dec	**12**	23	11	31	05-Apr
11	21	08	28	03-Aug	**14**	26	11	02-Apr	06	**17**	28	16	05-Aug	10
16	26	13	03-Dec	8	**19**	31	16	07	11	**22**	03-Oct	21	10	15
21	31	18	8	13	**24**	05-Jun	21	12	16	**27**	08	26	15	20
26	05-Feb	23	13	18	**29**	10	26	17	21					
01-May	10	28	18	23	**03-Sep**	15	31	22	26					

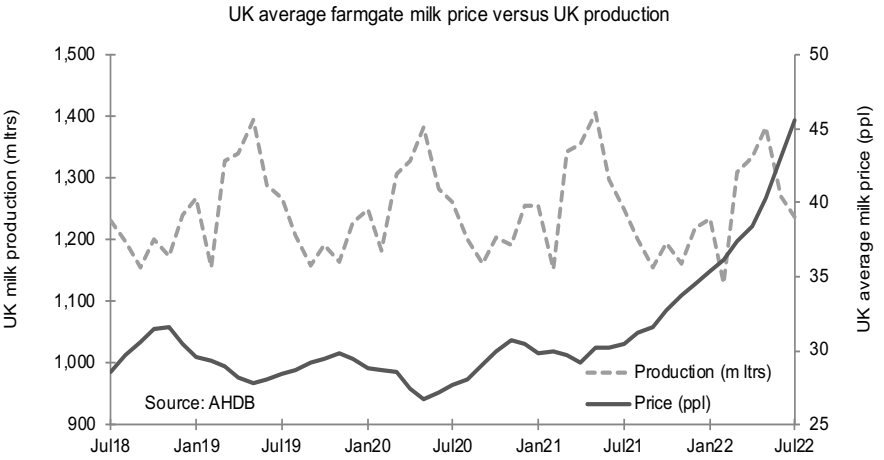
Note: Refer to the Miscellaneous section for gestation values for the above livestock. Values will change for different breed types.

Dairying

Introduction

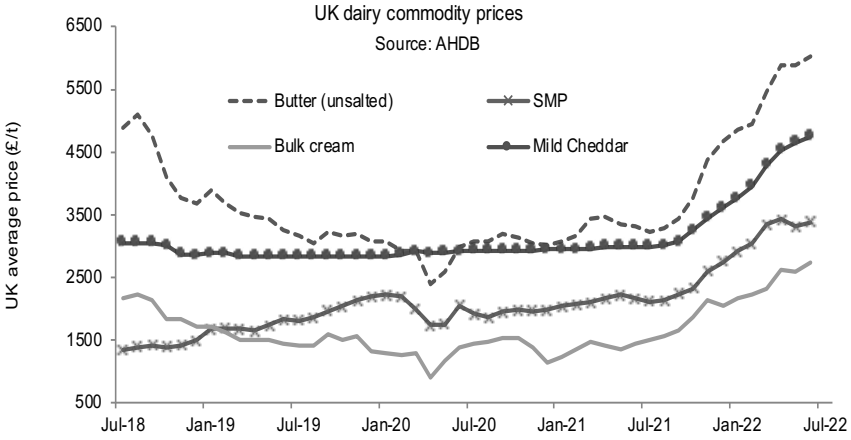
Farm-gate milk prices and price drivers

The UK average farm-gate prices have risen rapidly throughout the last quarter of 2021 and the first half of 2022, with milk price up to around 46ppl for July 2022, compared to around 10ppl less in January. It is likely that milk prices will continue to rise into the second half of 2022 due to milk shortages and processors looking to secure supplies. Unprecedented rises in input costs both domestically and globally as a result of soaring energy costs, the Ukraine conflict and adverse weather conditions have restricted milk output, with milk prices only just keeping up with rising feed, fuel and fertiliser costs. As a result, the spring flush in 2022 did not peak as high as in 2021, with milk output back 2.5%. UK milk supply for the 2021/22 milk year was 14,909 million litres, down 98 million litres from the previous year. The UK average farm-gate milk price rose throughout the 2021/22 milk production year with a peak of 36.79ppl in March 2022 with a low of 29.41ppl in April 2021.



The UK farm-gate milk price is mainly driven by the commodities market. Dairy fats (butter and cream) have increased significantly in price over the 12-month period from July 2021 to June 2022, due to milk shortages both in the UK and on the continent, as well as stagnant milk production and a shortage of butter supplies. During this period butter has risen from £3,230/t in July 2021, peaking at £6,020/t in June 2022. Cream has followed the butter trend, ranging from £1,508/t to £2,734/t during this 12-month period with prices significantly increasing month-on-month, especially during the first four months of 2022. The market for cheddar has also risen increasing over the last 12 months from £2,980/t in July 2021, up to £4,740/t in June 2022 due to firm demand and tight supplies. At the time of writing (June 2022), SMP price is around £3,380/t, after reaching a 12-month high of £3,430/t during April 2022.

The rise in commodity prices in the 2021/22 milk year was mainly due to a rapid decline in milk output in the summer of 2021 and rising input costs resulting in production remaining relatively constant throughout 2021 and below the previous year's production. It was a similar situation globally with production back on the previous year from the six key producing regions.



EU milk production increased by only 0.1% in 2021. It is thought that the EU has limited scope for growth in milk production in 2022 due to current and proposed regulations and environmental pressures.

World milk supplies for March 2022 were 0.7% below the same month in 2021, with average daily deliveries of 823.7 million litres. Production in the US, New Zealand and Australia have been greatly impacted by adverse weather. It is predicted that global milk production will decline in the first half of 2022, and it could take until nearly the end of the year or into 2023 before there is a slight recovery and an overall global reduction in milk of 0.5% is estimated for 2022.

Milk supply contracts

All UK dairy farmers are contracted to supply milk to an individual milk purchaser/processor. A select number of dairy farmers are on retailer-aligned contracts. Farmers on these contracts receive a milk price based on a cost of production formula used by the individual retailer. At the time of writing (June 2022), aligned milk contracts are in the region of 40.44ppl–44.2ppl for a standard liquid litre, with many already announcing a hike to 46ppl for July. The majority of non-aligned farm-gate milk prices are already in the region of 42ppl-46ppl for a standard liquid litre, based on 4% butterfat and 3.3% protein (and will be higher still for July). It is unusual for the non-aligned prices to be on a par, if not higher than retailer aligned contracts.

The price paid for milk going for manufacturing purposes places more emphasis on compositional quality, with a standard manufacturing litre

being based on 4.2% butterfat and 3.4% protein. Historically, liquid contracts have tended to be poorly rewarded for components compared to manufacturing contracts but this has changed in recent years. Depending on the contract, bonuses and penalties are awarded with milk composition and hygiene quality being either above or below the standard litre respectively. For hygiene quality, a standard litre is based on a bactoscan of 30,000/ml, somatic cell count (SCC) of 200,000/ml and thermodurics of 500/ml.

Additional bonuses for milk collections may include every other day collections, volume bonuses and flexible collection times.

Fixed price contracts

From time to time, some milk purchasers offer fixed contracts, allowing producers to fix a certain proportion of their milk at a given price for a period of time. 'Futures contracts' allow farmers to reduce their exposure to market volatility with regards milk price and to plan ahead with purchasing key inputs such as feed and fertiliser. Futures broker FC Stone calculates regular forward milk prices based on European milk futures contracts and currency exchange rates. Futures market based values are referred to as UK Milk Futures Equivalent (UKMFE) and the current gross price, as of end May 2022, was 53.53ppl. The price the farmer receives will be lower than these futures values once adjusted to reflect processor margin and transport costs (Net UKMFE price as of end May 2022 was 48.24ppl). While the latest data from AHDB Dairy puts the estimated cash cost of production for all year-round calving herds for the 12-month period ending December 2021 at 31.9ppl for the middle 50% and 28.8ppl for the top 25% respectively, this nowhere near represents the hike in input costs which have escalated since the start of the Ukraine conflict in February 2022. For June 2022, estimated cost of production was around 43ppl and some dairy industry analysts suggest that milk prices needed to be at least 48ppl to stimulate more milk output.

Outlook

Little growth in domestic and global milk production is predicted for 2022 despite continued demand for dairy commodities as a result of population and economic growth. Even though milk prices have continued to rise throughout the spring flush and summer months, high input costs have forced farmers to examine their feed costs, with little incentive to push cows with more concentrates to increase milk output. Feed costs look set to rise further going forward into the autumn and this is likely to hamper any recovery in milk supplies. There is much uncertainty in the feed markets with the on-going conflict in Ukraine and drought in parts of North America impacting on the 2022 harvest. As global stocks of wheat and soya continue to tighten, there are increasing concerns of a food crisis in 2023 and it is likely that high input costs will remain for at least the next 12 months.

Lactation Curves

The table below is an example of a lactation curve for a cow yielding 7,000 litres and can be used for budgeting purposes.

LACTATION CURVES - % Yield each month for a cow yielding 7,000 litres

	Month of calving											
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
January	12.3	-	-	4.7	6.4	7.4	8.5	9.6	10.6	11.8	12.9	13.4
February	12.0	11.0	-	-	4.5	5.9	6.8	7.7	8.6	9.7	10.8	11.6
March	13.0	13.5	12.4	-	-	5.3	6.8	7.7	8.6	9.8	10.9	12.0
April	11.9	12.8	13.4	12.4	-	-	5.3	6.7	7.6	8.6	9.8	10.8
May	12.1	13.2	14.3	15.1	14.1	-	-	6.0	7.5	8.6	9.7	10.8
June	10.4	11.7	12.8	13.8	14.6	13.8	-	-	6.0	7.3	8.3	9.4
July	8.7	9.9	11.0	12.0	13.2	14.1	13.1	-	-	5.5	6.9	7.9
August	7.5	8.5	9.4	10.6	11.7	13.0	13.9	12.8	-	-	5.3	6.6
September	6.7	7.5	8.4	9.5	10.8	12.0	13.4	13.9	12.8	-	-	5.3
October	5.4	6.8	7.6	8.6	9.7	11.2	12.5	13.6	14.2	13.1	-	-
November	-	5.1	6.1	7.0	7.9	9.1	10.3	11.5	12.5	13.0	12.1	-
December	-	-	4.6	6.3	7.1	8.2	9.4	10.5	11.6	12.6	13.3	12.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

These figures are broadly applicable to other yield levels.

It should be noted that the figures are intended only as a general guide and that annual yield, milking frequency, lactation number, calving index, feeding regime and geographical area will all affect the actual curve obtained.

Dairy Cow - Summary of Assumptions

(a) Milk Price 2022

The following gross margins include four annual yield levels, based on average production of 1,000,000 litres per annum:

Litres /cow	Calving system	Contract type	Average price (ppl) *
5,000	Spring	Manufacturing	48.0
7,000	All year round	Manufacturing	48.0
8,500	All year round	Liquid	47.0
10,000	All year round	Liquid	47.0

* Use price sensitivity to change gross margins to reflect current milk price.

Note that calving system and contract type are not specific to average yield per cow and it is not unusual for higher yielding herds to be on manufacturing contracts. Similarly, block calving herds (whether spring or autumn or both, are capable of much higher yields than 5000 litres).

(b) Feeding

The systems shown are all based on a grass silage feeding regime. As milk yield increases, forage quality becomes more critical. Although high milk yields can be achieved using conventional systems based on grass, grass silage and concentrates, the inclusion of a second forage, such as a wholecrop cereal or maize silage, will normally enhance intake and performance as will forage replacers such as draff or grainbeet along with other distillery by-products, fodder beet and potatoes. To avoid excessive concentrate use (target concentrate use per litre should be less than 0.4kg), good grassland management and well-preserved grass silage with high intake characteristics are key. Multi-cut silage can improve forage quality and reduce demand for purchased concentrates and protein sources.

Many different feeding systems exist. A TMR (Total Mixed Ration) is where cows receive 100% of their nutrition in a mixed ration fed in the feed trough. PMR (Partial Mixed Ration) is where cows are fed a base ration with additional concentrates fed at a rate depending on their level of milk production. Typically, feeding to yield is based on providing 0.45kg concentrate per litre over the base ration through the parlour, robot or out of parlour feeders.

Dairy farmers can replace part or all the purchased compound dairy cake or blends with home mixes using home-grown cereals and purchased straights. These mixes typically cost £15-20/t less than purchased product, but they do, however, incur greater demand on labour and machinery and require more storage capacity.

(c) Other livestock expenses

These are based on commercial dairy herds and include milk recording, bedding, sawdust, dairy detergents, and feeding straw.

Dairy Cow - Spring Block Calving

PHYSICAL DATA

Calving period	Spring **/cow**
Average annual yield (litres)	5,000
Herd life (years)	5.0
Calving interval (days)	370
Cow size (kg)	500
Feed requirements (kg):	
Silage	5,500
Concentrates	750
Concentrates fed (kg/litre)	0.15
Overall forage area (ha):	
Silage & aftermath grazing	0.11
Grazing	0.33
Total	0.44

Basis of data:

1. A spring calving herd managed on a low input system. Calving between February and April. Maximum utilisation of grazed grass - 150 days winter feeding period.
2. A herd of 200 cows producing 1 million litres, assumed at 4.4% BF and 3.5% Protein.
3. The dry cow diet includes 165kg feeding straw.
4. Calf sale/transfer value is an average of dairy heifers, males and beef cross calves at £145.50/hd then adjusted for calving interval and mortality. The calf value can be altered by £9.17 for each £10 difference in the sale/transfer price.
5. Cull cow sale price of £589.00/hd has been adjusted for herd life and mortality. The annual share can be altered by £1.95 for each £10 difference in cull cow price.
6. Heifer purchase/transfer price varies according to yield. A purchase price equating to 18ppl has been used. This has been adjusted for herd life and mortality. The annual share can be altered by £2.04 for each £10 difference in purchase/transfer price.

Dairy Cow - Spring Block Calving

GROSS MARGIN DATA

Calving period	Spring /cow
Average annual yield (litres)	5,000
OUTPUT	
Spring milk @ 48 p/litre	2,400
Calf value	133
Cull cow (annual share)	118
	2,651
Heifer replacement (annual share)	184
	2,467
VARIABLE COSTS	
Concentrates @ £395/t	296
AI	37
Vet & medicines	50
Other livestock expenses	111
	494
Gross Margin before forage	1,973
Forage variable costs:	
silage @ £1366/ha	150
grazing @ £743/ha	245
Total Variable Costs	889
GROSS MARGIN £/cow	1,578
GROSS MARGIN £/forage ha	3,586

Sensitivity-Change ±	**Change in Gross Margin/head (£)**
1 p/litre in milk price	50
£10/t in concentrate price	8

Dairy Cow – Moderate Input

PHYSICAL DATA

Calving period	All year /cow
Average annual yield (litres)	7,000
Herd life (years)	4.2
Calving interval (days)	390
Cow size (kg)	600
Feed requirements (kg):	
Silage	8,700
Concentrates	1,800
Concentrates fed (kg/litre)	0.26
Overall forage area (ha):	
Silage & aftermath grazing	0.17
Grazing	0.24
Total	0.41

Basis of data:

1. A moderate input system calving all year round; 200 days winter feeding period with cows at grass day and night during the grazing period.
2. A herd of 143 cows producing 1 million litres, assumed at 4.2% BF and 3.4% Protein.
3. The dry cow diet includes 115kg feeding straw.
4. Calf sale/transfer value is an average of dairy heifers, males and beef cross calves at £166.00/hd then adjusted for calving interval and mortality. The calf value can be altered by £8.61 for each £10 difference in the sale/transfer price.
5. Cull cow sale price of £707/hd has been adjusted for herd life and mortality. The annual share can be altered by £2.34 for each £10 difference in cull cow price.
6. Heifer purchase/transfer price varies according to yield. A purchase price equating to 18ppl has been used. This has been adjusted for herd life and mortality. The annual share can be altered by £2.45 for each £10 difference in purchase/transfer price.

Dairy Cow – Moderate Input

GROSS MARGIN DATA

Calving period	All year
	/cow
Average annual yield (litres)	7,000
OUTPUT	
All year milk @ 48 p/litre	3,360
Calf value	142
Cull cow (annual share)	169
	3,671
Heifer replacement (annual share)	308
	3,363
VARIABLE COSTS	
Concentrates @ £395/t	711
AI	48
Vet & medicines	82
Other livestock expenses	117
	958
Gross Margin before forage	2,405
Forage variable costs:	
silage @ £1366/ha	232
grazing @ £743/ha	178
Total Variable Costs	1,368
GROSS MARGIN £/cow	1,995
GROSS MARGIN £/forage ha	4,865

Sensitivity-Change ±	**Change in Gross Margin/head (£)**
1 p/litre in milk price	70
£10/t in concentrate price	18

Dairy Cow – Moderate/High Output

PHYSICAL DATA

Calving period	All year **/cow**
Average annual yield (litres)	8,500
Herd life (years)	3.6
Calving interval (days)	400
Cow size (kg)	650
Feed requirements (kg):	
Silage	11,200
Concentrates	2,800
Concentrates fed (kg/litre)	0.33
Overall forage area (ha):	
Silage & aftermath grazing	0.22
Grazing	0.24
Total	0.46

Basis of data:

1. A moderate input system calving all year round; 230 days winter feeding period. During the grazing period cows are housed at night and grazed during the day.
2. A herd of 118 cows producing 1 million litres assumed at 4.1% BF and 3.3% Protein.
3. The dry cow diet includes 160kg feeding straw.
4. Calf sale/transfer value is an average of dairy heifers, males and beef cross calves at £214/hd then adjusted for calving interval and mortality. The calf value can be altered by £8.40 for each £10 difference in the sale/transfer price.
5. Cull cow sale price of £674/hd has been adjusted for herd life and mortality. The annual share can be altered by £2.71 for each £10 difference in cull cow price.
6. Heifer purchase/transfer price varies according to yield. A purchase price equating to 18ppl has been used. This has been adjusted for herd life and mortality. The annual share can be altered by £2.86 for each £10 difference in purchase/transfer price.

Dairy Cow – Moderate/High Output

GROSS MARGIN DATA

Calving period	All year /cow
Average annual yield (litres)	8,500
OUTPUT	
All year milk @ 47 p/litre	3,995
Calf value	135
Cull cow (annual share)	189
	4,319
Heifer replacement (annual share)	437
	3,882
VARIABLE COSTS	
Concentrates @ £395/t	1,106
AI	58
Vet & medicines	100
Other livestock expenses	127
	1,391
Gross Margin before forage	2,491
Forage variable costs:	
silage @ £1366/ha	301
grazing @ £743/ha	178
Total Variable Costs	1,870
GROSS MARGIN £/cow	2,012
GROSS MARGIN £/forage ha	4,373

Sensitivity-Change ±	**Change in Gross Margin/head (£)**
1 p/litre in milk price	85
£10/t in concentrate price	28

Dairy Cow - High Output

PHYSICAL DATA

Calving period	All year **/cow**
Average annual yield (litres)	10,000
Herd life (years)	3.0
Calving interval (days)	415
Cow size (kg)	650
Feed requirements (kg):	
Silage	12,600
Concentrates	3,800
Concentrates fed (kg/litre)	0.38
Overall forage area (ha):	
Silage & aftermath grazing	0.24
Grazing	0.00
Total	0.24

Basis of data:

1. A high input, high output system calving all year round and housed for 365 days on a complete winter ration (assumes no access to grass or zero grazing).
2. A herd of 100 cows producing 1 million litres assumed at 4.0% BF and 3.2% Protein.
3. The dry cow diet includes 245kg feeding straw.
4. Calf sale/transfer value is an average of dairy heifers, males and beef cross calves at £227/hd then adjusted for calving interval and mortality. The calf value can be altered by £8.09 for each £10 difference in the sale/transfer price.
5. Cull cow sale price of £674/hd has been adjusted for herd life and mortality. The annual share can be altered by £3.11 for each £10 difference in cull cow price.
6. Heifer purchase/transfer price varies according to yield. A purchase price equating to 18ppl has been used. This has been adjusted for herd life and mortality. The annual share can be altered by £3.06 for each £10 difference in purchase/transfer price.

Dairy Cow - High Output

GROSS MARGIN DATA

Calving period	All year **/cow**
Average annual yield (litres)	10,000
OUTPUT	
All year milk @ 47 p/litre	4,700
Calf value	183
Cull cow (annual share)	225
	5,108
Heifer replacement (annual share)	551
	4,557
VARIABLE COSTS	
Concentrates @ £395/t	1,501
AI	68
Vet & medicines	117
Other livestock expenses	162
	1,848
Gross Margin before forage	2,709
Forage variable costs:	
silage @ £1366/ha	328
grazing @ £743/ha	-
Total Variable Costs	2,176
GROSS MARGIN £/cow	2,381
GROSS MARGIN £/forage ha	9,921

Sensitivity-Change ±	**Change in Gross Margin/head (£)**
1 p/litre in milk price	100
£10/t in concentrate price	38

Replacement Heifer Rearing

Fodder requirements of Holstein Friesian heifers

The following tables provide forage data to budget for the cost of replacement heifers. Also see pages 144-145.

		Approx. closing lwt (kg)	Heifer grazing (days)	Mainly silage ration Conc (kg)	Straw (kg)	Silage (kg)
Early autumn						
(1st Sept)/24 months						
Birth		40	-	-	-	-
0-3	S-N	110	-	140	45	-
4-8	D-A	220	-	410	135	800
9-14	My-O	355	123	125	-	1,160
15-20	N-A	490	-	275	-	4,290
21-24	My-A	585	102	42	85	440
Total			225	992	265	6,690
	Forage (ha)		0.21	-	-	0.13
Early spring						
(1st April)/24 months						
Birth		40	-	-	-	-
0-3	A-J	110	-	140	45	-
4-8	J-N	220	-	415	140	800
9-14	D-My	355	-	275	-	3,150
15-20	J-N	490	61	185	-	2,890
21-24	D-M	585	-	205	170	2,910
Total			61	1,220	355	9,750
	Forage (ha)		0.06	-	-	0.19

		Approx. closing lwt (kg)	Heifer grazing (days)	Mainly silage ration Conc (kg)	Straw (kg)	Silage (kg)
Early autumn						
(1st Sept)/27 months						
Birth		40	-	-	-	-
0-3	S-N	100	-	170	45	-
4-8	D-A	205	-	330	180	820
9-14	My-O	335	153	47	-	560
15-20	N-A	455	-	275	-	4,100
21-27	My-N	600	153	60	185	1,735
Total		-	306	882	410	7,215
	Forage (ha)		0.29	-	-	0.18
Early spring						
(1st April)/27 months						
Birth		40		-	-	
0-3	A-J	100	-	170	45	-
4-8	J-N	205	-	335	185	820
9-14	D-My	335	50	200	-	1,980
15-20	J-N	455	122	60	-	1,630
21-27	D-M	600	60	155	63	4,565
Total			232	920	293	8,995
	Forage (ha)		0.23	-	-	0.22

Replacement Heifer Rearing

PHYSICAL DATA

Time of birth		**Early autumn**	**Early spring**	**Early autumn**	**Early spring**
Age at calving		**24 months**	**24 months**	**27 months**	**27 months**
Ration type		Mainly silage	Mainly silage	Mainly silage	Mainly silage
Milk, whole	litre	0	0	0	0
Milk, substitute	kg	40	40	40	40
Concentrates:					
starter (proprietary)	kg	90	90	110	110
rearer	kg	360	360	325	325
cereal mix	kg	542	770	447	485
straw	kg	265	355	410	293
Forage: silage	kg	6,690	9,750	7,215	8,895
silage	ha	0.13	0.19	0.18	0.22
grazing	ha	0.21	0.06	0.29	0.23
Total forage	ha	0.34	0.25	0.47	0.45

Basis of data:

(a) **Quality of forage:**	**ME (MJ/kg DM)**	**DM (g/kg)**	**'Substitution Rate'**
Silage - 24m calving	11.0	300	3 - 3.5
Silage - 27m calving	10.5	300	3 - 3.5
Straw	6.3	850	1

(b) The forage hectares shown are derived from the Grassland section for silage (310 kgN, 3 cuts for heifers calving at 24 months; 220 kgN, 2 cuts for heifers calving at 27 months and grazing (175 kgN). The hectares for silage include a proportion of aftermath grazing, which in turn has been deducted from the grazing requirement.

(c) Intensification of grazing can save up to 25% of the area allocated.

Replacement Heifer Rearing

GROSS MARGIN DATA

Time of birth	**Early autumn**	**Early spring**	**Early autumn**	**Early spring**
Age at calving	**24 months**	**24 months**	**27 months**	**27 months**
Ration type	Mainly silage	Mainly silage	Mainly silage	Mainly silage
OUTPUT - Heifer at calving	1,665	1,665	1,665	1,665
Less heifer calf	160	160	160	160
	1,505	1,505	1,505	1,505
VARIABLE COSTS				
Milk, whole @ 47.5 p/litre	0	0	0	0
Milk, substitute @ £2475/t	99	99	99	99
Concentrates starters @ £420/t	38	38	46	46
rearing @ £400/t	144	144	130	130
mainly cereal mix @ £360/t	195	277	161	175
straw @ £100/t	27	36	41	29
Vet & medicines	44	44	44	44
AI & other livestock expenses	70	70	70	70
	617	708	591	593
Gross margin before forage	888	797	914	912
Forage variable costs:				
silage @ £1366/ha, silage @ £1087/ha,	178	260	196	242
grazing @ £528/ha	111	32	153	121
Total Variable costs	906	1,000	940	956
GROSS MARGIN (birth to calving)	599	505	565	549
GROSS MARGIN/forage ha (acre)	1,762 (713)	2,020 (817)	1201 (486)	1214 (491)

Note: The calf price of £120 and value of heifer sold of £1800 have been adjusted to allow for mortality (5-10%) and barren and reject heifers (5-10%) respectively.

Contract Dairy Heifer Rearing

Contract rearing dairy heifers by a dedicated rearer allows the farm to focus purely on the milking herd and reduces time and resources previously allocated to youngstock.

As achieving target body weight at different stages throughout the rearing process is the basis of efficient heifer rearing programmes, contracts are often based on certain targets being met, such as growth rate, age at bulling and age at first calving. The aim should be for heifers that calve at 24 months to reach 85-90% of mature body weight at calving.

Contract rearers tend to take delivery of heifers from between 2 to 4 months of age, returning them to the dairy farmer at 4 to 6 weeks before calving.

There are various types of contract:

- *Contract payment based on per animal per day*. This is where the farmer pays a flat rate fee per head per day based on the actual rearing costs.
- *Weight gain on a per kilogram basis contract*. The difference between the delivery weight to the rearer and the return weight to the farmer is divided by the number of days to determine growth rate per day. The danger with this type of contract is that the rearer must avoid producing heifers that are over-conditioned.
- *Sell and buy-back contract*. The rearer buys the calves at an agreed price, with the farmer retaining the right to buy back the heifers 4 to 6 weeks prior to calving. The rearer retains control of the system but is responsible for all costs and losses incurred. The farmer runs the risk of buying back heifers at an age or weight that is not desirable in their system.
- *Labour and Facilities only contract.* A contract where the farmer stipulates the rearing policy and covers all costs such as feed, semen, veterinary medicine, and transport costs (as well as any losses). The rearer only provides the labour and facilities.

Care must be taken to ensure that both the rearer and the dairy farmer's responsibilities are clearly defined, including performance targets and who covers what costs. The rearer should have insurance to cover any third-party claims involving the heifers in his care.

A summary of charges is given below. These are based on the rearer paying all costs associated with the heifers in their care, excluding transport.

		Charge
	£/day	***£/month***
From 14 days to 3 months of age	2.00	60
From 3 months to pre-calving (at 22 months of age)	1.0 - 2.13	64

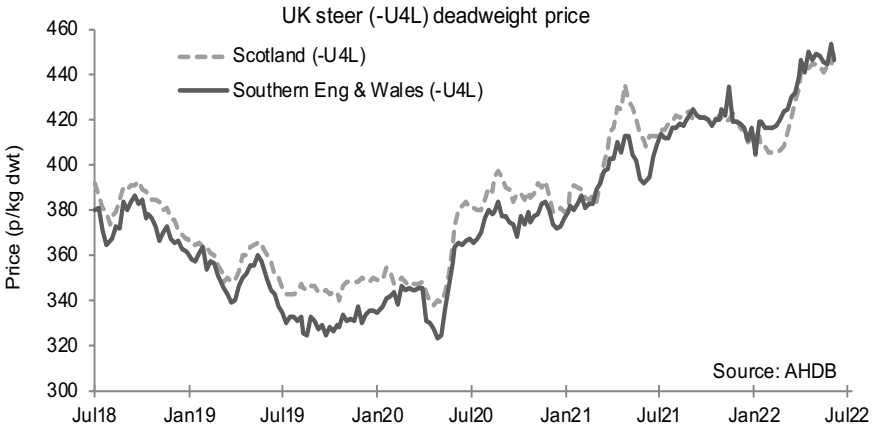
These are based on the requirements for a spring born heifer calving at 24 months.

Beef Cattle

Introduction

Markets and price drivers

The last few years have seen supply and demand become increasingly important to the beef market. With no intervention, the beef industry is now exposed to market forces and as such, beef price has become much more volatile. The market was steady in 2021 with some COVID-19 lockdowns closing hospitality and driving retail sales which helped to underpin the price. Imports were very low due to the closed hospitality sector and therefore lack of demand. The majority of Scottish processing capacity is now controlled by foreign companies.



The UK is still heavily reliant on imports of beef, particularly from Ireland. The volume of beef imported to the UK has a major effect on the UK price.

Volatility and lack of certainty impacts producer confidence especially considering beef production's long lead-time. Meeting carcase specification of the intended market is essential, and a short finishing period is likely to be most cost effective. Carcase balance issues also influence the producer price, for example, demand for higher value steaks over the BBQ season can lift whole carcase value. Beef demand is equally sensitive to inflation, the competitiveness of beef imports and alternative proteins such as chicken.

The demand for manufacturing beef (mince etc) has been exceptionally high in 2022 with a global shortage in supply. This has led to record cull cow trades with deadweight cows over £4.00/kg

With few exceptions, beef is traded on the commodity spot market and therefore most producers cannot use forward contracts or other price levelling mechanisms as a risk management tool. There is now a great deal of interest in shortening supply chains and dealing with or close to

the end consumer. While the whole beef industry can't do this, there are opportunities for some businesses to deal directly with their consumer and ensure both profitability and business resilience.

Marketing

The vast majority of prime cattle marketed in Scotland are marketed direct to the slaughterhouse and sold deadweight. However, a large proportion will be traded at some stage in their lives through the auction system. The live cattle auction provides a valued service, bringing many buyers and sellers together and creating genuine, healthy competition to buy livestock.

While some farmers sell all their cattle on one day, many seek to spread their risk by targeting several large sales per year. Price can be influenced by gaining feedback from buyers and selling the right type of cattle at the appropriate sales. Similarly, when selling direct to processors, a higher price might be achievable if a large number of in-specification cattle can be delivered at pre-arranged times and/or agreed to be spread throughout the year.

Margins

The bottom-line contribution of cattle is highly sensitive to the sales price. With the current market system, farmers have very limited options to influence the price they receive. For most farmers, efficiency savings are the key to improving financial performance. Efficiency savings also bring about a reduction to the carbon footprint for individual farm businesses.

The most profitable suckler cow enterprises make a positive net margin before subsidy. Top performing suckler beef systems tend to rear more calves per cow, to heavier weights, using less purchased feed. To achieve this, grassland management is key. Furthermore, while fixed costs may be lower, they are also diluted by selling more kilos of beef. The best farmers target investment in infrastructure and equipment towards things that lead to cost savings.

Suckler cow margins look to have remained steady this year with a strong store cattle trade. For producers with homegrown feeds and straw this will have benefitted them, however, with the rising input costs in some businesses the margin may be squeezed. There are concerns going into the winter of 2022 with high input prices and high cull cow values that cow numbers will reduce further.

Finishers margins have been under pressure this year, even with a high sales price (in excess of £4.50/kg – September 2022) the high price of store cattle has reduced any possible improvement in the margin.

Other benefits

It is important to remember that the cows form part of a business. How the enterprise complements other parts of the business is also important. For example, the share and spread of demand for labour and machinery

will affect the success of the enterprise mix in a business. Furthermore, well managed multiple enterprises can spread risk and improve cash flow, having additional and multiple sale dates.

Suckler cows play a vital role in managing upland grazings, providing benefit to biodiversity, landscape management and grazing quality. Mixed livestock grazing systems also contribute to reduced worm burdens for both cattle and sheep. Their manure is also an important source of nutrients for arable cropping as part of a crop rotation. Consequently, any enterprise should not be viewed in isolation.

Subsidies and support
The Scottish Suckler Beef Support Scheme (SSBSS), commenced in 2015. Payment is made on male and female calves, which are at least 75% beef bred, born on your holding and have been kept there for at least 30 days. The net payment rate per eligible calf on the mainland was approximately £103 and £147 on the islands. Actual payment rates are determined by the number of calves claimed each year and the exchange rate for that year. Payments are confirmed once applications are validated in the spring following the year of claim.

For further details on payments and the requirements of the SSBSS see pages 473-474 in the Rural Aid Schemes section.

General Reference Data

Store cattle valuations
The sale value of store cattle can vary depending on time of sale. This variation has been removed for the gross margins.

The age and weight of calves at sale varies depending on season or month of calving - *be cautious when comparing spring and autumn calving herds.*

Note that an increasing share of fixed costs are attributable as the length of time trading stock spend on farm increases – this is true where other breeding or trading stock could have made use of the farm resources.

Foster calves
To reduce risk of disease, it is assumed that no foster calves are bought to replace dead calves. No cost for replacement calves has been included in the margins thus, if foster calves are bought, the appropriate adjustment should be made to the gross margin.

Liveweight to deadweight-price conversion
In order to calculate the deadweight price, divide the liveweight price by the killing out percentage (KO %). For example: 200 p/kg / 0.52 = 385 p/kg deadweight. See following quick reference table:

Liveweight Price (p/kg)	Killing out % 50%	52%	54%	56%	58%	60%
	Deadweight price (p/kg)					
180	360	346	333	321	310	300
182	364	350	337	325	314	303
184	368	354	341	329	317	307
186	372	358	344	332	321	310
188	376	362	348	336	324	313
190	380	365	352	339	328	317
192	384	369	356	343	331	320
194	388	373	359	346	334	323
196	392	377	363	350	338	327
198	396	381	367	354	341	330
200	400	385	370	357	345	333
202	404	388	374	361	348	337
204	408	392	378	364	352	340
206	412	396	381	368	355	343
208	416	400	385	371	359	347
210	420	404	389	375	362	350
212	424	408	393	379	366	353
214	428	412	396	382	369	357
216	432	415	400	386	372	360
218	436	419	404	389	376	363
220	440	423	407	393	379	367
222	444	427	411	396	383	370
224	448	431	415	400	386	373
226	452	435	419	404	390	377
228	456	438	422	407	393	380
230	460	442	426	411	397	383
232	464	446	430	414	400	387
234	468	450	433	418	403	390
236	472	454	437	421	407	393
238	476	458	441	425	410	397
240	480	462	444	429	414	400
242	484	465	448	432	417	403
244	488	469	452	436	421	407
246	492	473	456	439	424	410
248	496	477	459	443	428	413
250	500	481	463	446	431	417

Hill Suckler Cows

PHYSICAL DATA

	Spring	Autumn
Calving period	**Feb-Apr**	**Sep-Nov**
Calves weaned per 100 cows put to the bull	90%	90%
Month of weaning	October	July
Days to weaning	220	270
Month of sale	October	October
Lwt of calves: at weaning (kg)	235	270
Lwt of calves: at sale/transfer (kg)	235	335
Herd life of cows (years)	7	7
Herd life of bulls (years)	4	4
Cow mortality (%)	1	1
Calf mortality (%)	4.5	4.5
Cow:bull ratio (:1)	35	35
Feeding/cow and calf (winter days):	180	200
silage (t)	5.5	7.5
straw (kg)	-	-
creep feed (kg) (incl. pre sale)	-	250
cow concentrates (kg)	50	200
cow cobs (kg)	50	50
grazing (hill/rough pasture)	>0.5	>0.6
Silage fertiliser (kg N/ha)	125	125
Silage:		
yield (t/ha from 1-cut)	20	20
DM quality (g/kg)	300	300
ME quality (MJ/kg DM)	10	10
Rough grazing (ha)	>0.6	>0.5
Silage & aftermath grazing (ha)	0.28	0.375
Housing system:		
Straw for general use incl. calving pens	0.33	0.42
Straw bedding (if in bedded courts) (t)	1.25	1.50

Based on bought-in straw.

* Amend bedding costs for cows outwintered or housed on straw.

Assumptions:

1. Grazing is assumed to be hill grazing with some improvements, carrying a maintenance charge of £50/grazing livestock unit.
2. SSBSS value is based on mainland payments, adjusted for living calves at 30 days of age. For further detail on this scheme see pages 152 and 473-474.

Hill Suckler Cows

GROSS MARGIN DATA

Calving period	**Spring Feb-Apr**	**Autumn Sep-Nov**
OUTPUT	**£/cow**	**£/cow**
Calf sales (lwt)		
Steers 350 kg @ 250 p / Heifers 320 kg @ 250 p	-	754
Steers 250 kg @ 250 p / Heifers 220 kg @ 250 p	529	-
Scottish Suckler Beef Support Scheme	95	95
	624	849
Less: Replacement - cow	83	83
bull	25	25
	516	741
VARIABLE COSTS		
Cow concentrates @ £390/t	20	78
Cow cobs @ £390/t	20	20
Creep feed @ £390/t	-	98
Vet & medicines	38	38
Straw bedding @ £110/t (bought-in)	36	46
Commission, haulage & tags	46	55
	160	335
Gross Margin before forage	356	406
Forage variable costs:		
silage @ £428/ha	118	161
grazing @ £10/grazing livestock unit	11	15
	129	176
Total Variable Costs	289	511
GROSS MARGIN £/cow	227	230

Sensitivity-Change ±	**Change in Gross Margin/head (£)**	
10 p/kg in lwt sale price	21	30
Sale weight ± 10kg	22	22
Herd life ± 1 year	16	16

Replacement Cost prices:

Cull cow	£720	In-calf heifer (purch.)	£1,250
Cull bull	£1,000	Replacement bull	£4,500

Upland Suckler Cows - Mainly Silage Diets

PHYSICAL DATA

Breed: Commercial cows bred to a range of bulls, mostly continental.

Calving period	**Feb-Apr**	**May-Jun**	**Aug-Oct**
Calves weaned	92%	92%	92%
Month of weaning	October	February	July
Days to weaning	220	270	300
Month of sale	October	April	October
Lwt of calves: at weaning (kg)	275	310	340
Lwt of calves: at sale/transfer (kg)	275	350	400
Herd life of cows (years)	7	7	7
Herd life of bulls (years)	4	4	4
Cow mortality (%)	1	1	1
Calf mortality (%)	4.5	4.5	4.5
Cow:bull ratio (:1)	35	35	35
Feeding/cow and calf (winter days):	180	180	200
silage (t)	4.8	5.0	7.5
straw (t)	0.3	0.2	0.35
calf concentrates (kg)	100	500	350
cow concentrates (kg)	100	150	200
Grazing fertiliser (kg N/ha)	125	125	125
Silage & aftermath fertiliser (kgN/ha)	200	200	200
Silage:			
yield (t/ha from 1-cut)	23	23	23
DM quality (g/kg)	300	300	300
ME quality (MJ/kg DM)	10.5	10.5	10.5
Overall forage area (ha):			
silage and aftermath grazing	0.21	0.22	0.33
grazing	0.30	0.30	0.34
	0.51	0.52	0.67
Housing system: In cubicles*			
Straw for general use incl. calving pens	0.33	0.33	0.42
Straw bedding (if in bedded courts) (t)	1.25	1.75	1.50

Based on bought-in straw, adjust if home-grown.

* Amend bedding costs for cows outwintered or housed on straw.

Assumptions:

1. Mainly grass farm either buying in all straw and concentrates or growing small amount of cereals. May/June calves weaned in February when on silage diets.
2. SSBSS value is based on mainland payments, adjusted for living calves at 30 days of age, and an exchange rate of £0.89/€. For further detail on this scheme see pages 152 and 473-474.

Upland Suckler Cows - Mainly Silage Diets

GROSS MARGIN DATA

Calving period			**Feb-Apr**	**May-Jun**	**Aug-Oct**
OUTPUT			**£/cow**	**£/cow**	**£/cow**
Calf sales (lwt - 92% crop)					
Steers		Heifers			
290 kg @	250 p	260 kg @ 250 p	633	-	-
370 kg @	250 p	330 kg @ 250 p	-	805	-
420 kg @	250 p	380 kg @ 250 p	-	-	920
Scottish Suckler Beef Support Scheme			97	97	97
			730	902	1017
Less: Replacement -		cow	98	98	98
		bull	29	29	29
			603	775	890
VARIABLE COSTS					
Cow concentrates @ £390/t			39	59	78
Calf concentrates @ £397/t			40	199	139
Vet & medicines			40	40	40
Feeding straw @ £100/t (bought-in)			30	20	35
Bedding straw @ £100/t (bought-in)			33	33	42
Commission, haulage, tags & levies			51	58	62
			233	409	396
Gross Margin before forage			370	366	494
Forage variable costs:					
silage @ £428/ha			89	93	140
grazing @ £390/ha			117	117	133
			206	210	273
Total Variable Costs			439	619	669
GROSS MARGIN £/cow			164	156	221
GROSS MARGIN £/ha			323	302	332

Sensitivity-Change ±	**Change in Gross Margin/head (£)**		
10 p/kg in lwt sale price	25	32	37
Sale weight ± 10kg	23	23	23
Herd life ± 1 year	19	19	19

Replacement cost prices:

Cull cow	£931	In-calf heifer (purch.)	£1,550
Cull bull	£1,125	Replacement bull	£5,200

Suckler Cows - Mainly Straw Diets

PHYSICAL DATA

Breed: Dairy-beef cross cows bred to range of bulls, mostly continental.

Calving period	**Feb-Apr**	**May-Jun**	**Aug-Oct**
Calves weaned (%)	92%	92%	92%
Month of weaning	October	December	July
Days to weaning	220	200	300
Month of sale	October	April	October
Lwt of calves: at weaning (kg)	275	270	340
Lwt of calves: at sale/transfer (kg)	275	350	395
Herd life of cows (years)	7	7	7
Herd life of bulls (years)	4	4	4
Cow mortality (%)	1	1	1
Calf mortality (%)	4.5	4.5	4.5
Cow:bull ratio (:1)	35	35	35
Feeding/cow and calf (winter days):	180	180	200
silage (t)	1.5	-	-
straw (t)	1.5	2.2	1.3
calf concentrates (kg)	120	550	400
cow concentrates (kg)	600	550	1,500
Grazing fertiliser (kg N/ha)	175	175	175
Silage & aftermath fertiliser (kg N/ha)	175	-	-
Silage:			
yield (t/ha from 1-cut)	23	23	23
DM quality (g/kg)	300	300	300
ME quality (MJ/kg DM)	10.5	10.5	10.5
Overall forage area (ha):			
silage and aftermath grazing	0.07	-	-
grazing	0.34	0.38	0.40
	0.41	0.38	0.40
Housing system: Straw bedding assumed*			
Straw bedding (t)	0.75	1.05	0.90

Based on home-grown straw, adjust if bought-in.

* Amend bedding costs for cows outwintered or housed elsewhere.

Assumptions:

1. Mixed farm growing sufficient grain to cover concentrate and straw feeding/bedding requirements. Only purchasing protein and minerals. May/June calves weaned earlier to reduce cow wintering costs. Small amount of silage made to cover extra grass growth in early season.
2. SSBSS value is based on mainland payments, adjusted for living calves at 30 days of age, and an exchange rate of £0.89/€. For further detail on this scheme see pages 152 and 473-474.

Suckler Cows - Mainly Straw Diets

GROSS MARGIN DATA

Calving period		**Feb-Apr**	**May-Jun**	**Aug-Oct**
OUTPUT		**£/cow**	**£/cow**	**£/cow**
Calf sales (lwt - 92% crop)				
Steers	Heifers			
290 kg @ 250 p	260 kg @ 250 p	633	-	-
370 kg @ 250 p	330 kg @ 250 p	-	805	-
420 kg @ 250 p	370 kg @ 250 p	-	-	909
Scottish Suckler Beef Support Scheme		97	97	97
		730	902	1006
Less: Replacement -	cow	98	98	98
	bull	33	33	33
		599	771	875
VARIABLE COSTS				
Cow concentrates @ £360/t (home-mix)		216	198	540
Calf concentrates @ £367/t (home-mix)		44	202	147
Feeding straw @ £65/t (home-grown)		98	143	85
Bedding straw @ £65/t (home-grown)		49	68	59
Vet & medicines		40	40	40
Commission, haulage & tags		51	58	62
		498	709	933
Gross Margin before forage		101	62	-58
Forage variable costs:				
silage @ £428/ha		28	-	-
grazing @ £528/ha		180	201	211
		208	201	211
Total Variable Costs		706	910	1144
GROSS MARGIN £/cow		-107	-139	-269
GROSS MARGIN £/ha		-263	-365	-671

Sensitivity-Change ±	**Change in Gross Margin/head (£)**		
10 p/kg in lwt sale price	25	32	36
Sale weight ± 10kg	23	23	23
Herd life ± 1 year	19	19	19

Replacement cost prices:

Cull cow	£931	In-calf heifer (purch.)	£1,550
Cull bull	£1,125	Replacement bull	£5,800

Spring Calving Cows Producing 18 - 20 Month Finished Cattle

PHYSICAL DATA

Breed: Commercial cows bred to a range of bulls, mostly continental

		Steers	**Heifers**
Calving period		Feb-Apr	Feb-Apr
Calves weaned (%)		92%	92%
Month of weaning		October	October
Calves sold finished (%)		91%	91%
Sale weight (kg lwt)		650	600
Dead weight (kg dwt)		365	340
Weaning weight (kg lwt)		290	260
Herd life of cows (years)		7	7
Herd life of bulls (years)		4	4
Cow:bull ratio (:1)		35	35
Feeding/cow and calf (winter days):			
silage (t)		5.0	5.0
straw bedding (t)		2.0	2.0
calf concentrates (kg) pre-weaning		100	100
cow concentrates (kg)		100	100
Forage area (ha):	silage + aftermath	0.16	0.16
	grazing	0.30	0.30
Overwintered calves:			
Feeding period 180 days, October-April			
Liveweight gain (kg)		110	110
Average daily liveweight gain (kg)		0.8	0.8
Feeding: barley/protein/minerals (t)		0.42	0.35
silage (t)		3.5	3.0
Silage area (ha)		0.11	0.10
Finishing cattle:			
Feeding period (days):	at grass	180	180
	housed	60	60
Liveweight gain		250	230
Daily liveweight gain:	at grass	0.8	0.8
	housed	1.2	1.2
Feeding: concentrates at grass (t)		0.20	0.25
barley/protein/minerals in house (t)		0.70	0.70
straw fed in house (t)		0.1	0.1
Grazing area (ha)		0.23	0.20

Housing system: Straw bedding assumed, home-grown*

* Amend bedding costs for cows outwintered or on slurry systems.

Assumption: SSBSS value as per note on page 158.

Spring Calving Cows Producing 18 - 20 Month Finished Cattle

GROSS MARGIN DATA

	Spring born	
	Steer	**Heifer**
OUTPUT	**£/cow**	**£/cow**
Calf sales (dwt - 91% crop)		
365 kg @ 425 p	1,412	-
340 kg @ 425 p	-	1,315
Scottish Suckler Beef Support Scheme	96	96
	1,508	1,411
Less: Replacement - cow	98	98
bull	33	33
	1,377	1,280
VARIABLE COSTS		
Cow concentrates @ £390/t	39	39
Calf concentrates @ £397/t	40	40
Barley, protein & minerals @ £350/t housed	392	368
Barley, protein & minerals @ £350/t at grass	70	88
Feeding straw @ £65/t (home-grown)	7	7
Bedding straw @ £65/t (home-grown)	130	130
Vet & medicines	75	75
Commission, levies & haulage	95	91
	848	838
Gross Margin before forage	529	442
Forage variable costs:		
silage @ £685/ha	185	178
grazing @ £390/ha	207	195
	392	373
Total Variable Costs	1,240	1,211
GROSS MARGIN £/cow	137	69
GROSS MARGIN £/ha (acre)	171 (69)	91 (37)

Sensitivity-Change ±	**Change in Gross Margin/head (£)**	
10 p/kg in dwt sale price	33	31
Not bedded on straw	130	130
£10/t in straw price	21	21

Replacement cost prices:

Cull cow	£931	In-calf heifer (purch.)	£1,550
Cull bull	£1,125	Replacement bull	£5,750

Overwintering Spring-Born Suckled Calves

PHYSICAL DATA

		Spring-born Steer		Spring-born Heifer	
Purchase/transfer date		October		October	
Sale/transfer date		April		April	
Feeding period (days)		180		180	
Liveweight:	at purchase/transfer (kg)	290		260	
	at sale/transfer (kg)	420		386	
Average daily liveweight gain (kg/day)		0.7		0.7	
Mortality (%)		1%		1%	
Feeding:	diet basis	silage	straw	silage	straw
	barley/protein/minerals (t)	0.30	0.75	0.25	0.75
	silage (t)	3.5	-	3.0	-
	straw (t) ME 6.5 MJ/kg DM	-	0.8	-	0.8
Silage area (ha)		0.11	-	0.10	-
Silage: yield (t/ha)		31	31	31	31
DM quality (g/kg)		300	300	300	300
ME quality (MJ/kg DM)		10.6	10.6	10.6	10.6
N-fertiliser (kg/ha)		220	220	220	220
Housing system: Straw bedding assumed*.					
Straw bedding (t)		0.5	0.3	0.5	0.3

Cost @ £65/t based on home grown straw - adjust if bought in.

* Amend bedding costs if outwintered or on slurry systems.

Assumptions:

1. Silage diet concentrates phased out by 4 weeks to turnout.
2. Silage could be costed on a per tonne basis for clamp silage instead of a per hectare basis to reflect the true cost of growing, making, storing and handling silage.

Overwintering Spring-Born Suckled Calves

GROSS MARGIN DATA

	Spring-born			
	Steer		**Heifer**	
OUTPUT	**£/head**		**£/head**	
Sale value (lwt - 1% mortality):				
420 kg @ 250 p	1040		-	
386 kg @ 250 p	-		955	
Less: Weaned calf (lwt):				
290 kg @ 250 p	725		-	
260 kg @ 250 p	-		650	
	315		305	
VARIABLE COSTS				
Diet basis	*silage*	*straw*	*silage*	*straw*
Barley, protein & minerals @ £350/t	105	-	88	-
Barley, protein & minerals @ £350/t	-	263	-	263
Feeding straw @ £65/t (home-grown)	-	52	-	52
Bedding straw @ £65/t (home-grown)	33	20	33	20
Vet & medicines	31	31	31	31
Commission, levies & haulage	52	52	49	49
	221	418	201	415
Gross Margin before forage	94	-103	104	-110
Forage variable costs:				
silage @ £685/ha	75	-	69	-
Total Variable Costs	297	418	270	415
GROSS MARGIN £/head	18	-103	35	-110
GROSS MARGIN £/ha (acre)	168 (68)	-	353 (143)	-

Sensitivity-Change ±	**Change in Gross Margin/head (£)**			
10 p/kg in lwt sale price	41	41	39	39
10 p/kg in lwt purchase price	29	29	26	26
Not bedded on straw	33	20	33	20
£10/t in straw price	5	11	5	11

Finishing Spring-Born Suckled Calves Intensively at 13 Months

PHYSICAL DATA

	Spring-born	
	Steer	**Bull**
Purchase/transfer date	October	October
Sale date	June	May
Feeding period (days)	240	225
Liveweight: at purchase/transfer (kg lwt)	300	300
at sale (kg lwt)	612	630
Deadweight at sale (kg dwt)	337	353
Average daily liveweight gain (kg/day)	1.30	1.47
Mortality (%)	1.0	1.0
Feeding:		
barley/protein/minerals (t)	1.8	2.5
straw (t) ME 6.5 MJ/kg DM	0.3	0.3
Housing system: Straw bedding assumed*.		
Straw bedding (t)	0.5	0.5

Based on home-grown straw, adjust if bought-in.

* Amend bedding costs if on slurry based systems.

Finishing Spring-Born Suckled Calves Intensively at 13 Months

GROSS MARGIN DATA

OUTPUT	Steer £/head	Bull £/head
Sale value (dwt - 1% mortality):		
337 kg @ 425 p (612 kg lwt)	1,416	-
353 kg @ 415 p (630 kg lwt)	-	1,449
Less: Store purchase (lwt):		
300 kg @ 250 p	750	-
300 kg @ 230 p	-	690
	666	759
VARIABLE COSTS		
Barley, protein & minerals @ £360/t	641	900
Feeding straw @ £65/t (home-grown)	20	20
Bedding straw @ £65/t (home-grown)	33	33
Vet & medicines	31	31
Commission, levies & haulage	62	63
Total Variable Costs	787	1047
GROSS MARGIN £/head	-121	-288

Sensitivity-Change ±	**Change in Gross Margin/head (£)**	
10 p/kg in dwt sale price	34	35
10 p/kg in lwt purchase price	30	30
Not bedded on straw	33	33
£10/t in straw price	7	7

Finishing Year Old Autumn-Born Suckled Calves at 18 Months

PHYSICAL DATA

	Autumn-born	
	Steer	**Heifer**
Purchase/transfer date	October	October
Sale date	April	April
Feeding period (days)	180	180
Liveweight: at purchase/transfer (kg lwt)	420	380
Liveweight: at sale (kg lwt)	650	600
Deadweight at sale (kg dwt)	360	340
Average daily liveweight gain (kg/day)	1.3	1.2
Mortality (%)	1.0	1.0
Feeding:		
barley/protein/minerals (t)	0.96	0.67
kg/day	3.9	3.7
silage (t)	4.5	4.5
kg/day	25.1	25.1
Silage area (ha)	0.15	0.15
Silage: yield	31	31
DM quality (g/kg)	300	300
ME quality (MJ/kg DM)	10.6	10.6
Silage fertiliser (kg N/ha)	220	220
Housing system: Straw bedding assumed*.		
Straw bedding (t)	0.75	0.70

Based on home-grown straw, adjust if bought-in.

* For slatted court omit bedding costs.

Assumptions:

1. Calves from Upland/Lowground Suckler Cows – silage or straw diet.
2. Silage could be costed on a per tonne basis for clamp silage instead of a per hectare basis to reflect the true cost of growing, making, storing and handling silage.

Finishing Year Old Autumn-Born Suckled Calves at 18 Months

GROSS MARGIN DATA

	Steer £/head		Heifer £/head	
OUTPUT				
Sale value (dwt - 1% mortality):				
360 kg @ 425 p (650 kg lwt)	1,515		-	
340 kg @ 425 p (600 kg lwt)	-		1,431	
Less: Weaned calf (lwt):				
420 kg @ 250 p	1,050		-	
380 kg @ 250 p	-		950	
	465		481	
VARIABLE COSTS				
Barley, protein & minerals @ £360/t	346		241	
Bedding straw @ £65/t (home-grown)	49		46	
Vet & medicines	24		24	
Commission, levies & haulage	65		63	
	484		374	
Gross Margin before forage	- 19		107	
Forage variable costs:				
silage @ £685/ha	103		103	
Total Variable costs	587		477	
GROSS MARGIN £/head	- 122		4	
GROSS MARGIN £/ha (acre)	- 811	-(328)	29	(12)

Sensitivity-Change ±	**Change in Gross Margin/head (£)**	
10 p/kg in dwt sale price	35	33
10 p/kg in lwt purchase price	42	38
Not bedded on straw	49	46
£10/t in straw price	7	7

Finishing Year Old Spring-Born Suckled Calves at 18 - 20 Months

PHYSICAL DATA

	Spring-born	
	Yearling steer	**Yearling heifer**
Purchase/transfer date	April	April
Sale date	December	October
Feeding period (days): at grass	240	240
housed	100	80
Liveweight: at purchase/transfer (kg lwt)	420	386
at housing (kg lwt)	532	498
at sale (kg lwt)	650	600
Deadweight at sale (kg dwt)	370	340
Average daily lwt gain: at grass (kg/day)	0.8	0.8
housed (kg/day)	1.1	1.2
Mortality (%)	0.3	0.3
Feeding:		
concentrates at grass (t)	0.20	0.25
barley/protein/minerals in house (t)	1.1	0.7
straw fed in house (t) ME 6.5 MJ/kg DM	0.1	0.1
Housing system: Straw bedding assumed*		
Straw bedding (t)**	0.25	0.20
Grazing area (ha)	0.23	0.20
Grazing fertiliser (kg N/ha)	175	175
Stocking rate at grass (animals/ha)	4.2	5.0

* Amend bedding costs if on slurry based systems.

** Based on home-grown straw, adjust if bought-in.

Finishing Year Old Spring-Born Suckled Calves at 18 - 20 Months

GROSS MARGIN DATA

OUTPUT	Steer £/head	Heifer £/head
Sale value (dwt - 0.3% mortality):		
370 kg @ 425 p (650 kg lwt)	1,568	-
340 kg @ 425 p (600 kg lwt)	-	1,441
Less: Yearling calf (lwt):		
420 kg @ 250 p	1050	-
386 kg @ 250 p	-	965
	518	476
VARIABLE COSTS		
Barley, protein & minerals @ £350/t (at grass)	70	88
Barley, protein & minerals @ £350/t (housed)	371	245
Feeding straw @ £65/t (home-grown)	7	7
Bedding straw @ £65/t (home-grown)	16	13
Vet & medicines	17	17
Commission, levies & haulage	66	63
	547	433
Gross Margin before forage	-29	43
Forage variable costs:		
grazing @ £528/ha	121	106
Total Variable costs	668	539
GROSS MARGIN £/head	-150	-63
GROSS MARGIN £/ha (acre)	-653 -(264)	-316 -(128)

Sensitivity-Change ±	Change in Gross Margin/head (£)	
10 p/kg in dwt sale price	37	34
10 p/kg in lwt purchase price	42	39
Not bedded on straw	16	13
£10/t in straw price	3	-

Beef Cattle Summer Finishing

PHYSICAL DATA

		Steer	Heifer
Liveweight at purchase	(kg)	450	420
Liveweight at slaughter	(kg lwt)	600	570
	(kg dwt)	330	310
Cattle bought		mid-April	mid-April
Cattle sold		mid-September	mid-September
Finishing period (days)		150	150
Liveweight gain (kg)		150	150
Daily liveweight gain (kg)		1.0	1.0
Supplementary feed:			
barley, proteins & minerals (kg)		308	250
Grazing area (ha)		0.23	0.20
Grazing fertiliser N (kg/ha)		175	175
Feed levels per day:			
first 8 weeks (kg)		0	0
next 6 weeks (kg)		3	2
next 4 weeks (kg)		4	3
last 2 weeks* (kg)		5	4

* Feed at this level to finish by mid-September. Many will house by this time if finishing later.

Assumptions:

In practice, a proportion of the following cattle may be sold as forward stores or housed for autumn finishing at heavier weights. If so, additional concentrate feeding will be required.

Beef Cattle Summer Finishing

GROSS MARGIN DATA

OUTPUT	Steer £/head	Heifer £/head
Sale value (dwt):		
330 kg @ 425 p (600 kg lwt)	1,403	-
310 kg @ 425 p (570 kg lwt)	-	1,318
Less: Purchased store calf in April (lwt):		
450 kg @ 250 p	1,125	
420 kg @ 250 p	-	1050
	278	268
VARIABLE COSTS		
Barley, protein & minerals @ £350/t	108	88
Vet & medicines	17	17
Commission, levies & haulage	62	60
	187	165
Gross Margin before forage	91	103
Forage variable costs:		
grazing @ £528/ha	121	106
Total Variable costs	308	271
GROSS MARGIN £/head	-30	-3
GROSS MARGIN £/ha (acre)	-131 -(53)	-16 -(7)

Sensitivity-Change ±	Change in Gross Margin/head (£)	
10 p/kg in dwt sale price	33	31
10 p/kg in lwt purchase price	45	42

Calf Rearing Costs to 3 Months

PHYSICAL DATA

		Bucket fed	*Ad-lib* fed
Liveweight (kg):	at birth	40	40
	at sale, 3 months	110	115
Liveweight gain (kg/day)		0.78	0.83
Feeding period (days)		90	90
Mortality (%)		5	4
		kg	**kg**
Feeding*:	Milk substitute	28	42
	Calf concentrates	160	150
	Hay	35	30
	Bedding (straw)	0.2	0.2

* Homebred calves receive colostrum followed by whole milk up to 10 days of age.

Calf Rearing Costs to 3 Months

VARIABLE COST DATA

	Bucket fed	Ad-lib
VARIABLE COSTS		
Feed:		
milk substitute @ £2475/t	69	104
calf concentrate @ £420/t	67	63
hay (purchased) @ £120/t	4	4
	140	171
Vet & medicines & tags	23	23
Bedding straw @ £65/t (home-grown)	13	13
	36	36
Total Variable Costs	176	207

Sensitivity-Change ±	**Change in costs/head (£)**	
£100/t in milk substitute price	2.80	4.20
£10/t in calf concentrate price	1.60	1.50

Assumptions:

1. Dairy calves do not receive SSBSS payments – eligible calves have to be 75% beef genetics.
2. Adjust straw cost if bought-in.

Intensive Finishing of Dairy Bred Bulls

PHYSICAL DATA

	Holstein	Beef
Breed		**Cross**
Liveweight at start (kg)	110	120
Feeding period (days)	290	300
Liveweight at slaughter (kg lwt)	500	545
Deadweight at slaughter (kg dwt)	265	300
Killing out percentage (%)	53	55
Overall daily liveweight gain (kg/day)	1.3	1.4
Mortality (%)	3	3
Feeding [1]**:**		
110-120 kg liveweight/purchase to slaughter:		
concentrates (barley/protein/minerals) (t)	2.15	2.30
straw (t)	0.4	0.4
Housing system: Straw bedding assumed [2].		
Straw bedding [3] (t)	0.6	0.6

1 For home bred calves see '*Calf rearing costs to 3 months'* (pages 172-173) for cost of feeding to 12-14 weeks (or 110-115kg lwt).

2 If housed on slurry based systems omit bedding costs.

3 Adjust straw cost if bought-in.

Intensive Finishing of Dairy Bred Bulls

GROSS MARGIN DATA

OUTPUT	Holstein £/head	Beef Cross £/head
Sale value (dwt - adj 3% mortality):		
265 kg @ 350 p	900	-
300 kg @ 390 p	-	1,135
Less: Calf purchase (3 months):		
@ £220	220	-
@ £320	-	320
	680	815
VARIABLE COSTS		
Concentrates @ £360/t	774	828
Feeding straw @ £65/t (home-grown)	26	26
Bedding straw @ £65/t (home-grown)	39	39
Vet & medicines	19	19
Commission, haulage & levies, etc.	49	55
Total Variable costs	907	967
GROSS MARGIN £/head	- 227	- 152

Sensitivity-Change ±	**Change in Gross Margin/head (£)**	
£10/t in concentrate price	22	23
10 p/kg in dwt sale price	25	29

Forage Based Finishing Dairy Steers at 24 Months

PHYSICAL DATA

	Holstein	Beef
Breed		**Cross**
Liveweight at start (kg) [1]	110	125
Feeding period (days)	659	659
Liveweight at slaughter (kg lwt)	618	632
Deadweight at slaughter (kg dwt)	315	335
Killing out percentage (%)	51	53
Overall daily liveweight gain (kg/day)	0.8	0.8
Mortality (%)	3	3
Feeding:		
110-125 kg liveweight/purchase to slaughter:		
concentrates (2nd stage calf mix) (t)	0.15	0.15
concentrates (barley/protein/minerals) (t)	0.59	0.68
silage (t) - over two housing periods	6.0	6.4
Grazing area - over two summers (ha)	0.42	0.42
Silage area - for two housing periods (ha)	0.30	0.32
Silage: yield	20	20
DM quality (g/kg)	240	240
ME quality (MJ/kg DM)	10.6	10.6
Silage fertiliser (kg N/ha)	125	125
Housing system: Straw bedding assumed [2].		
Straw bedding [3] (t)	1.2	1.2

1 For home bred calves see '*Calf rearing costs to 3 months*' (pages 172-173) for cost of feeding to 12-14 weeks (or 110-115kg lwt).

2 If housed on slurry based systems omit bedding costs.

3 Adjust straw cost if bought-in.

Forage Based Finishing Dairy Steers at 24 Months

GROSS MARGIN DATA

	Holstein		Beef Cross [3]	
OUTPUT	£/head		£/head	
Sale value (dwt - adj 3% mortality):				
315 kg @ 400 p	1,222		-	
335 kg @ 400 p	-		1,300	
Less: Calf purchase :				
@ £220	220		-	
@ £320	-		320	
	1,002		980	
VARIABLE COSTS				
Concentrate calf mix @ £380/t	54		54	
Concentrate barley blend @ £360/t	212		245	
Bedding straw @ £65/t (home grown)	78		78	
Vet & medicines	34		34	
Commission, haulage & levies, etc.	57		59	
Total Variable costs	435		470	
Gross Margin before forage	567		510	
Forage variable costs:				
silage @ £428/ha	128		137	
grazing @ £390/ha	164		164	
	292		301	
Total Variable costs	727		771	
GROSS MARGIN £/head [1]	275		209	
GROSS MARGIN £/ha (acre) [2]	191	(77)	141	(57)

Sensitivity-Change ±	Change in Gross Margin/head (£)	
£10/t in concentrate price	6	7
10 p/kg in dwt sale price	31	32

1 Unlike other beef finishing enterprises featured in the Farm Management Handbook, spanning over two years effectively incurs double the fixed cost share, which is not included above.

2 This enterprise produces a strong gross margin per head but the extensive nature of this enterprise dilutes its return per hectare.

3 The higher sales value of a continental-cross steer is majorly offset by the higher calf purchase price.

Sheep

Introduction

Markets and price drivers

The UK flock size was reported to stand at 14.5 million breeding ewes in the 2021 Defra December Census, a 2.7% growth year-on-year, although it remains below the 14.7 million ewes reported in 2016 and 2017. Other sheep and lamb numbers increased 3.7% from December 2020 to December 2022 to 8.3 million animals. This growth trend may be a rebound following pre-Brexit flock contraction and in response to a steady uplift in global demand for sheep meat.

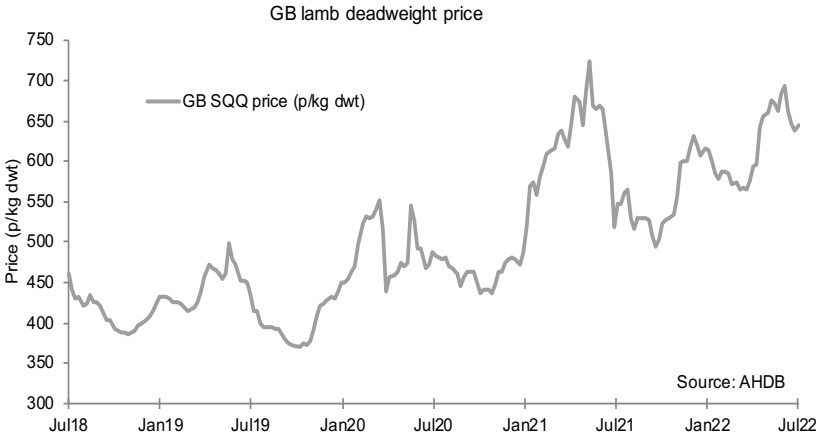
The UK remains the third largest sheep meat exporter, with over 95% of exports to the EU, competing with continental producers, New Zealand and Australia. To address seasonality of supply and carcass balance issues, the UK exports whole and half carcases, predominantly to France and Germany, and imports legs and loins from New Zealand and Australia. Reduced lamb supply in the Southern Hemisphere, the high value Chinese market, and the price of lamb relative to competitors have been key drivers of our favourable export demand in 2022. The flock in the southern hemisphere is rebuilding however, with favourable conditions returning, the Australian flock is forecast to increase by 3.5 million ewes.

Since leaving the EU, the UK has negotiated free trade agreements with Australia and New Zealand. However, shipping costs, processing issues and the attractive Chinese and US markets make it unlikely that these agreements will result in a big impact on import volumes in the short-term.

UK domestic consumption of lamb has declined over the last 40 years. However, the Islamic festivals are proving influential to demand. In 2023, Ramadam is set to end on April 21st and is followed by Eid al-Fitr until April 22nd and then Qurbani/Eid al-Adha falls on June 28th to July 2nd (dates are subject to the moon phases). These dates may benefit early season lamb price next year. Lamb is a premium product, although beef price is now comparable, lamb is expensive compared with other proteins, such as chicken and pork, and is therefore vulnerable to changing financial pressures experienced by the general public. Roasting leg joint demand has decreased more than other cuts, this indicates the effect of price and changing consumption patterns.

The producer price is significantly influenced by seasonality of supply as shown in the chart overleaf. Most producers finish their lambs off grass or forage crops; therefore weather is a key driver of lamb supply and thus, lamb price.

Recent trends in GB lamb deadweight price are shown in the following chart.



Marketing

Prime lamb sales are almost entirely reliant on the spot market. Since it is a seasonal product, the timing of sales has a large influence on price. Old season lamb tends to recover value heading towards the Easter market and as supply declines. However, producers incur greater costs to either grow a lamb quickly for the early market or delay sale until the price rises again in early spring. As the season progresses into the summer, the volume of lamb reaching the marketplace increases and the supply exceeds domestic demand. This moves the UK to being a net exporter, meaning a heavy reliance on the European customer. A competitive UK price compared with European lamb price works to our favour at this time.

The auction market typically accounts for 50% of sheep sales across the UK. Like the cattle market, the live auction system provides an important service. It is a mechanism that brings together sheep and customers to establish a transparent price. The most common method to spread risk, when selling at livestock auctions, is to target multiple sales per year. The future price may be influenced by buyer feedback. Similarly, when selling direct to processors, an improved price may be achieved if a large number of in-specification lambs can be delivered at pre-arranged times.

Supermarket specification lamb accounts for most domestic sales, however, a butcher's lamb is also a sizeable market (c. 10%). Over 40% of lamb marketed is out of specification. Exports include the heavy lamb trade to northern European countries, particularly France, which accounts for ~40% of sheepmeat exports. Belgium and Luxemburg are particularly important outlets for E and U grade lambs.

Technical performance

Sheep enterprise margins are inevitably sensitive to the sales price. However, there is limited opportunity to influence the overall market and greater potential exists through improving production efficiency within the

farmgate. Top performing flocks consistently rear more lambs, sell more finished (if they are on the right land type) and use less purchased inputs. Whilst fixed costs on these top performing farms may be lower, they are also spread over more kilos of lamb sold (higher output).

Subsidies and support

The Scottish Upland Sheep Support Scheme (SUSSS) is a coupled support payment for sheep to provide additional support to producers on LFASS category A land. The payment rate is estimated at €70/ewe hogg annually, but actual payment rates will be determined by the number of hogg applications each year. The full payment is made during the summer following the year when the claim is made. This support has not been included in the 2022/23 budget gross margins due to the specific nature of scheme eligibility. See Rural Aid Schemes, page 467 for more details.

General Reference Data

Sheep feeding

Suggested daily rations (kg fresh matter) for Scottish Blackface ewes (60 kg lwt) during pregnancy using average quality baled silage (DM 300g/kg, ME 10.5MJ/kg DM) and hay (DM 830g/kg, ME 8.3MJ/kg DM).

Weeks before lambing	Single-bearing ewes		Twin-bearing ewes	
	Silage	*Concentrates*	*Silage*	*Concentrates*
8	2.8	0	2.8	0
6	2.8	0	2.7	0.15
4	2.7	0.25	2.5	0.35
2	2.6	0.35	2.3	0.45
	Hay	*Concentrates*	*Hay*	*Concentrates*
8	1.1	0	1.1	0.1
6	1	0.15	1	0.4
4	0.9	0.4	0.8	0.6
2	0.85	0.55	0.7	0.8

Suggested daily rations (kg fresh matter) for crossbred ewes (e.g., mule, 75 kg lwt) during pregnancy using average quality baled silage (DM 300 g/kg, ME 10.5 MJ/kg DM) and hay (DM 830 g/kg, ME 8.3 MJ/kg DM).

Weeks before lambing	Single-bearing ewes		Twin-bearing ewes	
	Silage	*Concentrates*	*Silage*	*Concentrates*
Mid-pregnancy	2.8 *	0	3 *	0
8	3.3	0	3.2	0.15
6	3.2	0.1	3	0.35
4	3.1	0.25	2.8	0.5
2	3	0.4	2.7	0.75

	Hay	*Concentrates*	*Hay*	*Concentrates*
Mid-pregnancy	1 *	0	1.1 *	0
8	1.3	0	1.4	0.15
6	1.3	0.15	1.2	0.35
4	1.2	0.35	1.1	0.65
2	1.1	0.6	0.8	1

* restricted amount fed. Requirements in mid-pregnancy can also be met with grazed grass or forage crops such as swedes or fodder beet.

Concentrates based on high quality compound, e.g. ME 12.5 MJ/kg DM and 18% CP (fresh basis). Farmers lambing their flocks from mid-April can meet the pregnant ewe's requirements on well managed grass alone.

Wool

Following the disruption of Covid-19, the wool market is seeing some recovery; during 2021, the prices increased more than 50% compared with 2020 levels. Most wool is marketed through the British Wool Marketing Board. For more details of wool prices, charges, collection centres and grading depots, please contact the BWMB (www.britishwool.org.uk).

Hard Hill

PHYSICAL DATA

Breeds	Blackface, South Country & Lairg type Cheviot		
	Lambs reared (%)		
	70%	**85%**	**100%**
Ewe hoggs wintered	Away	Away	Away
Lamb crops per ewe (avg)	4	4	4
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	3	3	3
Lamb numbers:			
marked	73	88	103
sold/retained	70	85	100
sold: finished lambs	0	0	0
store lambs	44	59	74
flock replacement	26	26	26
Ewe numbers:			
draft/cast	14	15	16
mortalities	12	11	10
Wool sales (kg)	160	160	160
Concentrate feeding (kg)	1,800	1,900	2,000
Hay reserve (/annum) (kg)	2,000	2,000	2,000

Basis of data:

1. Lambs are assumed sold at or by the autumn sales 2022 (estimated price).
2. Lambing percentage reflects the range of performance found.
3. Mortality in ewe hoggs is assumed to be 3%.
4. Ewe concentrate feeding – 18% CP, ideally a balanced compound with feeding of ewes selected on the basis of scanning results. Assumes self-feed blocks are used on less accessible hills although expensive per unit of energy, ME range 8.5 to 12 MJ/kg DM, total block intake can range from 25-100 blocks/100 ewes.
5. Higher performance can result from better winter nutrition and provision of improved summer grazing for selected ewes, particularly those nursing twins.
6. Grazing is not charged.
7. Hay bought in.
8. Reflects hill farms based in north and west of Scotland.

Hard Hill

GROSS MARGIN DATA

			Lambs reared (%)		
			70%	**85%**	**100%**
OUTPUT				**£/100 ewes tupped**	
Store Lambs	44 @	£60	2,640	-	-
	59 @	£60	-	3,540	-
	74 @	£60	-	-	4,440
Draft/cast ewes:	14 @	£75	1,050	-	-
	15 @	£75	-	1,125	-
	16 @	£75	-	-	1,200
Wool sales 160kg @ £0.3/kg			48	48	48
			3,738	4,713	5,688
Less: ram replacement (net)			350	350	350
			3,388	4,363	5,338
VARIABLE COSTS					
Sheep feed @ £360/t			648	684	720
Away wintering ewe hoggs at £25/head (inc. haulage)			650	650	650
Vet, medicines & dips			492	501	510
Commission, levies, haulage, shearing, scanning & tags			557	656	755
			2,347	2,491	2,635
Gross margin before forage			1,041	1,872	2,703
Forage variable costs: hay @ £105/tonne			210	210	210
Total Variable Costs			2,557	2,701	2,845
GROSS MARGIN			831	1,662	2,493

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**		
£10/hd in all lamb sales	440	590	740
£10/hd in draft ewe price	140	150	160
£50/tonne in concentrate price	90	95	100
3% in lambing rearing rate	79	106	133

Moderate Hill

PHYSICAL DATA

Breeds	Blackface, South Country & Lairg type Cheviot		
	Lambs reared (%)		
	80%	**90%**	**100%**
Ewe hoggs wintered	Away	Away	Away
Lamb crops per ewe (avg)	4	4	4
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	3	3	3
Lamb numbers:			
marked	83	93	103
sold/retained	80	90	100
sold: finished lambs	0	10	15
store lambs	54	54	59
flock replacement	26	26	26
Ewe numbers:			
draft/cast	14	14	16
mortalities	12	12	10
Wool sales (kg)	160	160	160
Concentrate feeding (kg)	1,800	1,900	2,000
Hay reserve (/annum) (kg)	3,000	3,000	3,000

Basis of data:

1. Lambs are assumed sold at or by the autumn sales 2022 (estimated price).
2. Lambing percentage reflects the range of performance found.
3. Mortality in ewe hoggs is assumed to be 3%.
4. Ewe concentrate feeding – 18% CP, ideally a balanced compound with feeding of ewes selected on the basis of scanning results. Assumes self-feed blocks are used on less accessible hills although expensive per unit of energy, ME range 8.5 to 12 MJ/kg DM, total block intake can range from 25-100 blocks/100 ewes.
5. Higher performance can result from better winter nutrition and provision of improved summer grazing for selected ewes, particularly those nursing twins.
6. Grazing is not charged.
7. Reflects hill farms based in Central Scotland

Moderate Hill

GROSS MARGIN DATA

			Lambs reared (%)		
			80%	**90%**	**100%**
OUTPUT				**£/100 ewes tupped**	
Finished lambs:	10 @	£95	-	600	-
	15 @	£95	-	-	900
Store lambs:	54 @	£60	3,240	3,240	-
	59 @	£60	-	-	3,540
Draft/cast ewes:	14 @	£90	1,260	1,260	-
	16 @	£90	-	-	1,440
Wool sales 160kg @ £0.3/kg			48	48	48
			4,548	5,148	5,928
Less: ram replacement (net)			350	350	350
			4,198	4,798	5,578
VARIABLE COSTS					
Sheep feed @ £360/t			648	684	720
Away wintering ewe hoggs at £25/head (inc. haulage)			650	650	650
Vet, medicines & dips			492	501	510
Commission, levies, haulage, shearing, scanning & tags			627	689	764
			2,417	2,524	2,644
Gross margin before forage			1,781	2,274	2,934
Forage variable costs: 0.6 ha hay @ £733/ha			440	440	440
Total Variable Costs			2,857	2,964	3,084
GROSS MARGIN			1,341	1,834	2,494

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**		
£10/hd in all lamb sales	540	990	1,190
£10/hd in draft ewe price	140	140	160
£50/tonne in concentrate price	90	95	100
3% in lambing rearing rate	97	115	133

Improved Hill

PHYSICAL DATA

Breeds	Hill breeds inc Blackface hill type, NCC		
Lambing period	Assumed to commence 2nd week April		
	Lambs reared (%)		
	110%	**120%**	**130%**
Ewe hoggs wintered	Home	Home	Home
Lamb crops per ewe	4	4	4
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	3	3	3
Lamb numbers:			
marked	113	123	133
sold/retained	110	120	130
sold: ewe lambs	10	20	30
finished lambs	10	20	30
store lambs	62	52	42
flock replacement	28	28	28
Ewe numbers:			
draft/cast	14	15	16
mortalities	10	9	8
Ewe hoggs purchased	0	0	0
Wool sales (kg)	250	250	250
Concentrate feeding (kg)	4,500	5,000	5,500
Silage (ha)	2	2	2
Hay reserve (/annum) (kg)	0	0	0
Bedding straw - 6wk period (kg/day)	80	80	80
Improved permanent pasture assumed (ha)	7.0	7.0	7.0

Basis of data:

1. Estimate of stock prices autumn/early winter 2022.
2. Ewes are first tupped as gimmers.
3. Ewe concentrate feeding – ideally a balanced compound 18% CP.
4. Approximately 14 ewes/hectare on improved pasture (125kg N/ha, see Grassland-Grazing section, page 76) assumed alongside hill grazing (not costed) and silage aftermath (70kg N/ha, one cut, see Grassland Silage and Aftermath, page 78).
5. Straw bedding based on 80 kg/day for 100 ewes housed over a 6-week lambing period.
6. Silage yield and quality 6t DM/ha; ME 10.5 MJ/kg DM.

Improved Hill

GROSS MARGIN DATA

				Lambs reared (%)		
				110%	120%	130%
OUTPUT				£/100 ewes tupped		
Ewe lambs:	10	@	£120	1,200	-	-
	20	@	£120	-	2,400	-
	30	@	£120	-	-	3,600
Finished lambs:	10	@	£92 (36kg lwt)	920	-	-
	20	@	£92	-	1,840	-
	30	@	£92	-	-	2,760
Store lambs:	62	@	£66	4,092	-	-
	52	@	£66	-	3,432	-
	42	@	£66	-	-	2,772
Draft/cast ewes:	14	@	£75	1,050	1,050	1,050
Wool sales 250kg @ £0.3/kg				75	75	75
				7,337	8,797	10,257
Less: ram replacement (net)				400	400	400
				6,937	8,397	9,857
VARIABLE COSTS						
Sheep feed @ £360/t				1,620	1,800	1,980
Vet, medicines & dips				627	636	645
Bedding straw @ £100/t (bought-in)				336	336	336
Commission, levies, haulage, shearing, scanning & tags				844	943	1,042
				3,427	3,715	4,003
Gross margin before forage				3,510	4,682	5,854
Forage variable costs:						
2 ha silage @ £428/ha				856	856	856
improved permanent pasture @ £390/ha				2,730	2,730	2,730
				3,586	3,586	3,586
Total Variable Costs				7,013	7,301	7,589
GROSS MARGIN				- 76	1,096	2,268
GROSS MARGIN per forage ha				- 8	122	252

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**		
10 p/kg lwt in finished lamb price	35	69	104
£5/hd in all lamb sales	410	460	510
£5/hd in cast ewe price	70	70	70
10% lamb rearing rate	621	767	913

Draft Blackface Ewes

PHYSICAL DATA

Breeds		Draft Blackface to a terminal or crossing sire		
Lambing period		Commencing mid-March		
		Lambs reared (%)		
		130%	**140%**	**150%**
Ewe flock life (seasons)		1.5	1.5	1.5
Ram flock life (seasons)		3	3	3
		/100 ewes tupped		
Rams (no.)		2.5	2.5	2.5
Lamb numbers:				
marked		133	143	153
sold/retained		130	140	150
sold:	store	13	14	15
	finished	52	56	60
	breeding	65	70	75
Ewe numbers:				
sales		64	64	64
mortalities		3	3	3
purchased		67	67	67
Wool sales (kg)		250	250	250
Concentrate use:				
Ewe concentrate: ME 12.5 MJ/kg, 18% CP (kg)		5,500	6,000	6,500
Forage:	hay - 12,600 kg and aftermath grazing (ha)	2.5	2.5	2.5
	grazing (ha)	7.0	7.0	7.0
Total forage (ha)		9.5	9.5	9.5
Bedding straw (kg/day)		80	80	80

Basis of data:

1. This enterprise often supplies ewe lambs for a crossbred flock enterprise on farm, therefore all ewe lambs might be kept. Estimated breeding stock prices, autumn, help determine the value of this.
2. Estimate of finished and store lamb prices, summer and autumn 2022.
3. Silage yield and quality 6 t DM/ha; ME 10.5 MJ/kg DM.
4. Liveweight of lambs at sale: 36 kg, 32 kg store or sold as ewe lambs for breeding.
5. Straw bedding based on 80 kg/day for 100 ewes housed over a 6-week lambing period.
6. Approximately 14 ewes/hectare on improved pasture (125kg N/ha, see Grassland-Grazing section, page 76) assumed alongside hill grazing (not costed) and silage aftermath (70kg N/ha, one cut, see Grassland Silage and Aftermath, page 78).

Draft Blackface Ewes

GROSS MARGIN DATA

			Lambs reared (%)		
			130%	140%	150%
OUTPUT			£/100 ewes tupped		
Ewe lambs:	65 @	£120	7,800	-	-
	70 @	£120	-	8,400	-
	75 @	£120	-	-	9,000
Finished lambs:	13 @	£92 (36 kg lwt)	1,196	-	-
	14 @	£92 (36 kg lwt)	-	1,288	-
	15 @	£92 (36 kg lwt)	-	-	1,380
Store lambs:	52 @	£66	3,432	-	-
	56 @	£66	-	3,696	-
	60 @	£66	-	-	3,960
Cast ewes:	64 @	£75	4,800	4,800	4,800
Wool sales 250kg @ £0.3/kg			75	75	75
			17,303	18,259	19,215
Less: ewes purchased - 67 @ £90			6,030	6,030	6,030
ram replacement (net)			354	542	542
			10,919	11,687	12,643
VARIABLE COSTS					
Ewe concentrate @ £360/t			1,980	2,160	2,340
Vet, medicines & dips			667	676	685
Bedding straw @ £100/t (bought-in)			336	336	336
Commission, levies, haulage, shearing, scanning & tags			1,575	1,646	1,718
			4,558	4,818	5,079
Gross margin before forage			6,361	6,869	7,564
Forage variable costs:					
silage @ £428/ha			1,070	1,070	1,070
grazing @ £390/ha			2,730	2,730	2,730
Total Variable Costs			8,358	8,618	8,879
GROSS MARGIN			2,561	3,069	3,764
GROSS MARGIN per forage ha			270	323	396

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**		
£5/hd in store lamb price	260	280	300
£5/hd in breeding stock value	325	350	375
£5/hd in cast ewe price	320	320	320
£5/hd in ewe purchase price	335	335	335
10% lamb rearing rate	1,243	1,338	1,434

Crossbred Ewes

PHYSICAL DATA

Breeds	Large crossbred (75-85kg) e.g. Scotch Mule, Mule-cross			
Breed of ram				Terminal Sire
Lambing period				Commencing early April
			Lambs reared (%)	
Lambing period			**140%**	**160%**	**180%**
Lamb crops per ewe (avg)			4.5	4.5	4.5
Ram flock life (seasons)			3	3	3
			/100 ewes tupped	
Rams (no.)			2.5	2.5	2.5
Lamb numbers:					
marked			142	162	182
sold/retained			140	160	180
sold:	finished lambs		120	140	160
	store lambs		20	20	20
Ewe numbers:					
culls			17	17	17
mortalities			5	5	5
gimmers purchased			25	25	25
Wool sales - ewes, rams & hoggs (kg)			270	270	270
Ewe concentrate: ME 12.5 MJ/kg DM, 18% CP (kg)			5,000	6,000	7,000
Forage: improved grazing (ha)			10.0	10.0	10.0
silage (ha)			2	2	2
Total forage (ha)			12	12	12
Bedding straw (kg/day)			80	80	80

Basis of data:

1. Estimates of gimmer, finished and store lamb and cast ewe prices, autumn 2022. Finished lambs at 42 kg, store 34 kg.
2. Bedding straw based on 80 kg/day for 100 ewes housed over a 6-week lambing period. This can be deducted if no housing required.
3. Modern rams are capable of running at 80/100:1 in lowland flocks, stocked tightly.
4. Approximately 14 ewes/hectare on improved pasture (125kg N/ha, see Grassland-Grazing section, page 76) assumed alongside hill grazing (not costed) and silage aftermath (70kg N/ha, one cut, see Grassland Silage and Aftermath, page 78)
5. Silage yield and quality 6 t DM/ha; ME 10.5 MJ/kg DM.
6. Concentrate feeding will vary; systems with higher silage quality and better pasture utilisation will use less concentrates.

Crossbred Ewes

GROSS MARGIN DATA

OUTPUT		Lambs reared (%)		
		140%	**160%**	**180%**
		£/100 ewes tupped		
Finished lambs:	120 @ £107 (42kg lwt)	12,840	-	-
	140 @ £107	-	14,980	-
	160 @ £107	-	-	17,120
Store lambs:	20 @ £79	1,580	-	-
	20 @ £79	-	1,580	-
	20 @ £79	-	-	1,580
Cast ewes:	17 @ £90	1,530	1,530	1,530
Wool sales 270kg @ £0.4/kg		108	108	108
		16,058	18,198	20,338
Less: gimmers purchased - 25 @ £180		4,500	4,500	4,500
ram replacement (net)		542	542	542
		11,016	13,156	15,296
VARIABLE COSTS				
Ewe concentrate @ £360/t		1,800	2,160	2,520
Vet, medicines & dips		749	758	767
Bedding straw @ £100/t (bought-in)		336	336	336
Commission, levies, haulage, shearing, scanning & tags		1,385	1,537	1,687
		4,270	4,791	5,310
Gross margin before forage		6,746	8,365	9,986
Forage variable costs:				
silage @ £428/ha		856	856	856
grazing @ £390/ha		3,900	3,900	3,900
Total Variable Costs		9,026	9,547	10,066
GROSS MARGIN		1,990	3,609	5,230
GROSS MARGIN per forage ha		166	301	436

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**		
£5/hd in all lamb sales	700	800	900
£5/hd in cast ewe price	85	85	85
£5/hd in gimmer price	125	125	125
10% lamb rearing rate	1,442	1,656	1,870
30% change in stocking rate	1,170	1,170	1,170

Pure Maternal Flock

PHYSICAL DATA

Breeds Mid-sized (60-70kg) e.g. Lleyn, Romney,Aberfield,Easycare
Lambing period March-April

		Lambs reared (%)		
		140%	**160%**	**180%**
Lamb crops per ewe		4.5	4.5	4.5
Ram flock life (seasons)		3	3	3
		/100 ewes tupped		
Rams (no.)		2.5	2.5	2.5
Lamb numbers:				
marked		142	162	182
sold/retained		140	160	180
sales:	ewe lambs	25	35	45
	finished lambs	74	82	90
	store lambs	16	18	20
flock replacements		25	25	25
Ewe numbers:				
culls		18	18	18
mortalities		4	4	4
gimmers purchased		-	-	-
Wool sales (kg)		270	270	270
Ewe concentrate: ME 12.5 MJ/kg, 18%CP (kg)		2,000	3,000	4,000
Forage: grazing (ha)		7.0	7.0	7.0
silage (ha)		2.0	2.0	2.0
Total forage (ha)		9	9	9
Bedding straw (kg/day)		80	80	80

Basis of data:

1. Estimate of ewe lamb, finished and store lamb prices, cast ewe prices, summer and autumn 2022.
2. Finished lambs liveweight at sale, 38 kg, store lambs 32 kg.
3. Bedding straw based on 80 kg/day housed over a 6-week period. This can be deducted if no housing required.
4. Modern rams can run at 80/100:1 in lowland flocks, stocked tightly.
5. Approximately14 ewes/hectare on improved pasture (125kg N/ha, see Grassland-Grazing section, page 76) assumed alongside hill grazing (not costed) and silage aftermath (70kg N/ha, one cut, see Grassland Silage and Aftermath, page 78).
6. Silage yield and quality 6 t DM/ha; ME 10.5 MJ/kg DM.
7. Concentrate feeding will vary; systems with higher silage quality and better pasture utilisation will use less concentrates.

Pure Maternal Flock

GROSS MARGIN DATA

OUTPUT		Lambs reared (%) 140%	160%	180%
		£/100 ewes tupped		
Ewe lambs:	25 @ £120	3,000	-	-
	35 @ £120	-	4,200	-
	45 @ £120	-	-	5,400
Finished lambs:	74 @ £97 (38kg lwt)	7,178	-	-
	82 @ £97	-	7,954	-
	90 @ £97	-	-	8,730
Store lambs:	16 @ £66	1,056	-	-
	18 @ £66	-	1,188	-
	20 @ £66	-	-	1,320
Draft/cast ewes:	18 @ £90	1,620	1,620	1,620
Wool sales 270kg @ £0.4/kg		108	108	108
(add £290/100 ewes for Romney wool)		12,962	15,070	17,178
Less: ram replacement (net)		542	542	542
		12,420	14,528	16,636
VARIABLE COSTS				
Barley, protein & minerals @ £360/t		720	1,080	1,440
Vet, medicines & dips		844	854	865
Bedding straw @ £100/t (bought-in)		336	336	336
Commission, levies, haulage, shearing, scanning & tags		1,155	1,305	1,455
		3,055	3,575	4,096
Gross margin before forage		9,365	10,953	12,540
Forage variable costs:				
silage @ £428/ha		856	856	856
grazing @ £390/ha		2,730	2,730	2,730
		3,586	3,586	3,586
Total Variable Costs		6,641	7,161	7,682
GROSS MARGIN		5,779	7,367	8,954
GROSS MARGIN per forage ha		642	819	995

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**		
£5/hd in all lamb sales	575	675	775
£5/hd in cast ewe price	90	90	90
10% lamb rearing rate	1123	1334	1545
30% change in stocking rate	819	819	819

Early Finished Lamb Production

PHYSICAL DATA

Breeds	Suffolk/Continental cross ewe to terminal sire		
Lambing period	Mid-December to end January		
	Lambs reared (%)		
	140%	**160%**	**180%**
Lamb crops per ewe (avg)	5	5	5
Ram flock life (seasons)	3	3	3
	/100 ewes tupped		
Rams (no.)	2.5	2.5	2.5
Lamb numbers:			
marked	143	163	183
sold finished	140	160	180
Lamb liveweight at slaughter (kg)	40	40	40
Lamb deadweight at slaughter (kg)	19	19	19
Ewe numbers:			
culls	18	18	18
mortalities	4	4	4
gimmers purchased	26	26	26
Wool sales - ewes, rams & hoggs (kg)	270	270	270
Concentrate use:			
ewe concentrate: ME 12.5 MJ/kg, 18% CP (kg)	5,000	6,000	7,000
lamb concentrate (kg)	4,000	5,000	6,000
Total concentrate (kg)	9,000	11,000	13,000
Forage: silage (ha)	2.4	2.4	2.4
grazing (ha)	5.6	5.6	5.6
Total forage (ha)	8.0	8.0	8.0
Bedding straw (kg/day)	80	80	80

Basis of data:

1. Breeding stock prices, autumn 2022.
2. Finished lamb prices, June average.
3. Bedding straw based on 80 kg/day for 100 ewes housed over a 12-week housing period.
4. Modern rams are capable of running at 80/100:1 in lowland flocks, stocked tightly.
5. Ewes housed over winter. Lambs creep fed at grass
6 Approximately 18 ewes/hectare on improved pasture (125kg N/ha, see Grassland-Grazing section, page 76) assumed alongside silage aftermath (70kg N/ha, one cut, see Grassland Silage and Aftermath, page 78).

Early Finished Lamb Production

GROSS MARGIN DATA

	Lambs reared (%)		
	140%	**160%**	**180%**
OUTPUT	**£/100 ewes tupped**		
Finished lambs 140 @ £128 (40 kg lwt)	17,920	-	-
160 @ £128	-	20,480	-
180 @ £128	-	-	23,040
Cast ewes: 18 @ £90	1,620	1,620	1,620
Wool sales 270kg @ £0.4/kg	108	108	108
	19,648	22,208	24,768
Less: gimmers purchased - 26 @ £180	4,680	4,680	4,680
ram replacement (net)	542	542	542
	14,426	16,986	19,546
VARIABLE COSTS			
Barley, protein & minerals @ £360/t	1,800	2,160	2,520
Lamb concentrate @ £360/t	1,440	1,800	2,160
Vet, medicines & dips	642	644	645
Bedding straw @ £100/t (home-grown)	672	672	672
Commission, levies, haulage, shearing, scanning & tags	1,533	1,700	1,868
	6,087	6,976	7,865
Gross margin before forage	8,339	10,010	11,681
Forage variable costs:			
silage @ £428/ha	1,027	1,027	1,027
grazing @ £390/ha	2,184	2,184	2,184
Total Variable Costs	9,298	10,187	11,076
GROSS MARGIN	5,128	6,799	8,470
GROSS MARGIN per forage ha	641	850	1,059

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**		
10 p/kg lwt in finished lamb price	538	614	691
£5/hd in cast ewe price	90	90	90
£5/hd in gimmer price	130	130	130
£10/tonne concentrate price	90	110	130
10% lamb rearing rate	1,792	2,048	2,304

Low Cost System

PHYSICAL DATA

Breeds		Mid-sized (60-70 kg) Maternal bred ewe		
Lambing period		late April/May		
		Lambs reared (%)		
		140%	**150%**	**160%**
Lamb crops per ewe		4.5	4.5	4.5
Ram flock life (seasons)		3	3	3
		/100 ewes tupped		
Rams (no.)		2.0	2.0	2.0
Lamb numbers:				
marked		144	154	164
sold/retained		140	150	160
sales:	ewe lambs	10	20	30
	finished lambs	68	68	68
	store lambs	40	40	40
Ewe numbers:				
culls		18	18	18
mortalities		4	4	4
Wool sales (kg)		270	270	270
Concentrate use:				
barley/SBP to ewes at tupping (kg)		400	400	400
lamb finishing supplement (kg)		750	750	750
Total barley and concentrate (kg)		1,150	1,150	1,150
Forage: grazing (ha)		8.5	8.5	8.5
silage aftermath (ha)		1.7	1.7	1.7
Total forage (ha)		10.2	10.2	10.2

Basis of data:

1. Breeding stock price estimates, autumn 2022.
2. Estimate of finished and store lamb prices, autumn 2022.
3. Lambs sold finished October/November, store September/October.
4. Wool shedding breeds can reduce costs further.
5. Liveweight of lambs at sale: 38 kg.
6. Modern rams can run at 80/100:1 in lowland flocks, stocked tightly.
7. Minimal targeted late pregnancy feeding to triplet-bearing ewes, with some feed in reserve for extreme weather. Hoggs should be trained to eat concentrates.
8. Approximately 12 ewes/ha on improved pasture (125kg N/ha, see Grassland-Grazing section, page 76) assumed alongside silage aftermath (70kg N/ha, one cut, see Grassland Silage and Aftermath, page 78).

Low Cost System

GROSS MARGIN DATA

		Lambs reared (%)		
		140%	**150%**	**160%**
OUTPUT		**£/100 ewes tupped**		
Ewe lambs	10 @ £120	1,200	-	-
	20 @ £120	-	2,400	-
	30 @ £120	-	-	3,600
Finished lambs:	68 @ £97 (38kg lwt)	6,596	-	-
	68 @ £97	-	6,596	-
	68 @ £97	-	-	6,596
Store lambs:	40 @ £60	2,400	-	-
	40 @ £60	-	2,400	-
	40 @ £60	-	-	2,400
Draft/cast ewes:	18 @ £90	1,620	1,620	1,620
Wool sales 270kg @ £0.4/kg		-	-	-
		11,816	13,016	14,216
Less: ram replacement (net)		433	433	433
		11,383	12,583	13,783
VARIABLE COSTS				
Barley & mineralised SBP @ £360/t		144	144	144
Lamb finishing pellets @ £360/t		270	270	270
Vet, medicines & dips		503	512	521
Commission, levies, haulage, scanning & tags		1,052	1,132	1,213
		1,969	2,058	2,148
Gross margin before forage		9,414	10,525	11,635
Forage variable costs:				
silage @ £428/ha		728	728	728
grazing @ £390/ha		3,315	3,315	3,315
		4,043	4,043	4,043
Total Variable Costs		6,012	6,101	6,191
GROSS MARGIN		5,371	6,482	7,592
GROSS MARGIN per forage ha		527	635	744

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**		
10 p/kg lwt in finished lamb price	248	248	248
£5/hd in all lamb sales	590	640	690
£5/hd in cast ewe price	90	90	90
10% lamb rearing rate	1020	1140	1260
30% change in stocking rate	1,213	1,213	1,213

Gimmering

PHYSICAL DATA

Breeds	
System	Ewe lambs purchased in autumn, wintered on swedes and hay, grazed tightly in summer and sold as gimmers in autumn
	/100 sheep
Mortalities (no.)	2
Wool sales (kg)	270
Concentrate use:	
Barley (kg)	0
Forage: hay-5,000 kg (ha)	1.5
swedes (ha)	2.5
grazing (ha)	5.0
Total forage (ha)	9.0

Basis of data:

1. Ewe lamb price, autumn 2022.
2. Estimate of gimmer price, autumn 2022.
3. Silage yield and quality 6 t DM/ha; ME 10.5 MJ/kg DM.
4. Silage and aftermath grazing.
5. Yield of swedes 75 t/ha. See page 104-105 for swede production costs.
6. Opportunity to rear gimmers on a contract basis or mate the ewe lambs and keep or sell progeny
7. Approximately 20 ewes/ha on improved pasture (125kg N/ha, see Grassland-Grazing section, page 76) assumed alongside silage aftermath (70kg N/ha, one cut, see Grassland Silage and Aftermath, page 78).

Gimmering

GROSS MARGIN DATA

OUTPUT	£/100 sheep
Crossbred gimmers: 98 @ £180	17,640
Wool sales 270kg @ £0.4/kg	108
	17,748
Less: Crossbred ewe lambs purchased - 100 @ £120	12,000
	5,748
VARIABLE COSTS	
Concentrates - barley & minerals @ £360/t	-
Vet, medicines & dips	344
Commission, levies, haulage, shearing, scanning & tags	1,355
	1,699
Gross margin before forage	4,049
Forage variable costs:	
silage @ £428/ha	642
swedes @ £275/ha	688
grazing @ £390/ha	1,950
Total Variable Costs	4,979
GROSS MARGIN	769
GROSS MARGIN per forage ha	85

Sensitivity-Change ±	**Change in Gross Margin/100 sheep (£)**
£5/hd in sale price	490

Short Keep Lambs - Winter Finishing on Rape

PHYSICAL DATA

System		Store lambs purchased in September/October, sold finished November/December
Grazing period:	range, low to high	
	stocking period (days)	45-75
	average (days)	55
Stocking rate:	range (no./ha)	40-60
	average (no./ha)	50
Liveweight at start (kg)		27
Liveweight at slaughter (kg)		42
Deadweight at slaughter (kg)		19
		/100 lambs
Mortalities (no.)		2
Area of rape (ha)		2
Area of grass 'run-back' (ha)		0.6
Concentrates (cereal) fed (t)		1

Basis of data:

1. Estimate of store lamb price, autumn 2022.
2. Estimate of finished lamb/hogg price, November/December 2022.
3. Performance from lambs grazing rape can vary greatly between years. The requirement for supplementary concentrates is also very variable from year to year, and area to area. Cereal supplementation will be more necessary in higher rainfall areas, and it may be difficult to finish lambs in very high rainfall areas. Small lambs under 25 kg liveweight fail to perform well on rape and should be finished inside. A dry run back area with suitable forage and water should be provided. See page 100-101 for forage rape production costs.
4. Grazed on pasture without N fertiliser see Grassland-Grazing section, page 76.

Short Keep Lambs - Winter Finishing on Rape

GROSS MARGIN DATA

OUTPUT	£/100 lambs
Finished lambs: 98 @ £109 (42 kg lwt)	10,682
Less: Store lambs purchased - 100 @ £57	5,700
	4,982
VARIABLE COSTS	
Concentrates - barley & minerals @ £360/t	360
Vet & medicines	172
Commission, levies, haulage, shearing, scanning & tags	951
	1,483
Gross margin before forage	3,499
Forage variable costs:	
forage rape @ £328/ha	656
Total Variable Costs	2,139
GROSS MARGIN	2,843
GROSS MARGIN per forage ha	1,093

Sensitivity-Change ±	**Change in Gross Margin/100 lambs (£)**
£5/hd in lamb sale price	490

Short Keep Lambs - Indoor Finishing on Concentrates

PHYSICAL DATA

System		Store lambs housed in December, sold finished February
Liveweight at housing (kg)		28
Liveweight at slaughter (kg)		36
Deadweight at slaughter (kg)		16.5
Food conversion efficiency (kg feed/kg lwt gain)		range 7-10
Finishing period (days)		60
Daily liveweight gain (g)		100-150
		/100 lambs
Mortalities (no.)		3
Concentrates:	whole barley (kg)	4,020
	sugar beet pulp (kg)	1,610
	protein supplement (46% CP) (kg)	805
	salt/minerals/vitamins (kg)	165
	Total mix (kg)	6,600
Silage feeding (kg)		2,000
Bedding straw (housed period) (kg/day)		80

Basis of data:

1. Estimate of store lamb price, autumn 2022.
2. Estimate of finished lamb price, February 2022.
3. Suitable for late-born smaller lambs, non-standard types, any lambs under 25 kg liveweight and lambs that have failed to finish outside e.g. ram lambs, thin lambs.
4. Profitability depends on rising lamb prices rather than food conversion efficiency.
5. Care should be taken when introducing housed lambs to concentrate feeding where starchy cereals (e.g., barley) are used. Acidosis can often result, causing digestive upsets and in some cases, mortality. Typical feed conversion rate is 8.25 kg concentrate to produce 1 kg lwt (including concentrate fed during introductory period), for Blackface and other hill breeds. Crossbred lambs convert at 7-7.5 kg when gaining from 30-35 kg to 40-45 kg. Minerals will contain no Mg and low P.

Short Keep Lambs - Indoor Finishing on Concentrates

GROSS MARGIN DATA

OUTPUT	£/100 lambs
Finished lambs: 97 @ £109 (36 kg lwt)	10,573
Less: Store lambs purchased - 100 @ £63	6,300
	4,273
VARIABLE COSTS	
Concentrates homemix @ £360/t	2,376
Vet & medicines	172
Bedding straw @ £100/t (bought-in)	336
Commission, levies, haulage, shearing, scanning & tags	943
	3,827
Gross margin before forage	446
Forage variable costs:	
silage @ £428/ha	171
Total Variable Costs	3,998
GROSS MARGIN	275

Sensitivity-Change ±	**Change in Gross Margin/100 lambs (£)**
10 p/kg lwt in finished lamb price	363
£5/hd in store lamb purchase price	500
£10/t in concentrate price	66
10 days in finishing period - straw, feed and silage	476

Long Keep Lambs - Finishing on Swedes

PHYSICAL DATA

System	Store lambs purchased in September/October, run over stubbles and grassland to mid-December, folded on swedes to end March/mid-April
Liveweight at start (kg)	27
Liveweight at slaughter (kg)	44
Deadweight at slaughter (kg)	21
Finishing period (days)	70
	/100 lambs
Mortalities (no.)	4
Concentrates: barley and minerals (t)	1.0
Forage: silage (ha)	0.50
swedes (ha)	1.40
grazing (ha)	0.00
Total forage area (ha)	1.90

Basis of data:

1. Estimate of store lamb price, autumn 2022.
2. Estimate of finished hogg price, spring 2022.
3. Silage yield and quality 6 t DM/ha; ME 10.5 MJ/kg DM.
4. Yield of Swedes - 75 t/ha. See pages 104-105 for swede production costs. Use winter hardy varieties of swedes after December. A dry run back area with suitable forage and water should be provided. Supplement with an extra 100 g/head/day of soya if swede tops lost by frost and no grassy runback available. Provide access to dry lying area.
5. Grazing cost not included.

Long Keep Lambs - Finishing on Swedes

GROSS MARGIN DATA

OUTPUT	£/100 lambs
Finished lambs: 96 @ £114 (44 kg lwt)	10,944
Less: Store lambs purchased - 100 @ £57	5,700
	5,244
VARIABLE COSTS	
Concentrates @ £360/t	360
Vet & medicines	366
Commission, levies, haulage, shearing, scanning & tags	955
	1,681
Gross margin before forage	3,563
Forage variable costs:	
silage @ £428/ha	214
swedes @ £275/ha	385
grazing @ £390/ha	-
Total Variable Costs	2,280
GROSS MARGIN	2,964

Sensitivity-Change ±	**Change in Gross Margin/100 lambs (£)**
£5/hd in lamb sale price	480
£5/hd in store purchase price	500

Red Deer

Introduction

The June 2017 agricultural census recorded 8,000 farmed deer in Scotland – from 96 registered holdings, up 1,000 head (15%) from the previous year. It is estimated that deer and deer farm numbers have significantly increased since 2017. In 2018, Scotland produced around 3,500 tonnes of venison from wild deer, with farmed production only around 100 tonnes. The total UK venison market is estimated to be worth £100m with the farm sector in Scotland valued at approximately £540k. Over the last ten years, until the COVID-19 pandemic, UK retail sales of venison had steadily grown with research by Kantar showing that the UK venison retail market grew by 12% in value in 2019 (20% in volume) with that growth continuing through 2020 although it has now slowed. UK supply had been supplemented by imported venison to keep pace with market demand. However, imports have dramatically reduced in recent years with New Zealand products going to other markets including the USA.

Prior to COVID-19 and its impact on the catering, food service, restaurants, and events markets there was a drive in Scotland to encourage increased production of Scottish farmed venison and in so doing, reduce reliance on imports. Much of the wild venison that was held in cold storage as a result of the pandemic has now moved into the supply chain and encouragingly some processors have been looking for additional supply.

The two major UK retailers of farmed venison pledged to source only from UK farms from 2021.

A sector wide strategy for venison “Beyond the Glen” was launched in September 2018 and has been developed to fit with the Scotland Food and Drink strategy Ambition 2030.

The Scottish Venison Association was formed as a successor to the Scottish Venison Partnership to implement the strategy, an aim being to substantially increase the farmed sector output from 100 tonnes to 850 tonnes. This will be achieved by growing the annual kill from 1.7k to 15k animals and growing the value of the sector to £4.6m.

In the longer-term, the required increase to meet anticipated demand could be achievable if the relative profitability of farmed deer were to improve compared to beef and sheep. Much will depend on what changes to agricultural support and trade access are made following Brexit and whether these create opportunities for new enterprises such as deer farming. Interestingly, non-EU venison enjoys tariff free access to the EU compared to tariffs of ~50% for beef and sheep-meat. Brexit has brought further challenges for imports and exports. The sector whilst experiencing difficulties with new Brexit regulations initially, in common with much of the red meat sector, has largely overcome those problems although inevitably costs for export have increased. We may yet find that

more wild roe venison, which is traditionally exported to Europe, is available for the UK market.

Support and subsidies

Historically, deer farming did not attract support payments and subsidies putting it at a disadvantage to cattle and sheep farming. However, the reformed CAP regime had latterly allowed deer farmers to claim support payments under the Basic Payment Scheme. Scottish deer farmers remain disadvantaged however in that specific grant schemes (such as the SACGS) still do not allow inclusion of deer-specific equipment such as crushes.

Starting deer farming

The main barriers to people entering deer farming are the start-up costs which are estimated at upwards of £100,000 for a 100 hind breeding herd. Red deer breeding hinds will generally cost from £350 - £600 for pedigree stock with breeding stags costing from £1000 - £3,000. Other significant costs include fencing at £12.50 - £15.00/m (fencing costs continue to increase substantially due to the soaring price of timber and wire) and handling facilities, crush and weigh scales at £10,000 - £20,000.

Other barriers identified had been access to an abattoir, knowledge of where to obtain limited breeding stock and specialist knowledge relating to the industry. As the sector has grown, these barriers have been addressed with a dedicated deer abattoir opening in Fife and, as the sector expands, quality Scottish-bred breeding stock are now readily available. Also, the development of the new Scottish Venison Industry Strategy, previous initiatives such as the Deer Farm and Park Demonstration Project and well attended training and on-farm open days run by British Deer Farms and Parks Association (BDFPA) and the Venison Advisory Service have helped spread knowledge about the sector.

Once set up, there is a relatively low labour demand for deer farming meaning that it may fit well with existing livestock or arable enterprises. In general, deer are relatively healthy and free from disease. The main health issues are TB, Johne's disease, cryptosporidium, copper deficiency, lungworm and increasingly liver fluke, all of which are manageable with good practice. Scotland also remains officially and internationally recognised as free of bovine TB and measures are taken to ensure this status remains.

Farmed venison processing and markets

Deer farmers are unique in the livestock sector in being able to kill their deer either on the farm or in an abattoir. Deer for slaughter must be examined ante-mortem by a vet within 72 hours of death unless being transported to and killed in an abattoir. The meat must be processed through facilities that have been licensed and regularly inspected by the Food Standards Agency or Food Standards Scotland. Only two

supermarkets in the UK purchase farmed venison generally from abattoir killed carcases.

Currently there are two dedicated abattoirs in the UK killing Scottish farmed deer, one in Scotland and one in Yorkshire.

It is a QA requirement for the industry that all deer farms must have a physical vet inspection at least annually and Deer Health Plans kept updated.

At the time of publication, Downfield was the only farmed deer abattoir and processing plant in Scotland. Downfield is fully licensed by Food Standards Scotland (FSS) and accepts deer from farms and estates all over Scotland for private processing. Prior to the COVID-19 pandemic, Downfield supplied venison to chefs, suppliers and independent retailers in the Scottish food industry and offered fresh and frozen venison products under the Stagison brand. Since the COVID-19 outbreak, Downfield has seen an upturn in demand for their services from deer farmers who have been able to set up on-farm shops, mail order, and provide local delivery services from their own farms.

Some finished farmed deer are processed directly through the Dovecote Park producer group through state-of-the-art slaughter and processing facilities in Yorkshire. This group comprises members who farm deer to the highest welfare standards and are audited annually. All farms have Quality Assurance. Dovecote supplies high-end retail, selected foodservice outlets and is experiencing significant growth in venison sales.

Other Scottish finished farmed deer are marketed collectively through UK-wide First Venison Ltd which comprises a dedicated co-operative supply route to market.

Another option is for farmers to sell their deer to finishers. There are several producers in England and Scotland that will accept deer from 6 months old and finish them on their own farm before processing.

Venison Market and Consumer Information

Detailed market research undertaken across the UK by Kantar has indicated that the retail home venison market is growing in value, recording an increase of 10.9% through 2019. This research funded by the Scottish Government provides, for the first time, an accurate snapshot of how the UK retail venison market is performing and outlines consumer views in Scotland and the rest of the UK towards buying and eating venison. The Kantar research, which took place before the COVID-19 pandemic, found that the UK retail venison market was worth £14.4m in 2019, with a total of 1,221 tonnes sold that year. An additional two times that amount of venison is produced, most of it from Scotland's wild deer, which goes to market via other routes – catering, hotels and

restaurants and foodservice; independent butchers, farmers markets and mail order; and for export.

Kantar's research drilled down into the UK grocery retail sector, establishing that sales of primary cuts (including diced, cubed, stewing, steak, mince and roasting), were worth £7.1m (up by 43%), burgers and grills some £5.2m and sausages worth £1.0m. Venison is sold in the UK grocery retail sector at an average price of £11.78 per kilogram. The retail market is dominated by two brands accounting for 59% of sales with Highland Game (who specialise in wild venison) at #1 and Waitrose own label at #2. In terms of retailer share of venison Waitrose is in front with 33.2% of the market, Sainsbury's following with 13% and then Morrisons with 10.7%.

Attitudinal research undertaken by 56 Degree Insight highlighted that 49% of venison is bought from the supermarket; 26% from butchers; 14% from farm shops; and 9% from mail order. Venison shoppers are likely to be older and more affluent, 30% of all venison is consumed by those aged 65 and over. Also 52% choose venison because of taste; 34% because of high quality; 24% because of health/nutritional qualities; 22% to try something different; and 19% because they can buy it locally. Venison is 5x more likely to be eaten as a treat and 2x more likely to be eaten for health reasons versus other red meat.

Impact of COVID-19

During the COVID-19 pandemic venison sales into the restaurant/catering/foodservice sector were decimated but are now slowly recovering. During the downturn in the foodservice sector, several deer farms and wild deer enterprises which had previously sold through a processor into the food service sector took the decision to sell directly to the consumer using their own farm or estate shop or via on-line sales.

The impact of the pandemic on the wild deer sector was also felt by stalking businesses with a huge impact on income generated by the estates from stalking guests although the amount of venison going to processors did not diminish proportionally, albeit a much-reduced price was paid. That price paid to producers is now recovering although still well short of pre-covid levels.

Discussions between the Scottish Venison Association and Scottish Government resulted in a £60,000 online marketing and awareness campaign that ran through April/May 2021 as part of the Scotland Food & Drink Partnership recovery programme. Central funding has also been awarded to develop several short supply chain chill/processor initiatives across Scotland. In addition, the Scottish wild venison sector now has an important project underway to map its carbon footprint from hill to plate and implement measures to reduce this to net zero or beyond by 2035.

References

A range of information relating to deer farming is available from the organisations below:

- "Beyond the Glen". A strategy for the Scottish Venison Sector to 2030: www.deer-management.co.uk/wp-content/uploads/2018/09/Venison-Strategy-1.pdf
- Scottish Venison: https://www.scottish-venison.info
- The Venison Advisory Service: www.venisonadvisory.co.uk/
- The Deer Farm & Park Demonstration Project: http://deerfarmdemoproject.scottish-venison.info/
- The Scottish Venison Partnership (now Association): www.scottish-venison.info/
- The British Deer Farms and Parks Association: http://bdfpa.org/
- Quality Assured Farm Venison Scheme:
- https://www.saiglobal.com/assurance/farm-assurance/quality-assured-farm-venison.htm

Red Deer - Lowground Breeding and Feeding

PHYSICAL DATA

Calving period			May-Jun
Sale period			Aug-Nov
Herd life:	hinds (years)		12
	stags (years)		6
Calves born			90%
Calves reared			85%
Hind deaths (no.)			1
Liveweight at sale:		15-18 month stags (kg)	108
		15-18 month hinds (kg)	85
		cull hinds (kg)	110
Killing out percentage			54%
			/100 hinds
Stags (no.)			3
Sales:			
15-18 month stags (no.)			43
15-18 month hinds (no.)			35
cull hinds (no.)			7
Winter feeding period (days):			
hinds and stags			100
calves			180
Feeding:	concentrates (t)		19.1
	silage (t)		161.2
Silage:	yield (t/ha from 2 cuts)		31
	ME quality (MJ/kg DM)		10
	fertiliser (kg N/ha)		220
Grazing	fertiliser (kg N/ha)		175
Total forage area required (ha)			
Silage and aftermath grazing			5.2
Grazing			13.0
			18.2

Hay (3.8 ha at 7 t/ha) and swedes (1.7 ha at 75 t/ha) can be fed as an alternative to silage.

Housing system (straw bedding assumed):

Hinds housed January to April, calves housed November to April.

Straw bedding (t/hd)	- hinds and stags	0.10
	- calves	0.10
Antler sales	- kg per stag	5.50
	- kg per yearling	0.5
	- yearling antlers saleable	10%

Red Deer - Lowground Breeding and Feeding

GROSS MARGIN DATA

OUTPUT					**£/100 hinds**
Sale value (dwt):					
Stags	58 kg	@	650	p/kg dwt	16,023
Hinds	45 kg	@	620	p/kg dwt	9,902
Cull hinds	59.4 kg	@	400	p/kg dwt	1,663
Antlers:	18.6 kg	@	£10	/kg	186
					27,774
Less: hinds purchased					3,600
share of replacement stag					951
					23,223
VARIABLE COSTS					
Concentrates @ £350/t					6,699
Vet & medicines					573
Bedding straw @ £100/t (bought-in)					1,879
Other livestock expenses					2,430
					11,581
Gross Margin before forage					11,642
Forage variable costs:					
silage @ £685/ha					3,562
grazing @ £528/ha					6,864
					10,426
Total Variable Costs					22,007
GROSS MARGIN £/100 hinds					1,216
GROSS MARGIN £/ha					67

Sensitivity - Change ±	**Change in Gross Margin/100 hinds (£)**
£5/hd in all deer sales	425

Replacement cost prices:

Cull hind	£238	Hind (purch.)	£450
Cull stag	£151	Replacement stag	£2,000

Basis of data:

Sale price - slaughter price based on expected prices for sales to the abbatoir. In practice, many deer farms sell part of their production direct to retailers, caterers and consumers at deadweight prices over £5.50/kg but with additional processing and marketing costs.

Red Deer - Upland Breeding Selling Calves

PHYSICAL DATA

Calving period			May-Jun
Sale period			Nov-Dec
Herd life:	hinds (years)		12
	stags (years)		6
Calves born			90%
Calves reared			85%
Hind deaths (no.)			1
Liveweight at sale:		stag calves (kg)	50
		hind calves (kg)	40
		cull hinds (kg)	110
Killing out percentage			54%
			/100 hinds
Stags (no.)			3
Sales:			
stag calves (no.)			43
hind calves (no.)			35
cull hinds (no.)			7
Winter feeding period (days):			
stags			150
calves			50
Feeding:	concentrates (t)		15.3
	hay (t)		4.2
Hay:	yield (t/ha)		7
	ME quality (MJ/kg DM)		8.5
	fertiliser (kg N/ha)		125
Grazing	fertiliser (kg N/ha)		125
Total forage area required (ha)			
Hay and aftermath grazing			0.6
Grazing			10.0
			10.6
Hill outrun			70.0
Housing system (straw bedding assumed):			
Hinds outwintered on hill, replacement calves housed November to April.			
Straw bedding (t/hd)		- hinds and stags	0.00
		- calves	0.10
Antler sales		- kg per stag	5.50

Red Deer - Upland Breeding Selling Calves

GROSS MARGIN DATA

OUTPUT					**£/100 hinds**
Sale value:					
Stag calves	50 kg	@	280	p/kg lwt	5,950
Hind calves	40 kg	@	280	p/kg lwt	3,975
Cull hinds	59.4 kg	@	400	p/kg dwt	1,663
Antlers:	16.5 kg	@	£10	/kg	165
					11,753
Less: hinds purchased					3,600
share of replacement stag					952
					7,201
VARIABLE COSTS					
Concentrates @ £350/t					5,350
Vet & medicines					573
Bedding straw @ £100/t (bought-in)					70
Other livestock expenses					2,430
					8,423
Gross Margin before forage					-1,222
Forage variable costs:					
hay @ £597/ha					358
grazing @ £390/ha					3,900
					4,258
Total Variable Costs					12,681
GROSS MARGIN £/100 hinds					-5,480
GROSS MARGIN £/ha					-517

Sensitivity - Change ±	**Change in Gross Margin/100 hinds (£)**
£5/hd in all deer sales	425

Replacement cost prices:

Cull hind	£238	Hind (purch.)	£450
Cull stag	£151	Replacement stag	£2,000

Red Deer - Finishing Stag Calves

PHYSICAL DATA

Time of purchase		October
Sale period		Aug-Nov
Stags reared		97
Liveweight:	at purchase (kg)	50
	at sale (kg)	108
Killing out percentage		54%
Deadweight at sale (kg)		58
Mortality		3%
Liveweight gain (kg/day)		0.15
		/100 stags
Feeding:	concentrates (t)	10.9
	silage (t)	80.6
Silage:	yield (t/ha)	31
	ME quality (MJ/kg DM)	10
	fertiliser (kg N/ha)	220
Grazing	fertiliser (kg N/ha)	175
Total forage area required (ha)		
Silage and aftermath grazing		2.6
Grazing		5.5
		8.1

Hay (2.0 ha at 7 t/ha) and swedes (0.8 ha at 75 t/ha) can be fed as an alternative to silage.

Housing system (straw bedding assumed):

Calves housed November to April.

Straw bedding (t/hd)	- calves	0.10
Antler sales	- kg per yearling	0.50
	- yearling antlers saleable	10%

Red Deer - Finishing Stag Calves

GROSS MARGIN DATA

OUTPUT					**£/100 stags**
Sale value:					
Finished stags	58 kg	@	650	p/kg dwt	36,569
Antlers:	4.9 kg	@	£10	/kg	49
					36,618
Less: calves purchased	50 kg	@	280	p/kg lwt	14,000
					22,618
VARIABLE COSTS					
Concentrates @ £350/t					3,819
Vet & medicines					243
Bedding straw @ £100/t (bought-in)					970
Other livestock expenses					2,334
					7,366
Gross Margin before forage					15,252
Forage variable costs:					
silage@ £685/ha					1,552
grazing @ £528/ha					2,145
					3,697
Total Variable Costs					11,063
GROSS MARGIN £/100 stags					11,555
GROSS MARGIN £/ha					1,426

Sensitivity - Change ±	**Change in Gross Margin/100 stags (£)**
£5/hd in stag sales	485

Basis of data:

Sale price - slaughter price based on expected prices for sales to the abbatoir. In practice many deer farms sell part of their production direct to retailers, caterers and consumers at deadweight prices over £5.50/kg but with additional processing and marketing costs.

Pigs

Introduction

Markets and prices

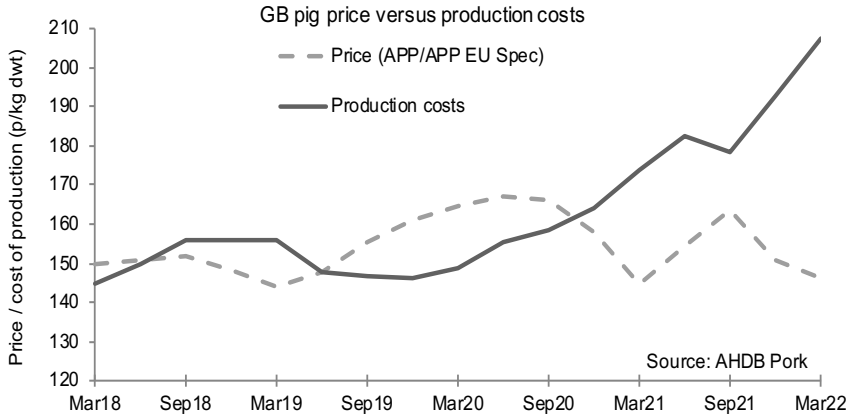
The last 12 months has seen a continuation of the perfect storm whereby pig producers have been receiving significantly less for their stock than the costs of production.

Prices continued to fall in early 2021 before slowly climbing through the summer and early autumn with the All Pigs Price (A.P.P.) peaking at just under 165p/kg in August before beginning a steady decline to 143 p/kg by early February 2022. Since then pig prices have steadily improved reaching 185 p/kg in early June. While competition from cheap EU pork and restricted processing throughputs due to COVID and BREXIT had impacted heavily on UK prices up until this spring, the tightening of supplies on the continent and subsequent price increases has fed through to the UK market. The downturn in the pig sector has also need a reduction in sow numbers at home and this has also seen UK supplies become tighter, adding further support to prices along with processing throughput at more normal levels. BREXIT continues to impact on labour supply however, particularly in the butchery and processing sectors and exporters seem to have a harder task than those importing pig meat into the country. The issues within the processing sector had led to a significant backlog of finished pigs on farm- not only incurring extra feed costs and putting pressure on buildings but resulting in pigs leaving the farm at much higher weights than normal, with average slaughter weights reaching a record 95.80kg early in 2022. Inroads have been made into the backlog as processing capacity returns to normal and UK supplies continue to tighten however slaughter weights at the end of May 2022 are still nearly 4kg higher than 12 months ago at just over 90kg.

Producer costs have risen sharply over the past year, mainly driven by the unprecedented rise in feed grain and protein costs. Feed costs in Q1 of 2021 were estimated at 117p/kg pig meat, and twelve months later this had risen to 148 p/kg (AHDB). This has risen again through the spring following the crisis in Ukraine. Producers have also incurred extra costs over the past year through having to keep pigs on farm longer due to the aforementioned supply chain issues. This has impacted in several ways, from increased feed requirements as pigs were fed for longer, extra accommodation being required and the benefit of any cheaper forward purchases of feed has been diluted as producers have been forced to buy in extra, more expensive feed on the spot market. The last few months have also seen rising energy costs, hitting indoor producers particularly hard.

Producer margins have been on a proverbial rollercoaster for several years. Price falls through 2018 and rising costs (mainly feed) saw pig producers losing money following a period of profitability with the average producer losing £11/head (13p/kg) by the start of 2019 (Q1 2019). Prices received then steadily increased and coupled with sharply falling feed

prices in spring 2019, producers were soon breaking even again (Q2 2019) and by the start of 2020 producers were making a margin of £14/head (16p/kg). Despite prices continuing to increase through the summer, costs increased more rapidly, and combined with prices starting to fall in the autumn of 2020 meant that margins quickly went from a positive to a negative margin of 6p/kg (£6 per pig) in the final quarter of 2020. Margins have remained negative since, with a sharp drop in prices coupled with rising costs in early 2021 meaning that producers were losing 29p/kg (£26/pig). By Q3 2021, these losses had reduced to 15p/kg as prices improved however since then the negative margin has increased significantly with costs of production rising to unprecedented levels to 207p/kg (£196/hd) compared to a pig price of 146p/kg (£138/hd), meaning producers were losing 61p/kg or £58 per finished pig by Q1 in 2022.



The December 2021 DEFRA census indicated a decline in the English breeding herd from 402,000 to 385,000, a reduction of 4.2% on the year reflecting the challenges facing the sector. According to the latest Scottish Government survey figures, the Scottish breeding herd also showed a reduction, of 8.7% from 35,914 to 32,773 for the year to June 2021. This contrasts with the sharp increase in the breeding herd seen in the previous survey although with surveys and censuses it is important to treat year on year changes with caution. Overall total pig numbers in Scotland increased on the year by 1% to 341,214, the highest number since 2012. As has been the trend for several years, many pigs are born and weaned in Scotland before being moved to England for finishing and slaughtering.

Sow productivity increased slightly in 2021 with AHDB Pork reporting the average number of pigs weaned per sow in the UK for the 12 months to December 2021 being 26.3 compared with 26.2 in 2020. The indoor herd saw an increase in productivity with pigs weaned per sow rising to 27.79 from 27.49 on the year, with the top third of producers now achieving

31.33 pigs weaned per sow per year. Within these figures litters per sow decreased slightly although there was an increase in numbers weaned per litter to 12.54. 2021 saw outdoor herd performance fall slightly in terms of productivity with numbers weaned per sow decreasing from 24.55 to 24.26.

The UK remains far from self-sufficient in pig meat with domestic production just over half of total UK consumption. Clean pig slaughterings increased in 2021, up 2% to 11.1 million. Slaughter weights continued to increase (88.6kg in 2021 compared to 86.9kg in 2020). Although there has been a trend towards heavier slaughter weights in recent years, supply chain issues have also impacted on the 2021 figures. 2021 saw 1,022,300t of UK pig meat produced, up 3.9% on the year. In context, there was 15% more pig meat produced in the UK than beef in 2021. UK domestic consumption figures increased by 1% in 2021. Exports (Including offal) were impacted by Brexit, falling 12.5% to 350,000 tons which were worth £567m. The UK also imports a significant volume of product from a range of countries to fulfil the shortfall in domestic production although these also reduced by 12% (to 732,000t) in 2021. Most of these suppliers are from within the European Union with the biggest being Denmark, Germany, and the Netherlands.

With UK product being seen by some markets as premium and the need to ensure maximum value from the carcase, the UK also exports a relatively large volume of lower value product. Most exports of UK pig meat have been to the EU in the past however the volume going to other countries has grown and in 2021 made up two thirds of the export market.

Marketing and processing

The UK pig industry is much more rationalised than other livestock sectors, such as beef and sheep with the supply chain for pigs more vertically integrated with contracts more common. Most of the pigs in Scotland are also marketed through two producer co-operatives.

In Scotland, there has been an expansion in slaughtering capacity in recent years following the development of the plant at Brechin. Slaughterings of clean pigs in Scotland had slowly been increasing up to 2020 however the disruption caused by Covid-19 and Brexit saw slaughterings of clean pigs decrease to 280,000, a fall of 21% in 2021. This meant an increase in Scottish pigs crossing the border to England for slaughter, in addition to the large number of weaners born and reared in Scotland before moving to England for slaughtering and processing.

In 2018, Quality Meat Scotland launched '*Provenance and Profit – A strategy for Scotland's pig industry*'. The initiative aims to double the sector value by 2030. Quality Meat Scotland have also run successful marketing campaigns in recent years building on the "Specially Selected Pork" brand including "Go Places with Pork" in 2021 and in 2022, "Make it

with Cred" to target a younger demographic, highlighting the health benefits and versatility of pork.

Sector Summary

Feed is the biggest cost in pig production and typically accounts for 50-60% of overall costs, although this has risen to over 70% in early 2022 (AHDB) as feed prices have increased dramatically. The profitability of pig production generally hinges on three factors; the price received for pigs, the feed price, and the efficiency of feed conversion. A more enduring route to profitability for pig producers is to raise the number of pigs reared per sow. Attention to detail is key, and the use of management software and benchmarking has enabled managers to remove inefficiencies in the breeding herd such as by improving the farrowing index and reducing the number of empty days. Numbers produced have continued to increase in recent years and from summer 2016 to autumn 2020, pig production was mostly profitable. This encouraged many producers to invest in their businesses, not only to accommodate the increased numbers of pigs but also to provide the space to take these pigs through to increasingly heavier weights. In addition, producers have also invested in new technology to further drive production efficiencies and improve environmental performance with an increasing focus on further reducing the carbon footprint of the sector.

Breeding Pigs - Indoor Units

PHYSICAL DATA*

	4 week weaning	
	Average	**Premium**
Litters/sow/year (no)	2.25	2.35
Live pigs born/litter (no)	15.00	16.00
Piglet mortality (%)	12.50	11.50
Weaners/litter (no)	13.13	14.16
Pigs weaned/sow/annum**	29.53	33.28
Pigs sold/sow/annum	28.65	32.28
Age at weaning (days)	27.0	
Age at sale/transfer (days)	75	
Liveweight at weaning (kg)	7.50	
Liveweight at sale (kg)	33.0	
Sow:boar ratio	100	
No. sows replaced annually (%)	55.0	
No. boars replaced annually (%)	40	
Sow mortality (%)	7.00	
Feed use (conventional diets):		
sow meal (sow, boar, gilt) (kg)	1,400	
Daily liveweight gain (g/day)	0.440	
Feed conversion ratio (:1)	1.70	
Feed (kg of feed/sow/annum):		
Creep feed (14 days of age to 9 kg lwt)	75	84
Weaner diet (9 to 15 kg lwt)	301	336
Rearing diet (15 to 34 kg lwt)	877	979
Total feed/sow/annum	2,652	2,798

* Based on data derived from AHDB Pork.

** Per sow and gilt in the herd, rounded and with an allowance for barreners.

Breeding Pigs - Indoor Units

GROSS MARGIN DATA

	£/sow/annum 4 week weaning	
	Average	**Premium**
OUTPUT		
Weaners sold @ £55*	1,575	1,775
Less:		
sow and boar replacement (net)	69	69
	1,506	1,706
VARIABLE COSTS		
Feed:		
sow meal @ £325/t	455	455
creep feed @ £950/t	71	80
weaner diet @ £600/t	180	201
rearing diet @ £375/t	329	367
Vet & medicines	28	30
Other livestock expenses	88	89
Total Variable Costs	1,151	1,222
GROSS MARGIN	355	484
Gross Margin/weaner sold	12.39	14.99

Sensitivity-Change ±	**Change in Gross Margin/sow/annum (£)**	
£1/weaner sold	29	33
1 weaner pig for sale	55	55
£5/t in feed prices	14	14

Replacement cost prices:

Cull sow (160 kg @ 60 p/kg dwt)	£96	Replacement gilt	£210
Cull boar (180 kg @ 55 p/kg dwt)	£99	Replacement boar	£800

* Weaners sold includes a 3% post weaning mortality.

Basis of data:

1. Feed cost is purchased feed, an estimate derived from quoted list prices.
2. Vet and medicine costs and other livestock expenses are SAC Consulting estimates.

Breeding Pigs - Outdoor Units

PHYSICAL DATA

	Average	Premium*
Breeding herd		
Stocking rate (sows/ha)	14	14
Litters/sow/year (no.)	2.25	2.33
Live pigs born/litter (no.)	12.8	13.3
Piglet mortality (%)	12.0	11.0
Weaners/litter (no.)	11.2	11.8
Pigs weaned/sow/annum	25.2	27.5
Weight at weaning (kg)	7.5	7.5
Age at weaning (days)	27.0	27.0
Proportion sows replaced annually (%)	55.0	55.0
Proportion boars replaced annually (%)	40	40
Sow mortality (%)	5.0	5.0
Sow:boar ratio (:1)	100	100
Sow feed used (kg/annum)	1,425	1,400
Weaners		
Post weaning mortality (%)	3.5	3.5
Weaners sold/sow	24.36	26.51
Age at sale/transfer (days)	75	75
Weight at sale (kg)	33.00	33.00
Weight gain (kg)	25.50	25.50
Daily liveweight gain (g/day)	450	475
Feed conversion ratio (:1)	1.70	1.65
Weaner feed (kg/weaner)	43.35	42.08

* Selected on pigs reared/sow/year.

Breeding Pigs - Outdoor Units

GROSS MARGIN DATA

	£/sow/annum			
	Average		**Premium**	
OUTPUT				
Weaned pigs @ £55	1,340		1,458	
Less: sow and boar replacement (net)	68		68	
	1,272		1,390	
VARIABLE COSTS				
Feed: sow cobs @ £340/t	485		476	
weaner feed @ £400/t	438		462	
Vet & medicines	30		30	
Transport	30		30	
Other livestock expenses	85		85	
Total Variable Costs	1,067		1,083	
GROSS MARGIN	205		307	
GROSS MARGIN/weaner sold	8.40		11.56	
GROSS MARGIN £/ha (acre)	2,867	(1,160)	4,292	(1,737)

Sensitivity-Change ±	**Change in Gross Margin/sow/annum (£)**	
£1/weaner sold	24	27
1 weaner pig for sale	55	55
£5/t in feed prices	- 3	- 4

Replacement cost prices:

Cull sow (160 kg @ 60 p/kg dwt)	£96	Replacement gilt	£210
Cull boar (180 kg @ 55 p/kg dwt)	£99	Replacement boar	£800

Note:

Sow costs are higher than indoor units due to the requirement for cob nuts for management purposes.

Finishing Pigs

PHYSICAL DATA

Type of finisher	All Average	Finishers Premium
Liveweight: at purchase/transfer (kg)	33.0	33.0
at slaughter (kg)	113.0	114.0
Deadweight: at slaughter (kg)	85.3	86.6
Killing out (%)	75.5	76
Mortality (%)	3.5	3.0
Liveweight gain (g/day)	870	942
Feed conversion ratio (:1)	2.94	2.78
Feed use (kg)	235	225
Days in herd	92	86
Sale price (p/kg dwt)	180	180
Feed price (£/t)	325	325

Finishing Pigs

GROSS MARGIN DATA

	£/hd	
	All Average	**Finishers Premium**
OUTPUT		
Sales	153.57	155.95
Less: weaner cost @ £55 (plus allowance for mortality)	56.93	56.65
	96.64	99.30
VARIABLE COSTS		
Feed	76.38	73.13
Vet & medicines	2.0	2.0
Other livestock expenses	9.00	9.00
Total Variable Costs	87.38	84.13
GROSS MARGIN	9.27	15.18
Sensitivity-Change ±		
1 p/kg dwt in sale price	0.85	0.87
£10/t in feed prices	2.35	2.25

Basis of data:

Other livestock expenses include deductions for power, water, bedding, haulage, commission and levies.

Poultry

Introduction

Despite coronavirus and Brexit labour shortages placing pressure on the British poultry sector over the last couple of years, strong consumer demand for poultry and eggs has seen the sector fare relatively well. The last few months, however, have placed a multitude of stresses on producers which, though not new, have never before been experienced simultaneously.

Avian Influenza (AI) has decimated some producers, and forced free range flocks to be housed between the 29th November 2021 and 2nd May 2022, a loss to livestock welfare as much as incomes. BFREPA estimates that 1.8m laying hens have been taken out of production due to HPAI epidemic to July 2022, accounting for 7.1% of the total UK flock.

Margins for producers are also getting tighter, with serious increases in feed prices and energy, but egg prices staying stagnant at best. Conventional feed has seen upwards of a £30/t price rise, and organic feeds over £100/t. The Ranger notes than even some of the top producers are losing around £1 per hen in the current situation. Some producers are facing the decision to leave industry or not, or at what scale to continue going forward. Prices are just now beginning to rise (summer 2022) on supermarket shelves, although this is quite a time lag for producers, and does not compensate for the increase in costs.

Despite tight margins, the number of free-range hens keeps going up, month by month. With a cost-of-living crisis, eggs are a cheap protein source so demand could be strong and some are seeing opportunity in this. In the last 12 months producers have applied for sheds accommodating 1.139m hens in England, 0.294m in Scotland, 0.132m in Wales, and 0.347m in N. Ireland – a total of 1.912m hens, and this trend is expected to continue.

Some retailers have been increasingly focused on reducing emissions in their food supply chains, and both Morrisons and Waitrose have been exploring reducing soya use in poultry as a major source of emissions. However, in light of recent events in Ukraine, food security, price and self-sufficiency may become priorities over sustainability at least for the immediate term, unless there are win-wins for these and carbon targets.

Chicken Egg Production

In 2021 the UK produced 31.4 million cases of eggs (360 eggs to a case) up 198,000 cases on 2020. Despite record production towards the end of 2020, production has been gradually falling from a peak in spring 2021, possibly following a line of increasing costs and supply chain pressures including labour. Of the total produced, 69% of eggs were produced in England and Wales, 13% in Scotland and 18% in Northern Ireland (source - Defra 2022). The Quantity of eggs bought for processing still

have not recovered to pre-pandemic levels, affected both by reduced food service and a slow return to pre-Covid working and travel patterns, as well as a reduced EU market for food processing products.

Producers have also seen an increase to farmgate egg prices through 2021, at an average of 88.0 ppd (pence per dozen), an 11%% increase from 2020. Despite rising input costs, from feed to energy, prices have so far been slow to rise in 2022, stretching producers to the max; with a cost-of-living crisis and eggs a cheap protein source, the egg sector is between a rock and a hard place. Throughout 2021, layer settings have slowly declined, reverting to 2019 levels. The industry seems to being polarised in its response to tight margins, and in some cases losses, with some producers scaling up and others reconsidering the future of egg enterprises.

Free-range production rose 8.5% from 2020, and organic 3.2%. The table below shows egg production by system as a % of total egg production by year.

	1965	1980	2010	2021
Cage*	53%	95%	50%	35.4%
Barn	37%	4%	5%	1.8%
Free range	10%	1%	42%	59.0%
Organic	-	-	3%	3.8%

* enriched cages became a legal requirement for cage systems for laying hens in 2012.

Independent egg producers can sell their eggs via the large egg producers/packers, or through local businesses (e.g. hotels, farmer's markets). The British Free Range Egg Producers Association (BFREPA) provide guidance on contracts between producers and packers, which can be found here: https://www.bfrepa.co.uk/wp-content/uploads/2019/10/Contracts-Booklet-October2019.pdf. Flock size and thus scale of egg output will probably govern which route an egg producer favours. See page 118 for information on poultry keeping regulations.

Egg grading

Egg grading percentages are dependent on a large number of variables, e.g., lighting programmes and feed specifications and can be altered by changing the feeding and lighting during rearing and the feed specifications during lay. Most major breed management manuals provide suitable information. The following table shows the egg grading ratios as a percentage with weight for each grade.

	Ratio	Grade A weight
Very large	4.0%	>73g
Large	42.0%	63-72.99g
Medium	43.0%	53-62.99g
Small	4.0%	<53g
Seconds	7.0%	-

Egg price indicators

	Pence per 6 pack			
	Very large	*Large*	*Medium*	*Mixed weight*
Cage	-	-	-	70
Barn	-	-	-	-
Free range	157	120	88	100
Organic	320	248	190	185

Source: Leading supermarkets average price for standard 6 packs (July 2021).

Quality assurance
The predominant and most recognised hen egg assurance scheme is the British Lion Quality Code of Practice, which covers 90% of UK egg production.. For more information, see http://www.egginfo.co.uk/.

For updates on changes to the Code of Practice for Lion Quality eggs visit the British Egg Industry Council website at:
www.britisheggindustrycouncil.com

Other assurance schemes, such as Freedom Foods free range egg production, or Soil Association organic egg production, can be found at:
- www.freedomfood.co.uk/industry/rspca-welfare-standards
- www.soilassociation.org/farmersgrowers/technicalinformation/poultrylaying

Broiler Meat Production

The UK produced 1.77 million tonnes of broiler chicken meat in 2021, an increase of 4.4% from 2020. This is broadly in line with increases in production for the last 5 years, excluding 2019. Chicken meat sales have survived the pandemic well in comparison to other meats, and the closure of food service for much of the year seems to have just shifted sales to groceries for home cooked poultry, rather than reduced sales as per most other meats. While shortage of workers following EU exit and Covid restrictions has had some impact on supply chain capacity, the largest single impact on the sector has been Avian Influenza (AI), resulting in the death or culling of thousands of birds across the UK in the last few months.

Most broiler chickens are reared conventionally, with free range and organic production accounting for about 5% of the market. Conventional rearing typically means in light-controlled houses but providing natural daylight through windows (along with other types of environmental enrichment, such as perches and bales of wood shavings/straw) is becoming increasingly popular. Both male and female broiler chicks grow rapidly, so either or both sexes can be reared, depending on what

target slaughter weight is desirable. With conventional rearing, the average liveweight at the point of slaughter (at around 36-40 days of age) is 2.2 kg (Defra 2020b).

Legislation governing the keeping of conventionally reared broiler chickens (Council Directive 2007/43/EC) stipulates the maximum stocking densities allowed but note that the UK does not permit the highest stocking density of >39-42 kg/m^2 (Defra 2011). For more information on housing space requirements see page 407.

Many broiler producers sell their produce under the Assured Chicken Production scheme, which is part of the Red Tractor farm assurance scheme, to ensure food safety and traceability. For more information, see https://assurance.redtractor.org.uk/standards

Useful Poultry References

- British Poultry Council (BPC): www.britishpoultry.org.uk/
- BFREPA (British Free Range Egg Producers' Association) – www.bfrepa.co.uk & www.theranger.co.uk
- USDA 2019, Livestock and Poultry: World Markets and Trade.
- Council Directive 1999/74/EC Laying down minimum standards for the protection of laying hens, pp1-5.
- Council Directive 2007/43/EC Laying down minimum rules for the protection of chickens kept for meat production, pp1-10.
- Defra 2011 Interim guidance for keepers of conventionally reared meat chickens: www.gov.uk/government/publications/meat-chicken-keeper-guidance
- Defra 2022. United Kingdom Egg Statistics: www.gov.uk/government/statistics/egg-statistics.
- Defra 2022b. United Kingdom Poultry and Poultry Meat Statistics: www.gov.uk/government/statistics/poultry-and-poultry-meat-statistics
- https://www2.gov.scot/Topics/farmingrural/Agriculture/Livestock/eggs

Laying Hens - Free Range

PHYSICAL DATA

Source:	Hyline Brown Management Guide 2019
Egg stock	Brown
Body weight at 17 weeks (kg)	1.40-1.48
Body weight at 70 weeks (kg)	1.91-2.03
Age at 50% production (age, weeks)	20
Peak production (%)	95-96
Laying period:	
Pullets housed (weeks)	17
Pullets point of lay (weeks)	18
Weeks in lay per annum adjusted for downtime	48.5
Bird laying cycle (week 18 to 72) (eggs)	319-330
Adjusted egg production (bird/annum) *	272
Mortality:	
Livability during lay (%) - refer to breed management guides	0.97
Stocking density (birds/ha)	2,500
Feed:	
Feed use (16 to 18 weeks) (kg/hd)	1.10
Feed use (19 to 72 weeks) (kg/hd)	41.664

* Adjusted for 365d, mortality, downtime (pullet to lay, washing)

Note:

Other bird expenses include veterinary treatments, disinfectants, litter, dead bird disposal and range maintenance.

Laying Hens - Free Range

GROSS MARGIN DATA

	£/1000 bird/annum Wholesale	£/doz Wholesale
OUTPUT	£	£
Eggs sales @ £0.939/doz	21,293	0.94
Old hen value less catching cost	48	0.00
Less:		
Pullet purchase @ £5.27 per bird	5,270	0.23
	16,071	0.71
VARIABLE COSTS		
Concentrate feed purchased @ £425.79/t	16,048	0.71
Other bird expenses	680	0.03
Total Variable Costs	16,728	0.74
GROSS MARGIN	-657	-0.03

Sensitivity ±	**Change in Gross Margin/1000 birds/annum (£)**
£0.10/doz eggs sold	2,268
£10/t feed	377
1% increase in mortality at point of lay (£/1000 birds)	-7

Basis of data:

1. Egg price based on BFREPA UK average packer to producer free range price, as at July 2022.
2. High numbers of second grade eggs may be penalised and devalue the average price received.
3. Pullet price based on estimated BFREPA price (16 week fully vaccinated 3,000 bird order), July 2022.
4. Producers selling direct to market will incur additional packaging, grading and marketing costs as well as increased transport, labour and administration costs.

Grading, packaging and marketing costs vary significantly from business to business depending on the degree of automation, the size of the packing operation and the requirements of the customer being supplied.

Organic Farming

Introduction

In 2021 the area of organic farmland in the UK increased by 3.60% to 506,600ha from 489,000ha in 2020. This is mainly due to a continued increase in arable crops, temporary grassland and woodland. The organic land area decreased steadily from a high of 743,500ha in 2008 to a low of 474,000ha in 2018,but has grown again over the last three years. The area of organic land in the UK now covers 2.9%. In contrast, organic production in Europe has grown to 14.7 million hectares in 2020 from 9.5 million hectares in 2012, and now covers 9.5% of farmland.

The area of land used for organic farming in Scotland in 2021 was 103,900ha; and this has increased from 95,700ha in 2020 and represents 1.8% of Scottish farmland. The area of in-conversion land has increased from 8,700ha in 2020 to 14,200ha in 2021.

Organic pig & poultry numbers continue to increase, with 17.8% and 6.2% rises seen respectively between 2020 and 2021. Cattle, sheep and other livestock (goats, deer and horses) have seen decreases in their numbers.

Total organic food sales in the UK increased by 5.2% during 2021, creating a market worth £3.05 billion. Organic produce makes up approximately 1.4% of the UK food and drink sector.

At farm level, the organic milk price premium is generally 10ppl premium on conventional milk. The finished beef price trend has generally followed the conventional price, with an organic premium of approximately 50p -100p/kg. The premium for organic lamb remains small at peak sale season in the autumn, but outwith this period, premiums are usually available (50-100p/kg).

Prices for organic cereals, remain strong, with premiums of approximately £150-200/t for organic cereals, but this is dependent on price and availability of imported organic cereals.

Why farm organically?

Organic farming seeks to work with natural biological systems to produce high quality food in an environmentally sustainable way that minimises damage to the environment and wildlife. This enables organic produce to attract a price premium.

Organic farming systems exclude the use of agrochemicals and synthetic fertilisers, and generally have low input systems with lower variable costs, which combined with price premiums have the potential to create profitable businesses where enterprise output can be maintained.

In Scotland, organic farming has been supported under the Agri-environment Climate Scheme (AECS) of the Rural Development Programme. Attractive rates have been available for both organic conversion and maintenance funding as shown in the following table.

£/ha	Year 1	Year 2	Year 3	Year 4	Year 5
	Conversion		Maintenance		
Arable	280	280	65	65	65
Fruit/veg	400	400	200	200	200
Improved grass	140	140	55	55	55
Rough grazing	12.50	12.50	8.50	8.50	8.50

The first two years of organic conversion payments are higher than the latter three years where maintenance rates apply. This is to compensate for lower output during the conversion period before organic premiums can be attained.

Land that is managed organically is exempt from all Greening requirements of the Basic Payment Scheme (BPS) (see the Rural Aid Schemes section on page 467).

The principles of organic farming also accord with the ethos of many land managers. Using clover and livestock manures to provide fertility, the promotion of health rather than treatment of disease, and an 'acceptable' weed burden that provides food for birds and pollinating species are the aims of some land managers. Going through the formal process of certification allows produce to be sold as organic, and so receive a price premium.

How to get into organic farming

Some farm businesses require big changes to their systems in order to convert, while others will require little change. It is worth talking through the implications of converting with an adviser. Many organisations run organic farm walks throughout the year, giving farmers the chance to visit an organic farm which will demonstrate the link between organic farming and good environmental management.

There are several different organic bodies that provide certification (details on page 247). The choice of certification body can depend on several factors, including cost and the enterprises operated on the farm. Grant funding is available for farmers, and it is advisable that this is secured before conversion.

Organic conversion

Converting to organic farming will require changes in farm management with emphasis on increasing a farm's self-reliance: growing most of its own livestock feed; recycling nutrients through manure management; and using ley phases with a lot of clover to fix nitrogen, and which helps to provide fertility for arable crops later in the rotation. As well as building fertility, crop rotations also provide clean grazing and help manage the weed burden. The requirement for more 'natural' production restricts the amount of concentrates that can be fed to cattle and sheep, emphasising a forage-based system. Housed livestock have maximum stocking

densities, and must also have a dedicated lying area, possibly necessitating changes to housing with existing slatted floors.

Technical information

The data used in the preparation of the gross margins overleaf has been a necessary compromise of organic production figures from across Scotland. This should be borne in mind when using the margins, for example, in areas where straw is difficult to source a much higher price should be allocated to bedding.

Silage yield is based on a lower yielding, two cut system. Where yields are high due to a large clover yield in a year with an early spring, this should be increased. If only one cut is taken and yields are lower then the forage area will have to be adjusted accordingly. Silage costs are based on baling and wrapping a third of the silage produced. This cost will increase or decrease depending on the proportion of pit or baled silage.

Organic certification

Any farmer wishing to produce food for sale as organic must comply with regulations setting out the minimum standards of production. Certification bodies have their own standards which are generally more specific, and in some respects stricter than the basic EU standards. All farmers in the UK are certified to this higher level.

The number of licensed producers and processors in Scotland has continued to decrease from 577 in 2018 to 529 now in 2021. There are 359 registered organic crop producers and 276 registered organic livestock producers.

Organic Farming Contacts

Certification bodies

Scottish Organic Producers Association (SOPA)	0131 335 6606 info@sopa.org.uk
The Biodynamic Association (BDA)	01453 759 501 office@biodynamic.org.uk
Organic Farmers and Growers (OF&G)	01939 291 800 info@ofgorganic.org
Irish Organic Association (IOA)	+353 090 643 3680 info@irishoa.ie
The Organic Food Federation	01760 720 444 info@orgfoodfed.com
Organic Trust Ltd.	+ 353 (0) 185 30271 organic@iol.ie
Quality Welsh Food Certification Ltd. (QWFC)	01970 636 688 enquiries@qwfc.co.uk
Soil Association Certification Ltd.	England: 0300 330 0100 Scotland: 0131 666 2474
Global Trust Certification Ltd.	01244 898165 gtcenquiries@saiglobal.com

Information and advice

SAC Consulting	01467 625385
The Organic Research Centre	01488 658 298 hello@organicresearchcentre.com

Organic Wheat - Winter

PHYSICAL DATA

(a) Seed
Organic seed sown at 200 kg/ha (1.60 cwt/acre).

(b) Fertiliser
No manure or mineral fertiliser applied routinely to first crop after ley. Annualised cost of rock phosphate and permitted potash fertiliser (e.g. sulphate of potash) after derogation.

(c) Trace elements
Trace elements (e.g. manganese sulphate).

(d) Other crop expenses
Net wrap at 50-77p/bale for round straw bales.

Organic Wheat - Winter

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	4.0	(1.6)	5.3	(2.1)	6.5	(2.6)
Straw yield: t/ha (t/acre)	2.1	(0.9)	2.8	(1.1)	3.4	(1.4)
OUTPUT			**£/ha (acre)**			
Grain @ £420/t*	1,680		2,226		2,730	
Straw @ £45/t	95		126		155	
	1,775	(718)	2,352	(952)	2,885	(1168)
VARIABLE COSTS						
Seed @ £550/t	110		110		110	
Fertiliser	68		68		68	
Trace elements	10		10		10	
Other crop expenses	10		13		16	
	197	(80)	200	(81)	203	(82)
GROSS MARGIN	1,578	(638)	2,152	(871)	2,682	(1085)

GRAIN PRICE SENSITIVITY						
£400 /t	1,498	(606)	2,046	(828)	2,552	(1033)
£440 /t	1,658	(671)	2,258	(914)	2,812	(1138)
£460 /t	1,738	(703)	2,364	(957)	2,942	(1191)

* Feed price (milling premium £30/t)

Basis of data:

Sale price estimate for 2023 crop, September/October ex-farm spot price at 15% moisture content and average quality.

Organic Oats - Spring

PHYSICAL DATA

(a) Seed
Organic seed sown at 200 kg/ha (1.60 cwt/acre).

(b) Fertiliser
No manure or mineral fertiliser applied routinely to first crop after ley. Manure applied to 2nd and 3rd crop after ley. Annualised cost of rock phosphate and permitted potash fertiliser (e.g. sulphate of potash) after derogation.

(c) Trace elements
Trace elements (e.g. manganese sulphate).

(d) Other crop expenses
Net wrap at 50-77p/bale for round straw bales.

Organic Oats - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.0	(1.2)	4.0	(1.6)	5.0	(2.0)
Straw yield: t/ha (t/acre)	1.8	(0.7)	2.4	(1.0)	3.0	(1.2)
OUTPUT			**£/ha (acre)**			
Grain @ £360/t*	1,080		1,440		1,800	
Straw @ £45/t	81		108		135	
	1,161	(470)	1,548	(626)	1,935	(783)
VARIABLE COSTS						
Seed @ £530/t	106		106		106	
Fertiliser	68		68		68	
Trace elements	10		10		10	
Other crop expenses	8		11		14	
	192	(78)	195	(79)	197	(80)
GROSS MARGIN	969	(392)	1,353	(548)	1,738	(703)
GRAIN PRICE SENSITIVITY						
£340 /t	909	(368)	1,273	(515)	1,638	(663)
£380 /t	1,029	(416)	1,433	(580)	1,838	(744)
£400 /t	1,089	(441)	1,513	(612)	1,938	(784)

* Milling price (feed price £30/t lower)

Basis of data:

Sale price - estimate for 2023 crop, September/October ex-farm spot price at 15% moisture content and average quality.

Organic Barley - Spring

PHYSICAL DATA

(a) Seed

Seed sown at 200 kg/ha (1.6 cwt/acre).

(b) Fertiliser

No manure or mineral fertiliser applied routinely to first crop after ley. Manure applied to 2nd and 3rd crop after ley. Annualised cost of rock phosphate and permitted potash fertiliser (e.g. sulphate of potash) after derogation.

(c) Trace elements

Trace elements (e.g. manganese sulphate).

Organic Barley - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.0	(1.2)	4.0	(1.6)	5.0	(2.0)
Straw yield: t/ha (t/acre)	1.6	(0.6)	2.1	(0.9)	2.7	(1.1)
OUTPUT			**£/ha (acre)**			
Grain @ £380/t*	1,140		1,520		1,900	
Straw @ £50/t	80		106		133	
	1,220	(494)	1,626	(658)	2,033	(823)
VARIABLE COSTS						
Seed @ £530/t	106		106		106	
Fertiliser	68		68		68	
Trace elements	10		10		10	
Other crop expenses	7		10		12	
	191	(77)	193	(78)	196	(79)
GROSS MARGIN	1,029	(416)	1,433	(580)	1,837	(744)
GRAIN PRICE SENSITIVITY						
£360 /t	969	(392)	1,353	(548)	1,737	(703)
£400 /t	1,089	(441)	1,513	(612)	1,937	(784)
£420 /t	1,149	(465)	1,593	(645)	2,037	(824)

* Feed price (malting premium £30/t)

Basis of data:

Sale price estimate for 2023 crop.

Organic Beans - Spring

PHYSICAL DATA

(a) Seed

Seed sown at 225 kg/ha (1.8 cwt/acre).

(b) Fertiliser

No manure or mineral fertiliser applied routinely to first crop after ley. Manure applied to 2nd and 3rd crop after ley. Annualised cost rock phosphate and permitted potash fertiliser (e.g. sulphate of potash) after derogation.

(c) Trace elements

Trace elements (e.g. manganese sulphate).

Organic Beans - Spring

GROSS MARGIN DATA

Grain yield: t/ha (t/acre)	3.0	(1.2)	5.0	(2.0)
OUTPUT		**£/ha (acre)**		
Grain @ £570/t*	1,710		2,850	
	1,710	(692)	2,850	(1153)
VARIABLE COSTS				
Seed @ £700/t	175		175	
Fertiliser	68		68	
Trace elements	10		10	
Other crop expenses	-		-	
	253	(102)	253	(102)
GROSS MARGIN	1,457	(590)	2,597	(1051)
GRAIN PRICE SENSITIVITY				
£530 /t	1,337	(541)	2,397	(970)
£610 /t	1,577	(638)	2,797	(1132)
£630 /t	1,637	(662)	2,897	(1172)

* Feed price

Basis of data:

Sale price estimate for 2023 crop. Deductions for high levels of field beans which do not meet minimum quality standards can reduce the price considerably.

Organic Potatoes - Maincrop

PHYSICAL DATA

(a) Seed

Planted at 2.5 t/ha. This figure can rise to 4 t/ha depending on seed size. Organic seed must be used unless a derogation is obtained for specialist varieties.

(b) Fertiliser

Farm yard manure used, no artificial fertiliser.

(c) Sprays

Seed treatment	None.
Nematicide	Assumption of no treatment applied.
Herbicides	None used.
Blight control	None used.
Aphid control	None used.
Slug control	2 applications of ferric phosphate (derogation obtainable) for high risk situations. If low risk situation (i.e. sandy soils), reduce cost by £43/ha.
Desiccation	Pulverising and/or gas burning. See page 381 for costs.

(d) Other crop expenses

SPCS field inspection fees; roguing and labels and positive ventilation and cold storage are included. Other costs may include bags (£7.50-£11.20/t of crop) and royalties (which will depend on variety).

(e) Irrigation

Irrigation may be applied in some circumstances for yield and quality. These costs are not included. Annual capital charge could be £350-500/ha plus £1.60-1.90/ha.mm with a contract charge of approximately £5.40/ha.mm.

(f) Casual labour

These costs are not included. Costs calculated using the data below could be used. Labour charged at £13/hr as per labour rates on page 62 for low yielding potato crops.

Organic Potatoes - Maincrop

GROSS MARGIN DATA

Yield: t/ha (t/acre): seed	-	(0.0)	-	(0.0)
Yield: t/ha (t/acre): ware	25	(10.1)	49	(19.8)
Yield: t/ha (t/acre): s/feed	1	(0.4)	2	(0.8)
	26	(10.5)	51	(20.6)
OUTPUT		**£/ha (acre)**		
Seed @ £0/t	-		-	
Ware @ £310/t	7,750		15,190	
Stockfeed @ £30/t	30		60	
	7,780	(3,149)	15,250	(6,172)
VARIABLE COSTS				
Seed @ £375/t	938		938	
Fertiliser	-		-	
Sprays	53		53	
Other expenses	2,016		3,841	
	3,007	(1,217)	4,832	(1,955)
GROSS MARGIN	4,773	(1,932)	10,418	(4,217)
WARE PRICE SENSITIVITY				
£150 /t	773	(313)	2,578	(1,043)
£250 /t	3,273	(1,325)	7,478	(3,026)
£310 /t	4,773	(1,932)	10,418	(4,216)
£360 /t	6,023	(2,437)	12,868	(5,208)

Organic Dairying

Introduction

Organic dairy farming aims for self-sufficiency within a unit. An effective way of doing this is by utilising high quality grass and grass silage as the main source of both protein and energy. This achieves economies in concentrate feeding. Further economies can be made by growing more protein on the farm such as peas and beans and increasing the use of clover in grass leys to reduce bought-in protein costs. Replacing compound feeds and blends with home mixes will help reduce feed costs further. The higher reliance on forage means that milk output is around 20% lower than in a conventional system.

Gross margins

The enterprise performance levels are specific to the individual cow per annum based on the whole herd performance divided by the average number of cows in the herd. They allow for a number of variables, but also contain a number of constant assumptions.

Variables

Traditionally dairy herds could either be classed as spring or autumn calving. A more level production of milk is now being encouraged by milk purchasers. This has resulted in adjustments to calving patterns, with more herds now achieving all-year round calving.

Feeding systems vary ranging from a simple system of silage or grass ad-lib with parlour cake fed to yield. Higher input systems may make use of a partial mixed ration with a low level of concentrate fed along with silage, again topped up with parlour feeding. Total mixed rations may also be fed without additional parlour feed. Organic concentrate costs are significantly higher, in the region of about 50-70% over conventional feeds. Whatever the system, forage inclusion must be a minimum 60% of the total ration on a dry matter basis. It is a requirement of the organic certification standards that dairy cows must be at pasture when conditions allow, which is typically over 200 days on average per year.

Constant assumptions

Herd life	3 to 5 years
Calving interval	390 days
Cow mortality	1-2%
Calf mortality (up to 7 days)	8%
Size of cow	600 kg
Winter feeding period	180 days

Rations

For simplicity the feeds included have been restricted to ad-lib silage and grass plus 18% crude protein, 13.0 ME compound cake.

Organic Dairying - Summary of Assumptions

(a) Average price assumed (ppl)

An average price of 54ppl is assumed. This will fluctuate seasonally and may be partly dependent on quality characteristics such as hygiene measures and milk fat and protein percentage.

(b) Calf value

A sale/transfer price of £166/hd has been adjusted for calving interval and mortality. The calf value can be altered by £8.61 for each £10 difference in the sale/transfer price.

(c) Cull cow (annual share)

A sale price of £707.00/hd has been adjusted for herd life and mortality, and assumes no variation between high and low yielding cows. The annual share can be altered by £2.34 for each £10 difference in cull cow price. Assumed herd life of 4.17 years.

(d) Heifer replacement (annual share)

Heifer purchase/transfer price varies according to yield. A purchase price equating 18ppl has been used, here, and this has been adjusted for herd life and mortality. The annual share can be altered by £2.45 for each £10 difference in purchase/transfer price.

(e) Other livestock expenses

These are taken from commercial dairy herds and include milk recording, bedding sawdust and dairy detergents.

Organic Dairy Cow - 7,000 Litres

PHYSICAL DATA

Calving period	All year **/cow**
Average annual yield (litres)	7,000
Feed requirements (kg)	
Silage (kg)	7,700
Concentrates (kg)	1,800
Concentrates fed per litre (kg)	0.26
Overall forage area (ha)	
Silage and aftermath grazing	0.25
Grazing	0.34
Total	0.59

Basis of data:

See *Summary of assumptions-physical data,* page 258-259.

Organic Dairy Cow - 7,000 Litres

GROSS MARGIN DATA

Calving period	All year **/cow**
Average annual yield (litres)	7,000
OUTPUT	£
All year milk @ 54 p/litre	3,780
Calf value	143
Cull cow (annual share)	169
	4,092
Less: Heifer replacement (annual share)	308
	3,784
VARIABLE COSTS	
Concentrates @ £600/t	1,080
AI	48
Vet & medicines	82
Other livestock expenses	101
	1,311
Gross margin before forage	2,472
Forage variable costs:	
Silage @ £103/ha	26
Grazing @ £103/ha	35
Total Variable costs	1,372
GROSS MARGIN £/cow	2,411
GROSS MARGIN £/ha	4,087

Sensitivity-Change ±

1 p/litre in milk price	70
£10/t in concentrate price	18

Organic Suckler Cows - Mainly Silage Diets

PHYSICAL DATA

Breed:	Commercial type cows bred to a range of bulls, mostly continental
Calving period	Feb-Apr
Calves weaned (%)	92
Month of weaning	October
Days to weaning	220
Month of sale	October
Liveweight of calves at sale	
Steers (kg)	260
Heifers (kg)	240
Herd life of cows (years)	7
Herd life of bulls (years)	4
Cow mortality (%)	2
Calf mortality (%)	3
Cow:bull ratio (:1)	35
Feeding/cow and calf (winter days):	180
silage (t)	6
calf concentrates (kg)	180
cow concentrates (kg)	-
Straw (t)	0.9
Silage:	
yield	30 t/ha from 2 cuts;
quality	DM 220 g/kg; ME 10.5 MJ/kg DM
Overall forage area (ha)	
silage and aftermath grazing	0.20
grazing	0.45
	0.65

Assumptions:

Mainly grass farm either buying in all straw and concentrates or growing small amount of cereals.

Note:

1. Cull cow value based on 100% of cull cows into the food chain.
2. SSBSS based on 94% calves claimed. See pages 152 and 473-474 for more details.

Organic Suckler Cows - Mainly Silage Diets

GROSS MARGIN DATA

Calving period		**Feb-Apr**	
OUTPUT		**£/cow**	
Calf sales (lwt - 92% crop)			
Steers	Heifers		
260 kg @ 250p	240 kg @ 250p	575	
Scottish Suckler Beef Support Scheme		92	
		667	
Less: Replacement -	cow	88	
	bull	26	
		553	
VARIABLE COSTS			
Barley @ £303/t		55	
Minerals		15	
Vet & medicines		40	
Straw - feeding & bedding @ £100/t (bought-in)		90	
Commission, tags & levies		30	
		229	
Gross Margin before forage		324	
Forage variable costs:			
silage @ £103/ha		21	
grazing @ £103/ha		46	
		67	
Total Variable Costs		296	
GROSS MARGIN £/cow		257	
GROSS MARGIN £/ forage ha (acre)		395	(160)

Sensitivity-Change ±

10 p/kg in lwt sale price	23
Sale weight ± 10kg	23
Herd life ± 1 year	18

Replacement cost prices:

Cull cow	£900	In-calf heifer (purch.)	£1,450
Cull bull	£1,150	Replacement bull	£4,750

Organic Finishing Cattle

PHYSICAL DATA

Liveweight at purchase (kg)	250
Liveweight at slaughter:	
kg lwt	580
kg dwt	320
Cattle bought	October
Cattle sold	January
Finishing period (days)	440
Liveweight gain (kg)	330
Daily liveweight gain (kg)	0.75
Supplementary feed-barley, protein & minerals (kg)	700
Straw (t)	0.8
Overall forage area (ha)	
silage and aftermath grazing	0.22
grazing	0.25
	0.47

Organic Finishing Cattle

GROSS MARGIN DATA

OUTPUT	£/head	
Sale value (dwt):		
320 kg @ 495p	1,584	
Less: Purchased store calf in October (lwt)		
250 kg @ 250p	625	
	959	
VARIABLE COSTS		
Barley, protein & minerals @ £355/t	249	
Vet & medicines	18	
Straw - feeding & bedding @ £100/t (bought-in)	80	
Commission, tags & levies	52	
	399	
Gross Margin before forage	560	
Forage variable costs:		
silage @ £103/ha	23	
grazing @ £103/ha	26	
	49	
Total Variable Costs	448	
GROSS MARGIN £/head	511	
GROSS MARGIN £/ha (acre)	1,086	(439)

Sensitivity-Change ±

10 p/kg in dwt sale price	32
Dwt sale weight ± 10kg	50

Organic Breeding Ewes - Finished Lamb Production

PHYSICAL DATA

Breeds		Crossbred ewe to terminal sire
Lambing period		April/May
Lamb crops per ewe (avg)		4
Ram flock life (seasons)		3
		/100 ewes tupped
Rams (no.)		2.5
Lamb numbers:	marked	150
	mortalities	5
	sold finished	145
Lamb lwt at slaughter (kg)		42
Lamb dwt at slaughter (kg)		20
Ewes:	culls	20
	mortalities	5
	gimmers purchased	25
Wool sales (kg)		272
Concentrate use: barley/mineral (kg)		2,000
Total concentrate (kg)		2,000
Forage (ha):	silage	1
	grazing	12
Total forage (ha)		13

Basis of data:

1. Silage yield and quality 30 t/ha from 2 cuts; ME 10.5 MJ/kg DM.
2. Breeding stock and finished lamb prices 2022/23 season.

Organic Breeding Ewes - Finished Lamb Production

GROSS MARGIN DATA

OUTPUT		£/100 ewes tupped	
Finished lambs: 145 @ £114/hd		16,530	
Cast ewes: 20 @ £90/hd		1,800	
Wool sales: 272kg @ £0.4/kg		109	
		18,439	
Less:	25 gimmers purchased @ £150/hd	3,750	
	ram replacement (net)	292	
		14,397	
VARIABLE COSTS			
Cereals & minerals @ £480/t		960	
Vet, medicines & dips		488	
Commission, levies, shearing, scanning & tags		1,164	
Gross margin before forage		11,785	
Forage variable costs:			
1 ha silage @ £103/ha		103	
12 ha grazing @ £103/ha		1,236	
Total Variable Costs		3,951	
GROSS MARGIN		10,446	
GROSS MARGIN £/ forage ha (acre)		804	(325)

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**
£1/hd in finished lamb price	145
£1/hd in draft ewe price	20
5% change in lambs sold	827

Crofts and Small Farms

Introduction

This section gives an overview of crofting and small farms.

Information on land tenure and legislation is included as well as information on support schemes specifically directed to crofts and small farms.

Gross margins have been designed with a smaller scale in mind. These focus on beef cattle, sheep and poultry.

For new entrants to farming, this section should be read in conjunction with the New Entrant section on page 427.

Crofting

Crofting is a form of land tenure which is unique to Scotland. Generally, a croft is a relatively small agricultural land holding which is normally held in tenancy and which may or may not have buildings or a house associated with it.

Crofts range in size from less than 0.5ha to more than 100ha. An average croft is nearer 5ha.

A crofter is the tenant or owner-occupier of a croft. Usually, the crofter holds the croft on the "statutory conditions", which apply to every croft tenancy, and will not have a written lease.

There are 20,777 crofts and an estimated 11,500 crofters in Scotland. Some crofters have more than one croft. It is estimated that there are more than 33,000 people living in crofting households.

There are legislative duties which must be adhered to when taking over a croft. Residence on the croft is required or the crofter must reside within 32km. There is a duty not to neglect the croft, to cultivate and maintain the croft for agriculture or to put it to another purposeful use (e.g. any use which does not have an adverse effect on the croft, the public interest, the interests of the landlord or the use of adjacent land).

Common grazings
There are over 1,000 common grazings in the crofting counties. A common grazing is an area of land shared by a number of crofter shareholders. The use of a common grazing is governed by a grazing committee, elected by the shareholders in the Common. Individual shareholders have a ‘souming’ which governs the amount of stock they are allowed to graze. Details of shares and ‘soumings’ are contained in the Regulations for the Common Grazing.

The Crofting Commission
The Crofting Commission is a Non-Departmental Public Body (NDPB) responsible for regulating crofting. The Commission comprises of six

Crofting Commissioners elected from geographic areas in the crofting counties, and three Commissioners appointed by the Scottish Government.

Obtaining a croft

There are several ways to obtain a croft. The following table gives details of these, and the requirements involved.

Type of change	Description	Notification to Crofting Commission	Crofting Register Required?
Assignation	Transfer of a croft tenancy from tenant crofter to proposed new tenant	Assignation Application Croft Tenancy form	Yes
Sub - Let	Transfer of a croft tenancy from tenant crofter to proposed new tenant for a fixed period of time	Subletting Application Croft Tenancy form	No*
Change of ownership – tenant purchasing croft	Purchase of Croft	Notification of change of ownership form	No*
Change of ownership – change of owner-occupier	Purchase of Croft	Notification of change of ownership form	Yes
Letting	Croft is let by landlord or owner-occupier to a tenant	Application to Let Croft (Whole or Part)	Yes
Short Term Letting	Owner Occupier letting a croft to a tenant for less than 10 years	Short Term Let Application Owner-Occupier Crofter	No*

*** Refers to First Time Registration. Please note that if the croft concerned is already on the new Crofting Register, then a Form B and a £90 fee will be required to update the register.**

Crofting terms

Decrofting is the term used for the process of removing land from crofting tenure. This is typically used to secure a house site suitable for commercial lending.

Resumption, similar to decrofting, is the removal of land from croft tenure; in this case it is carried out by the landlord, following permission from the Scottish Land Court.

Apportionment is the term used when someone who shares in a common grazing wants to take part of the common grazing for their own exclusive use.

Crofting register
The crofting register is map based and provides a definitive record of the extent of, and interest in, land within crofting tenure in Scotland. The register shows the boundaries of land and also name and address of the crofter. The register is maintained by the Keeper of the Registers of Scotland.

Applications to register a croft should be submitted to the Crofting Commission. As well as completing Form A which can be found at https://www.ros.gov.uk/services/forms/guidance-and-forms you must also supply a clear and legible map showing the boundaries of the croft. Maps that meet the desired standard can be acquired from local authorities, architects and surveyors and distributors of Ordnance Survey maps.

Small Farms

In contrast to crofts, small farms are not specifically mentioned in legislation; instead they are governed under the same agricultural tenancy legislation as detailed in pages 397-403. To be eligible for small farm specific grants and services, the Scottish Government deems a small farm to be a holding between 3ha and 30ha in size.

Rural Aid Schemes for Crofts and Small Farms

Agriculturally active crofts and small farms are entitled to the same direct subsidies that are available to the rest of the farming industry, as detailed in the Rural Aid Schemes section on page 467. There are also grant schemes specifically designed to benefit crofters and small farmers.

Crofting Agricultural Grant Scheme (CAGS)
This scheme provides grants for crofters to make improvements to their crofts and help to sustain their businesses. Funds of up to £25,000 for individual crofters and £125,000 for groups of crofters can be used for capital projects, such as the construction or improvement of agricultural buildings and for the establishment of Common Grazings Committees.

CAGS grant rates are shown in the following table:

	Individuals		Groups [1]	
	Young Crofters [2]	Other Crofters	Young Crofters [2]	Other Crofters
LFA	80%	60%	90%	80%
NLFA	60%	40%	80%	60%

[1] e.g. Grazing committees.

[2] under 41 years old, with adequate occupational skills and competence, and in business for less than 5 years.

Funding for eligible capital projects can cover all aspects of the project, including the cost of materials, transportation of materials, costs of contractors and own labour. Items eligible for grant aid include:

1. Erection or improvement of agricultural buildings, and shelters for the temporary housing and sheltering of out-wintered livestock.
2. Works associated with agricultural building, including yards, hard-standings, dungsteads, and silos (excluding grain silos).
3. Investment in land management, including the initial grassland improvement works for the restoration of degraded land and the control of bracken.
4. Slurry stores.
5. Arterial drainage and field drainage.
6. All other forms of general drainage including under drainage, hill drainage and ditching.
7. Provision or improvement of facilities for the organised feeding of out-wintered livestock, including permanently fixed troughs and feed barriers, and associated concrete bases.
8. Provision or improvement of equipment for the handling and treatment of livestock.
9. Planting of shelter belts and the provision of fences, hedges, walls, gates or stock grids.
10. Provision or improvement of amenities, including water supplies, mains electricity connections, electricity generators or gas supplies.
11. Provision of electrical equipment.
12. Provision or improvement of access tracks to land improvement areas, roads, bridges, culverts or boat slips.
13. Assistance of up to £500 towards the establishment of a properly constituted Common Grazings Committee.

Small Farms Grant Scheme

This scheme provides support to eligible farmers or crofters for investments related to development, modernisation or adaptation of small farms, i.e. holdings that have between 3ha and 30ha of eligible agricultural area. To be eligible, total gross income for sole traders should be no more than £30,700 and £41,000 for partnerships or groups. Funds of up to £25,000 for individuals and £125,000 for groups can be used to erect or improve agricultural buildings, provision of slurry stores, field drainage, handling facilities, shelter belts, electrical equipment and for access.

Croft House Grant (CHG)

This scheme provides grants for crofters to improve and maintain the standards of crofter housing, with the aim of attracting and retaining people within the crofting areas of Scotland. Grants are available for new builds, major repairs, internal improvements and rebuilding work.

Intervention rates
Funding of 40% of the costs up to a maximum of £38,000 in high priority areas and up to £28,000 in standard priority areas. Projects below £8,000 in value are ineligible for grant aid under CHG.

New House
There are limits applied to the size of a new build house which relate to the number of bedrooms:

House type	Two bed single storey	Two bed two storey	Three bed single storey	Three bed two storey	Four bed single storey	Four bed two storey	Five bed single storey	Five bed two storey
Maximum eligible floor area (m2)	112	120	138	146	164	172	191	199

These limits also apply to house improvement grants where the proposal is to increase the size of the dwelling house.

House Improvements
The grant can be used to facilitate minor and major improvements to existing croft houses. Croft houses which have been decrofted for mortgage purposes are still eligible provided the applicant meets the remaining scheme requirements. Please see below examples of minor and major improvements; this list is not exhaustive.

Example of Minor improvements include:
- First time provision of modern fitted kitchens (not replacement).
- First time provision of bathrooms, or replacement of new bathroom suites.
- First time provision of storm porches with floor area not exceeding four square metres.
- First time provision of a central heating system, or replacement of elements of the system which have become unsafe or un-serviceable.
- Rewiring where the existing wiring has become unsafe or un-serviceable.

Examples of Major improvements include:
- Replacement of doors and windows.
- Replacement of roof covering.
- Replacement of gutters and down pipes.
- Provision of, or modification and repairs to chimneys and flues.
- Repairs to cracks in walls.
- Provision of chemical damp proof courses.
- Provision of, or replacement of external rendering, where this is required to maintain water tightness.
- Replacement of decayed or undersized structural elements such as lintels.
- Repairs to timber roof and floor structure where water ingress or infestation has led to decay.

- Provision of, or modification to external walls, and internal partitions as required to create a functional dwelling house.
- Provision of thermal and sound insulation to external wall linings, internal partitions, floors, and roof spaces.
- Provision of, or replacement of floors, solums and under-floor ventilation.
- Lowering external ground levels and provision of external drainage where required to divert surface water from the building.
- Provision of ramps and other means of access.
- Application of chemical treatment for woodworm and other infestations.

Quotes
No quotes are required for new build houses; improvement works require a minimum of two competitive quotes for the proposed works. If the crofter is a builder and wishes to carry out the work this is acceptable; however, they must submit a quotation. In these circumstances the crofter would need to submit the two other competitive quotes in addition to his/her own. The quotations must be submitted along with the application.

Eligibility & Application Windows
Eligibility is partly based on the production of a 5-year business plan for the croft. Applications are accepted all year round, but decisions are typically made four times a year with the following closing dates: 1st March, 1st June, 1st September and 1st December.

Scoring
Applications are assessed on a points system to help prioritise funding. Scoring takes into account: current accommodation, assignation re-let details, other property which is/was owned and could/has been sold, and also current and proposed croft activity.

Agri-Environment Climate Scheme (AECS)
Full details of AECS can be found on page 476. There are a number of options which are particularly relevant for crofters and small farms. These include:

Management Option	Payment Rate
Conservation Management of Small Units (up to 30ha)	£77.78/ha
Cattle Management on Small Units	Retention - £107.38/ha
(up to a max of 20ha @ 2 ha/cow)	Introduction - £162.63/ha
Cropped machair	£239.76/ha

Croft and Small Farm Gross Margins

The gross margins on the following pages give an insight into livestock enterprises on a smaller scale. The gross margins are an illustration and must be adjusted for specific circumstances. The variable costs take

account of added costs for smaller volumes being purchased and/or for being based in remote areas. All concentrate feeding and straw (for feeding and bedding) are assumed to be bought-in.

Beef

The suckler cow margins are based on crofts and small farms with a mixture of inbye ground and rough grazing/common grazing. The margins provide an illustration of a herd with 10 native type suckler cows on in-wintered (native cross cattle) and out-wintered (pure native) systems calving mainly in February - April.

Output is based on a calving percentage of 90% and selling weaned calves in October. Income from the SSBSS (see page 473-474 for more detail) is based on the Island rate. This should be reduced for £40/cow (90% calving percentage) if budgeting for a mainland system. Adding value to output would come from direct marketing beef.

Replacement costs are based on purchasing all breeding stock. If hiring a bull, this cost should be adapted.

For more information on keeping cows see pages 114-125, 150-177, 406 and 409.

Sheep

For crofts and small farms, sheep provide a basis in getting started in commercial livestock farming. Compared to cattle, sheep require a lower capital investment to establish a flock and income can be generated within a 12 month period due to their short gestation period.

The sheep gross margins illustrate technical and financial performance for a range of croft and small farm situations. The margins are based on Blackface and Cheviot hill breeds and Mule and Texel type lowland breeds. Where other breeds are used, prices should be adjusted accordingly. Income comes from selling lambs and cast sheep at the auction market either as store or finished animals. Adding value to output would come from direct marketing lamb or fleece.

Replacement costs are based on retaining homebred ewe lambs or buying in gimmers for lowland situations. Rams are assumed to be hired. Where buying rams, costs should be adjusted. The margins do not account for keeping flock replacements.

For more information on keeping sheep see pages 114-125, 179-207, 206 and 409.

Free range chicken egg production

Free range egg production is an ideal enterprise for a croft or small farm business. There is a smaller land requirement compared to other livestock, low flock set-up costs and quick and regular cashflow. Any significant capital expense will be mainly dictated by requirement for bird housing. In recent years there have been housing orders for poultry.

Given this background, it would be advisable to design your system and housing around this, for example considering if there is good ventilation in buildings and considering if an outdoor area can be netted off.

When keeping more than 50 birds the keeper must be registered (see page 118 for more detail). If the intention is to sell eggs beyond the farm gate, e.g. to farm shops or local shops, then the business should be registered with the Scottish Government Eggs and Poultry Unit. For details and guidance see:
https://www.ruralpayments.org/publicsite/futures/topics/inspections/all-inspections/egg-and-poultry-inspections/.

For alerts from APHA about poultry diseases see:
https://www.gov.uk/guidance/apha-alert-subscription-service

The enterprise illustrated assumes chicken egg production using hybrid birds. Egg production using native chicken breeds or other species, such as ducks or geese could also be considered. The gross margin assumes buying point of lay pullets, purchase of feeding in 25kg bags (purchasing at least 1t at a time) and marketing eggs at the farm gate using labelled (with laying date and best before) half dozen boxes. When selling the eggs at the farm gate, a premium price is available as customers appreciate the eggs freshness, provenance and taste.

Other croft and small farm enterprise options
See the Diversification section on page 285 for more information on other livestock and farm diversification ideas.

Suckler Herd - Croft and Small Farm

PHYSICAL DATA

Breed: Cross bred native and purebred native cows bred to native bull.

	Upland suckler in-wintered	**Hill suckler out-wintered**
Calving period	Feb-Apr	
Calves weaned	90%	90%
Month of weaning	October	October
Days to weaning	220	220
Month of sale	October	October
Lwt of calves: at weaning (kg)	255	235
Lwt of calves: at sale/transfer (kg)	255	235
Herd life of cows (years)	10	9
Herd life of bulls (years)	4	4
Cow mortality (%)	1	2
Calf mortality (%)	4	4
Cow:bull ratio (:1)	10	10
Feeding/cow and calf (winter days):	180	180
silage (t)	5.4	6
straw (t)	0.6	0
calf concentrates (kg)	100	0
cow concentrates (kg)	180	180
Grazing fertiliser (kg N/ha)	40	30
Silage & aftermath fertiliser (kgN/ha)	125	125
Silage:		
yield (t/ha from 1-cut)	20	20
DM quality (g/kg)	280	280
ME quality (MJ/kg DM)	10.5	10.5
Overall forage area (ha):		
silage and aftermath grazing	0.27	0.30
Improved grazing	0.30	0.20
Unimproved / Hill Grazing	2.00	4.00
	2.57	4.50
Housing system: access to shed		
Straw for general use incl. calving pens	0.25	0.10

Suckler Herd - Croft and Small Farm

GROSS MARGIN DATA

	Upland suckler in-wintered	Hill suckler out-wintered
OUTPUT		£/cow
Calf sales (lwt)	90%	90%
Steers Heifers		
270 kg @ 230 p 240 kg @ 230 p	528	-
250 kg @ 230 p 220 kg @ 230 p	-	486
Scottish Suckler Beef Support Scheme	131	131
	659	617
Less: Replacement - cow	71	73
bull	63	63
	525	481
VARIABLE COSTS		
Cow concentrates @ £560/t	101	101
Calf concentrates @ £560/t	56	0
Vet & medicines	67	67
Straw feeding and bedding @ £150/t	128	15
Commission, haulage, tags & levies	57	56
	408	238
Gross Margin before forage	116	242
Forage variable costs:		
silage @ £912/ha	246	274
grazing @ £258/ha	77	52
	323	326
Total Variable Costs	731	564
GROSS MARGIN £/cow	-207	-84
GROSS MARGIN £/ha	-80	-19

Sensitivity-Change ±	**Change in Gross Margin/head (£)**	
10 p/kg in lwt sale price	23	22
Sale weight ± 10kg	21	21
Herd life ± 1 year	14	9

Replacement cost prices:

Native cross cull cow	£930	Native cross i/c heifer (purch.)	£1,550
Pure native cull cow	£720	Pure native i/c heifer (purch.)	£1,250
Cull bull	£999	Replacement bull (purch.)	£3,500

Sheep Flock – Croft and Small Farm

PHYSICAL DATA

Breeds:		Hill - Lowland		
Breed of Sire		Hill	Low	Low
Breed of Dam		Hill	Hill/Low	Low
Lambing period				Early April
		Lambs reared (%)		
		80%	**120%**	**160%**
Lamb crops per ewe (avg)		4.5	4.5	4.5
		/10 ewes tupped		
Rams Hired		1	1	1
Lamb numbers:				
marked		8	12	16
sold/retained		8	12	16
sold:	finished lambs	0	0	13
	store lambs	5	8	3
retained for breeding		3	3	0
Ewe numbers:				
culls		1	2	2
mortalities		1	1	1
gimmers purchased		0	0	3
Wool sales - ewes, rams & hoggs (kg)		16	25	27
Ewe concentrate (kg)		180	450	600
Forage: improved grazing (ha)		0	0.7	1
silage/hay (ha)		0	0.2	0.3
Total forage (ha)		0	0.9	1.3
Bedding straw (kg/day/hd)		0	0.8	0.8

Sheep Flock - Croft and Small Farm

GROSS MARGIN DATA

OUTPUT			Lambs reared (%)		
			80%	120%	160%
			/10 ewes tupped		
Finished lambs:	0 @	£0	-	-	-
	0 @	£0	-	-	-
	13 @	£118	-	-	1,534
Store lambs:	5 @	£54	270	-	-
	8 @	£66	-	528	-
	3 @	£73	-	-	219
Cast ewes:	1 @	£61	61	-	-
	2 @	£63	-	126	-
	2 @	£84	-	-	168
Wool sales:	16 @	£0.30	5	-	-
	25 @	£0.30	-	8	-
	27 @	£0.40	-	-	11
			336	662	1,932
Less: gimmers purchased @ £161/hd			-	-	403
ram hire @ £5/ewe			50	-	-
ram hire @ £6/ewe			-	60	60
			286	602	1,469
VARIABLE COSTS					
Ewe concentrates @ £370/t			67	167	222
Vet, medicines & dips			90	93	95
Bedding straw @ £160/t			-	54	54
Commission, levies, haulage, shearing, scanning & tags			56	86	168
			213	400	539
Gross margin before forage			74	203	931
Forage variable costs:					
silage @ £912/ha			-	182	228
grazing @ £258/ha			-	181	258
Total Variable Costs			213	763	1,025
GROSS MARGIN			74	- 161	445

Sensitivity-Change ±	**Change in Gross Margin/100 ewes (£)**		
10 p/kg lwt in finished lamb price	-	-	50
£5/hd in all lamb sales	25	40	80
£5/hd in cast ewe price	5	10	10
£5/hd in gimmer price	-	-	12

Free Range Laying Hens - Croft and Small Farm

PHYSICAL DATA

System:	Hybrid
Body weight at 17 weeks (kg)	1.44
Body weight at 70 weeks (kg)	1.97
Age at 50% production (age, weeks)	20
Peak production (%)	80
Pullets housed (weeks)	16
Pullets point of lay (weeks)	18
Weeks in lay per annum adjusted for downtime	49.1
Bird laying cycle (week 18 to 85)	270
Adjusted egg production (eggs/bird/annum) *	184
Livability during lay (%) - refer to breed management guides	92%
Feed use (16 to 18 weeks) (kg/hd)	1.23
Feed use (19 to 72 weeks) (kg/hd)	49.14

* Adjusted for 365d, mortality, downtime (pullet to lay, washing)

Free Range Laying Hens - Croft and Small Farm

GROSS MARGIN DATA

OUTPUT	£/100 bird/annum	£/doz
Eggs sales @ £4/doz	6,130	4.00
Old hen value less catching cost	0	0.00
Less:		
Pullet purchase @ £8.5 per bird	850	0.55
	5,280	3.45
VARIABLE COSTS		
Feed @ £648/t	2,391	1.56
Other bird expenses	480	0.10
Packaging - trays & cases	693	0.45
Total Variable Costs	3,563	2.11
GROSS MARGIN	1,717	1.34

Sensitivity ±	**Change in Gross Margin/100 birds/annum (£)**
£0.10/doz eggs sold	153
£10/t feed	37
1% increase in mortality at point of lay (£/100 birds)	-2

Note: Costs are typcially much higher in a smaller flock, however, this can be mitigated through higher value egg sales direct to customers.

Diversification

Introduction

The Scottish Agricultural sector is facing significant changes following Brexit, current changes in agricultural policy and subsidies, and the challenge in addressing our global climate emergency.

As the agricultural industry moves towards a clearer focus on providing environmental benefits – natural habitat, water resources, carbon sequestration, landscapes, biodiversity, and social capital – we are likely to see diversification become even more critical to business survival as farmers reduce their dependency on direct farm payments.

Diversification presents many opportunities for farmers, crofters and land managers to re-assess their asset base and look at ways to generate new income streams to provide a sustainable future for their business

Diversification enterprises should ideally complement the existing business model, drawing upon the current skills & interests, experience, buildings, machinery, and/or land capabilities.

It is important that farmers do not diversify out of desperation, as new business ventures can take a considerable amount of time and commitment to show results. Depending on the type of diversified enterprise chosen, it may place new pressures and demands on other farm resources such as labour, capital, buildings, land and machinery.

Diversification Considerations

It is highly recommended that businesses considering diversification carry out market research, a feasibility study and business plan with a diversification professional working directly in the industry. This will ensure that the best possible advice is presented to the business before they start their diversified journey.

Before launching a new business venture, it is crucial to assess the following factors:

1. ***Market*** – Assess the market you intend to supply. Are there any opportunities in the market? What is your Unique Selling Point? Can you build and develop your USP? Who are your customers? Where are they located? What is the size of your market? Is it a growing market or is the market saturated? Who are your competitors? Identify strengths and weaknesses in your competitors and consider how you can differentiate your offer
2. ***Resources*** – Are there any under-utilised resources e.g. outbuildings, cottages, machinery, land, watercourses, woodland, upland pasture etc. suitable for farm diversification? Is the proposed new venture correct for you, your family and the farming business? Do you or your family have specific qualities, interests, skills and experience that would lend to a specific business venture? Do you

have the time to invest in the new business venture while continuing to run the core farming activities? Do you need to take on additional labour?

3. ***Location*** – Does your existing business, or proposed new venture, have location advantages? Is it near to a busy commuter route? Is it close to tourist attractions? Does the farm have good access? E.g., tarmac/gravel tracks. Consider accessibility and ease of customer use.

4. ***Labour*** – Do you have sufficient labour and resource to run the new venture along with the existing farm business? Do you need to employ part-time or full-time staff? Don't spread resource thinly just to try to reduce costs—it is important to maximise efficiency but also maintain good product/service quality and customer experience.

5. ***Legal*** – Entering into a new business venture may have a different tax and VAT structure from the existing farming enterprise. Seek advice from your accountant and/or lawyer when scoping a new business venture. HMRC should be consulted regarding VAT issues (see pages 516-519 for details on VAT). Diversified businesses may require additional staff, increasing the employer's National Insurance and pension contributions payable under automatic enrolment. The proposed diversified business may be subject to Inheritance Tax and/or Capital Gains Tax when the farm owner/manager passes the business on to successors. Diversification can change how farmland and buildings are treated for Inheritance Tax purposes. It is advised to seek guidance from a trained professional.

6. ***Insurance*** – Changes to your insurance policy may be required when setting up a diversified enterprise. New activities relating to property and/or agricultural buildings will result in a change in cover. Agricultural buildings which are no longer used for livestock or machinery may be classed as a "change in agricultural use". Contents insurance may be required if the new business has internal materials contained within the buildings, holiday accommodation, or glamping activities. Public Liability Insurance is required to protect you if a member of the public suffers personal injury, or if any of their property is damaged, as a result of your business activities. Employers Liability Cover would be required if you employ full-time or part-time staff to manage, administrate or assist with the business enterprise. This also covers cleaning and maintenance staff.

7. ***Risk Management*** – A Health and Safety and Fire Plan is required before setting up a new business venture. Business Interruption Cover is insurance that covers the loss of income that a business suffers after a natural disaster e.g., fire, wind, flooding etc. Although Business Interruption Cover is not essential, it is advantageous to cover any financial loss/loss of income incurred due to a natural disaster.

8. ***Hygiene*** – If you are responsible for developing and maintaining a business' food safety management procedures, you are legally required to have formal food safety and hygiene certification – contact your local authority for more information. Following registration, your business will undergo regular inspections to ensure that you meet food hygiene standards and legislation. You must also follow the principles of Hazard Analysis and Critical Control Point (HACCP). Useful information can also be found on the Food Standards Scotland website (http://www.foodstandards.gov.scot).

9. ***Planning Permission*** – Planning permission may be required if the new business venture involves erecting or modifying a permanent building. Planning permission may also be required if there is a change of agricultural land or change of land use. It is advisable to contact your local authority and/or professional planning consultant early to gauge what planning regulations are required. Getting your local authority on board early is beneficial in the long run and they can answer any questions or concerns you may have before a project begins. See pages 410-415 for further details.

Sources of Information

SAC Consulting published a guide for farm diversification giving advice on suitable diversification enterprises supported with case studies. This guide can be found here:

https://www.ruralbrexit.scot/resource/future-proof-your-business-through-diversification-report/

Links to support organisations and other useful sources of information include:
SRUC – https://ww1.sruc.ac.uk/
SAC Consulting - https://ww1.sruc.ac.uk/business-services/what-is-your-goal/diversification/
Farm Advisory Service - https://www.fas.scot/
AHDB Beef and Lamb Box Scheme – http://beefandlamb.ahdb.org.uk/directselling/box-schemes/
Food Standards Scotland – http://foodstandards.gov.scot/business-and-industry/advice-for-new-businesses
Soil Association – https://www.soilassociation.org/
Business Gateway – https://www.bgateway.com/
Scotland Food & Drink – https://www.foodanddrink.scot/
Connect Local – https://connectlocal.scot/
Quality Meat Scotland – http://qmscotland.co.uk/
Visit Scotland – https://www.visitscotland.com/accommodation/caravan-camping/glamping/
Inspired Camping – https://www.inspiredcamping.com/starting-a-glamping-business/

Food Hygiene – HACCP https://www.food.gov.uk/business-guidance/hazard-analysis-and-critical-control-point-haccp

Speciality Crops

Speciality oil crops

Several speciality oil crops have been grown in the UK for a wide range of uses. Some oilseed crops perform particularly well in Scotland yielding higher oil levels while others are not suited to Scotland due to agronomic constraints, particularly the higher risk of a late and wet harvest. Crops with greater potential for cultivation in Scotland are outlined below.

Oilseed rape – Developing specialist markets for conventional oilseed rape (*Brassica napus*) and varieties with specialist oil profiles allows diversification whilst having the benefit of a crop which is familiar to growers. Several growers throughout Scotland have set up specialist brands of cold pressed rapeseed oil for culinary use in recent years. These include Mackintosh of Glendaveny, Ola Oils, Summer Harvest, Borderfields, Supernature and Black and Gold. Markets have been developed which recognise the excellent nutritional characteristics of rapeseed oil (it has the lowest levels of saturated fatty acids of all commonly used fats and oils) in combination with the benefits of cold pressing to maintain natural vitamin content.

High Erucic Acid Rapeseed (HEAR) is grown to produce erucic acid, used as a specialist lubricant particularly for plastics for which it has clearance for food contact. Seed from HEAR varieties is not suitable for human consumption and HEAR varieties cannot be grown in the same rotation as conventional varieties. Yields are typically below the best conventional varieties but similar to average yielding conventional varieties. Contracts for production are available from a number of merchants.

Another oilseed rape type, with high oleic, low linolenic levels in its oil (HOLL), is used as a specialist healthy frying oil. The oil profile of this type means that it is very stable, resisting oxidation and retaining its taste in a catering environment. Details of varieties can be found on the North UK Oilseed Rape Varieties List (AHDB).

Linseed – Linseed oil is high in α-linolenic acid, and used for the manufacture of coatings, drying agents and putty; low shelf life makes it less desirable for food use. In Scotland the area of linseed grown is currently low. Spring sown varieties tend to be rather late maturing for Scottish conditions. The introduction of autumn sown varieties provides an earlier harvest and these have potential for Scotland if winter hardiness can be confirmed with trials currently in progress.

Minor oilseed crops – A range of more novel oilseed crops can be grown in the UK and Scotland though few are presently being widely

grown due to limited contracts and agronomic limitations, though this may change.

Crambe: Like HEAR, Crambe (*C abyssinica*) is grown for the erucic acid contained in its seeds. It has been grown extensively in the UK and it grows well in Scotland. Crambe contains higher levels of erucic acid than HEAR, but its yields are slightly lower.

Echium: Echium (*Echium plantagineum*) also known as Viper's bugloss, produces high levels of stearidonic acid (14% of oil). The oil has valuable application in cosmetics and in skin care for the treatment of eczema and sunburn and as an anti-wrinkle preparation, as well as for health supplements such as a fish oil alternative as an Omega 3, 6 and 9 source. Echium has been successfully grown in trials in Scotland, although it is challenging to grow and produces low yields. It is spring sown, the crop flowers for an extended period and time of swathing has to be carefully selected to maximise seed setting.

Camelina: Part of the *Brassicaceae* family like canola and mustard, camelina used to be grown in the UK prior to oilseed rape and imported palm oil. It has uses in the food market as a distinctively nutty and pepper oil, or as a seed for topping baked products, and is high in Omega 3 fatty acids. There is also growing interest in its use as a biofuel, particularly for aviation. Technical notes on growing have been produced by Bangor University: (http://www.calu.bangor.ac.uk/Technical%20leaflets/030201Camelinafinal.pdf).

Specialist oilseed crops seed suppliers and contract buyers include; Premium Crops (www.premiumcrops.com), and Nature's Crops (www.naturescrops.com)

Speciality grains and pulses

Minor cereals and grains – with growing consumer interest in low gluten or gluten-free cereals and many supermarkets having special diet sections, there is increasing opportunity for producers to diversify into alternative cereals. While yields may be lower than conventional varieties, premiums for certain crops can compensate for this, and cereals such as rye, emmer and spelt can perform well in challenging conditions, depending on careful variety choice. Buckwheat can be sold as gluten-free if not contaminated with other cereals, research has shown various health benefits including lowering blood sugar, and it hold potential as a plant protein as a naturally high protein cereal.

Dehulling and processing can be challenging as machinery may need to be adjusted, and small quantities can be a barrier for larger processors. A contract is advisable for alternative cereal crops, as well as consulting the processor on choice of variety for the intended use/market.

Alternative proteins – Grain legumes are often seen as a low-income crop in arable rotations, with higher value break crops such as rape given preference. However, improving prices, reflecting increasing market interest for locally-grown (and soya alternative) legumes for both feed and food, offers potential for future domestic pea and bean production. Higher value feed markets, such as protein substrate for salmon feed, as well as more options for products destined for human consumption (with a premium of up to £100/t) and climate related co-benefits, may, provide further market opportunity in the future.

Changing consumer demands has seen a year-on-year growth in meat alternative products such as Quorn, and Beyond Meat, as well as more sophisticated ways of processing vegetable proteins, providing increasing demand and higher-value markets for pulse crops. Hodmedod, a company based in Suffolk, were also successful in growing the first lentil crop since Roman times in 2017, as well as marketing a range of pulses, including fava beans, yellow and green split peas and carlin peas.

Legumes require no additional nitrogen and can carry over 30kg N/ha in the soil for subsequent crops, reducing N leaching and costs of applied N (of £24/ha). They are beneficial in arable rotations for disease, weed and nitrogen management, and although they are less profitable as stand-alone crops, their returns are improved when factoring in yield benefits and reduced input costs to subsequent crops in the whole rotation. Trials of intercropping peas with spring barley in Scotland have shown to have no adverse effects on yield and improved returns, and farmers in Scotland are actively and productively doing this; alternative methods of cropping such as this therefore offer potential for expanding production of other legumes. The PGRO publish an annual list of recommended varieties, as well as an agronomy guide for grain legumes, trial results and troubleshooting guides (www.pgro.org).

Lupins: Lupins can be grown as a high-quality alternative to soya for livestock feed, and offer a much higher protein content than either peas or beans. There are various potential food uses, although being a common allergen it is less preferred for food markets. Largely spring varieties are available in the UK and prefer a pH of 7 or less. An Agronomy Guide for growing lupins is available on the PGRO website (http://www.pgro.org/downloads/Lupin-Agronomy-Guide-2014.pdf).

Essential oil crops

Essential oil crops are generally grown on a smaller scale than the specialist oil crops mentioned above and can provide high value opportunities. Several are being grown throughout the UK, including lavender, peppermint, rose and rosemary, although the less favourable conditions at harvest in Scotland limit production potential.

Tea

The Tea Gardens of Scotland are one of a very small number of Scottish producers of tea. Tea produced in Scotland is a niche and high value

product and is challenging to produce, with many tea growing businesses integrating with visitor experiences such as gardens, tastings, and blending courses.

Fibre crops

Flax and hemp for fibre can both be cultivated successfully in Scotland and more widely in the UK. There is interest in increasing the use of natural fibres, however, commercial scale processing of these fibres is currently absent or limited in Scotland and the UK at present.

Flax is traditionally used for high quality linen production requiring exacting production conditions There are a small number of producers in the UK for niche, small-scale markets, and no open market currently.

Industrial hemp is usually grown for either fibre or oils/seeds, and there are currently around 40 producers across the UK; currently dual-purpose varieties struggle in the UK as the seeds ripen a month after the fibre is suitable for harvest. Hemp can be incorporated into an arable or mixed arable rotation as a break crop, and is effective in improving soil, sequestering carbon to an amount which could compete with timber, absorbing soil pollutants, and reducing use of inputs. Hemp is relatively hardy, but performs best on deeper, lowland soils.

End uses include biocomposites for car components in the automotive industry, lightweight glass replacement in the aviation industry and insulation materials in the construction industry. A further use for hemp in construction is as 'hempcrete', where the inner core of the stem is blended with a lime based binder and cast around a timber frame. Hemcrete's qualities of high levels of thermal insulation and excellent strength characters are of note and it meets building regulations, counting towards the code for sustainable homes (CSH). There is also scope for hemp to be used in sustainable packaging alternatives, as industry, consumers and policy increasingly look for non-plastic options as well as other high-value markets (e.g. hemp mattresses), which are increasingly being explored and production area in the UK slowly expanding.

In addition to fibre use, the oil from the seeds has an application in the higher-value specialist food market, a market which has more than doubled during the last five years due to interest in health claims, and is expected to triple in value over the next five years; products from this include essential (CBD) oils, cooking (hemp) oils, teas, milk alternatives, and flours/meals, as well as protein-based by-products.

The lack of processing facilities in Scotland and the UK limits greater cultivation of these crops as they are bulky and expensive to transport in their raw state, hence it is necessary to have processing facilities close to the site of production for economic viability. Only varieties of hemp with a THC content of less than 0.2% and from EU approved seed can be grown; a licence is required for the cultivation of hemp, which can be

obtained through the processor of the hemp fibre, or applied for directly through the Home Office, and lasts for three growing seasons.

Alternative Livestock

There is a wide range of alternative livestock enterprises that farmers can diversify into, many of which can use existing husbandry skills, and complement existing livestock systems on the farm. Alternative livestock are principally kept for fibre (e.g. cashmere goats, alpacas, angora goats, etc), meat (e.g. wild-boar, buffalo, ostrich, venison, ducks, geese, rabbits, etc), milk and dairy products (e.g. dairy-goats, dairy-sheep, etc) or worms for a variety of reasons including; composting of green waste, fishing bait, sale of composting and earthworms for household food waste/compost etc.

Diversification into alternative livestock can have considerable capital costs to start-up, particularly through the requirement to purchase livestock, equipment, and infrastructure (deer fencing, handling facilities etc.

Before diversifying into alternative livestock, the economic viability of this venture should be explored. Whether you keep alternative livestock for fibre, meat, or other uses, the end markets can be very niche with limited demand.

In addition to the actual cost of livestock, there are high capital costs associated with stock control, such as housing, fencing and specialist handling facilities (e.g. specialised wild boar and deer fencing). If alternative livestock are being farmed for meat then it is also recommended to check that local abattoirs are licensed to slaughter that specific type of animal and, if not, what alternatives may exist.

Honey production may be a suitable diversification option for some farmers. Bees play an important role in the pollination of food crops and could be introduced alongside an existing arable, fruit or vegetable enterprise. More information can be obtained from the Scottish Beekeepers' Association (www.scottishbeekeepers.org.uk) and the British Beekeepers' Association (www.bbka.org.uk).

Insect farming could provide a sustainable alternative protein source for animal feed, while helping to reduce our reliance on protein imports and environmental impacts. Insect farming provides a circular economy opportunity to turn organic residues, including pre-consumer food waste, into feedstock for food systems. Scotland is well placed to become a global leader in this emerging industry, contributing to the Scottish Government's circular economy objectives and food waste reduction targets. Insect farming can also support aquaculture, agriculture and food and drink businesses. Insects need high quality feeds to perform well just like any other livestock. Production systems can be very

expensive, highly automated with purpose-built units. More information can be found here:
https://www.zerowastescotland.org.uk/event/insect-farming-scotland

It is advised that anyone who is considering diversifying into alternative livestock should contact the appropriate producer association for advice and support at an early stage of the diversification process. It would also be valuable to speak to others already working in the sector.

Information specifically on deer farming can be found on pages 209-221.

Retailing

Selling farm produce directly to consumers can be an excellent diversification option for farmers enabling them to add value to their primary produce. The COVID-19 pandemic has increased consumer awareness of the food and drink they consume, where it comes from, and the environmental impacts of our global food system. This presents a huge opportunity for farmers, and food and drink producers to sell their produce locally, promoting high quality produce with strong provenance and environmental credentials.

Farm retailing can range from simple 'honesty boxes,' 'box' delivery services, farm vending facilities, to large, multifunctional retail outlets.

As with any business venture, market research, a feasibility study, and a rigorous business plan incorporating a marketing plan should be prepared and should include information and research into all the relevant aspects of the proposal, such as:

- The size of the local population within a 30-60 minute drive of the proposed retail outlet(s).
- Key transport routes, e.g., is the proposed site on a key arterial route?
- Capital costs: car parking and access, construction, storage facilities, website creation, brand and digital investment, purchase of delivery van(s), interior design and materials etc.
- Running costs: including business rates, rent, staff costs, advertising, and other fixed/variable costs.
- Consideration of range, variety and pricing (this should reflect the quality of produce offered including the freshness, environmental impact and provenance of the produce on offer).
- Competitor outlets (not just other farm shops).
- Planning permission requirements.
- Legislative requirements (e.g. environmental health, food hygiene, labelling, health and safety, trading standards, access from the local Highways Authority, accessibility requirements).

Further advice is available from a number of sources including:

- SAC Consulting Food and Drink: https://ww1.sruc.ac.uk/business-services/help-in-your-sector/food-drink/ Telephone: 01224 711 044

- Taste of Scotland: http://taste-of-scotland.com/farmers-markets-in-scotland/
- National Farmers' Retail and Markets Association: www.farma.org.uk; Telephone: 0345 319 6740
- The Larder - A Guide to Scotland's Food & Drink: https://food.list.co.uk/guides/the-larder/
- Scottish Government food and drink policy: https://beta.gov.scot/policies/food-and-drink/
- Scotland Food and Drink: http://www.foodanddrink.scot/
- Food Tourism Scotland Strategy: https://www.foodanddrink.scot/resources/publications/food-tourism-scotland/

Farmers' markets

Farmers markets provide a great opportunity for producers to sell directly to consumers, and for consumers to purchase fresh, local food and drink on the high street. Most farmers' markets are held monthly, with some held more frequently, particularly in areas with larger populations.

In recent years, there has been a big increase in online retail sales through businesses' own websites and collaborative online food hubs and farmers markets. 'Neighbourfood' is an example of an online marketplace where consumers can order local produce online and collect from a local collection hub.

More information can be found here:

https://www.neighbourfood.co.uk/
https://www.neighbourfood.co.uk/markets

Producers considering selling produce through a farmers' market should:

- Assess what is already being sold at the market. Will there be a demand for their produce? Is there enhancement of the product range? Some markets will limit the number of producers from the same sector eg meat, alcohol etc.
- Contact the market organiser for more information on the operation of the local market.
- Visit a local market and obtain information on competitors' products and prices.
- Consult other sources of advice, e.g. Farm Retail Association https://farmretail.co.uk/ There is also a Farm Retail Association (FRA) Facebook members' forum which provides an informal platform for farm shops and stakeholders to share knowledge and information.
- Consider whether the business can commit the time, money and other resources to preparing and selling produce at farmers' markets.
- Think about how the customer will be attracted to the product. Consider the product itself, packaging, information about the product, layout of the stall and price.

- Consider how the product can be stored and displayed, ensuring compliance with all legislation and other regulations. For more information contact Food Standards Scotland (www.foodstandards.gov.scot).
- Contact your local regional food group.

Farm shops

Farm shops vary in size and product/service offering. The farm retail market is saturated in some regions and therefore it is important to carry out a feasibility study before starting. New retail outlets or farm cafes must provide a unique selling point or have a strong attraction in order to attract and retain customers. Many farm shops are now becoming food tourism destinations where customers will spend time participating in recreational/leisure activities during their visit.

The increase in popularity of farm shops is linked to the growing trend amongst consumers to buy local food with strong provenance and traceability. Most farm shop businesses are initially based around products that are produced or made on the farm, in the shop, or where possible, within the local area. Linking the farm shop to produce grown or made on the farm and telling the history or provenance of the farm is a key marketing tool.

Vending Machines (Milk & Fresh Produce)

With strong consumer demand for local, traceable produce, installing a vending machine is a relatively low-cost method of diversification. Farm vending allows consumers to purchase fresh local produce such as potatoes, vegetables, eggs, soft fruit, and more, 24 hours per day, 365 days per year. Farm vending provides farmers with significantly higher profit margins than mainstream markets and ensures that profits are retained at the farm gate. Farm vending is also advantageous as it doesn't require the same staff involvement as it would in running a 'traditional' farm shop.

Farm vending machines are usually custom-built and come in varying sizes. Machines can be ambient or chilled depending on the type of produce sold. Some farms have chosen to create walk-in farm vending retail spaces where customers can browse products, purchase fresh produce, and buy fresh coffee from self-service takeaway machines.

In the correct location, with a good variety of produce available, farm vending machines can have a payback period of around 12 months. Vending machines should be ideally positioned where there is good vehicular access and/or areas with high customer footfall, i.e. farms near to a main road, shopping centre, caravan park, petrol station, etc. Machines need to be kept under cover to protect them from the elements and consideration should be given for parking and groundworks.

Planning permission may be required if the machine is located within a purpose-built shed/outbuilding. Keeping vending machines stocked with a variety of seasonal fresh produce is important to ensure repeat custom.

Tourism

Agri-Tourism

Farm-based recreation or 'agri-tourism' is becoming increasingly popular among tourists/visitors and is a diversification enterprise which promotes a more diverse and sustainable rural economy. Agri-tourism provides farmers, crofters and landowners with additional income and the opportunity to connect with the public.

Agri-tourism has moved towards the provision of rural experiences where customers can get a hands-on flavour of the countryside and/or the daily life of a farmer. Bespoke packages can be created and may include accommodation, private dining experiences, farm tours and other farm-based activities.

Farm Tours

Farm tours and supervised on-farm experiences can be very socially rewarding for both farmers and customers, strengthening relationships between farmers and the public. Farm tours and other educational initiatives allow visitors to learn about farming, food production, and the environment, and can be very financially rewarding for farmers and landowners. Farm tours are relatively easy to set up without considerable overheads, but considerations should be given for public liability insurance, health & safety, and showcasing your business and farm animals to the general public in the best possible way.

Wellbeing Tourism

Wellbeing tourism has been identified as one of the top new farm diversification trends following the Covid-19 pandemic, where visitors can engage in wellbeing activities, farm tours, nature trails and more.

Sensory gardens, forest bathing, organic skincare products, paddleboard yoga, thermal pools and wild swimming are all driving consumer interest. Digital detox is high on the agenda, as is social connection following the pandemic. Those booking rural breaks in Scotland also want good local food and drink with nutritional benefits to aid their health and wellbeing.

Ecotourism and nature-based tourism

An increasing number of tourists and visitors are looking for "green" holidays or activities. Ecotourism, which tends to be connected to educational aspects such as the promotion of sustainability, is different from nature-based tourism which can be viewed as tourism to places of natural significance or beauty, although there is some overlap between the two concepts.

Businesses looking to diversify could consider their own 'green credentials' and how they could, if necessary, modify their marketing to attract the maximum number of customers. Many businesses are members of initiatives such as the Green Business Tourism Scheme (www.green-tourism.com) and membership of such schemes can be used in marketing and promotional material. Tourism businesses could incorporate nature-based activities such as wildlife-watching and adventure-based activities into their offering to take advantage of their natural capital. Information on the local environment, scenery and nature-based activities in the area could also be provided to potential customers. Signposting and collaboration between businesses adds to the customer experience and also supports the local economy.

Self-catering

Planning permission and building regulations (see pages 410-415) are the essential first steps when considering offering self-catering accommodation. If starting a new business or converting/extending your premises, you should contact your local authority planning department for their advice on planning permission at a very early stage. Any structural alterations to a property, or the construction of a new building, will be subject to building regulations, so again contact your local authority.

Good marketing is required to maximise occupancy rates and participation in quality assurance schemes will also be beneficial, e.g. VisitScotland Quality Assurance Schemes (www.visitscotland.org). Membership of associations can also be beneficial, such as the Association of Scotland's Self-Caterers (http://www.assc.co.uk/). These associations and membership groups provide up to date information and guidance particularly any changes to health and safety, cleaning protocols, and COVID-19 guidelines.

Glamping

Glamping is a tourism experience where individuals, couples, or groups seek to immerse themselves in the natural environment by going back to basics and re-connecting with nature from a luxurious base. Glamping has become a popular option for UK holiday-makers and overseas visitors seeking the luxuries of hotel accommodation alongside the freedom and adventure of camping. Glamping sites usually provide electricity, heating, kitchen and toilet facilities as standard, with many sites now offering saunas, jacuzzi's and hot tubs. Due to the popularity and availability of glamping in the agri-tourism market, customer expectations have increased, and many providers are now operating in competition with 4- and 5-star rural accommodation providers.

Glamping sites should ideally be located near areas of spectacular scenery, on the banks of lochs, nestled beneath hillsides, along popular walking or cycling routes, or within proximity of towns, villages or cities. Planning permission may be required for a glamping site in some locations. Conflicts of interest between tourism, accommodation, cars,

caravans, and the natural environment should be considered. Seek advice from your local authority at an early stage of the diversification project.

The glamping market in the UK is nearing saturation point so careful consideration should be given before investing in this enterprise.

Sources of information
Sources of further information for tourist accommodation include:

- Criteria/guidance for Small Serviced Classification (http://www.visitscotland.org/business_support/quality_assurance/accommodation/self_catering_accommodation.aspx)
- Farm Stay (www.farmstay.co.uk)
- Accommodation in Scotland (http://www.explorescotland.net/holiday-in-scotland/accommodation/)
- Farm Business Innovation Diversification into Glamping (http://www.farmbusinessshow.co.uk/news/blog.asp?blog_id=2518)

Sports & Leisure Tourism

The outdoor sports and leisure market has grown rapidly since the Covid-19 pandemic. UK farmers could tap into this market by providing customers with the opportunity to enhance their health, fitness, and wellbeing in a natural countryside setting.

Farm/Outdoor Fitness
Farm fitness is a relatively new concept which is quite novel as a diversification enterprise. Throughout lockdown, indoor gyms, swimming pools, sports halls, and aerobics/fitness class venues were temporarily closed. Consumer demand to keep physically active during this time presented farmers and landowners with the opportunity to provide safe, outdoor spaces for people to exercise. This has now developed into new farm-based gym facilities being offered with state-of-the-art equipment, cardio and weights machines, and outdoor fitness classes.

It is possible to start a farm/outdoor fitness enterprise and employ suitable staff with appropriate skills, qualifications, and enthusiasm, but careful consideration should be given to how the enterprise fits in with existing farming operations.

Children's activities
Farm-based children's soft play areas are popular among families during the holiday season. Converting old farm buildings or utilising fields as a children's play park can be a profitable venture for farmers/landowners. Location, ease of access, and activities offered determine the success of the enterprise. A children's play park would complement a farm shop, café or retail outlet.

Outdoor Education
Outdoor education plays an important role in children's development, educating them on the provenance of food, farming, and the environment. Outdoor education and activities also promote good mental and physical health, by allowing those from an urban area the opportunity to explore the countryside in a safe and supervised environment.

Eco-therapy & Care Farming
Mental ill-health is one of the most common health issues worldwide and is sadly on the rise. Following the COVID-19 pandemic the number of people experiencing mental ill-health is predicted to rise in future, therefore it is ever-more important now to find new solutions to support people with mental health issues.

Eco-therapy, often referred to as 'green care' or 'green exercise,' is a form of therapeutic treatment in which patients take part in activities in the natural environment. These activities may include gardening, caring for animals, woodland walks, and horse riding, and has shown results in supporting people experiencing anxiety and/or depression. Nature has incredible healing qualities and eco-therapy is now being prescribed by general practitioners for stress and anxiety.

Equestrian Enterprises

Equestrian related enterprises are often seen as good diversification options for farms or rural occupiers as they can easily complement the existing infrastructure land and business model of the farm. Enterprises that are commonly considered are:

- Horse Livery
- Cross Country Course
- Riding School
- Horse Bed and Breakfast
- Horse Riding Holidays
- Equine Health
- Equine Chiropractic
- Equine Massage

Horse livery
On-farm horse and pony livery can range from providing grazing only, to DIY livery, and full livery (including labour, grazing, stabling, grooming, feeding and possibly exercise).

Financial returns will vary depending on the level of service (which is dependent on the knowledge of the person/s running the yard) and facilities being provided (e.g. a basic farm diversification versus a specialist / professional yard).

Livery services are likely to range from 70-100% occupancy. Grass and DIY livery are realistically the base market for farm diversification projects

while part and full livery services will be more suited to yards with skilled personnel.

Horse riding holidays
Location is fundamental to the success of horse-riding holidays. A riding holiday centre is most suited to premises in scenic and rural areas. Good access to off-road riding over a variety of terrain is essential.

The service can include the provision of horses to hire or there can be the option for guests to bring their own horses.

Basic facilities could include:

- A covered area for tacking up or a tack room.
- Stables and/or grazing (for hire horses and/or guest's horses).
- Toilet facilities.
- Living accommodation for guests

The service can be enhanced by providing other riding facilities, i.e. all weather or indoor arenas, show jumping and cross country facilities, riding lessons, and all-inclusive luxury accommodation. With the above in mind, investment could be high if starting from a blank canvas. This enterprise will work best when there are already horses and facilities in place. Local authority licensing will apply where horses are provided.

Riding for the differently abled
A riding school for differently abled adults and/or children is a rewarding diversification enterprise. Horses and ponies provide therapy, achievement and enjoyment to people who are differently abled. Providing a safe, fun, and supporting learning environment can improve the lifestyle for people with physical and learning difficulties, mental illnesses or other additional support needs. For further information see http://www.rda.org.uk/.

Wedding Venues

Converting old or disused farm buildings into a wedding venue may be a profitable diversification option for farmers. Farm-based wedding venues have grown in popularity over the past 5-10 years as couples see farm barns, marquees, and farm countryside as the special place to host their wedding.

Combining a working farm and a wedding venue does not come without its challenges and requires considerable commitment and a specific skillset to run successfully. However, developing a successful wedding venue on a working farm can be a very lucrative diversification option providing significantly higher profits than the core farm business.

Wedding venue considerations:

- Location of the venue near to a main road with good access and transport links. The location should ideally have a picturesque landscape with suitable car parking, toilet facilities and accessibility for differently abled people.
- The level of service offered; basic package of the venue as standard but extra services such as; catering, bar, disco/band/entertainment, transport, photography, and on-site accommodation could be included for an additional charge.
- Planning permission: may be required for the renovation or erection of the proposed venue.
- Legislation requirements such as; health and safety, food hygiene, public liability insurance, alcohol licencing, and employment law may apply to the venture.

Pet Boarding Facilities

Animal husbandry is second nature to many farmers and may be a suitable diversification option to capitalise on underutilised farm buildings. Boarding kennels or a cattery could be incorporated into an existing farm business. Kennel and cattery units vary in size and specifications.

Pet boarding facility considerations:

- The location of the business should ideally be situated near a town or city with a large customer population.
- A change of building or land use may require a change in your insurance.
- Running a kennels or cattery business is a lifestyle choice and the owner may be tied to the business 24/7. Consider employing full-time/part-time staff to share workload and shift patterns to maintain a good work-life balance.
- Noise impacts from dogs and cats may cause offence or nuisance to neighbours.
- Before starting the business, you must contact the local authority to cover any building planning issues, business rates, operating licences and any other obligations.
- You must receive a licence under the Animal Boarding Establishment Act 1963.
- Public liability and product liability insurance is required. You should also be insured for professional indemnity and against the loss of income if you lose your licence. Liability to animals in your care custody and control is definitely required. In the case of kennels and catteries, cover for vets' fees can be extended to include any illness in a client pet that commences within 72 hours after leaving your establishment. Property damage cover should also be purchased.

For further information and a guide to building kennels or a cattery visit https://www.gla.ac.uk/t4/~vet/files/teaching/SAHusbandry/boardingkennels.pdf

Forestry and Farm Woodlands

Introduction

Woodlands can be a valuable part of the farm business, providing multiple benefits such as shelter for livestock, windbreaks for crops and income from timber. They also have a positive impact on a larger scale by capturing carbon, creating wildlife habitat, and contributing to natural flood management.

Increasing the area of woodland in Scotland is a key Scottish Government objective to help meet national targets for reducing carbon emissions, supply the demand for wood products with home-grown timber, and restore and expand native woodlands for biodiversity benefits. Farmers are being encouraged to plant new woodlands and actively manage existing woodlands to benefit the farm business and provide public goods.

On 1 April 2019 forestry became fully devolved in Scotland. Scottish Forestry replaced Forestry Commission Scotland, taking responsibility for policy, regulation, and the Forestry Grant Scheme (FGS). Forestry and Land Scotland (FLS) replaced Forest Enterprise Scotland in looking after publicly owned forests. Both organisations are agencies of the Scottish Government.

This section provides guidance on trees and the law, plant health, woodlands and shelter, timber prices, financial assistance for farm woodlands, and taxation.

Trees, the Law and Regulations

Felling Permissions

Anyone wishing to fell trees requires a Felling Permission (previously called a felling licence) issued by Scottish Forestry, unless an exemption applies or another form of felling approval such as a felling licence (including a forest plan) has previously been issued. It is an offence to fell trees without a Felling Permission if no exemptions apply. Illegal felling can result in a fine of up to £5,000 per tree and a criminal record for those involved.

Changes to the regulation of tree felling in Scotland came into effect on 1 April 2019 when the Forestry and Land (Scotland) Act 2018 replaced the Forestry Act 1967 in Scotland. Felling Licences issued before 1 April 2019 are still valid, if the expiry date has not been passed.

Exemptions

You may be allowed to fell trees without a Felling Permission if an exemption applies. The 2019 regulations made some changes to exemptions, full details are available from Scottish Forestry: http://forestry.gov.scot/support-regulations/felling-permissions. Two

important changes are that a Felling Permission is now required to clear windblown trees, and to fell nuisance trees.

Exemptions include:

- Up to 5 cubic metres of timber within any set calendar quarter. This exemption does not apply in native broadleaved woodland between 0.1 and 0.5 hectares inclusive and Caledonian Pinewood sites.
- Trees with a stem diameter of 10cm or less, when measured 1.3m from the ground.
- A tree that poses an immediate danger to people or property.
- Completely dead trees. Trees that are dying or have blown over are not exempt.

Restrictions

Felling must also comply with legislation and best practice regarding water quality, flood risk, conservation areas, and protected species such as badgers or bats.

Felling trees covered by a Tree Preservation Order (TPO) or within a Conservation Area requires additional consent from the Local Authority. Felling within a Site of Special Scientific Interest (SSSI) requires consent from Nature Scot, formerly Scottish Natural Heritage (SNH).

Obligation to replant

Felling Permissions, except those for thinning, are issued on the condition that the felled area will be replanted within a specified timescale, including areas cleared of windthrow. This includes the obligation to carry out the maintenance necessary for the trees to become established. Scottish Forestry may allow replanting in an alternative area of the same size as the felled area.

Grant funding is available to help with restocking through the Woodland Improvement Grant (WIG) for Restructuring Regeneration. Note that you first need to have an approved Long-term Forest Plan (LTFP) or Management Plan to be eligible for WIG funding.

Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) is the process of identifying the environmental effects, either positive or negative, of the proposed project on the environment with the aim of avoiding, reducing or offsetting any adverse impacts.

The Forestry (Environmental Impact Assessment) (Scotland) Regulations 2017, are applied to forestry projects, namely afforestation, deforestation, roads and quarries. If Scottish Forestry, the competent authority, decides that a proposal for one of these projects is likely to have a significant effect on the environment then under EIA Regulations, consent must be obtained prior to starting the work. As a result, you will be required to

submit an Environmental Impact Assessment Report (EIA Report) as part of your application for consent.

The process for this, is to identify the activities that will be undertaken. Once these have identified, their potential environmental impact should be assessed, along with any mitigation that could reduce the impact. Once this has been carried out, an EIA Screening Determination form is submitted to Scottish Forestry who will assess the potential impacts and proposed mitigation. If they are content with the proposal, Scottish Forestry will give a Screening Opinion stating 'consent not required', this means the works can start. If Scottish Forestry feel that the project needs to be tested with a full EIA, then a 'consent required' letter will be issued. At this stage, a scoping process will be untaken to address the issues that need to be assessed within an EIA Report.

Thresholds and sensitive areas apply to EIA, which enable some work to be undertaken without a full EIA screening being undertaken. These are:

Project	Threshold where any part of the land is in a sensitive area	Threshold where no part of the land is in a sensitive area
Afforestation	2 hectares in a National Scenic Area (NSA) No threshold in other sensitive areas	20 hectares
Deforestation	0.5 hectare in a NSA No threshold in other sensitive areas	1 hectare
Forest Roads	No threshold	1 hectare
Forest Quarries	No threshold	1 hectare

For more information on EIAs, please refer to the Scottish Forestry web page provided using the link below:
https://forestry.gov.scot/support-regulations/environmental-impact-assessment

United Kingdom Forestry Standard (UKFS)
The United Kingdom Forestry Standard (UKFS) is the reference standard for sustainable forest management in the UK. It outlines the context for forestry, sets out the approach of the UK governments to sustainable forest management, defines standards and requirements, and provides a basis for regulation and monitoring – including national and international reporting.

The UKFS is separated into different elements for sustainable forest management, each supported by Guidelines for managers.

These elements are:

- General Forestry Practice
- Biodiversity
- Climate Change
- Historic Environment
- Landscape
- People
- Soil
- Water

Each of these elements are divided into legal and good forestry practice requirements. These legal and good forestry practice requirements should be followed when undertaking any forest operations.

Should these legal and good forestry practice requirements be breached, Scottish Forestry have powers under the UKFS Compliance Procedure to issue advisory/ warning letters or suspend/ revoke permissions given under Forest Plans, Felling Permissions, Forestry Grant Scheme contracts, and EIA consented operations.

Further information on the UKFS can be found at:
https://forestry.gov.scot/sustainable-forestry/ukfs-scotland
Details on UKFS Compliance can be found at:
https://forestry.gov.scot/publications/115-briefing-note-20-ukfs-compliance-procedure

Plant Health

The threat posed by tree pests and diseases is increasing, due to increased global travel, and imported plants and wood products. Climate change is also altering the ranges of many plant pathogens. The risk of spreading tree diseases can be reduced by taking simple biosecurity measures, such as cleaning mud from shoes, dogs' paws, and bike and car tyres between visits to different woodlands. Five of the most common threats to tree health are described below but this list is not exhaustive.

You can find guides to symptoms of tree pests and diseases on the Observatree https://www.observatree.org.uk/resource-library/ and Forest Research websites: http://forestresearch.gov.uk/tools-and-resources/pest-and-disease-resources. If you are concerned about the health of any trees, seek professional advice, and report any confirmed cases on the Tree Alert online reporting tool: https://treealert.forestresearch.gov.uk/. It is required by law that diseases classified as notifiable are reported.

Scottish Forestry monitors woodlands for early warning signs of tree health problems and issues Statutory Plant Health Notices (SPHNs) to landowners. An SPHN will usually require the felling of trees to contain an infection and avoid it spreading further.

Larch disease (*Phytophthora ramorum)* – notifiable disease

P. ramorum is currently the biggest threat to tree health in Scotland, having already infected and killed thousands of hectares of larch. *P. ramorum* does not affect the quality of the timber so infected trees can still be processed but only by facilities that hold a licence to handle the material. A Management Zone covers the centre of the primary outbreak in Galloway. The area covered by the management zone is best viewed on the Scottish Forestry Map viewer:
https://scottishforestry.maps.arcgis.com/apps/webappviewer/index.html?id=0d6125cfe892439ab0e5d0b74d9acc18

You must apply for a movement licence to remove wood from a site issued with an SPHN or to move larch material from within the Management Zone to any site outside it. Wood from SPHN sites or wood moving from within the Management Zone to a site outside it can only go to a facility that holds a processing licence to handle it. Information and application guidance for movement or processing licences can be found on the Forest Research website: https://www.forestresearch.gov.uk/tools-and-resources/pest-and-disease-resources/ramorum-disease-phytophthora-ramorum/phytophthora-manual-9-licences-move-and-process-wood-trees-ramorum-disease/

Scotland is split into three management zones, based on where actions will have the greatest impact on controlling the spread of *P. ramorum*. For a map of the zones, see: https://forestry.gov.scot/sustainable-forestry/tree-health/tree-pests-and-diseases/phytophthora-ramorum.

The rules around felling and planting larch vary between the zones but **outbreaks of *P. ramorum* are occurring in all three risk zones**. All woodland owners should remain vigilant and regularly inspect for symptoms of the disease. Japanese, European and hybrid *Larix* species are all affected. While larch is the main timber tree at risk, rhododendron and other ornamental shrubs are also susceptible and help spread the disease. Other susceptible tree species include sweet chestnut, horse chestnut, beech, and several non-native oak.

P. ramorum is a notifiable disease so must be reported. First check the symptoms against online guidance and report the suspected outbreak through Tree Alert (see above for links). If *P. ramorum* is confirmed, Scottish Forestry will issue an SPHN (if outside the management zone), placing a legal requirement on the owner to fell the infected trees, and a buffer zone around them, within a set timescale. If you receive an SPHN, grant aid is available to assist with agents' fees and restocking. For further information see page 321 and:
https://www.ruralpayments.org/topics/all-schemes/forestry-grant-scheme/tree-health/.

Chalara Ash dieback (*Hymenoscyphus fraxineus)*

First discovered in the UK in October 2012, Chalara Ash dieback is an infection caused by the ***H. fraxineus*** fungus, which is spreading

throughout the UK. The airborne spores can spread within miles of an outbreak but transport of plants and spores in mud on tyres and shoes is thought to be responsible for spreading the disease over longer distances.

The general advice is not to fell live ash trees, even if they are infected, unless they pose a safety risk. This will allow resistant trees to be identified and survive as future breeding stock. Ash is one of the last tree species to come into leaf in spring, so it is best to look for Chalara symptoms from July to September.

Juniper disease (***Phytophthora austrocedri***) **– notifiable disease**
P. austrocedri is a fungus-like pathogen which threatens juniper trees in Britain. Juniper (*Juniperus communis*) is an important but declining native species, thus a significant proportion of juniper woodlands are protected. Infected trees have been found at sites across Scotland and the north of England. The pathogen primarily attacks roots and extends up into the lower stem. Eventually the tree will be killed by girdling of the main stem. The pathogen is notifiable, and all suspected cases must be reported through Tree Alert.

Red band needle blight (*Dothistroma septosporum)*
D. septosporum is a fungus which typically attacks older needles on conifers, initially creating yellow bands that turn red. Sometimes all but the base of the needles can turn brown, rather than causing bands. Infected needles will die and fall off, gradually weakening the tree. This reduces timber yields and can eventually kill trees.

It has been found on a range of conifer species but pine are the most common hosts, including Scots, Lodgepole and Corsican pine. The disease exists throughout Scotland and is managed by thinning to increase airflow through the woods, and by planting less susceptible tree species in future rotations. It is not a notifiable disease and there are no restrictions on timber movement.

Dutch elm disease (*Ophiostoma novo-ulmi)*
This disease has already killed 60 million elm trees in Britain and continues to spread throughout Scotland. It is caused by a fungus that is spread from tree to tree by the elm bark beetle.

Local authorities may require owners to fell elms infected by Dutch elm disease, under the Dutch elm disease (Local Authorities) (Amendment) Order 1988. To prevent the spread of the disease, regulations also control the movement of elm logs within the terms of a licence. It is not a notifiable disease.

Phytophthora pluvialis
First discovered in the UK in a woodland in Cornwall in September 2021, *P. pluvialis* is a fungus-like pathogen that affects a variety of soft conifers including western hemlock, radiata pine and Douglas fir. Further

investigations are ongoing to identify the spread and severity of this pathogen, but cases have already been confirmed in Devon, Cumbria, Surrey, Shropshire, and at multiple sites in both Scotland and Wales.

Woodland and Shelter

Trees and woodland can provide valuable protection from wind and driving rain which can:

- reduce lamb and ewe mortality resulting from evaporative chilling
- increase weight gain in livestock
- increase milk yields in cows
- improve livestock health and condition
- reduce feed costs
- reduce evapotranspiration of pasture and crops
- protect light soils
- increase soil organic matter content

Woods can act as a wind shield or a wind break, depending on the porosity of the wood. These principles are set out below:

Wind Shield

- Virtually impermeable woodland (<40% porosity)
- Reduces wind speed by up to 90%
- Wind speed reduction over distance of up to 10 times tree height from lee side of forest
- Greatest shelter within distance of 3 to 5 times of tree height
- Completely stops wind within small area; high turbulence in field
- Best for livestock protection

Wind Break

- Permeable woodland (40-60% porosity)
- Reduces wind speed by up to 70%
- Wind speed reduction over distance of 20-30 times tree height from lee side of forest
- Achieves reduced wind speeds across large area
- Little turbulence well above ground
- Best for crops and silage

Scottish Timber Log Prices

The table below provides a comparison of Scottish timber prices. These values are representative of prices offered for clear fell harvesting only; lower prices will be offered for thinning operations.

Prices vary according to market conditions, quality of timber, total volume harvested, ease of access and transport cost. Values are given in £/t, sold on an out-turn tonnage basis. Roadside sales are net of harvesting

costs, while standing sales are net of harvesting and haulage costs and represent the gross margin of that crop.

Due to spiralling diesel prices and global market uncertainty at time of writing (due to combinations of COVID-19, Brexit, 2021 winter storms and Ukraine conflict), prices have not been updated for timber in 2022 - instead we have retained typical prices from 2021 to reflect a 'healthy' market position, as opposed to current recovering market we see across Scotland at this time.

Typical broadleaf and conifer log prices for the year to May 2022 are as follows:

Species	Log Type	Price (£/t)	
		Roadside	Standing
Larch	Logs	60-80	55-75
Scots pine	Logs	65-95	70-90
Sitka spruce	Green logs*	75-95	65-85
Sitka spruce	Pallet wood	55-75	50-65
Mixed conifers	Chipwood or pulp	30-50	20-40
Lodgepole pine	Logs	65-80	60-75
Mixed conifer	Slats	40-60	35-50
Hardwd Logs	Various	50-220	40-200

* Green Logs are timber stems of a size and quality suitable for use in construction, such as roof joists or beams.

Timber crop values at clear fell range considerably, with high quality crops usually selling well. Estimated standing sale timber values for Sitka spruce (yield class 16, appropriately thinned) felled at 45 years old can be anywhere from £6,000 to £22,000/ha.

Woodland owners increasingly keep part of the timber harvested for their own use for woodfuel. The cost to harvest and extract small round-wood to roadside is typically in the range £12-18 per tonne.

Financial Assistance for Farm Woodlands

Financial assistance for the creation and maintenance of forestry and farm woodlands is supported through the Forestry Grant Scheme (FGS).

The FGS is entirely administered, except for payments, by Scottish Forestry. Payments are made by Rural Payments and Services (RP&S) Full details of the FGS can be found at: https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/forestry-grant-scheme/.

The following information has been adapted from the above website to give an overview of the scheme options. Applicants should refer to the

full scheme guidance as revisions are likely and applicants should always check for the latest updates.

Forestry activity is supported under eight categories and these are:

1. Woodland Creation
2. Agroforestry
3. Woodland Improvement Grant
4. Sustainable Management of Forests
5. Tree Health
6. Harvesting and Processing
7. Forest Infrastructure
8. Forestry Co-operation

Woodland creation
Grants for woodland creation largely continue as they have since 2015. These can be very attractive for planting of a significant scale especially for timber-producing woodlands. 50-60% of new planting tends to be of productive woodlands. Scottish Forestry achieved 10,480 ha of the Scottish Government woodland creation target of 13,500 ha for 2021/22. Demand for Woodland Creation grants continues to be high, with contracts already approved and budget allocated for many 2022/23 projects already.

FGS offers a per-hectare payment for initial planting, which varies depending what type of woodland you want to grow (the nine options are listed below). Capital payments are available for items required to establish the woodland, including fencing, tree shelters, bracken control, and gorse removal. An annual maintenance payment is paid per-hectare and claimed on the Single Application Form (SAF) for five years. You can continue to claim Basic Payment on land planted under the scheme.

Small Woodlands Loan Scheme
Scottish Forestry has introduced a loan scheme to help with the costs of establishing Woodland Creation projects. FGS funding is paid after initial operations are complete, typically three months from when a claim is submitted. The loan can provide 50% of the value of capital items up front, acting as a partial bridging loan in the time between the work being done and the grant funding being paid. Woodland creation schemes up to 50ha are eligible, up to a maximum value of £40,000 per application.

Sheep and Trees
The Sheep and Trees initiative is aimed at supporting upland sheep farmers to grow a timber crop while continuing to farm livestock (where sheep are a major component). This package offers funding for forest infrastructure, such as new road building, along with woodland creation. Forest Infrastructure grant can be claimed when planting between 10 and 50ha under the Conifer or Diverse Conifer options in blocks of at least 10ha.

Woodland Creation Options and Grant Rates

There are nine options for woodland creation, each with specific requirements for composition and stocking densities:

1. Conifer – timber crops of predominantly Sitka spruce.
2. Diverse Conifer – timber crops of species other than Sitka spruce.
3. Broadleaves – grown at high stocking density to produce hardwood timber.
4. Native Scots Pine – native pinewood habitat creation or expansion.
5. Native Upland Birch – low-density downy birch habitat on shallow peaty soils (<50cm depth).
6. Native Broadleaves – other native woodlands, mainly lowland habitat types.
7. Native Low-density Broadleaves – specific native woodland or scrub habitats such as transition zones between woodlands and open hill.
8. Small or Farm Woodland – mixed broadleaved and conifer woodlands less than 10ha, no individual block more than 5ha.
9. Native Broadleaves in Northern and Western Isles – native woodland habitats in high exposure areas on the islands or elsewhere within the crofting counties.

A higher rate of grant is payable in four target areas:

1. Conifer, Diverse Conifer or Broadleaves in areas defined as being preferred or potential in the relevant local authority woodland strategy or equivalent.
2. Areas identified by the Cairngorms National Park Authority as a priority for woodland expansion, for predominately Scots pine or native broadleaved options.
3. Woodlands for Water, in priority areas identified by SEPA, for all options other than the Conifer option.
4. Native woodland options within the area identified as the Highland Native Woodland Target area.

A capital grant is available for using vegetatively propagated genetically-improved Sitka spruce. This is to encourage use of the most productive plants to grow high-yielding timber crops.

The Central Scotland Green Network (CSGN) offers an additional capital item payment for woodland creation schemes within the CSGN area of central Scotland. Different payment rates per hectare are offered within the Core, Outer Core and Fringe areas. These CSGN areas are shown on Scottish Forestry's Map Viewer:
https://scottishforestry.maps.arcgis.com/apps/webappviewer/index.html?id=0d6125cfe892439ab0e5d0b74d9acc18.
CSGN payments are limited and may not be available if the budget for a particular year has already been allocated.

The planting grants and capital grants applicable to the woodland creation scheme are as follows:

Planting Grant			Payment rate (£/ha)
Standard Areas	***Initial Planting***	***Annual Maintenance***	***Total for 5 yrs***
Conifer*	1,920	208	2,960
Diverse conifer*	2,160	336	3,840
Broadleaves*	2,880	528	5,520
Native Scots Pine	1,840	272	3,200
Native upland birch	1,840	128	2,480
Native broadleaves	1,840	272	3,200
Native low-density broadleaves	560	96	1,040
Small or farm woodland*	2,400	400	4,400
Native Broadleaves in Northern and Western Isles	3,600	624	6,720
Target Areas			
Conifer	2,160	234	3,330
Diverse conifer	2,430	378	4,320
Broadleaves	3,240	594	6,210
Native Scots Pine	2,070	306	3,600
Native upland birch	2,070	144	2,790
Native broadleaves	2,070	306	3,600
Native low-density broadleaves	630	108	1,170
Small or farm woodland	2,700	450	4,950
Native Broadleaves in Northern and Western Isles	4,050	702	7,560

* Where ploughing is the agreed method of ground preparation, the Initial planting payment rate is reduced by £240/ha for the Conifer option, £270/ha for the Diverse conifer option, £360/ha for the Broadleaved option and £300/ha for the Small or Farm Woodland option.

Capital Item Grant	Payment rate
CSGN – Core Area Contribution	£2500/ha
CSGN – Out Core Area Contribution	£1500/ha
CSGN – Fringe Area Contribution	£750/ha
Genetically improved Sitka Spruce	£150/ha
Stock fence	£4.40/m
March stock fence	£2.75/m
Deer fence	£7.60/m
Deer fence - high cost	£9.90/m
Upgrading stock fence to deer fence	£3.28/m
Rabbit-proofing stock or deer fence	£1.60/m
Tree shelter: 1.2 to 1.8 metres	£2.00 each
Tree shelter: 0.6 to 1.1 metres	£1.16 each
Vole guard	£0.19 each
Enhancing or modifying a stock fence - Black Grouse and Capercaillie core areas	£2.00/m

Capital Item Grant	Payment rate
Enhancing or modifying a deer fence	
- Low cost Black Grouse/Capercaillie core areas	£2.00/m
- High cost Black Grouse/Capercaillie core areas	£4.48/m
Conversion of deer fence to stock fence Black Grouse and Capercaillie core areas	£1.60/m
Gate for stock fence	£136 each
Gate for deer fence	£172 each
Badger gate	£64 each
Self-closing gate for non-vehicular access	£280 each
Building or restoring drystone dykes	£26.40/sq. m
Bracken control, mechanical or chemical removal	£225/ha
Gorse removal	£720/ha

Demand for Woodland Creation grants is high and has been increasing for the past few years. Applications for FGS can be submitted all year round but funding runs from April each year and becomes increasingly competitive as contracts are approved and budget allocated. Applications are scored on how well they will deliver Scottish Forestry's objectives.

Scottish Forestry pay particular attention to the 'value for money' of proposed schemes. Those with a total grant value (including 5 years of maintenance payments but excluding any CSGN contribution and basic payments) of greater than £6000/ha are classed as 'high cost' schemes. There is a smaller pool of money available for these schemes and grant funding is therefore more competitive. It is usually necessary to demonstrate a significant level of public benefit.

Fencing is generally considered the preferred method of protecting a new woodland. At scale, fencing is also usually cheaper than using individual tree shelters. Scottish Forestry may support tree shelters if using them will cost less than fencing.

Income from sales of carbon credits is playing an increasingly important role in making certain types of woodland creation schemes financially viable. One condition of carbon funding is the 'additionality rule' – the income from selling carbon credits must be essential to allow the project to go ahead. Due to rising costs of delivery (in particular fencing and tree supply), many projects now qualify for this scenario, where income from selling carbon credits turns a net cost into a net surplus.

Per-tonne of carbon dioxide equivalent (CO_2e) rates for sales of carbon credits have increased during the last 12 months but can vary widely from £8/tCO_2e to in excess of £25/tCO_2e. For more information on Carbon values, please refer to page 329.

When planning farm woodlands it is important to consider other benefits and costs. For example:

- Additional benefits can include shelter, conservation, sporting, amenity and carbon sequestration, the latter seeing dramatic price rises throughout 2020/21. See pages 324-326 for further information on forestry and climate change.
- The loss of agricultural production from the land is an opportunity cost and this can be minimised by planting less productive land, such as where bracken has established. If a significant proportion of the farm is planted, it may be possible to reduce fixed costs.
- Potentially, one of the largest financial impacts is the effect on land values. Generally, the more productive the land that is planted with trees, the greater the potential loss in capital value. In some circumstances capital values can be improved by new woodland, for example through better shelter, amenity, or sporting.

Woodland Improvement Grant

This grant aims to support forest management, activity to enhance the environment, and improve public access to existing woodlands. There are five options in this category:

1. Habitats and Species
2. Restructuring Regeneration
3. Low Impact Silvicultural Systems (LISS)
4. Woodlands In and Around Towns (WIAT)
5. Planning including Long-term Forest Plan, Forest Plan Renewal, Woodland Grazing Plan, WIAT Urban Woodland Management Plan and Deer Management Plan.

Grant payments for options under the Woodland Improvement Grant are as follows:

Option	Grant payment
Habitats and Species	Standard costs for capital works and items from a set list. Actual costs are available for work in woodland SSSI and Natura sites where it can be demonstrated that the actual costs of the eligible capital items will be higher than the set standard costs list for this option
LISS	Standard costs for capital works and items from a set list
WIAT	Standard costs for capital works and items from a set list
Long-term Forest Plan	£25/ha for first 200ha, £5/ha thereafter (minimum £500; maximum £15,000)
Forest Plan Renewal	£10/ha for first 200ha, £5/ha thereafter (minimum £500; maximum £10,000)
Woodland Grazing Management Plan	£1,200 per plan

Option	Grant payment
WIAT Urban Woodland Management Plan	£1,000 for any area up to 10ha, £25/ha thereafter
Deer Management Plan	£12/ha for first 500ha, £1/ha thereafter (minimum £5,000; maximum £15,000)

Payments for restocking, (known as restructuring regeneration) comprise a single capital payment. An approved long-term Forest Plan or Woodland Management Plan must be in place to be eligible for these grants. The payments are:

Delivering UKFS Woodland (no more than 75% of area as a single species)	£300/ha
Delivering Diversity and Resilience Woodland (no more than 60% of area as a single species)	£550/ha
Improved Vegetative Stock for Sitka Spruce	£60/ha

Sustainable Management of Forests

These grants support a range of activities in existing woodlands that will:

- Increase species and structural diversity through Low Impact Silvicultural Systems (LISS) management.
- Encourage natural regeneration to expand native woodlands.
- Bring native woodlands and designated woodland features into active management and good ecological condition.
- Support management of rural and urban woodlands for public access.
- Control grey squirrels where they are a threat to the red squirrel population.
- Control predators to benefit Capercaillie and Black Grouse.
- Reduce deer impacts to a level that will allow regeneration of conifer and broadleaved species.

The grant support for this category comprises nine options. All payments are made for up to a maximum of five years. An approved Long-Term Forest Plan (LTFP) or Woodland Management Plan must be in place to be eligible for these grants. Approved Deer Management Plans and/or Woodland Grazing Plans may also be required to be eligible for some options.

Grant	Payment rate
Low Impact Silvicultural Systems (LISS)	£30/ha/yr
Native Woodlands	£25/ha/yr
Livestock Exclusion	£43/ha/yr
Woodland Grazing	£100/ha/yr
Public Access – Rural Woods	£100/ha/yr
Public Access – Woods In and Around Towns (WIAT)	£100/ha/yr for first 10ha £10/ha/yr for any additional areas
Grey Squirrel Control	£200 per trap/yr

Grant	Payment rate
Predator Control for Capercaillie and Black Grouse	£6.60/ha/yr
Reducing Deer Impact	£6.00/ha/yr

Forest Infrastructure
This option has two aims:

1. Existing Woodlands - To provide support for new access infrastructure that will bring small-scale, undermanaged woodlands or inaccessible woodlands back into active management to improve the economic value of forest and woodland through timber production, to increase the area of woodland in Scotland that is in sustainable management and to improve the environmental and social benefits of woodland. This option is limited to woodlands of up to 50 hectares in size.
2. Sheep and Trees - To provide support for new access infrastructure to new woodlands as part of the Sheep and Trees initiative. This initiative is aimed at raising awareness of the many opportunities woodland can bring to land managers. This option, as part of the Sheep and Trees grant package, is only available for upland livestock farmers when creating between 10ha and 50ha of productive Conifer or Diverse Conifer woodland and is limited to up to 30m per hectare planted, with a cap of 1,500m per application.

Grant support is available for several capital grant operations associated with construction of new forest infrastructure:

Grant	Payment rate
Forest road with on-site material *	£25.80 per linear metre
Lay-bys, turning areas, and loading bays	£6.60 per square metre
Bell-mouth junction **	£32.40 per square metre

* in the Sheep and Trees option allowance of up to 30 metres/ha of woodland creation (cap of 1,500 metres/application)
** not available for the Sheep and Trees option

Agroforestry
Agroforestry can be described as an integrated approach to land management, where trees and agriculture co-exist to provide multiple benefits. This option provides grant support to help create small-scale woodlands within sheep grazing pasture. These trees can:

1. provide shelter for livestock
2. provide timber
3. increase biodiversity
4. enhance the landscape

This grant has two payment types:

- a capital grant for initial establishment
- an annual maintenance grant that is paid for five years

The rate of capital grant that can be claimed depends on the number of trees that are planted per hectare. Two stocking levels and grant rates are available:

Planting density	Initial payment	Annual maintenance
400 trees/ha	£3,600/ha	£84/ha/yr
200 trees/ha	£1,860/ha	£48/ha/yr

The rate per hectare has been set to cover:

- purchase of trees and stakes
- purchase or construction of appropriate protection
- planning, site assessment, supervision, ground preparation, and planting

A contribution is also included to the cost of beating-up and weeding.

Tree Health

This option provides support to prevent the spread of larch disease, *Phytophthora ramorum* (see page 310 for more information on the disease itself).

This option helps with the restoration of forests affected by the disease by supporting the work to remove infected trees and carry out subsequent replanting.

Grant support consists of a number of standard cost capital items. These are available for work to help prevent the spread of disease and restore affected woodlands. The eligible items and payment rates for eligible operations on infected land are listed in the following table:

Grant	Payment
Agent services - Advisory	£200
Agent services - Compliance	£500
Agent services - Harvesting and marketing	£1,000
Tree clearance (clearing saw)	
- Larch under 26 years - first 5ha	£600/ha
- Larch under 26 years - >5ha up to 10ha	£450/ha
- Larch under 26 years - >10ha	£300/ha
Tree clearance (other mechanised equipment)	
- Larch under 26 years - first 5ha	£1,200/ha
- Larch under 26 years - >5ha up to 10ha	£900/ha
- Larch under 26 years - >10ha	£600/ha
Un-economic felling	
- Larch on Islands - first 5ha	£2,400/ha
- Larch older than 26 years - first 5ha	£1,200/ha
- Larch greater than 26 years - >5ha up to 10ha	£900/ha
- Larch greater than 26 years - >10ha	£600/ha
Restocking - Delivering Diversity and Resilience in Woodlands	£1,400/ha
Manual Rhododendron Eradication	
- Light	£3,500/ha
- Medium	£5,500/ha
- Difficult	£7,300/ha
Mechanised Rhododendron Eradication	
- Light	£2,200/ha
- Medium	£3,400/ha
- Difficult	£5,600/ha
Foliar Spray Treatment Rhododendron Eradication	£200/ha
Follow-up Rhododendron Eradication	£200/ha
Stem Injection Rhododendron Eradication	
- Medium	£3,000/ha
- Difficult	£4,500/ha

Harvesting and Processing

This option supports investments in three main areas:

1. New specialised equipment which will increase the local small-scale harvesting and processing capacity with the aim of:
   - helping to bring woodlands into management
   - promoting the economic and sustainable production of timber and timber products through processing
   - adding value to local economies on a non-industrial scale processing (less than 10,000 tonnes per annum), primary timber processing (less than 5,000 tonnes per annum), secondary processing equipment (less than 500 cubic metres per annum)
   - providing support to facilitate and support diversification and to assist with the creation of new small-scale enterprises and related employment.

2. New specialised equipment for forest tree nurseries (including tree nurseries in England and Wales) and ground preparation and fencing equipment for afforestation projects with the aim of:
    - promoting economic development in rural areas in Scotland by supporting new and existing forestry businesses
    - scaling up and expanding the capacity within the forest tree nursery sector and the forestry contractor resource to help delivery of the Scottish Government ambitious woodland creation target
    - helping forest nurseries to adapt, become more resilient and recover from COVID-19.
3. Support for the mobile equipment to help forestry businesses or enterprises to adapt and recover from COVID-19, with the aim of:
    - promoting economic development in rural areas in Scotland by supporting new and existing forestry businesses.

Grant support is based on actual costs with a maximum contribution of 40%. The balance of funding must come from private funds and not from other public funds. Public funds include all EU funds, and any UK government funds, including local authority and lottery grants. In any single application, the minimum and maximum grant award totals will be:

- Aim 1 – harvesting and primary processing equipment minimum £2,500 and maximum £50,000
- Aim 1 – secondary processing equipment minimum £1,000 and maximum £6,000
- Aim 2 – nursery and ground prep equipment minimum £2,500 and maximum £50,000
- Aim 3 - mobile equipment to help adapt and recover from Covid-19 minimum £2,500 and maximum £50,000

One application round will be run each year with a closing date of 31 January for the submission of applications. Applications with a claim year of 2022 must spend grant awards by the end of March 2023.

The grant cannot be used for purchase of chippers or second-hand equipment. A business case must be submitted as part of the grant application.

Forestry Co-operation

This option aims to encourage landscape-scale collaborative projects between two or more landowners by providing support for project facilitation and co-ordination. The subsequent management activity can be supported through other options within the Forestry Grant Scheme.

Grant support of £250 per day is available for up to 40 days to support the cost of a project co-ordinator for the following stages of a project:

- Feasibility – this stage is the initial exploratory phase
- Consolidation – this stage focusses on the detail of the project.

Trees and Taxation

Forestry enjoys several benefits in relation to taxation. Their value to stimulating the forestry sector was recognised in the Land Reform Review in 2014. Taxation considerations for forestry are listed below:

Income Tax - Currently, profits arising from the commercial occupation of woodlands are not chargeable to Income Tax and Corporation Tax and the value attributable to trees is exempt from Capital Gains Tax. The sale of voluntary carbon credits is not currently chargeable to VAT. However, applicants should always seek professional independent advice based on their specific circumstances.

Capital Gains Tax (CGT) - There is no CGT applied to the gain in value of commercial trees. CGT does however apply to a gain in value on the land.

Inheritance Tax (IHT) - Where commercial woodland has been in individual ownership for at least two years, it will normally attract 100% IHT Business Property Relief.

Corporation Tax (CT) - Where a company owns woodland which is independent of their trading operations, there is no CT liability on income generated by timber sales or surplus resulting from forestry grants.

For more detail see the Taxation section on page 503.

Forestry and Climate Change

Afforestation is one of the methods by which climate change reduction targets can be achieved. For each new hectare of forest and woodland created, it is estimated that, on average, seven tonnes of CO_2 will be removed from the atmosphere each year. The Climate Change Plan includes commitments to incrementally increase the annual woodland creation target from 12 000 to 18 000 ha per year by 2024/25. Scotland's forests cover is currently 19% of the total land mass area. The Scottish Government's forestry strategy aim is to increase this to 21 % by 2032.

Growing trees act as a carbon sink, sequestrating carbon dioxide from the atmosphere and converting it to wood. This carbon remains locked away as long as the timber is used in construction, fencing or other wood products.

The total carbon stock in UK Forests is estimated to have increased to 4.0 billion tonnes of carbon dioxide equivalent in 2020, up from around 3.2 billion tonnes of carbon dioxide equivalent in 1990. Of this 4 billion tonnes CO2e, over half (51%, 2.0 billion tCO2e) is sequestered in Scotland's forestry stock.

The permanent planting of trees (not Christmas trees) on agricultural land will result in net sequestration of carbon. Deep peats (greater than 50cm deep) should not be planted as peat itself sequesters carbon and planting it with trees would cease its function as such. Similarly, evidence suggests that maximum C-sequestration benefits on a per-hectare-basis might be achieved on the highly productive lowland areas, although potentially at a high agricultural opportunity cost. Agroforestry, where trees are planted in a way that allows the land is to be kept in agricultural production may be an option here. Scotland-wide, significant benefits are also possible on the less productive lands, by avoiding disturbance of organic soil layers.

Carbon value

Tree planting on agricultural land will contribute to reducing a farm's carbon-footprint, where:

- It is a permanent change in land use.
- The planting conforms to the UK Forestry Standard.
- The risks to the planting and the accuracy of sequestration predictions are considered.

New woodland may qualify for payments under a carbon brokerage scheme (the Woodland Carbon Code – WCC), as long as additionality can be proven whereby it can be demonstrated that the creation of the woodland would not have happened without the assistance of the WCC.

Current payments for new planting range dramatically dependent on species, contract period, location and management regime. Values offered vary significantly between projects, as it is often the case that the carbon value of a woodland scheme is also linked by investors to the diverse range of other benefits a site may deliver, for example, a native broadleaved scheme which reduces flood risk for an area would likely achieve significantly higher carbon values than a commercial conifer monoculture plantation.

Carbon Credit values have risen significantly from 2021 into 2022 as more businesses and individuals look to reduce the environmental impact of their activities as part of efforts to work towards 'net zero' targets and wider Environmental, Social and Governance (ESG) principles, and as growing awareness of climate change also starts to influence public perception of greenhouse gas emissions and a shift towards sustainable living. More businesses and individuals are looking to offset their own emissions, and woodland creation is playing a huge part in this move as an affordable and sustainable approach to offsetting emissions whilst also delivering a multitude of biodiversity and landscape benefits.

To the end of March 2022, a total of 1,534 projects had been registered under the Woodland Carbon Code, covering around 59 thousand hectares of woodland with a projected total sequestration of 18.7 million tonnes of carbon dioxide over the lifetime of these projects.

Wood fuel
Wood can be used as a renewable heat source and is usually sold to the customer as logs, chips or pellets. Woodland owners can sell smaller sized roundwood as logs. Values vary according to whether the wood is soft wood (conifer) or hard wood (broadleaf); for log prices see page 312.

Standing and lying deadwood can be of considerable ecological value, it may also have a lower calorific value than 'live' wood. Where it is safe to do so, deadwood should be left in the forest.

Short Rotation Forestry (SRF) is a system for producing woody biomass for renewable energy projects. For more information on this system and biomass heating, see pages 359 and 353-354.

Woodland as pollution control
Native riparian woodland can provide an effective buffer against diffuse pollution. Woodland acts as a buffer reducing the risk of surface run-off, leaching, spray pesticide drift and fertilisers entering the watercourse. Trees can reduce the risk of erosion and when fenced can help prevent stock from entering the water courses.

Woodland as flood control
Forests and woodlands can slow down and reduce levels of flooding downstream. The forest canopy slows the rate at which rain reaches the ground, tree roots make the soil more porous and therefore more able to retain water (together with generally higher organic content than outside the forest), and transpiration of water from the soil.

Species choice for woodland creation
Sitka spruce, comprising over 60% of the national timber crop, has traditionally been favoured for its rapid growth and great adaptability. It is however a high-rainfall species, requiring over 2m of rain per year. On the drier east coast, the incidence of drought crack in Sitka spruce, which makes otherwise valuable timber worthless, is increasing as the climate becomes drier and warmer. Greater species diversity is therefore required, placing emphasis on more suitable species such as Norway spruce and Scots pine. Although slower growing and lower yielding than Sitka spruce, the long-term view should be taken, establishing trees which in decades ahead will be tolerant of drier and warmer conditions and still produce good quality timber.

Carbon

Climate change, carbon, and the environment

It is now widely accepted that all businesses, including farms will have to take action to reduce greenhouse gas emissions responsible for driving climate change.

Scottish Government have set ambitious targets to reduce greenhouse gas losses across Scotland, with an interim goal of a 75% reduction in emissions by 2030 (against a 1990's baseline), with the aim of achieving net zero emissions by 2045.

Agricultural production is underpinned by natural biological processes, which in turn give rise to greenhouse gases. With around 7.5 $MtCO_2e$ (million tonnes CO_2 equivalent) of greenhouse gases attributed to the agricultural sector in 2018, in terms of contributions to total Scottish greenhouse gas emissions it is third on the list behind transport (12.9$MtCO_2e$) and business (8.4 $MtCO_2e$), (Scottish Government, 2020).

Agricultural greenhouse gas emissions

There are three main greenhouse gases produced through routine agricultural activities:

- Carbon dioxide (CO_2) is produced by burning fossil fuels such as coal, oil, and diesel.
- Methane (CH_4) is produced as a natural by-product of enteric fermentation during ruminant digestion and, to a lesser extent, from management of organic manure.
- Nitrous oxide (N_2O) which is released during the application of synthetic and organic fertilisers to the soil, from urine deposition by grazing animals, soil cultivation and changes in land use and vegetation.

Greenhouse gases are typically quantified in terms of CO_2 equivalents (CO_2e) based on their relative global warming potential (GWP) over a 100-year period. The table below provides an approximate assessment of the GWP of the main three greenhouse gases.

Greenhouse gases and their global warming potential (GWP)

Greenhouse gas	**GWP** (over 100 year period) per kg emitted
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous oxide (N_2O)	298

By expressing emissions in terms of CO_2 equivalents, it allows groups of greenhouse gases to be quantified as a single number allowing cross sector and year-on-year results to be easily compared.

Agriculture as part of the solution to climate change

As other sectors cut their emissions, it is anticipated that the contributions from farming activities will gain more prominence. However, the agricultural sector has the potential to be part of the solution to climate change.

Through improving technical efficiency and using new technologies and techniques, alongside implementing land management practices which can store or 'sequester' carbon removing it from the atmosphere and locking it into soils, vegetation and trees, the agricultural sector has a key role to play.

More information on practical mitigation measures and steps farmers are taking to reduce emissions and sequestrate carbon is available at www.farmingforabetterclimate.org (see below).

Farmer led groups

Following the work of the Suckler Beef Climate Group in 2020, the Scottish Government established four additional Farmer Led Groups (arable, dairy, pig, and upland farming/crofting) to explore how individual sectors can reduce emissions and contribute to Scotland's climate change targets. These groups put forward a range of proposals to Scottish Government in early 2021 for consideration. The final reports including recommendations from the Suckler Beef Climate Group, are available at https://www.gov.scot/policies/agriculture-and-the-environment/farmer-led-climate-change-groups/

National Test Programme

Early in 2022 Scottish Government announced plans for the National Test Programme, aimed to transform and futureproof agriculture in Scotland, in line with post-Brexit policy development and sustainable transition goals.

Track 1 aims to encourage farmers to improve knowledge and practice of environmental performance and efficiency. The first phase of Track 1 is named Preparing for Sustainable Farming (PSF), and provides funding for soil sampling, carbon audits, and specific areas of training.

Track 2 will design, test, improve and standardise the tools, support and processes to support and reward farmers, crofters and land managers who deliver climate and biodiversity outcomes.

The Farm Advisory Service will provide updates through the FAS newsletter and publications as the Programme develops.

For more information on the Programme see:
https://www.fas.scot/news/preparing-for-sustainable-farming/
https://www.gov.scot/publications/next-step-delivering-vision-scotland-leader-sustainable-regenerative-farming/pages/2/

Farming for a Better Climate

The Farming for a Better Climate programme, funded by the Scottish Government and facilitated by SAC Consulting, works with farmers to find practical and profitable solutions, tips and ideas to improve business efficiency, reduce greenhouse gas losses from the farm and help farmers and land managers adapt to a changing climate.

Recent projects include exploring soil regenerative agriculture techniques with a group of farmers in the northeast of Scotland and the launch of the Agriculture, Biodiversity and Climate Change (ABCC) Network with industry partners.

For more information, including updates from the Soil Regenerative Agriculture Group and to find out what farmers in the ABCC Network are doing, register for the free e-newsletter via climatechange@sac.co.uk. The project webpages at www.farmingforabetterclimate.org also host a range of practical guides, podcasts, videos and farmer case studies showing how other farmers are reducing their farm carbon footprint. Find Farming for a Better Climate on Facebook and follow on Twitter @SACfarm4climate.

Farm carbon calculators and carbon footprinting

Farm carbon calculators are highly useful business tools, not only for understanding carbon management within the business, but also helping determine relative resource use and efficiency across the business. Often the farms with the lowest carbon emissions are also the most productive and profitable within their sector, so carbon footprints can help a farm to save money and improve performance.

Typically farm carbon calculators will ask for information on:

- Crop areas and yields
- Livestock numbers and productivity
- Input use (feed, fertilisers, bedding, pesticides etc.)
- Electricity and fuel use
- Manure and fertiliser management

Some tools also ask for information on land use and farm practices to provide a soil carbon sequestration figure.

A farm carbon assessment involves:

1. Calculating an initial carbon footprint measurement.
2. Benchmarking
3. Identifying mitigation (positive change) measures.
4. Monitoring and reviewing.

1. Calculating an initial (baseline) carbon footprint

This will provide a 'starting-point' to help to understand current practices and productivity and to provide a baseline to monitor progress. The more accurate a business is when inputting data, the greater the accuracy of the carbon footprint.

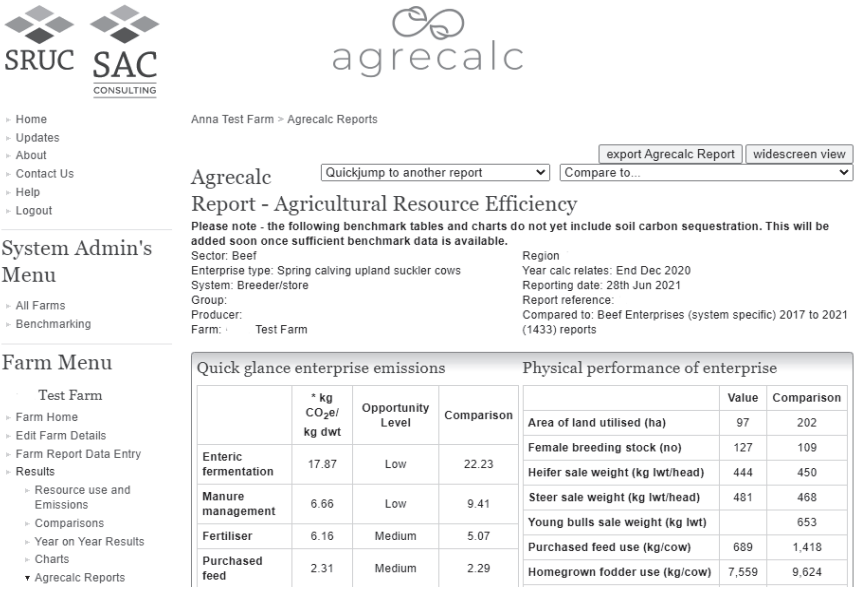
Up until August 2022 grant funding of £500 was available through the Farm Advisory Service (www.fas.scot/carbon-audits/) to carry out a farm business carbon audit. Audits are carried out using Agrecalc, the carbon and resource efficiency calculator developed by SAC Consulting to give a picture of carbon emissions from each farm enterprise, and across the farm business.

From April 2022, funding towards the cost of a carbon audit is available through the National Test Programme (see page 331).

2. Carbon footprint benchmarking

Benchmarking a baseline carbon assessment will enable businesses to compare their farm enterprises to other similar farms, to identify high emissions areas, and opportunities for mitigations and optimising resource use.

As shown in the sample report, Agrecalc's benchmarking facility can provide businesses with an indication of whether the performance of an individual enterprise is above or below average and can highlight areas where improvements can be made. The quick glance enterprise emissions report benchmarks a business's enterprise emissions broken down by source against similar farms, together with the 'opportunity level' for improvement.



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Anna Test Farm > Agrecalc Reports

export Agrecalc Report | widescreen view

Agrecalc

Quickjump to another report | Compare to...

Report - Agricultural Resource Efficiency

Please note - the following benchmark tables and charts do not yet include soil carbon sequestration. This will be added soon once sufficient benchmark data is available.

Sector: Beef
Enterprise type: Spring calving upland suckler cows
System: Breeder/store
Group:
Producer:
Farm: Test Farm

Region
Year calc relates: End Dec 2020
Reporting date: 28th Jun 2021
Report reference:
Compared to: Beef Enterprises (system specific) 2017 to 2021 (1433) reports

Quick glance enterprise emissions

	* kg CO_2e/ kg dwt	Opportunity Level	Comparison
Enteric fermentation	17.87	Low	22.23
Manure management	6.66	Low	9.41
Fertiliser	6.16	Medium	5.07
Purchased feed	2.31	Medium	2.29

Physical performance of enterprise

	Value	Comparison
Area of land utilised (ha)	97	202
Female breeding stock (no)	127	109
Heifer sale weight (kg lwt/head)	444	450
Steer sale weight (kg lwt/head)	481	468
Young bulls sale weight (kg lwt)		653
Purchased feed use (kg/cow)	689	1,418
Homegrown fodder use (kg/cow)	7,559	9,624

3. Identifying suitable mitigation measures

Mitigation measures fall into 3 categories:

1. Avoiding or reducing emissions through improving efficiency and or work practices.
2. Reducing or eliminating through changing inputs e.g., switching to renewable energy sources.
3. Sequestering or offsetting emissions.

Effective mitigation strategies for one farm may not be effective on another farm, so specialist advice from a farm advisor may be helpful to identify actions that are best suited to the individual farm and to identify short-term and longer-term options.

Mitigation measures can include:

- Looking at most significant emissions sources on the farm and in comparison to other farms.
- Identifying easy changes e.g., switching an input for one with lower associated emissions or finding ways to reduce energy/fuel use.
- Focusing on 'win-wins' that will provide resource and cost savings as well as carbon savings, such as precision feeding of livestock. The Marginal Abatement Cost Curve, produced by SRUC researchers, provides substantial detail into the cost-effectiveness of selected mitigation measures.
- Investigating funding schemes. The Sustainable Agriculture Capital Grant Scheme piloted in 2020 provided up to £20,000 of grant per farm for capital items linked to emissions reduction.
- Using the baseline carbon audit results to test out potential impact of implementing different measures e.g., finishing cattle earlier, this can be a useful tool when creating a carbon plan for the business going forward.

The Farming for a Better Climate website provides advice and resources for farmers wishing to assess and improve their carbon footprint.

4. Monitor and review

After new practices and measures have been implemented, repeating the carbon assessment process helps to monitor and review progress. Carrying out a second audit a year or two later will allow a business to assess the impact of the 'easy wins', but for more involved practices and system changes waiting three to five years may be more appropriate.

Choosing the most appropriate carbon calculator

As there are various farm carbon calculators in the UK that will generate a farm carbon footprint with differing methodologies, outputs, and features – which one should you choose? All carbon calculators are essentially computer models, and how they calculate emissions varies

according to the underlying calculations and assumptions made. The more detailed the data input, the more accurate the result. For an independent comparison of the key farm greenhouse gas calculators see online at:
https://www.climatexchange.org.uk/research/projects/comparative-analysis-of-farm-based-carbon-audits/

The key questions to consider when choosing a farm carbon calculator are:

- What data does it ask for? Do you have this data readily available in your farm records?
- Are the results presented in a way that is useful to you and will help inform business decisions? Are you interested in whole farm results, individual enterprise results, or both?
- Does the tool enable you to benchmark against other similar farms?
- What standards and methodology are used? Calculators based on IPCC (Intergovernmental Panel on Climate Change) guidelines are considered more scientifically rigorous, and certification such as PAS 2050 means it has been reviewed and verified by a third party on its use of the internationally applicable method for quantifying product carbon footprints.
- Does your buyer e.g., milk company or your participation in a particular grant or business support scheme require or recommend that you use a particular carbon calculator?

Once you have chosen your carbon footprinting tool, it is best to stick with the same one to make it easier to compare your progress year on year.

Farm carbon accounting and the National Inventory

A crucial principle of farm carbon footprinting is that it calculates only the emissions associated with agricultural activities on the land, not overall emissions from the land itself. To be able to measure, monitor and benchmark with consistency and to identify areas for efficiency and resource use improvement, it is necessary to separate out natural cycles of greenhouse gases from land and those resulting from agricultural activity.

Due to how carbon is accounted on a national scale in the UK's Greenhouse Gas Inventory, farm woodlands and renewables are classified as non-agricultural activities. This means that the carbon benefit is attributed to LULUCF (Land Use, Land Use Change and Forestry) and Energy sectors respectively.

However, some carbon tools, such as Agrecalc, calculate carbon sequestration from woodlands and soil carbon, and energy generated by on-farm renewables, in addition to whole farm emissions. This allows the user to measure and monitor the footprint of these, as part of the whole

farm picture. Renewables generated and used on-farm are included in this. As renewables have a lower carbon footprint than grid electricity, emissions from farm energy use associated with enterprises will also be reduced. While farm woodlands may currently be considered part of the LULUCF, agroforestry is one way in which trees would be considered part of agriculture, according to the GHG Inventory.

Carbon benchmarks by enterprise

As an illustrative guide to carbon benchmarking within Scottish Agriculture the following benchmarks were extracted from the Agrecalc dataset. The benchmarks provide breakdown of emission sources by enterprise, and average key performance indicators. Additional options are available in the Agrecalc webtool, including comparison with the top 25% performers and benchmarking against previous carbon audits.

Beef Benchmarks	Upland suckler spring calving cows		Lowland suckler spring calving cows	
EMISSIONS BY SOURCE	kg CO2e/ kg dwt (%)			
Enteric fermentation	22.23	*53%*	19.72	*52%*
Manure management	9.41	*22%*	7.59	*20%*
Fertiliser	5.07	*12%*	5.44	*14%*
Purchased feed	2.29	*5%*	2.02	*5%*
Purchased bedding	0.75	*2%*	0.71	*2%*
Fuel	1.32	*3%*	1.14	*3%*
Electricity	0.04	*0%*	0.05	*0%*
Other	1.09	*3%*	1.01	*3%*
TOTAL EMISSIONS	42.22		37.69	
KEY PERFORMANCE INDICATORS				
Steer sale weight kg	488		506	
Mortality %	3		3	
Calving %	92		92	

Sheep benchmarks	Crossbred ewe flock		Good hill ewe flock	
EMISSIONS BY SOURCE	kg CO2e/ kg dwt (%)			
Enteric fermentation	17.22	*56%*	19.63	*60%*
Manure management	6.00	*20%*	6.71	*20%*
Fertiliser	4.11	*13%*	2.72	*8%*
Purchased feed	1.50	*5%*	1.70	*5%*
Purchased bedding	0.10	*0%*	0.07	*0%*
Fuel	0.89	*3%*	0.86	*3%*
Electricity	0.04	*0%*	0.03	*0%*
Other	0.90	*3%*	1.11	*3%*
TOTAL EMISSIONS	30.76		32.81	
KEY PERFORMANCE INDICATORS				
Lamb sale weight (kg dwt/head)	18.97		17.57	
Mortality %	7		4	
Lambing percentage (%)	159		135	

Dairy benchmarks	Dairy - all year calving, 8,000l avg. yield	
EMISSIONS BY SOURCE	kg CO2e/ kg FPC milk	
Enteric fermentation	0.54	*42%*
Manure management	0.28	*22%*
Fertiliser	0.16	*12%*
Purchased feed	0.27	*21%*
Purchased bedding	0.01	*1%*
Fuel	0.03	*2%*
Electricity	0.01	*1%*
Other	0.02	*2%*
TOTAL EMISSIONS	1.30	
KEY PERFORMANCE INDICATORS		
Milk production (l/cow)	7,784	
Mortality %	5	
Calving %	81	

Ruminant systems – key emissions sources

- **Enteric fermentation** – methane emissions are caused by the digestive process of the animal as they break down plant materials in the rumen. This is a normal process, so emissions cannot be eliminated, however there is much ongoing research into the role of diets and additives in reducing enteric emissions.
- **Manure management** – total emissions relate to how much time livestock spend at pasture, on the hill, or housed, whether slurry or bedded systems, and how the manure is stored.
- **Fertiliser** – linked to fertiliser use for pasture, other home-grown forages/feed crops and bedding produced on farm for livestock use.
- **Purchased feed** – this source of emissions is regarded as embedded emissions. Embedded emissions may include fertiliser, fuel use in the production of the feed, as well as transport to the farm.

Top mitigation actions for beef and sheep systems

- Improve livestock performance - linked to genetic selection (breed, EBVs) and management practices e.g., seeking to reduce days to slaughter, reduce age at first calving and reduce carcass weight.
- Increase calves/lambs reared – linked to reducing mortality rates through improved breeding selection, birth management, nutrition, and body condition scoring management.
- Increase homegrown forage use and reduce purchased feeds – linked to adapting management practices to make better quality silage, improve grassland management, growing additional forage

crops and seeking to match feed demand with grass supply (appropriate lambing and calving dates).

- Optimising feeding and nutritional strategy, use of precision feeding to reduce days to slaughter, improve feed conversion efficiency, thereby improving ewe and cow performance.
- Optimising soil nutrient use by carrying out soil sampling, nutrient budgeting incorporating organic manures, manure management, and optimal fertiliser application and timings.

Top mitigation actions for dairy systems

- Improving livestock performance through genetic selection (breed, EBVs) and management practices to reduce calving interval, improve fertility, using sexed semen, and improving milk quality.
- Increasing milk output and quality through optimising nutrition, body condition score management, and improving the health and welfare of the herd.
- Increasing homegrown forage use and reducing purchased feeds through producing better quality silage, improving grassland management, reviewing grazing strategies, growing alternative forage crops, and seeking to better match feed demand with grass supply.
- Optimising nutrient use through soil sampling, nutrient budgeting incorporating organic manures, manure management, and optimal fertiliser application and timings.
- Reviewing manure management and storage linked to the use of slurry store covers, acidification and separation, and precision spreading.

Cereal Benchmarks	Malting spring barley		Feed wheat	
EMISSIONS BY SOURCE	kg CO2e/ kg grain (%)			
Manure and fertiliser	0.24	*67%*	0.29	*71%*
Pesticides	0.00	*0%*	0.00	*0%*
Lime	0.04	*11%*	0.03	*7%*
Fuel	0.06	*17%*	0.06	*15%*
Electricity	0.00	*0%*	0.00	*0%*
Crop residues	0.03	*8%*	0.03	*7%*
Other	0.00	*0%*	0.00	*0%*
TOTAL EMISSIONS	0.36		0.41	
KEY PERFORMANCE INDICATORS				
Grain yield (t/ha)	6.4		8.9	
Straw yield (t/ha)	3.5		3.5	
Fertiliser use (t per t grain)	0.09		0.78	
Electricity use (kWh per t grain)	3.62		17.06	
Red diesel use (l per t grain)	18.82		18.88	

Top mitigation actions for cereal crops

- Optimising nutrient use using soil sampling, nutrient budgeting incorporating organic manures, manure management, optimal fertiliser application and timings and optimising fertiliser/manure/biosolids use.
- Exploring alternatives to synthetic nitrogen using grassland and legumes in crop rotation, using more N-efficient crop varieties, choosing lower emission fertilisers, and the use of cover crops for nutrient carry-over.
- Monitoring and improving fuel use – identifying use hotspots and using GPS to reduce fertiliser and fuel use.
- Reducing tillage intensity where appropriate. This is beneficial for fuel as well as seeking to reduce soil compaction and soil carbon, although there are potential trade-offs with crop productivity.
- In areas/seasons where grain drying is necessary, consider energy sources with lower associated emissions, e.g., renewable energy.

Top enterprise emissions sources for cereal crops

- **Manure and fertiliser** – the embedded emissions of fertiliser and manure (imported or 'home-produced') and the process of application and volatisation.
- **Fuel use** – linked to the field operations of establishing, treating, harvesting, and drying the crop.
- **Crop residues** – these emissions relate to the incorporation of the proportion of the crop not removed at harvest. For example, if straw is incorporated, the crop residue emissions will be higher than if it was removed. Benefits of straw incorporation to soil carbon and subsequent crop yields are not included in the carbon calculation but should be recognised.
- **Lime use** – this may or may not be a component in the carbon footprint, depending on whether the farm is recording actual lime use when it is applied, or the annual liming requirement. When applied correctly, the benefits of liming on productivity and improving emissions per unit of output of crop generally outweigh the emissions associated with using it.

Mitigation actions for other sectors

While the livestock and crop systems selected give an indication of emissions sources for other similar ruminant animal systems, emissions from mono-gastric livestock like pigs and poultry are quite different. Emissions are largely from nitrous oxide and carbon dioxide, reflecting embedded emissions of purchased feeds (including land use change), and energy use for indoor systems.

Top mitigation measures for pigs and poultry usually focus on optimising feeds, nutrition, health, and genetics.

Whole farm emissions mitigation
General whole farm actions can also be taken to reduce or offset emissions across agricultural enterprises. These include:

- **Energy and fuel use**: monitoring energy and fuel use, such as using a smart meter, can assess the efficiency of equipment and activities, and help identify small changes such as switching to more energy efficient lightbulbs or insulating areas of heat loss in water pipes.
- **Renewable energy:** generating renewables on farm, such as wind, solar and hydro-electric power may reduce energy bought in from the grid for use on farm and have lower emissions when doing a carbon audit. According to the National Inventory, emissions mitigation from energy sold to the grid is also considered as 'exported' from the farm. See the Renewable Energy section, page 347, for further information on a wide range of farm renewable activities.
- **Fertiliser and manure management:** preparing a farm nutrient management plan can help to identify opportunities for better utilisation of organic and inorganic fertiliser e.g., applying nitrogen at optimum rates and timings, maintaining, or increasing clover content of swards or other legume crops.
- **Carbon sequestration and offsetting:** various measures can be used to manage soil carbon, including tillage practices, soil erosion control, conserving areas for biodiversity, and managing or increasing woodland areas. For more information on farm woodlands see the Forestry and Farm Woodlands section, page 305.

Soil carbon sequestration

On farms, soil carbon can be increased or decreased depending on the use of the land. All soil has existing (resting) carbon stocks, i.e., a natural level of carbon in the soil, which is determined by climatic factors such as temperature, moisture content, as well as mineral composition and soil texture. Generally, the soil carbon stocks in the UK vary between around 80–120 tonnes carbon per hectare to a depth of 30cm. Changes in the management of the land may affect whether these resting soil carbon stocks are maintained, increased, or depleted.

Agriculture is part of a natural carbon cycle, where carbon in the atmosphere is captured in plants and recycled to the atmosphere through livestock and animal consumption or natural breakdown. Without interference the system is in a carbon balance, with soil carbon stocks being maintained. As this (biogenic) carbon is recycled relatively quickly into the atmosphere, the growth of plant material on its own cannot usually be considered as sequestration.

Agricultural practices affecting this system can alter the amount of carbon 'recycled', resulting in either carbon sequestration or carbon loss, depending on the practice. The principle used by IPCC is that changes in

agricultural practice that lead to changes in soil carbon stock levels will; if maintained, take effect over a 20-year period. After year 20 it is assumed that the soils have reached a new equilibrium of soil carbon stocks (higher or lower) and that no more soil carbon sequestration will then take place from this change in management practice.

Example: As part of the natural cycle, grass and stored carbon is removed by grazing animals, which then return the carbon back into the atmosphere or the soil, either as enteric fermentation or as manure. The portion of the grass not eaten by stock or removed by harvesting machinery, together with the roots, will in time decompose, and the carbon will then be stored in the soil. Therefore, the ability for grassland to sequester carbon in the soil depends on grassland management practices, forage utilisation, stocking density, reseeding practices, as well as land use factors such as the length of time it has been grassland, and the soil type.

In reality, it is accepted that soil carbon changes may not occur evenly over a set time and the length of time this change occurs may vary widely too. However, to make carbon estimates workable at the farm level a simplification of complex soil carbon interactions is considered necessary, as has been adopted by the current IPCC methodology.

Carbon sequestration is not an infinite process – soil will not keep absorbing carbon indefinitely, no matter how you manage it. All soils will have a natural maximum carbon threshold, based on the soil type, characteristics, structure, and management, just as soil organic matter will increase to a point but reach a maximum potential percentage individual to that type of soil. This is described as the soil reaching 'carbon saturation'.

Carbon markets and credits in agriculture

There is increasing interest and attention on 'carbon farming', i.e. the possibility that agriculture could provide a source of carbon credits through management practices, and an additional income stream to farmers through the sale of credits. Investors are moving into this space, offering farmers payments for unqualified carbon credits, and some farmers have begun to sell these assets.

However, unlike woodlands and peatlands, there is not yet a set of standards for agricultural or soil carbon credits, and the market is currently unregulated. Various research and policy projects are ongoing to explore support and systems required for a regulated carbon market in agriculture, which may enable safer engagement in these new markets. For the time being, the recommendation is not to sell carbon credits until such frameworks are in place.

If you are considering selling carbon credits in the future, here are a few things to check before entering the market:

- **Establish whether you have anything to sell**. Carbon offsets or sequestration may be small relative to total emissions of production. The best way to establish what your farm carbon balance is and whether you might have any carbon assets to sell is to do a carbon audit which includes soil carbon sequestration.
- **Understand the principles of soil carbon sequestration**. Soil carbon stocks are not the same as sequestration, and credits cannot be linked to stocks. Soil carbon can be sequestered or lost, and soils reach a 'saturation point' where limited further sequestration occurs. Only credits linked to sequestration can be sold if you meet the required criteria.
- In most cases **carbon credit payments require additionality**, i.e., proof that the intervention of the land owner is responsible for any changes in soil carbon levels.
- They will also **proof that carbon capture has occurred,** including a credible measurement of soil carbon levels over an extended period of time.
- The **market for soil carbon credits is currently unregulated** (unlike the woodland and peatland codes). A soil carbon code is in the process of development, due later this year.
- **Who knows where the carbon price will go?** Sell now and you might be kicking yourself in a few years as prices are likely to increase as pressure grows to reach net zero targets. If you decide to sell, sell only a share of what you can capture in any one year or spread any sales out.

As more becomes clear about the direction of standards for agricultural and soil carbon codes, the Farm Advisory Service will continue to provide updates via the website and other publications. For more information on the Woodland Carbon Code, see the Forestry and Farm Woodlands section.

The role of peatland in farm carbon accounting

Farm carbon footprinting aims to estimate emissions occurring solely as a result of agricultural activities. While peatland may be found on a croft, farm, or an estate, most of the carbon sequestered by peatland occurs naturally, whether or not that land is farmed, so shouldn't be included in a farm's carbon footprint. This is consistent with other farm GHG accounting such as nitrous oxide emissions, in that soils produce nitrous oxide emissions naturally, but we only include in a farm's carbon footprint the 'extra' emissions which come as a result of management.

Methodologies to explore the impact of farm management practices on the carbon stock change of peatland are being explored, although it

should be noted that this is a double-edged sword; often, farming of peatland reduces or reverses the sequestration process vs. natural peat, which would have to be accounted into farm carbon footprints.

Renewable Energy

Introduction

The current energy crisis, price cap rises, fluctuating energy prices, government incentives and a growing awareness of the impact of climate change have prompted many farmers to consider generating renewable energy, as well as assessing where energy efficiency savings can be made. Since closing of incentive schemes, such as the Feed in Tariff (FiT) and Renewable Heat Incentive (RHI), which historically were the main motivation for small and medium scale renewable developments, the goal now is to make the best use and get the most value out of renewable generation. Energy savings are now the driving factor for many farm scale renewable projects. This section introduces the renewable energy technologies that are most relevant to the rural sector: wind, hydro, anaerobic digestion, biomass heating, ground source heat pumps, biodiesel and energy crops. Landowners pursuing renewable energy projects are advised to seek independent advice to verify likely energy yields, costs and technical and economic viability, rather than rely solely on information supplied by equipment manufacturers. Consideration of local planning policy and environmental impact, alongside suitable engineering, construction and design scrutiny should be undertaken for any renewable development.

Energy efficiency

Before considering installing any renewable energy generation technologies it makes sense to review what opportunities there may be to improve energy efficiency. Undertaking an energy audit helps to identify energy uses and highlight potential opportunities to reduce energy bills as well as to improve your business's carbon footprint (see page 329 for more detail on carbon foot printing). The first step in reducing energy use is to measure current usage levels to set a baseline. This can be measured by taking meter readings or by using figures from business trading accounts. Using more regular physical and financial records will provide greater detail and understanding of energy uses. Comparing the level of energy used in subsequent years against the baseline figure will then give an idea of trends in energy consumption. Sources of energy inefficiency can then be identified and addressed, both in terms of technical solutions and management changes.

Increasing power efficiency, managing voltage and making the best use of your existing grid connection are all important steps to consider before investing in renewables. Getting these things right and optimising your existing systems can help save you money and make sure you are investing in the right scale and type of renewable technology or storage options available.

Benchmarking energy use against other similar farms can also highlight where improvements can be made. There can be differences in energy use of 30% or more with comparable businesses. The greatest savings in energy use will come from changes to farming systems and practices,

therefore agricultural knowledge is vital to be able to exploit these potential savings.

Renewables options appraisal

Each renewable energy technology has different characteristics, which will influence whether or not it is suited for use on a particular farm. It is vital to carefully consider what your objectives are and what you want from a renewable energy installation at an early stage. The following factors are important to consider before deciding which renewable energy technology option(s) you wish to investigate:

- What is the scale and pattern of your energy demand?
- What energy resources do you have available on your farm?
- How much capital do you have access to for investment?
- What level of risk are you willing to take?

For general information on energy efficiency and renewables, see:

- Farming for a Better Climate (www.farmingforabetterclimate.org/)
- Energy Savings Trust (www.energysavingtrust.org.uk)
- Carbon Trust (www.carbontrust.com)
- Scottish Renewables (www.scottishrenewables.com)
- Renewable Energy Association (www.r-e-a.net)
- Business Energy Scotland (https://businessenergyscotland.org/)

Grants, incentives and income options

Incentive schemes for renewable energy projects were the main driver for development during the early days of the technology. The FIT scheme was one of the main incentives for farmers looking to install renewable energy technologies, but it is no longer available. As renewable technologies advanced, the lower cost of the technology and the savings from offsetting energy bills and other payment options can make appropriately designed small and medium scale renewable projects an economically viable option without incentive payments and government subsidies. Impartial advice is recommended to help explore all the various options available when considering renewable developments.

As the technology has developed, less funding support has been required. Banks and financial companies continue to offer support and favourable loans and funding options for a range of renewable developments and for any developer it is worth exploring these options.

Using renewables to offset your own energy demand and therefore reduce your energy bills is still the best option, especially at the moment with energy price hikes and a fluctuating energy market. If you have a high onsite demand that matches well with renewable generation, then it is worth considering your options to offset these high energy bills.

Power purchase agreements (PPA) and export price tariffs are now higher in some cases than some FiT payments were (Spring 2022).

However, there can be conditions such as minimum capacity requirements, and the payments can vary widely, therefore, it is beneficial to shop around to find the best offer.

The Smart Export Guarantee (SEG) enables generators to be paid for electricity exported to the grid. SEG is an obligation set by the government for licensed electricity suppliers to offer a tariff and make payment to small-scale low-carbon generators for electricity exported to the National Grid, if they can meet certain criteria. The SEG rate is determined by the various licensees.

There has been a mix of different support mechanisms over the years for different types and scale of renewable generation, including the Renewable Heat Incentive (RHI), Renewable Obligation Certificates (ROCs), and Contracts for Difference (CfDs). More information on all government schemes can be found at: www.ofgem.gov.uk/environmental-and-social-schemes

Support for biofuels is provided by the Renewable Transport Fuels Obligation (RTFO). The RTFO came into effect on 15 April 2008 and aims to increase the use of renewable fuels in the UK and cut the reliance on imported diesel.

A consultation titled; *Amending the Renewable Transport Fuels Obligation (RTFO) to increase carbon savings on land, air and at sea* was undertaken in 2021. It proposes:

- increasing the main RTFO target to supply renewable fuels from 9.6% to 14.6% by 2032;
- expanding RTFO support to new transport modes such as renewable hydrogen in rail and maritime;
- implementing updated sustainability criteria.

For further information on the RTFO please see:
www.gov.uk/guidance/renewable-transport-fuels-obligation

Batteries and storage

There is ever increasing interest and demand to couple renewable energy projects with battery technology or some other form of storage. This can have the advantage of making better use of your renewable technology, increasing yields and reducing the intermittency issues faced by renewable generation. The advancement of electric vehicles and increasing demand for grid balancing services provide additional opportunities in this area.

Storage technologies that can be appropriately deployed at a farm scale include batteries, heat storage and hydrogen production. The market is continuing to grow, bringing a wider range of options available to farmers. A range of revenue streams can be accessed by storage operators including reduced energy import costs, the ability to trade electricity at

more attractive price points and receipt of payments for providing grid balancing services.

It is recommended anyone considering these options explores the full range of storage technologies available and gets independent advice from a reputable source. Careful financial analysis and system design is needed, alongside an assessment of onsite demands and export opportunities to ensure storage options are viable.

Wind Power

On-farm wind power has two main scales of operation to consider, with commercial wind farm sites having a focus on exporting power to the grid, while small to medium scale generation is more concerned with offsetting purchased power within the farm business. Even if the power generated is primarily being used on the farm, demand may not always be constant, therefore it is likely that a proportion of the power produced will have to be sold to the grid at certain times.

For landowners with suitable sites for large-scale wind developments there are several development options available:

- Allow a developer to install the turbine(s) in exchange for an annual payment;
- Install the turbine(s) independently either by self-funding or using bank finance, or any combination of the two;
- Joint venture scheme with developer or neighbour;
- Community project with local buy-in.

Wind turbines

Wind turbines are best located in exposed areas with open fetch especially in the direction of the prevailing wind, away from residencies, though situated as close as possible to a grid connection and with good road access. Farmland is often ideal because the total footprint of a turbine development is relatively small and does not lead to a significant loss of agricultural land.

Larger wind turbines take advantage of the higher wind speeds that exist at greater altitude and so are more efficient and economic, however, they also require a larger capital investment.

When comparing the potential benefits of wind power, it is important to be able to compare like with like, therefore, an understanding of the following terms is key:

Rated power - The maximum power that can be produced when the turbine is operating within its safety limits. It is quoted in kW, which is a measure of the energy produced per second.

Theoretical power production - Rated power x number of hours of production per day x number of days operation per year: 500 kW x 24 hrs

x 365 days = 4,380,000 kWh.

Capacity factor - Wind is not always blowing at a speed sufficient to spin the turbine and generate power, therefore, the capacity factor refers to the percentage of the total available time that the turbine is actually generating power, e.g. 30%.

Actual power production per year - Theoretical power x capacity factor: 4,380,000 kWh x 30% = 1,314,000 kWh.

The actual power produced will depend on the average wind speed in the area and other factors such as the height of the turbine, diameter of the rotor and the proximity of any feature that shelters the turbine or creates turbulence such as buildings, trees, walls, and the like.

Hydro Power

Small-scale run-of-river hydro schemes can be a viable source of renewable electricity on a suitable site.

The key factors that determine the power produced by a hydro scheme are:

Head - The vertical distance through which the water will fall.

Flow Rate - The quantity of water that will be available for power production.

Developers of hydropower schemes require a water use licence from Scottish Environment Protection Agency (SEPA) who will seek to ensure a balance between the benefits to renewable energy generation and the adverse impacts on the water environment. Schemes where the fall in the river between the intake and discharge points has a gradient of 1 in 10 or steeper will be more likely to obtain a water use licence.

Civil engineering costs vary greatly from site to site. Development costs for very small schemes are much higher per kW capacity than larger schemes. Small sites where the available head is 3 m or less are unlikely to provide a reasonable return on investment unless existing infrastructure can be utilised to reduce capital cost. Higher head schemes need lower flows and hence smaller and cheaper equipment to generate the same power as low head schemes.

The flow rate will vary during the year, however, for a scheme to be viable there must be sufficient flow to keep the system operating at near its rated power for a large proportion of the time. Some flow must be left in the stream for environmental sustainability and consideration of the needs of migrating fish is important.

An indication of the power production of a scheme can be obtained from the following equation:

Power produced (kW) = 7 x Flow rate (m^3/s) x Head (m)

A capacity factor of 50% can be expected where a scheme is sized on the mean flow of the river, therefore a 10 kW scheme may have an annual output of approximately 43,800 kWh, which is sufficient for about 10 houses.

Further information can be obtained from British Hydropower Association (www.british-hydro.org).

Solar Photovoltaics

The sun's energy has always been used by farmers for growing and drying crops. With electricity prices on the increase, farmers can now look to harness the power of the sun in a rather different way. Solar photovoltaic (PV) panels, which produce electricity from sunlight, have become an increasingly common sight on farms in recent years. Despite the comparatively low solar insolation levels in Scotland when compared to the south of England, solar PV can still be a viable option north of the border.

PV panels can be either roof or ground-mounted. Roof mounted arrays are more efficient in terms of land use because they make use of an existing area of space that is not currently adding value to a farm business. Farms also commonly have large areas of roof available in the form of barns and sheds, although it is important to check that roofs are strong enough to support a system if retrofitting to an existing structure. Another issue is that roofs do not always face in the optimum direction (south) or at the optimum angle (usually around 30-40 degrees) and may be shaded by other structures, and in these cases ground-mounted arrays can be an alternative option.

Ground mounting allows for the ideal positioning of panels, which maximises the efficiency of a scheme. However, it can also mean that land use is diverted away from food production and into energy production and there can be additional planning considerations. Land around the panels can still be used for small-scale livestock. The panels are mounted on a framework at a height that allows animals to graze and forage beneath them without damaging or compromising the operation of the system. Advice on the impacts of installing ground mounted solar panels on area based agricultural subsidy payments should be taken.

The capital costs of panels have fallen meaning that solar PV can be a viable investment in the right location and under the right conditions.

Biomass Heating

Biomass boilers are a well proven, efficient and reliable technology that has been developed over many years in countries such as Austria and Germany. These boilers are generally technologically advanced and

highly efficient. More basic boilers are available which are less efficient and have very little automation, and consequently come at a significantly lower capital cost.

There are four main types of biomass boiler: woodchip boilers, pellet boilers, log boilers and straw boilers. All four options have pros and cons and care must be taken to ensure the right type of system is selected to match user requirements, including factors such as the degree of automation required, the scale and patterns of heat demand, capital cost and local fuel availability.

A few key facts about different woodfuel options include:

- Woodchip and pellet boilers can be fully automated.
- Log and straw boilers can be an economic option where farms have their own log or straw supply. However, they must be loaded manually, generally on a daily basis as a minimum.
- Woodchip is a lower cost fuel when compared to pellets, but is bulky and can be difficult to handle.
- Wood pellets are clean, easier to handle, require less space to store and have a higher energy output. They are more expensive than chip and cannot be produced on-farm. However, the capital cost of a pellet boiler is lower than a chip boiler.
- Woodchip boilers and their fuel supply systems have higher capital costs, and for technical reasons they are generally not suited to smaller, domestic applications (e.g. below 50kW).

Costs for biomass boilers are highly variable depending on the individual system requirements. There may also be significant costs associated with installations such as constructing a fuel store, or purchasing specialist vehicles to use for handling or loading fuel, etc.

In most small-scale situations, it is not practical to produce electrical power from biomass, because such systems are complex and expensive. For this reason generating power is only worth considering when there is a large demand for both heat and power.

Farm Scale Biodiesel

Biodiesel can be made from a wide range of vegetable oils and animal fats (tallow). High quality straight vegetable oil (SVO) can also be used as a fuel at higher inclusion rates in certain engines. The use of biodiesel and SVO above 5% inclusion could impact on engine manufacturer's warranties.

On-farm biodiesel production from rapeseed involves two stages; cleaning and crushing the seed to extract oil and esterification of the oil by mixing with methanol in the presence of a catalyst to remove glycerol. Although chemically this is a simple process there is a need for careful quality control to achieve the required standards. Handling methanol and

the catalyst (usually potassium hydroxide) on the farm is hazardous and requires attention to health and safety and insurance. To produce SVO is the same as for biodiesel without the esterification reaction step. Rapeseed meal is an important co-product of the crushing process and a useful protein supplement for animal feed.

Growers should calculate an 'on the road' price considering the costs of feedstock, capital and operating costs, allowing for income from production of rapeseed meal, and adding the full fuel duty and VAT. Small-scale producers may benefit from a 2,500-litre tax free personal allowance. Production costs for SVO are considerably lower.

Renewable Transport Fuel Obligation (RTFO) Certificates offer the potential for increased returns however it may prove difficult for smaller operators to access this income. Biodiesel from waste materials such as tallow receive double RTFC's. Data on carbon and sustainability performance must be independently verified before RTFCs are awarded.

Anaerobic Digestion

Anaerobic digestion (AD) uses bacteria to convert organic matter into methane and carbon dioxide (referred to as "biogas"), in the absence of oxygen. The biogas can be used to provide heat, generate electricity or upgraded to biomethane (carbon dioxide is removed) for injection into the gas grid. In addition, AD can provide other benefits; utilising wastes, reducing emissions of methane, cutting odours and enhancing water quality.

Feedstock can be any biodegradable non woody plant, animal matter (manures/slurry), energy crops (grass, rye or maize silage, beet) and food waste. Food wastes are becoming less attractive due to falling gate fees for accepting them, complex licensing and regulation and higher capital costs of the plant for pasteurisation. However, sustainability requirements that 50% of biogas must be derived from wastes or residues has the potential to open up new markets for AD, so long as the waste material is responsibly sourced and suitable for AD. It is important that the mix is kept relatively consistent and that the balance of carbon to nitrogen is suitable for the bacteria. Feedstock can comprise conventional grass silage, however, specialised energy crops are likely to perform better overall in an AD plant, as they are not selected for feed quality, just dry matter yield and nitrogen efficiency.

The high degree of automation and control in a modern biogas plant means that on-farm plant costs are high. For any proposed plant, the cost and availability of feed stock will be the main factors determining viability. If you do not have enough of your own land available to produce sufficient feedstock, securing long term contracts for off-farm feedstocks will be essential. A thorough feasibility study is also recommended to assess the viability of any project being considered.

For larger scale AD plants, whether gas–to-grid or Combined Heat and Power, farmers are mainly involved as feedstock suppliers. The capital costs of gas-injection plants are higher due to the need to "scrub" the gas to meet grid standards (remove carbon dioxide). The location of these plants is also usually dependent on local gas grid capacity. Where feasible, gas to grid AD plants have a clear economic advantage, and this is reflected in the increasing number of new plants following this approach. For farmers supplying feedstock the principles are the same though there may be greater seasonality of pricing in gas to grid plant reflecting payment structures for wholesale gas (higher prices in the winter).

Farmers growing crops for AD feedstock will find that prices vary from plant to plant and will reflect the basis of the sale; standing crop or delivered plant. Prices will also reflect shared costs such as specialist machinery and the value assigned to digestate.

The relative profitability of AD and cereal crops will change from year to year and that is why AD crops are best included as part of range of crops and market outlets. AD plant operators are unique in offering relatively long contracts of 5 to 10 years for feedstock crops. Therefore, the best approach for most farmers is likely to be to include AD crops as part of mixed cropping system. This will deliver some security of income from long term AD contracts alongside flexibility to benefit from any rise in grain prices that may occur.

AD crops may also offer other potential benefits to the farm business including; spreading the workload, providing early entry for oilseed rape and enabling grass to be brought back profitably to all-arable rotations.

Farmers growing AD feedstock must now meet key sustainability standards to receive support. Ofgem require all RHI claimants to demonstrate their feedstocks meet sustainability criteria regarding land use change (rarely relevant in UK) and carbon emissions. For the RHI the carbon intensity of the feedstock must be less than 34.8 g CO_2 equivalent per MJ of energy produced. In crop production the main source of greenhouse gases is inorganic nitrogen fertiliser, so usage needs to be minimised. In AD systems this is partly achieved by the application of digestate back to the crop. With careful planning it is likely that most crops grown for AD will be able to meet these carbon targets. Ofgem provide an online calculator and guidance though it is advised that expert advice is also sought when preparing this information especially for the first time. See www.ofgem.gov.uk for full details.

Crop Costs for Anaerobic Digestion

PHYSICAL DATA

(a) Yield and harvest

Yields are based on crops grown in southern and central Scotland assuming average weather conditions and SRUC's experience from recent trials. Actual yields will vary widely and are much less certain in the north with maize not recommended outwith south west Scotland. Trial results indicate that rye yields are more consistent year to year than beet, reflecting the crop's longer growing period. Harvest of winter hybrid rye is typically around the middle to end of July with maize and energy beet harvests in late October.

(b) Seed

Certified seed has been assumed for all crops and hybrid seed for rye and maize.

(c) Fertiliser

Full rates of artificial fertiliser have been calculated to match crop offtake. Where digestate from an Anaerobic Digestion (AD) plant is applied fertiliser rates should be adjusted accordingly. In practice digestate use is likely to reduce but not entirely replace the requirement for artificial fertiliser due to mismatches in nutrient availability and timing between crops.

(d) Sprays

Full rates based on current best practice have been assumed.

(e) Contract

These include the cost of specialist contractors for harvesting and transporting the roots or silage produced to a nearby (within 3 miles) AD plant. Transport costs should be adjusted accordingly to the distances involved.

(f) Output prices

The price in the market for AD feedstock will be determined by local feedstock supply and demand issues and the conditions of the contract. The contract price will reflect the basis of the sale; standing crop, ex-farm or delivered to plant. It will also reflect the method agreed to share other costs such as specialist machinery and the value and costs assigned to any digestate applied to the land (see previous pages).

Crop Costs for Anaerobic Digestion

COST OF PRODUCTION DATA - LOCAL DELIVERED BASIS

	Energy beet	Hybrid rye	Grass silage	Maize
Yield: fresh (t/ha)	67.5	42.0	36.0	38.0
Dry matter (%)	22%	34%	29%	30%
Yield : dry matter (t/ha)	14.85	14.28	10.44	11.40
Methane yield (m^3/fresh t)	99	108	95	106
Energy (MWhr TH/fresh t)	1.2	1.3	1.1	1.3
Energy (MWhr TH/ha)	79.7	54.1	40.9	48.0
		£/ha		
COSTS				
Seeds	194	154	22	184
Fertiliser	525	716	851	623
Sprays	168	44	13	80
Contract cultivation	352	294	71	314
Contract harvesting	388	176	459	170
TOTAL COSTS (£/ha)	1,626	1,384	1,416	1,372
TOTAL COSTS (£/t)	24	33	39	36
TOTAL COSTS (£/MWhr TH)	20	26	35	29

Note: Contract costs include fuel. The above cost of production data exclude charges such as land rental, interest, management time and any margin requirements which will be important to include when considering any contract price agreement.

Biomass Crops for Energy

Willow short rotation coppice

Willow is a perennial biomass crop grown principally for energy production on a 15 to 20 year rotation with harvesting every 3 to 4 years once established. Returns from the crop are highly dependent on yield and woodchip price. The main market for the woodchip is on contract to power generators and large-scale thermal plants. The woodchip is not suitable for small-scale biomass heating schemes without significant grading and drying costs due to the high bark and moisture content and oversized chips. Given the limited markets, high costs of establishment, variable growth rates and lack of planting grants the crop is largely uneconomic.

Short rotation forestry

This is a variation on conventional forestry based on early harvesting of fast-growing species through coppicing and regrowth. In general, the most economic age to harvest conventional timber species is at maturity so the case for shorter rotations in most species remains unproven. A number of tree species capable of coppicing can be used for short rotation forestry (SRF), e.g. Alder, Notofagus, Poplar, Eucalyptus and Sycamore. Large- scale trials with several species and sites are currently being carried out by the Forestry Commission. As with conventional forestry, a wide range of sites will be suitable for cultivation of these species, including sites which have a lower nutrient status and a poorer land classification.

Trees are grown to butt size 15-20 cm for harvest at 8-20 years. Current advice is to plant at 2m square and apply broad spectrum herbicide to control weeds during establishment. Nitrogen application in the first year should be avoided as there is no benefit to growth. SRF has not been examined on a sufficiently extensive scale or period to derive crop data as yet. Yields will vary from site to site, with average annual increments estimated at between 4 to 9 m^3/ha/yr or around 1.5 to 3.2 ODT/yr. Planting grants may be available as part of the forestry grant schemes being offered under Rural Development across the UK. See the Scottish Forestry (https://forestry.gov.scot/) for updates on the energy forestry trials work underway.

Miscanthus

Miscanthus is a perennial energy crop suited to the southern half of the UK with viability dependent on yields, contract prices and proximity to biomass power stations or other market outlets. The crop has also found a higher value outlet as poultry and horse bedding due to its high level of moisture absorbency and low dust levels. The miscanthus chips are also less favoured than woodchips for fuel due to low bulk density and high chlorine content. As a result, growing the crop for bedding is becoming the preferred end use in many areas. The crop uses a C4 photosynthetic pathway, like maize, requiring high light intensities and temperatures.

Yields at suitable sites south of a line from the Severn to the Wash are expected to be 12-15 ODT/ha. Lowground sites north of this may also be feasible but as with maize, yields and viability are likely to be reduced.

The crop is established using rhizomes, typically at 15,000 plants/ha. Like willow coppice, planting requires specialist equipment and relatively costly planting material resulting in high establishment costs. After the first year the crop can be harvested annually and has a useful life of 15-20 years. Weed control is necessary in the establishment year and possibly in the first spring. Nutrient demand is low with typically an application of 40N:40P:40K kg/ha in year one. Most crops are unlikely to require further applications although up to 150 kg/ha N may be applied over the first 2 years in some situations. The need for pest and disease control is low.

Reed canary grass

Reed canary grass is a perennial plant well suited to cultivation in northern and western parts of the UK and commonly grown in Scandinavia for fodder and increasingly for AD. In the UK the plant is widely used as a game cover crop. It grows well under marginal conditions, including upland areas and brownfield sites in northern and western areas. It is a perennial crop established from seed (unlike Miscanthus) leading to considerable cost advantages.

Establishment and cultivation are undertaken with existing farm equipment with the need for some nitrogen fertiliser to achieve maximum yield. Trial yields vary from 5 to 14 ODT/ha with the crop performing better at more northern sites where average yields of over 10 ODT/ha have been achieved. Further work is needed to determine viability, but it has cost saving and land use flexibility advantages compared to other perennial crops and can utilise more marginal land. The crop also has useful flexibility in its end use; in the summer it can be cut for AD production or grazed by cattle; in the winter and spring it can be baled for biomass fuel or animal bedding.

Fuel

Introduction

This section provides information on fuel prices, calorific values, relative costs accounting for efficiency of conversion, costs and regulations for liquid fuel storage.

When comparing different fuels, it is essential to include any losses from conversion to heat as different fuels and technologies differ significantly.

In April, domestic energy bills jumped after the price cap was increased by 54% to £1,971 for the average household. A price rise again in October 2022 is expected to see a further increase of around £800 for a typical household, according to Ofgem. Households, business and agricultural enterprises are all feeling the ramifications from these increased costs. Energy prices are currently very volatile due to multiple factors, therefore this section should be used as a rough guide only and farmers should closely monitor trends and changes in prices throughout the year.

Fuel Prices

The figures provided below are an approximation of the price in spring/summer 2022. These should be used as a guide only and should be supported by actual quotes that take into consideration site specific information. In most cases fuel prices change daily and the price will depend on many factors including the volume purchased, location, length of contract and supply profile. Fuel prices this year continue to fluctuate due to numerous political and economic factors including sanctions against Russia and COVID-19 impacts, causing high demand for natural gas and therefore high prices.

Energy prices can vary widely across the country, however everyone is experiencing increased fuel bills. These high prices have led to an increase in the amount of fuel poverty in Scotland (defined as any household spending more than 10% of their income on energy). Help with energy bills and advice can be found at: https://www.mygov.scot/help-energy-bills

All prices are exclusive of climate change levy (CCL), where applicable, and VAT.

Electricity

Electricity prices are incredibly high at present, with future increases likely. It is hard to predict but Ofgem expect typical bills to increase by another 42% from 1st October 2022 with some analysts predicting it could be as high as 65%. If you are currently on a fixed rate deal, expect this to increase substantially at the end of your current contract. Electricity prices will vary depending on what part of the country you are in and your type of supply. Given the volatility of energy markets and the current

problems they face, it is prudent to shop around for the best deal and to keep abreast of advice from experts, comparison websites and any future government policy interventions.

Standing charges vary widely. For large supplies they are less relevant, however, for small supplies the standing charge will be a much greater proportion of the annual cost.

Gas

Tariff type (piped gas)	**unit p/kWh**	**daily charge**	**average p/kWh**
Credit (domestic)	17.48	33.78	18.30
Debit (domestic)	15.14	27.93	15.82
Pre-pay (domestic)	7.33	37.28	8.24

As discussed previously, gas prices are substantially higher than in previous years and the energy market is incredibly volatile. These figures should be used as a rough guide only. We recommend you shop around for the best deal and keep up to date with the latest advice and any potential future developments. Estimates on business tariffs are difficult to find, therefore suppliers should be contacted directly for current rates.

Propane

	Price
Propane (bulk, not in a long term contract)	74.20 p/litre
Propane (47 kg cylinders)	£87.06 per cylinder
Butane (12 kg cylinders)	£44.21 per cylinder

Diesel oil

	p/litre
Gas oil (red diesel), 35 sec, tractor	115.64
Kerosene, 28 sec, Aga Cookers, etc	120.89
Derv (white diesel)	196.96

Coal

	£/t
House coal (100 x 10kg bags)	501.40

Biomass Fuels

	Price
Firewood - seasoned hardwood logs (delivered)	£126.88/m^3
Firewood - seasoned softwood logs (delivered)	£99.25/m^3
Woodchips (G30, 30% moisture)	£190.00/t
Wood pellets (5 t blown, including delivery)	£300.00/t
Wood pellets (100 x 10kg bags, including delivery)	£425.29/t

Straw

	£/t
Large round bales (ex farm)	60.00

Calorific Values of Fuels

These values are only approximate and may vary quite considerably:

Electricity	3.60 MJ/kWh
Gas	3.60 MJ/kWh
Propane/Butane	50.00 MJ/kg; 25.50 MJ/litre
Gas oil	42.50 MJ/kg; 35.70 MJ/litre
Kerosene	43.50 MJ/kg; 36.64 MJ/litre
Coal	31.40 MJ/kg
Firewood (20% moisture content)	14.71 MJ/kg
Woodchips (30% moisture content)	12.50 MJ/kg
Wood pellets	16.85 MJ/kg
Straw (20% moisture content)	13.80 MJ/kg

Note: 1 tonne liquefied propane gas = 1,957 litres (approx.)
1 m^3 of loose seasoned hardwood timber = 0.35 tonnes (approx.)
1 m^3 of loose seasoned softwood timber = 0.25 tonnes (approx.)

Fuel Cost Values

The fuel cost values have been corrected for efficiencies:

	p/MJ	Efficiency (%)	p/MJ	p/kWh
Electricity	9.08	100	9.08	32.69
Gas	4.20	80	5.26	18.92
Propane (bulk)	2.91	80	3.64	13.09
Propane (47 kg)	3.71	80	4.64	16.70
Butane (12 kg)	7.38	80	9.23	33.22
Gas oil	3.24	70	4.63	16.66
Kerosene	3.30	70	4.71	16.97
Coal (open fire)	1.60	25	6.39	22.99
Firewood (efficient log boiler) [1]	2.70	80	3.37	12.14
Firewood (basic log boiler) [2]	2.46	60	4.11	14.79
Woodchips [3]	1.52	80	1.90	6.84
Wood pellets (blown)	1.78	85	2.09	7.54
Wood pellets (bagged)	2.52	85	2.97	10.69
Straw (cereal)	0.43	60	0.72	2.61

[1] burning softwood 20% moisture content
[2] burning hardwood 20% moisture content
[3] 30% moisture content

Fuel Storage

Safe storage for fuel on farms, rural businesses and dwellings should be a high priority. Regulation for the storage of fuel is covered by the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). These regulations are applicable for farms, although there are exclusions. One of the main requirements for new and existing above-ground tanks where there is a storage capacity of 200 litres or more, is the provision of a secondary containment system (bund) of sufficient capacity to contain at least 110% of the largest tank or 25% of the total storage capacity.

For further detail on the regulations, guidance should be sought from your local SEPA office or see:
https://www.sepa.org.uk/regulations/water/pollution-control/oil-storage-in-scotland/ or refer to NetRegs, more detail on page 419.

Fuel storage tanks come in various types, shapes, and sizes. When choosing your fuel tank, siting should be taken into consideration. Guide prices for storage tanks are shown below:

Plastic tanks	**Capacity (litres)**				
	1200	**1500**	**2000**	**2500**	**5000**
Single skin	£569	£615	£653	£914	£1,819
Bunded	£1,509	£1,609	£1,685	£1,865	£2,869
Dispensing (bunded)	-	£1,869	-	£2,089	£3,119
Underground	£3,635 *(1400 litres)*			£4,195 *(2500 litres)*	

All tank prices are ex VAT and do not include delivery and, design and installation charges.

Labour and Machinery

Introduction

The largest component of fixed costs on farm is labour and machinery. This is also the most variable between farms. For this reason, it is essential to fully understand and manage both labour and machinery costs as they can have a large bearing on the financial viability of the farm business. This section details the key elements including standard labour requirements by enterprise, machinery operating data such as rates of work per hour, methods to calculate the cost of owned machinery, detailed contractors' charges for a wide range of farm operations and regulations for on-road use. The final section details essential information on labour costs, regulation and health and safety requirements.

Standard Labour Requirements

Enterprise	**Hours/ annum**	**Enterprise**	**Hours/ annum**
CROPS (per hectare)		***LIVESTOCK (per animal)***	
Cereals	18	Dairy cows	
Oilseeds	16	50 cows	42
Hops	60	100 cows	35
Sugar beet	33	150+ cows	28
Field beans and peas	16	Beef cows	26
Potatoes		Other cattle	12
early	200	Sheep	
main crop	110	ewes and rams (lowland)	5.2
Fodder crops	6	ewes and rams (LFA)	3.7
Miscanthus	16	other sheep (lowland)	2.9
Outdoor vegetables/salad	280	other sheep (LFA)	3.1
Other peas and beans	500	Pigs and poultry	
Vining peas	12	sows	28
Top and soft fruit	425	finishing and rearing pigs	2.3
Hardy nursery stock	1,900	piglets (<20 kg)	0.2
Fruit/vegetables under cover	7,000	broilers	0.09
Flowers/plants under cover	13,000	laying hens	0.36
Mushrooms	7,220	growing pullets	0.24
Fallow	2.9	other poultry	0.10
Grassland	3.1	Goats	12
Silage (made by farm)		Deer	15
1st cut	12	Horses*	40
2nd cut	10		
Rough grazing	1.5		

Note: There are difficulties in standardising labour requirements and these figures represent 'typical' labour requirements under representative

conditions for enterprises of average size and performance. They are not necessarily reflective of economic viability.

If calculating farm labour demand, note that crop coefficients should be reduced proportionately for operations carried out by contractors. Livestock coefficients should be reduced pro rata if an animal is not on farm for a full year.

These figures relate to those published in a report of the UK Farm Classification Document (October 2014) and which recommends that 1900 hours of labour are equivalent to one standard annual labour unit. To reflect smaller field sizes, the standard labour requirements for field enterprises should be increased by 50% for Northern Ireland.

*Detailed figures for horses can be found in the following publication: The Equine Business Guide, ABC, 7th Edition, 2019.

Machinery Operating Data

Rates of work

The following figures are typical rates of work for conditions in northern UK. Actual rates of work can vary widely from these figures depending on the organisation of the system. Methods of calculating rates of work are shown later.

For 'standalone' operations such as ploughing and cultivating, factors such as soil type and conditions, field size and shape, topography, operator experience and size of tractor will affect the overall work rate.

Rates of work for planting, drilling, spraying and fertilising operations will depend on application rates and external field factors such as ease and speed of refilling and location of materials (e.g. water, fertiliser, seed potatoes).

For other operations, which require a system approach, such as grain, silage and potato harvesting, additional factors such as crop yields, labour and transport availability can have a marked effect on work rate.

	Typical rate of work (ha/8 h day)
Ploughing (reversible plough):	
4 furrows	6.9
6 furrows	10.4
Cultivating:	
heavy disc, 3 m, 100 mm deep	13.4
light tine, 3.5 m, 100 mm deep	15.7
harrows, 4.5 m	20.2
combination cultivator (for seedbed preparation), 3 m	13.6

	Typical rate of work (ha/8 h day)	
power harrow, 3 m, 150 mm deep		10.0
roller, 2.4 m, heavy		12.3
roller, 7.3 m, light		46.7
potatoes, bedforming, 1.83 m bed		6.0
potatoes, stone windrowing basic, 2 row (Reekie)		4.5
Fertilising:		
twin disc, 1,000 kg capacity		24.0
lime spreader, 2 machines and 1 loader		32.0
slurry, 6,000 litre size, 0.8 km haul		29.6
Grain drilling: establishment (following ploughing)		
3 m grain only drill		16.2
3 m grain/fertiliser drill		13.0
3 m combination power harrow/grain only drill		12.6
4 m combination power harrow/grain/fertiliser drill		15.0
4 m trailed machine/grain/fertiliser drill		32.5
Grass: seed sowing - drill 3.7 m wide		10.4
Roots: precision sowing, 2 row		2.4
Potatoes: planting, 2 row, cupped design (narrow spacing)		6.0
Potatoes: planting, 6 row, belt design (wide spacing)		15.0
	Application rate	
	200 litres/ha	*100 litres/ha*
Spraying:		
tractor mounted, 850 litre tank, 12 m boom, no bowser	33.6	40.0
tractor mounted, 800 litre tank + 600 litre on front, 18 m boom	52.0	64.0
tractor mounted, 800 litre tank + 600 litre on front, 18 m boom, with bowser	60.8	72.0
sprung LGP vehicle, 800 litres, 12 m boom, with bowser	68.0	87.2
self-propelled, 2,500 litres, 24 m boom, with bowser	144.0	176.0
Grain:		
combine harvesting, drum width 1.05 m, typical cutter bar width 3-3.7 m		14.3
combine harvesting, drum width 1.30 m, typical cutter bar width 6.6 m		26.9
combine harvesting, drum width 1.6 m, typical cutter bar width 7.7 m		31.4
combine harvesting, drum width 1.7 m, typical cutter bar width 9.12-11.97 m		42.8

	Typical rate of work (ha/8 h day)
Potatoes:	
haulm pulverising: 1.8 m, 2 row	6.5
harvesting: two row trailed, elevator discharge	3.5
Turnip harvesting	1.6
Silage making:	
(i) 5 men, 75 kW + precision chop harvester, 3 trailers, buckrake	
800 m haul:	9.0
1,500 m haul:	7.4
(ii) 6 men, 90 kW + precision chop harvester, 3 trailers, buckrake	
800 m haul:	16.0
1,500 m haul:	10.0
(iii) 6 men, self propelled harvester, 4 trailers, buckrake (will usually involve a rake operator at some point to 'group' the smaller mower bouts into a single larger bout)	40.8
(iv) 2 men, forage wagon, buckrake (depending on distance to pit)	15.0-20.0
Grass:	
mowing, disc, 2.4 m width of cut	15.4
mowing, disc, 3.0 m width of cut	19.2
mowing, disc, 9.0 m width of cut	46.1
baling hay, conventional baler	6.4
baling straw, conventional baler	9.6
baling straw, round baler	16.0

Days available for field work

(e.g. ploughing, cultivating, drilling, root harvesting)
Calculated for Bush Estate, Midlothian, altitude 200 m.

Month	Field work days for three soil types and two month probability levels					
	Light soil		Medium soil		Heavy soil	
	50%	75%	50%	75%	50%	75%
January	25	24	22	18	20	12
February	25	23	21	17	19	12
March	25	24	21	18	20	15
April	27	25	22	19	24	17
May	28	26	25	22	26	20
June	28	26	27	24	27	24
July	29	27	28	26	28	26
August	28	26	27	25	27	24
September	27	25	25	23	24	20
October	26	23	23	19	22	17
November	26	22	23	18	23	17
December	26	23	22	18	23	14

Probability levels of 75% (18 years out of 24) and 50% (12 years out of 24) are shown in the table so that different risk levels can be compared. The 75% probability level is recommended for machinery and labour planning.

If machinery and labour are adequate for 18 years out of 24, other facilities such as contractors, overtime and casual labour can be used during the remaining years. Alternatively, the operation can be performed in wetter conditions.

Soils data used for the calculation of these figures are based on three drainage categories:

Light soils	Freely drained sandy loam	e.g. Darvel series
Medium soils	Moderately drained loamy clay	e.g. Macmerry series
Heavy soils	Imperfectly drained clay loam	e.g. Winton series

Workday figures in the table are based on the daily fluctuations of soil moisture content, predicted from daily values of rainfall, sunshine hours and mean air temperature. A day is assumed to be a work day if the soil moisture content at 9 am is below the lower plastic limit and the total rainfall during the same day does not exceed 10 mm.

Meteorological data spanning 24 years has been used.

The following example uses the figures in the previous table to help calculate the work rate of a tractor.

Example: A tractor has to be purchased to plough 120 ha of heavy soil between mid-August and mid-September. What work rate will be required?

From the preceding table, at 75% probability, the number of days available on a heavy soil during the months of August and September are 24 and 20 respectively.

- Therefore, days available second half of August = 24/2 = 12
- Therefore, days available first half of September = 20/2 = 10

22

Assuming an eight-hour working day, the total time available is 176 hr. In order to complete the work within the desired period the tractor should be capable of ploughing at least 0.68 ha/hr (calculated by dividing 120 ha by 176 hr).

Alternatively, if the lower probability of 50% is chosen for the same soil and area the tractor work rate would be calculated as:

- Days available second half of August = 27/2 = 13.5
- Days available first half of September = 24/2 = 12.0

25.5

Assuming an eight-hour working day, the total time available is 204 hr. In order to complete the work within the desired period the tractor should be capable of ploughing at least 0.58 ha/hr (calculated by dividing 120 ha by 204 hr).

Typical field efficiencies

Field efficiency is a measure, as a percentage, of a machine's field capacity after taking into account for failures to utilise the full operating capacity. These failures result from items such as overlapping, turning and other routine time delays associated with the operation. Typical figures, shown in the following table, are expressed as a percentage.

Ploughing	90%	Grain only drilling	75%
Power harrow + grain only drill	60%	Combining	85%

Calculating workrate

$$\text{Workrate (ha/hr)} = \frac{\text{working width (m)} \times \text{forward speed (km/hr)} \times \text{field efficiency (\%)}}{10}$$

For example, a 9.1m combine travelling an average of 6km/hr has a work rate of 4.64 ha/hr as per the calculation below:

$$\text{Workrate (ha/hr)} = \frac{9.1 \text{ (m)} \times 6 \text{ (km/hr)} \times 85 \text{ (\%)}}{10} = 4.64 \text{ ha/hr}$$

Estimating Machinery Costs

Machinery costs on many farms can be a major contributor to high levels of fixed costs. Part of the reason for this is that often farmers do not have a clear idea of what their machinery is costing them. Consequently, to improve machinery management the first step is to establish current machinery costs.

To compare the cost of doing the job in-house against the rates charged by a local contractor, the actual machinery costs must be costed. This is a straightforward task for an operation like combining where one machine is involved. But for more complex operations, such as sowing or silage harvesting, the task is more difficult as only part of the tractor's duties are attributable to the operation. In such cases a wider assessment of the farm's annual machinery usage must also be undertaken.

Example calculation - cost estimate for purchasing and operating a combine harvester

To illustrate the principle behind estimating machinery costs this example has been shown on pages 378-379, showing the purchase of a combine harvester for £275,000 versus using contractors.

This method is based on estimating the annual fixed and operating costs of the machine given expected annual use and machine life. These

estimates can then be used in a partial budget for comparison with alternative policies such as the use of a contractor.

The following three tables provide the supporting information for the steps in the machinery calculation.

Table 1: Depreciation - average annual fall in value

Frequency of renewal (years)	Complex (high depreciation rate) [1]	Established (many moving parts) [2]	Simple (few moving parts) [3]
1	34.0%	26.0%	19.0%
2	24.5%	19.5%	14.5%
3	20.0%	16.5%	12.5%
4	17.5%	14.5%	11.5%
5	15.0%	13.0%	10.5%
6	13.5%	12.0%	9.5%
7	12.0%	11.0%	9.0%
8	11.0%	10.0%	8.5%
9	10.0%	9.5%	8.0%
10	9.5%	8.5%	7.5%

Typical frequency of renewal with heavy use
Typical frequency of renewal average use
Typical frequency of renewal with light use

1 e.g. Potato Harvesters, Pea Viner

2 e.g. Tractors, Combines, Balers, Forage Harvesters

3 e.g. Ploughs, Trailers

Table 2: Fuel consumption

Fuel is a significant cost for farming and rural businesses. Actual fuel consumption will vary depending on variables such as the power and size of machine used, depth of operation, correct calibration, appropriate maintenance of machinery, speed and care of operation. The table below gives an indication of the fuel cost of some farming operations based on red diesel costs of £1.14/l (Aug 2022).

	Fuel consumption *(l/hour)*	Time taken for operation *(hours/ha)*	Diesel usage *(l/ha)*	Diesel cost *(£/ha)*
Subsoiling	18.9	1.11	21.00	23.94
Ploughing (6 furrow)	26.8	1.11	29.75	33.92
Heavy Cultivation	26.8	0.71	19.13	21.80
Light Cultivation	8.6	0.47	4.02	4.58
Power harrow	26.8	1.00	26.78	30.52
Fertiliser spreading	8.6	0.18	1.57	1.79
Grain drilling 3m	18.9	0.53	9.95	11.34

	Fuel consumption *(l/hour)*	Time taken for operation *(hours/ha)*	Diesel usage *(l/ha)*	Diesel cost *(£/ha)*
Rolling 7.3m light	8.6	0.33	2.88	3.28
Potato Planting 2 row	10.8	1.33	14.40	16.42
Mowing 3m	18.4	0.49	9.01	10.27
Baling straw, round bales	26.8	0.50	13.39	15.26
Forage harvesting	61.2	0.40	24.48	27.91
Spraying 24m	10.8	0.18	1.96	2.24
Towing (trailer)	16.2	0.40	6.48	7.39
Combine harvesting 7.7m	37.8	0.31	11.63	13.26
Potato harvesting 2 row	21.6	2.29	49.37	56.28

Table 3: Estimated annual cost of spares and repairs (as a percentage of purchase price at various levels of use)

	Approximate Annual Use (Hours)				
	500	***750***	***1000***	***1500***	***+ each additional 100***
Tractors	5.0%	6.7%	8.0%	10.5%	5.0%

	Approximate Annual Use (Hours)				
	50	***100***	***150***	***200***	***+ each additional 100***
Harvesting machinery					
Combine harvesters, balers, potato harvesters	1.5%	2.5%	3.5%	4.5%	2.0%
Other implements					
Ploughs, cultivators, toothed harrows, hoes	4.5%	8.0%	11.0%	14.0%	6.0%
Rotary cultivators, mowers, pea cutter windrowers	4.0%	7.0%	9.5%	12.0%	5.0%
Disc harrows, fertiliser spreaders, FYM spreaders, combine drills, potato planters (with fertiliser), sprayers, hedge cutters	3.0%	5.5%	7.5%	9.5%	4.0%
Swath turners, tedders, side delivery rakes, unit drills, forage harvesters, semi-automatic potato planters	2.5%	4.5%	6.5%	8.5%	4.0%

	Approximate Annual Use (Hours)				
	50	*100*	*150*	*200*	*+ each additional 100*
Corn drills, milking machines, hydraulic loaders	2.0%	4.0%	5.5%	7.0%	3.0%
Grain driers, grain cleaners, rolls, hammer mills	1.5%	2.0%	2.5%	3.0%	0.5%

Example calculation - Purchase of combine harvester versus using contractors

Cost element	**Value**	**ref**	**Factor**	**Calculation**
Area harvested (ha)	600	*A*	-	-
Work rate (ha/hr)	2.75	*B*	-	-
Annual hours worked (hr)	218	*C*	-	A / B
Machine life (yr)	9	*D*	-	-
Purchase price (£)	275,000	*E*	-	-
F'cast 5yr selling price (£)	33,000	*F*	12%	E*depreciation% *(table 1)*
Average value (£)	154,000	*G*	-	(E+F) / 2
Depreciation (£)	26,889	*H*	-	(E-F) / D
Interest (£)	7,700	*I*	5%	G*interest rate (%)
Insurance (£)	2,310	*J*	£15	G*£ per £1k
Annual fixed costs (£)	36,899	*K*	-	H+I+J
Fuel use (l/ha)	12	*L*	-	*(table 2)*
Fuel cost (£)	8,208	*M*	£1.14	A*L*fuel price (£/l)
Spares and repairs (£)	12,375	*N*	4.5%	E*% *(table 3)*
Labour (£)	2,727	*O*	£12.50	labour (£/hr)*(A/B)
Annual operation costs (£)	23,310	*P*	-	M+N+O
Annual cost (£)	**60,209**	*Q*	-	K+P
Annual cost (£/ha)	**100**	*R*	-	Q / A
Contractor charge (£/ha)	109			(*incl. fuel*)

Based on these assumptions, owning a combine is cheaper (£100/ha) than average contractor's charges (£109/ha) but other factors must be considered:

- If the farmer increases the area harvested the overall cost of the combine increases to reflect higher fuel, repairs and depreciation costs. But this increase is spread over a much larger area and consequently reduces cost per ha.

- Work rate has a major effect on machinery cost. Many factors influence work rate efficiency, some of which are beyond the control of the farmer, while others can be improved upon.
- Contractor's charges are also highly variable depending on the above and other factors such as the level of local competition amongst contractors which can greatly affect charges.

For more information on payment terms involved in purchasing machinery see credit options on pages 499-501.

Machinery Contractors' Charges

Prices are indicative market rates taken from various contractors and machinery rings throughout Scotland with the costs of the driver (generally) included. Fuel is not normally included in contract charges. However, as prices and contractors arrangements (e.g. farm fuel used) vary considerably within areas, the prices listed below only serve as a guide and local information should be sourced for specific operations.

Costs of carrying out specific operations, i.e. arable stubble to stubble and preserved forage are illustrated on pages 46, 74-75 and 88.

	Average price	Price range
Arable cultivation		
Ploughing	£64.84 /ha	£51.89-£75.25
with press	£7.23 /ha	£4.94-£9.88
Discing	£46.55 /ha	£37.07-£61.43
Power harrow	£56.22 /ha	£49.42-£69.23
Min till cultivations	£52.58 /ha	£37.07-£74.40
Cambridge roller	£15.35 /ha	£11.12-£25.57
with paddles	£9.88 /ha	£9.88
Subsoiling	£66.82 /ha	£54.36-£80.31
Topping - fallow	£31.26 /ha	£22.24-£38.18
Rotovating	£65.02 /ha	£54.36-£72.75
Grassland maintenance		
Heavy flat roller	£30.67 /ha	£22.24-£37.07
Topping - grass	£35.97 /ha	£24.71-£46.13
Chain harrowing	£25.85 /ha	£8.65-£35.83
Spring tine harrowing	£33.23 /ha	£27-18 - £40.40
Aeration	£30.89 /ha	£30.89
Sward lifting	£63.27 /ha	£50.83-£80.31
Sowing		
Grass seed - broadcast	£33.47/ha	£32.35-£34.59
Grass seed - with harrows	£37.60 /ha	£22.24-£47.86
Grass seed - direct drilling	£56.10 /ha	£49.42-£63.80
Grain (no fert.)	£44.22 /ha	£37.07-£51.37

	Average price	Price range
Oilseed rape (no fert.)	£59.96 /ha	£54.36-£66.89
Turnips	£71.66 /ha	£44.48-£98.84
Beet	£75.12 /ha	£61.28-£88.96
One pass cultivation/drill (cereals, no fert.)	£65.01 /ha	£51.89-£78.40
One pass cultivation/drill (OSR, no fert.)	£64.76 /ha	£54.36-£80.63
with fertiliser	£6.18 /ha	£4.94-£7.41
Maize (without plastic)	£72.85 /ha	£56.73-£88.96
Maize (with plastic)	£150.73 /ha	-
Fertiliser spreading		
Spinner	£11.64 /ha	£9.88-£15.05
with variable rate	£4.24 /ha	£3.09-£6.45
Liquid fertiliser (surface)	£14.65 /ha	£14.48-£14.83
Irrigating (/25mm)	£172.97 /ha	£123.55-£222.39
Manure and lime		
Rotary - medium	£39.75 /hr	£30.00-£49.50
Rear discharge - medium	£41.50 /hr	£36.00-£46.00
Rear discharge - large	£53.02 /hr	£44.00-£67.05
Slurry - medium	£37.83 /hr	£36.00-£40.00
Slurry - large	£50.02 /hr	£41.50-£66.55
Lime	£6.15 /t	£4.00-£7.58
with gps	£2.50 /t	-
Umbilical - Dribble Bar	£89.50 /hr	£89.00-£90.00
with additional pumps	£47.55 /hr	£31.10-£64.00
Spraying		
Spraying	£13.65 /ha	£11.12-£16.31
with gps	£3.71 /ha	-
Slug pellet application	£8.33 /ha	£7.41-£9.88
Weed wiping	£45.00/hr	£35.00-£55.00
Combinable harvesting		
Cereals	£95.63 /ha	£84.04-£110.70
with yield mapping	£4.94 /ha	-
with chopper	£11.92 /ha	£6.35-£22.96
Oilseed rape - direct	£94.48 /ha	£84.01-£110.70
Oilseed rape swathing	£51.24/ha	£44.48-£57.99
Peas and beans	£109.09 /ha	-
Crimping/bruising grain/pulses	£12.84 /t	£8.60-£18.00
Straw chopping	£41.18 /ha	£34.59-£44.48
Forage		
Mower	£27.40 /ha	£24.71-£30.29
Mower and conditioner	£34.17 /ha	£27.18-£8.30

	Average price	Price range
Tedding/raking	£18.18 /ha	£11.12-£22.07
Precision chop - self-propelled	£68.51 /ha	£54.36-£80.31
Cutting, raking, chopping and carting	£170.31/ha	£160.62-£189.70
Forage box	£125.60 /hr	£120.00-£131.21
Forage harvester (whole crop)	£108.58 /ha	£88.96-£125.45
with processor	£13.59 /ha	-
Maize (including forager, 3 trailers and buckrake)	£171.50 /ha	£160.00-£179.54
Baling and wrapping		
Silage/hay - 4x4	£3.00 /bale	£2.60-£3.84
with chopper	£0.40 /bale	£0.30-£0.50
Silage – 5x4x2.3	£4.00 /bale	£3.70-£4.30
Hay - small square	£0.60 /bale	£0.50-£0.78
Straw - 4x4	£2.77 /bale	£2.30-£3.35
Straw - 4x5	£3.24 /bale	£2.65-£4.69
Straw - 8x4x2.3	£4.86 /bale	£4.30-£5.84
Straw - 8x4x4	£7.39 /bale	£7.00-£8.06
Straw - small square	£0.62 /bale	£0.43-£0.80
Wrapping - round	£2.08 /bale	£1.30-£2.66
incl. wrap (4 layers)	£4.74/bale	£4.30-£5.71
incl. wrap (6 layers)	£5.91/bale	£5.30-£6.72
Wrapping - square	£3.49 /bale	-
incl. wrap (4 layers)	£5.76/bale	£4.90-£6.62
Wrapping - tube-line, silage	£2.82 /bale	£2.80-£2.85
Wrapping - tube-line, straw	£2.72 /bale	£2.55-£2.80
Stacking	£0.49 /bale	£0.35-£0.60
Ag bagging	£6.75 /t	-
Baling and wrapping incl. wrap (4 layers)	£7.81/bale	£5.80-£9.35
Root and potato work		
Deep plough	£74.40 /ha	£67.95-£81.12
Deep ridge	£64.55 /ha	£49.42-£85.25
Bed tilling	£143.73 /ha	£103.78-£222.39
Destoning	£255.03 /ha	£234.75-£85.01
Bed forming	£74.13 /ha	£34.59-£113.67
Potato planting - without fertiliser	£126.02 /ha	£81.54-£197.68
Potato planting - with fertiliser	£136.73 /ha	£88.96-£210.04
Potato pulverising	£59.30 /ha	£39.54-£76.60
Potato harvesting - excl. pickers	£528.18 /ha	£395.36-£694.99
Turnip harvesting	£41.00 /hr	-
Tractor hire - including driver		
4 WD up to 100 hp	£31.25 /hr	£30.00-£32.50
4 WD 101 - 150 hp	£37.47 /hr	£32.00-£47.36
4 WD 151 - 220 hp	£41.03 /hr	£34.00-£50.13

	Average price	Price range
4 WD 220 - 300 hp	£48.20 /hr	£36.00-£64.60
4 WD over 300 hp	£58.95 /hr	£38.00-£79.89
Tracked	£60.00 /hr	-
with loader	£4.00 /hr	-
with trailer	£7.28 /hr	-
4 WD telehandler	£35.38 /hr	£30.00-£43.52
JCB type excavator	£34.50 /hr	£32.00-£37.50
Tracked excavator 15-25t	£38.85 /hr	£32.00-£43.89
with rock pecker	£14.00 /hr	£13.00-£15.00
Skidsteer	£77.50 /day	£60.00-£100.00
Tractor with post chapper (+ man)	£41.05 /hr	£32.50-£52.77
Labour		
Casual	£13.33 /hr	£12.00-£14.00
Experienced/skilled [1] (weekdays)	£14.17 /hr	£12.50-£15.00
Cereal/potato roguing	£16.50 /hr	£15.00-£18.00
Secretarial	£18.25 /hr	£16.50-£20.00
Miscellaneous		
Strimming	£19.00 /hr	£18.00-£20.00
Hedge cutter	£44.42 /hr	£36.00-£52.67
Log splitter	£33.00 /hr	£31.00-£35.00
Snow plough	£52.44 /hr	£35.00-£67.26
Road brush	£33.50 /hr	£30.00-£37.00
Haulage - forage (hay and straw) [2]	£20.00 /t	£10.00-£35.00
Haulage - concentrates [2]	£20.00 /t	£10.00-£40.00

[1] includes skilled relief milkers, stockmen, shepherds, sprayer operators and forklift/digger/HGV drivers.

[2] for small flocks/herds a minimum fee of £100-150.

[3] haulage charges are highly dependent on distance travelled, weight of load and options for a back load.

Grain Drying

All costs for drying include a price for handling and loading.

Grain

Reduction to 15% moisture content from:

16%	17%	18%	19%	20%	21%	22%	23%
£9.00/t	£10.00/t	£11.00/t	£13.50/t	£15.00/t	£16.50/t	£18.00/t	£16.50/t

Contractor's weight loss (including drying and cleaning):

From	16%	17%	18%	19%	20%	21%	22%	23%
Weight loss	4%	6.3%	7.2%	8.2%	9.2%	10.2%	11%	13%

See page 47 for equivalent grain weights at varying moisture contents.

Oilseed rape

Reduction to 8% moisture content from:

10%	11%	12%	14%	16%	18%	20%	22%
£13.00/t	£14.00/t	£15.00/t	£17.00t	£20.00t	£22.00t	£24.00/t	£26.00/t

Contractor's weight loss (including drying and cleaning):

From	10.5%	11.5%	12.5%	14.5%	16.5%	18.5%	20.5%	22.5%
Weight loss	3%	4.5%	6%	9%	12%	15%	18%	21%

Drainage

Drainage costs and work rates will vary considerably depending on specific site circumstances (current drainage system and terrain) and requirements. All drainage work should be fully discussed, inspected, designed and quoted (materials and labour split) prior to work commencing to prevent discrepancies at a later date.

Draining

Operation	*Price*
3t mini-digger + man + diesel	£25.00-£30.00/hr
7 ½ ton JCB + man + diesel	£32.00-£37.00/hr
15 ton tracked digger + man + diesel	£32.00-£45.00/hr
Typical work rate (32" depth)	20 - 40m/hr
Trencher (+ man + diesel + handling gravel + pipe)	£2.75-£10.50/m
Typical work rate	150 - 200m/hr
Trenchless (+ man + diesel + handling gravel + pipe)	£2.50-£9.75/m
Typical work rate	150 - 200m/hr
Tractor + gravel cart (incl. man + diesel)	£30.00-45.00/hr or £1.75-£2.75/ton handling charge

Approximate draining costs on an area basis are shown below:

Lateral spacing	*Method*	*Materials*	*Price £/ha*
7m	Digger	no gravel	6,406
15m	Digger	purchased gravel	6,466
15m	Digger	own gravel	4,036
15m	Digger	twinwall plastic pipe & own gravel	6,063
15m	Trenchless	purchased gravel	4,227
20m	Digger	purchased gravel	4,849
20m	Trenchless	purchased gravel	3,208

Materials

Material		*Price*
Gravel		£20.00-£26.00/ton
Corrugated plastic pipe	60mm (150m coil)	£116.00(or £0.77/m)
	80mm (100m coil)	£110.00(or £1.10/m)
	100mm (100m coil)	£150.00(or £1.48/m)
	160mm (35m coil)	£156.00(or £3.12/m)
Twinwall plastic pipe	100mm	£14.82 (or £1.60/m)
(6m lengths incl. coupling)	150mm	£26.86 (or £3.26/m)
	225mm	£61.60 (or £6.93/m)

Pipe requirements

Lateral spacing	*m/ha*	*m/acre*
7m	1,430	575
15m	670	270
20m	500	200

Gravel requirements (tonnes per 1 metre run)

Width of trench	*Depth of gravel (mm)*				
	250	*300*	*450*	*600*	*900*
100mm	0.05	0.06	0.09	0.12	0.18
125mm	0.06	0.08	0.11	0.15	0.23
150mm	0.08	0.09	0.14	0.18	0.27
225mm	0.11	0.14	0.20	0.27	0.41
300mm	0.15	0.18	0.27	0.36	0.54
450mm	0.23	0.27	0.41	0.54	0.81
600mm	0.30	0.36	0.54	0.72	1.08
750mm	0.38	0.45	0.68	0.90	1.35

Secondary drainage treatments

Operation	*£/hr*	*£/acre*
Subsoiling	65.00-115.00	54.00-80.00
Moling	65.00-115.00	50.00-100.00
Flat lifter	75.00-120.00	50.00-70.00
Aerator	23.00-84.00	25.00-35.00

Drain jetting

	Price
Drain jetter with tractor	£40.00-£60.00/hr
Drain jetter with tractor (incl. digger + tractor + bowser)	£700-£800/day

Ditch cleaning

	Price
Ditch cleaning (20-125m/hr)	£1.75 - £2.25/m or £38.00-£48.00/hr

Fencing

The costs in the following table will vary considerably depending on fence purpose, fence length, site difficulty (such as access, ground conditions, presence of rock, and number of turns) and, type and quality of materials.

Net fences	**£/m**
Mild steel netting, 2 mild steel plain wires, 1 mild steel barb wire assuming stobs every 2m, a strainer at either end, a turning post every 50m and 8 gripples every 200m	5.02
High tensile netting, 3 high tensile plain wires, 1 barb wire assuming stobs every 3m, a strainer at either end, a turning post every 50m and 8 gripples every 200m	4.55
High tensile steel netting, 2 high tensile plain wires, 1 high tensile barb wire assuming steepleless steel posts every 4.5m, a steepleless steel strainer with stay kit at either end, a steepleless steel turning post every 50m and 8 gripples every 200m	6.16

Plain wire fence	**£/m**
8 high tensile plain wire, 1 barb wire assuming stobs every 2m, a strainer at either end and a turning post every 50m	4.47

Scare fence	**£/m**
2 barb wire assuming stobs every 5m, a strainer at either end and a turning post every 50m	2.39

Electric fences (energisers not included)	**£/m**
High tensile netting, 4 high tensile plain wires assuming stobs every 3m, a strainer at either end, a turning post every 50m and 8 gripples every 200m	4.78

Electric fences (energisers not included)	**£/m**
8 high tensile plain wires assuming stobs every 2m, a strainer at either end and a turning post every 50m	4.84
2 high tensile plain wires, assuming stobs every 5m, a strainer at either end and a turning post every 50m	2.53

Deer fence	**£/m**
Deer netting, rabbit netting, 3 mild steel plain wires assuming stobs every 3m, a strainer at either end and a turning post every 50m	8.50

Post and rail fence	£/m
5 rails assuming stobs every 2m, a strainer at either end	12.37

Hedges	£/m
Hedge laying	15.00

There are regional and contractor variances on fence types. It is important to ensure the materials are chosen with purpose in mind, e.g. net fencing for sheep can differ from that suitable for cattle so as to help prevent loss of sheep ear tags. All fencing work should be fully discussed, inspected and quoted (materials and labour split) prior to work commencing to prevent discrepancies at a later date.

Labour costs for fencing will vary between £10.00-16.50/hr. Chapping costs are £25.00-38.00/hr and for strainers, £15/post. Dismantling existing fencing, site preparation and fence disposal are added charges.

Dry Stone Walling

Excluding provision of material	£25-50 /m^2
Stone	£60-100 /t

Regional and contractual variations will apply in terms of the price of dry stone walling, in part depending on ease of access to site, availability of stone and nature and size of the wall. In general terms the price quoted for labour will be based on a metre square rate and will include the building of both sides of the wall, where a free-standing structure is required. Prices will vary for retaining walls. It is good practice to discuss and inspect the work with the dry stone waller beforehand, which will help identify whether additional stone is required. As a rough guideline, 1t of stone will be required for every linear metre of a free-standing wall approximately 1.3m high. Specialist stones, such as throughbands, quoins or copes may need to be sourced separately.

The Dry Stone Walling Association (www.dswa.org.uk) has a list of current professional members available on its website.

Agricultural Vehicles on the Road

Below are some key points that should be adhered to when agricultural vehicles are to be used on the public road. Vehicles must be used for 'agricultural purposes' before it can be licenced as an agricultural vehicle.

Drivers licence **–** Usually a full car licence will include the 'F' category which is the tractor section. For some vehicles (combines etc) category 'B' will also be required. Vehicles fitted with tracks depending on the steering arrangement may require the 'H' category on the drivers licence.

Farm ATV's can be registered as light agricultural vehicles and driven on the road provided they have the full road legal kit.

Drivers ages – After passing the 'tractor' test a 16 year old can drive an agricultural vehicle on the road provided it is mounted on wheels, is no wider than 2.45m and is not pulling a trailer exceeding a single or double axle close coupled design which is also below 2.45 m wide. Once over 17 years old they can then operate most agricultural machines apart from tracked machines which is over 21 years of age. You must sit a separate test, category H, for tracked vehicles. Drivers aged 17-20 will be restricted to a Maximum Authorised Mass (MAM) of no more than 3,500kg. Anyone wishing to tow a trailer behind a car, van or 4x4 and has passed their driving test after the 1st January 1997 is required to sit a separate B + E trailer test.

Speed limits – The majority of agricultural tractors may travel at 25mph. Some tractors are built to higher specifications and are permitted to travel at up to 40mph. The higher speed limit applies to tractors that have (among other requirements) all-wheel suspension, braking efficiency of 50%, pneumatic tyres, a speedometer and a horn. The exact requirements are contained in the Construction and Use Regulations 1986 (as amended). Wider tractors (falling into the special type agricultural vehicle category) have lower speed limits as follows:

- Vehicles 2.55m - 3.5m wide are limited to 20 mph.
- Vehicles 3.5m - 4.3m wide are limited to 12 mph.

For more information, see:
https://www.gov.uk/government/publications/tractors-regulations-on-use/tractors-and-regulatory-requirements-a-brief-guide-september-2017

Trailer brakes – If a vehicle is travelling up to 25mph then hydraulic brakes are sufficient. Over 25mph then progressive brakes should be fitted along with ABS and a failsafe system.

Vehicle weights – Depending on axle spread the maximum authorised mass (MAM) should not exceed 31,000kg (tractor and implements attached). The trailer on its own again depending on axle load limits should not exceed 18,290kg. The additional axle load on the rear axle of the tractor imposed from the trailer should not exceed 3,000kg.

Vehicle widths – Up to 3m wide no notification is required. 3.0m - 3.5m, the police have to be notified, max speed 20mph. 3.5m - 4.3m, notification to police, attendant vehicle and lights fitted in reduced visibility, max speed 12mph. Over 4.3m, notification to secretary of state, attendant vehicle and lights fitted in reduced visibility. In all cases any projections must be marked and lights fitted when required.

Pick up hook rings – Ensure the gap between the top of the hook and the upper part of the hitch does not exceed 10mm gap when locked. The minimum thickness of the trailer ring should be no less than 30mm.

Tyre condition – Up to 20mph the tyres have to be in a safe condition and roadworthy. Over 20mph and there can be no cuts exceeding 25mm in length, have a minimum of 1mm tread depth and no obvious damage or wear and tear.

Lights – All lights when fitted must be visible, working and correctly positioned. Amber beacons are only required on unrestricted dual carriageways unless used as a warning for wide vehicle etc. No rear facing white lights are allowed.

Registration plates – Plates fitted to towing vehicles must match the vehicle and the registered keeper of the vehicle.

Fuel – Red diesel is permitted only if the vehicle is registered as an agricultural vehicle and being used for an agricultural related purpose. The rules changed as at 1st April 2022 and can be found at https://www.gov.uk/guidance/using-rebated-fuels-in-vehicles-and-machines-excise-notice-75-from-1-april-2022.

MOT testing – Most agricultural vehicles will be MOT test exempt but must still meet the construction and use regulations when on the public road.

Labour Legislation and Policy

National hourly wage rates – excluding agricultural workers

The mandatory National Living Wage (NLW) applies to workers aged 23 and above, whilst the National Minimum Wage (NMW) applies to apprentices and those under 23. The following table shows the NLW and the NMW hourly rates for age categories.

	NMW and NLW hourly rates (£/hr)		
Age	**2022**	**2021**	**2020**
23 +	9.50	8.91	8.72
21-22	9.18	8.36	8.20
18-20	8.63	6.56	6.45
16-17	4.81	4.62	4.55
Apprentice *	4.81	4.30	4.15

* Applies if they are under 19 or if older then only when they are in the first year of apprenticeship, thereafter minimum wage or National Living Wage for their age applies.

Some employers are part of a voluntary scheme to pay an enhanced 'Real Living Wage', currently £9.90 per hour, payable from 18 years old.

Minimum hourly wage rates for agriculture

Scotland

The following table summarises the rate of pay figures as set in the Agricultural Wages (Scotland) Order (No.68) with effect from 1 April 2022.

Agricultural minimum hourly wage (£/hr) - Scotland	
Minimum hourly rate of pay for all ages of workers [1]	9.50
Minimum hourly rate of pay for workers who undertake an SCQF Level 4 or 5 or equivalent [2]	5.95
Additional sum for workers with qualifications [3]	1.41
Overtime [4]	From: 14.25
Dogs (£/dog/week - up to a max. of 4 dogs)	7.01

1 Hourly rate applies to workers whether full time, part time, students etc. and no matter what type of work is done.

2 Minimum hourly rate of pay for SCQF or equivalent, payable in first year of apprenticeship after which the minimum hourly rate of pay as set for the year will apply.

3 For workers with a relevant qualification at SCQF6 or above (includes SVQ/NVQ Level 3, NC. HNC. HND), or those with a Certificate of Acquired Experience obtained before 31 December 1997.

4 Based on the minimum hourly rate of pay to which the worker is entitled multiplied by 1.5 - e.g. £9.5 x 1.5 = £14.25.

England

Agricultural workers in England must be paid at least the NMW (see page 388). Where an employment contract dated before 1 October 2013 exists and mentions the Agricultural Wages (England and Wales) Order 2012 the employee still has the right to be paid the agricultural minimum wage for the graded pay rate that they are entitled to. The agricultural minimum hourly wage rate for those above compulsory school age is £6.21 (Grade 1) after which the rates rise to £9.40 (Grade 6) in accordance with a graded scale relating to specific job definitions and qualifications.

Wales

Agricultural workers in Wales are paid according to the Agricultural Wages (Wales) Order 2022, with a variable rate depending on specific job definitions and qualifications. This order came into force on 22 April 2022 and is backdated to 1st April 2021 therefore some employers may need to make back payments to employees. The full scale of hourly rates can be accessed by following the link at the bottom of the section.

Northern Ireland

In Northern Ireland from 1st April 2022 the minimum agricultural hourly pay rate, applicable for the first 40 weeks cumulative employment, is £6.95 (Grade 1) to £11.50 (Grade 6) in accordance with a graded scale relating to specific job definitions and qualifications. Where at any time the NMW or NLW becomes higher than the agricultural hourly rate set out above, then the minimum rate shall be equal to the NMW or the NLW.

Estimated annual labour costs
The following example calculates the estimated annual labour costs to an employer based in Scotland. The earnings of the worker, based on the same assumptions, are also shown.

Assumptions:

- Employee in employment for over 26 weeks
- 39 hr/wk, 5 days/wk, 52 wk/yr less 30 days holidays
- Minimum hourly rate - £9.50
- 10 hr/wk overtime
- Employers National Insurance Contributions (NIC) @ 15.05%
- Employers liability insurance @ 1%
- Overtime rate - £14.25
- £12,570 personal allowance
- Annual minimum wage amount and annual overtime amount below include pay for 6 weeks holiday as if overtime is as regular as weekly then employees should be paid overtime as part of their holiday pay.

Labour cost to employer	**Annual**	**Weekly**	**Hourly**
Minimum wage for employee	£19,266.00	£370.50	£9.50
Employers NIC	£2,899.53	£55.76	£1.43
Employers liability insurance	£192.66	£3.71	£0.10
	£22,358.19	£429.97	£11.02
Overtime	£7,410.00		£14.25
Employers NIC	£1,115.21		£2.14
Employers liability insurance	£74.10		£0.14
	£8,599.31	£165.37	£16.54
Total labour cost incl. overtime	**£30,957.50**	**£595.34**	**£13.38**

Employees earnings	**Annual**	**Weekly**	**Hourly**
Workers earnings (gross)	£26,676.00	£513.00	£11.53
Less tax	£2,809.07	£54.02	£1.21
Workers earnings (after tax)	**£23,866.93**	**£458.98**	**£10.31**

For more information on National Insurance Contributions and Income Tax, see pages 504-506 and 519-520).

Pensions
Employers have a legal obligation to automatically enrol eligible employees into a workplace pension scheme and pay employers contributions. Depending on the circumstances of businesses, your auto-enrolment duties will begin on either the staging date given to you by the Pensions Regulator or the date that you first hire an employee. Those aged between 22 and state pension age and earn at least £10,000/year must be automatically enrolled. Employers are also required to pay minimum contributions for these employees which is 3% of their earnings. If employees are aged between 16 and 74 and earn between £6,240 up

to £10,000/year, they can request to be added to the workplace pension and if they do, employers must pay contributions. However, if workers are aged between 16 and 74 and earn less than £6,240/year then they do need to be enrolled if they ask but employers don't need to make any contributions.

Redundancy
An employee having worked for an employer for 2 years or more will normally be entitled to Statutory Redundancy Pay. The following table lays out the basis of calculating a redundancy pay amount:

Employee Age	No. weeks pay for each full year worked
under 22 years old	0.5
22-41 years old	1.0
over 41 years old	1.5

An upper limit on weekly pay is set at £571 per week for redundancy pays on or after 6 April 2022. The maximum statutory redundancy pay that can be received is £17,130. Different rates apply prior to 6 April 2022.

Length of service is capped at 20 years with service over this period having only the last 20 years of employment taken into account. Only complete years are counted.

There is no upper age limit for an employee receiving redundancy pay.

For example, a 50-year-old having worked for their employer for 25 years earning £650/week is made redundant on 7 April 2022. The employee would be entitled to 24.5 weeks pay (11 years @ 1.0 plus 9 years @ 1.5). This equates to a redundancy pay of £13,989.50.

Higher levels of redundancy pay can be agreed between employees and employers. Redundancy pay less than £30,000 is tax free.

You are not entitled to redundancy pay if your employer offers you suitable alternative work either within the organisation or in an associated company that you refuse without good reason.

Different upper limits on weekly pay apply in Northern Ireland.

Maternity/paternity
Maternity leave arrangements will differ according to specific job arrangements. Statutory leave is 52 weeks with the first 26 weeks as ordinary leave and the last 26 weeks as additional leave. You do not have to take 52 weeks but must take 2 weeks following the birth of the baby. The earliest time to start leave is 11 weeks before the expected birth of the baby.

Maternity pay is paid up to 39 weeks with 90% of average weekly earnings (before tax) for the first 6 weeks and £156.66 or 90% of average weekly earnings (whichever is lower) for the next 33 weeks.

For paternity leave, the entitlement is either one week or two consecutive weeks. This leave must be taken in one go, not odd days. You do not need to give an exact date for when your leave will start but can instead say the day after the birth or one week from the day of birth. Paternity pay is £156.66 or 90% of average weekly earnings (whichever is lower).

It is now possible to have Shared Parental Leave (SPL) and Statutory Shared Parental Pay (ShPP). You can share up to 50 weeks of leave and up to 37 weeks of pay between you.

Labour arrangements
When employing staff the following should be considered at the outset of employment:

- Holidays and holiday pay.
- Sick pay.
- Maternity and paternity arrangements and pay.
- Pension provision.
- Provision of appropriate PPE (personal protective equipment).
- Dog allowance (where necessary).
- Other benefits, e.g., accommodation, vehicles, bonuses, subsistence.
- Dismissal.
- Redundancy.

The options for labour on farm include casual/irregular workers, self-employed contractors, or hiring permanent staff/employees.

Self-employed contractors are generally hired to carry out a specific task, i.e. harvest work, shearing, fencing, rather than being available at all times to carry out general farm work. Contracting rates are summarised on pages 379-382. HMRC are looking carefully at self-employed contractors and considering where they should more properly be considered an **employee**. There can be serious financial consequences for the employer if a contractor is later deemed to be an employee, particularly if the correct tax has not been paid. Factors taken into consideration include the number of different businesses the contractor works for, whether they provide their own equipment, whether they can send someone else in their place, and the extent to which they can refuse work.

More formal arrangements with contractors exist that would see all or most of the physical farm labour being carried out by the contractor. In this case the contractor would also, in most circumstances, provide machinery and additional labour requirement. The farmer/landowner would provide the land, capital and fixed infrastructure. These arrangements include contract farming and share farming. The agreements can be devised to suit each circumstance specifically, but the main theme is that the farmer/landowner retains an active interest in the business both from a management point of view and financially. For more details, see pages 434-439.

Other labour opportunities would involve hiring employees on a full-time or part-time basis and the following aspects should be considered as part of the decision-making process:

- Job requirements.
- Qualifications required/training provision.
- Provision of a house and vehicle.
- Payment terms (see minimum hourly wage rates on page 388-393).
- Employment contracts.
- Performance related employment incentives.
- Legality of a person being hired.
- Employment insurance.
- Health and safety.
- Registration with HM Revenue and Customs (HMRC).

Sources of information
Full and specific details of agricultural wage arrangements and conditions across the UK can be found at the following websites:

- UK Non- Agricultural: https://www.gov.uk/national-minimum-wage-rates
- Scottish Government (Agricultural): https://www.gov.scot/publications/agricultural-wages-scotland-twenty-sixth-edition-guide-workers-employers/
- England (Agricultural): https://www.gov.uk/agricultural-workers-rights
- Wales (Agricultural): https://gov.wales/agricultural-wages-minimum-rates-pay
- Northern Ireland (Agriculture): https://www.daera-ni.gov.uk/articles/awb-agricultural-rates-pay-orders-and-reports

Further information on labour suppliers, training, pensions, redundancy, and other statutory obligations can be found at the following websites:

- Gangmasters Licensing Authority (GLA): http://www.gla.gov.uk/
- LANTRA: http://www.lantra.co.uk/
- Department for Work and Pensions (DWP): www.dwp.gov.uk
- HM Revenue and Customs: https://www.gov.uk/government/organisations/hm-revenue-customs
- Advisory, Conciliation and Arbitration Service (ACAS) : https://www.acas.org.uk/advice

Health and Safety

Health and safety should be regarded as an essential part of farm business management. Along with the construction industry, agriculture has the worst safety record of any sector. The Health and Safety Executive (HSE) is responsible for ensuring compliance with legislation and also provides a source of advice and guidance for businesses (see www.hse.gov.uk).

The Health and Safety at Work Act 1974 and the Management of Health and Safety at Work Regulations (MHSW) 2003 place duties on businesses and individuals to ensure that adequate provision is made for health and safety at work. Employers must ensure, so far as is reasonably practicable, the health, safety and welfare of employees and any others who may be affected by what they do.

Every business should have a health and safety policy. The policy should identify the aims for the employees' health and safety and outline the various responsibilities, systems and communication to ensure that health and safety objectives are fully met. This should be in writing if five or more people are employed. Guidance on this is available from the HSE (www.hse.gov.uk/pubns/indg275.pdf).

The MHSW Regulations place duties on employers and the self-employed to make a suitable and sufficient assessment of the risk to their own health and safety and that of others from the work they do. This includes employees, any casual workers, part-timers, trainees, customers or contractors. It will also include those who may be affected by work activities, e.g. neighbours, sales people and members of the public. The assessment can be conducted by the business itself, or can be contracted out to a specialist. The people carrying out the risk assessments must be competent, it is not essential to hold a qualification in health and safety. The HSE provide useful guidance on conducting a risk assessment – 5 Steps to Risk Assessment (www.hse.gov.uk/pubns/indg163.pdf). The 5 steps are:

1. Identify the Hazards.
2. Decide who might be harmed and how.
3. Evaluate the risks and decide on precautions.
4. Record your findings and implement them.
5. Review the risk assessment and update if necessary.

There must be a clear chain of command on who is responsible for each area of work and equipment to maintain health and safety within the business The final responsibility generally lies with the business owner.

It is good practice to produce a written risk assessment and it is a statutory requirement if five or more people are employed by the business. The risk assessments must be communicated to staff and all relevant people.

A further assessment should be made for Control of Substances Hazardous to Health (COSHH). This is similar to a risk assessment but considers the risks from substances such as dust, gases, fumes, pesticides and zoonoses.

If an accident or near miss occurs it should be reported to the HSE in accordance with the Reporting of Injuries Diseases & Dangerous Occurrences Regs (RIDDOR).

When carrying out risk assessments for an agricultural related business be aware that one of the biggest causes of death in agriculture is falls from height. Given that most workers spend probably less than 1% of their time working at height this represents the most dangerous part of the year. Every business should examine what tasks are being carried out at height and try to eliminate these or find safer methods.

Many deaths and injuries are caused by transport and machinery. One of the most important pieces of relevant legislation is the Provision and Use of Work Equipment Regulations 1998 (PUWER) which states that:

- All equipment must be fit for purpose.
- All equipment must be properly maintained.
- All equipment must be properly commissioned.
- Equipment must be inspected after difficult conditions.
- Operators and maintenance mechanic must be sufficiently trained.
- Guards over all dangerous parts.
- Safety features all working.
- Lighting sufficient to operate machinery.

All staff have a legal obligation to co-operate with their employers and follow safe procedures.

Particular care should be taken to ensure the safety of children on farms, and the minimum ages for operating or travelling in certain vehicles and machines must be observed.

There are many other pieces of relevant legislation relating to health and safety at work that agricultural businesses should comply with. In some instances training and certification is required.

A useful source of information for farmers is the HSE publication "Farmwise" (http://www.hse.gov.uk/pubns/books/hsg270.htm) which provides practical advice and guidance on health and safety.

Land and Buildings

Introduction

This section gives detail on the main legislative, technical and finances related to land and buildings.

Land tenure remains a topical subject as implementation of the Land Reform Act (2016) continues. The detail that follows gives brief descriptions. Specialist legal advice should be sought for specific tenure related circumstances.

Building spaces guidance and costs are laid out to allow users to budget space requirements and capital requirements for existing and new buildings.

Property operating costs for different types of farms can be found in the Whole Farm Data section on page 445.

Land Tenure

There are four types of agricultural tenancy currently available for use in Scotland, although this will change with the ongoing implementation of the Land Reform (Scotland) Act 2016.

To establish what law applies to any agricultural tenancy, it is necessary to determine which type of tenancy is involved. There are currently three core pieces of legislation which govern agricultural tenancies in Scotland. These are:

- Agricultural Holdings (Scotland) Act 1991: '1991 Act' tenancies (secure heritable tenancies)
- Agricultural Holdings (Scotland) Act 2003: Grazing or mowing leases, Short Limited Duration Tenancies (SLDT) and Limited Duration Tenancies (LDT)
- Land Reform (Scotland) Act 2016: Modern Limited Duration Tenancies (MLDT) and *Repairing Tenancies (this latter provision has not yet come into effect)*

Agricultural Holdings (Scotland) Act 1991
All agricultural tenancies entered into prior to 27th November 2003 are 1991 Act Tenancies.

Tenancies granted under this act give security of tenure to the tenant for unlimited successive generations (i.e. a secure tenancy). The act sets out how rents should be calculated; how improvements should be compensated; how fixed equipment should be maintained and how disputes should be settled.

In order to circumvent the security of tenure granted by a full 1991 Act Tenancy, "Limited Partnerships" were developed.

A 1991 Act Tenancy (with all the legislation that governs this type of tenancy applying) was created but granted not to an individual but rather a partnership comprising the landowner or 'Limited Partner', and farmer 'General Partner'. If the landowner dissolves the partnership, then the tenant technically no longer exists and by this means the tenancy is ended. These partnerships were normally agreed to last for a defined period (often 15-20 years) and thereafter on a year-to-year basis (tacit relocation). Once the initial term has run its course the tenancy can be ended by the landowner withdrawing from the partnership. This can be done by serving notice on the General Partner.

Agricultural Holdings (Scotland) Act 2003
The 2003 Act came into force on 27 November 2003.

Grazing or mowing tenancies (grass lets)
These are agricultural tenancies where the land is let for grazing or mowing only and for a specific period of the year not exceeding 364 days.

When a Grazing or Mowing Tenancy has ended, the land may only be let again for the same purpose to the same tenant provided one clear day has elapsed between tenancies.

If, with the landowner's agreement (actual or assumed), the tenant continues to occupy the land after the tenancy period has ended, the tenancy is automatically converted to a Short Limited Duration Tenancy (SLDT).

Short Limited Duration Tenancies (SLDT)
These are agricultural tenancies where the letting is for not more than 5 years. There are no statutory rent provisions for a SLDT. SLDT's cannot be assigned to 3rd parties, but relatives can succeed to the tenancy. Statutory rules on fixed equipment and compensation for improvements at the end of tenancy apply. If the tenant continues in occupation at the end of a 5-year SLDT then a Modern Limited Duration Tenancy (MLDT) is automatically created. Where this happened before 30 November 2017 a Limited Duration Tenancy (LDT) was created.

Limited Duration Tenancies (LDT)
These are agricultural tenancies commenced before 30 November 2017 where the letting is for a minimum term of 10 years - with no upper limit (older LDT's were for a minimum of 15 years).

To end an LDT a Notice to Quit needs to be served by the landlord. This is a 2-staged process over three years. If the LDT is not terminated by notice at the expiry of the lease, there is instead a cycle of continuations. The tenant may terminate an LDT at the expiry of the contractual term or the expiry of a continuation by written notice given not less than one year and not more than two years notice.

The rules regarding repairs, improvements and rent reviews for LDT's are similar to those for 1991 Act Tenancies. LDT's can be assigned to a third

party, subject to landlords' consent (landlords can only object on the grounds of the ability, finance or character of the assignee). Landlords can also pre-empt an assignation by matching the highest offer. A LDT also gives the tenant the ability to use land for a non-agricultural purpose (diversification). Since 30 November 2017 a new 'Modern Limited Duration Tenancy' has replaced the LDT (for new agreements – see below).

Changes to Agricultural Holdings (Scotland) Act 1991

The 2003 Act made the following changes to the 1991 Act:

- *Fixed Equipment* – Post Lease Agreements (PLA) can be removed by the tenant giving notice to the landlord following a rent review; writing-down agreements for tenants improvements are no longer valid (there is some debate to whether improvements fully written-down before 2003 are included in this); record of condition no longer required to be completed by a Recorder appointed by Government.
- *Rent* – Various instructions on how to set rents were included, for which recent court cases have provided legal interpretation.
- *Diversification* – now allowed on agricultural holdings. The landlord has the right to object. The tenant is able to appeal to the Land Court
- *Compensation for Vacant Possession* - compensation may be payable to a tenant where a tenant voluntarily gives up possession of a holding.
- *Assignation* – details in following sections.
- *Miscellaneous* – leases can no longer be terminated on grounds of non-residency; Consent from the Land Court is required on a Notice to Quit in most circumstances; the definition of good husbandry now extended to include conservation activities and diversification, as permitted under the 2003 Act.
- *Tenants Right to Buy* – provides a pre-emptive right of a tenant (under a 1991 act tenancy) to buy land tenanted by him if the landlord intends to sell i.e. the tenant has the right of first refusal, provided the tenant has registered his interest. Registration is required with the Register of Community Interests and needs to be renewed every 5 years.

Land Reform (Scotland) Act 2016

The Land Reform (Scotland) Act 2016 received Royal Assent on 22nd April 2016. Much of the detail is being dealt with through "Secondary Regulation", which is ongoing.

Modern LDT

A new tenancy has been created known as a Modern Limited Duration Tenancy (MLDT). The tenancy is for a minimum of 10 years and has many of the same features as an LDT. For new entrants (regulations have been made to define a "New Entrant") there is a clause where the tenancy may be broken after 5 years.

Assignation

A tenant has the right to assign the interest in the tenancy to any one of the persons mentioned in a new subsection of the 1991 Act: *any person who would, or would in any circumstances have been, entitled to succeed to the tenant's estate on intestacy by virtue of the Succession (Scotland) Act 1964.* The landlord's right to withhold consent, if there are reasonable grounds for doing so, continues to remain in force, unless the person to whom the assignation is being made is a near relative. The following list shows who qualifies as a near relative:

- A parent of the tenant.
- A spouse or civil partner of the tenant.
- A child of the tenant.
- A grandchild of the tenant.
- A brother or sister of the tenant.
- A spouse or civil partner of such a brother or sister.
- A child of a brother or sister of the tenant.
- A grandchild of a brother or sister of the tenant.
- A brother or sister of the tenant's spouse or civil partner.
- A spouse or civil partner of such a brother or sister.
- A child of such a brother or sister.
- A grandchild of such a brother or sister.

Where the assignee to a tenancy is a near relative the grounds upon which the landlord can object are restricted to the following:

- That the person is not of good character.
- That the person does not have sufficient resources to enable the person to farm the holding with reasonable efficiency.
- That the person has neither sufficient training in agriculture nor sufficient experience in the farming of land to enable the person to farm the holding with reasonable efficiency.

The provisions in relation to limited duration tenancies (LDT's) and Modern Limited Duration Tenancies (MLDT's) have been amended so that where the assignee is a near relative the grounds for objection are restricted to those mentioned above.

Succession

The succession provisions in relation to 1991 Act tenancies, repairing leases, LDT's and MLDT's are also made uniform.

The existing time limits to notify the landlord that a tenancy has been inherited remain in place. Where the lease permits a bequest of the tenant's interest, the tenancy must be accepted within 21 days of the death. In the case of intestate transfers, the deceased tenant's executors must transfer the tenancy to a suitable beneficiary within a year of the death. The beneficiary then has 21 days to notify the landlord that the acquisition has taken place. Where the successor, whether by bequest or on intestacy, is a near relative, the landlord has one month to object to the succession. However, the grounds of objection are limited to these to

those listed in the previous section (character, resources and experience).

The 2016 Act abolishes the 'viable unit test' in relation to the unit that is being inherited and it also removes the specific challenge that the successor is already in occupation of an independent viable unit elsewhere.

Landlord's Improvements
Tenants now have the right to object to improvements proposed by their landlord. The landlord has the right of appeal to the Land Court.

Diversification
There are new rules regarding the ability of a landlord to object to a tenant's diversification notice.

Amnesty for tenant's improvements
The tenant's improvements amnesty came into effect on 13 June 2017 and provided a 3-year window for tenants with 1991 Act Tenancies, SLDTs, LDTs and MLDTs. Due to COVID-19, the deadline was extended to 13 December 2020.

Relinquishment and assignation of 1991 Act Tenancies
This part of the Act was brought into force on 28th February 2021. It allows a tenant to assign their tenancy for value to a person "who is progressing in farming" or a "new entrant". The landlord has a right of pre-emption. If a tenant wants to go down this route, they must offer to relinquish the tenancy to the landowner in the first instance (it is independently valued). If the landlord does not accept the tenants notice to relinquish, the tenant may then assign the tenancy.

The Scottish Land Commission has issued a guide to the relinquishment and assignation process, which can be accessed using the following link: https://www.landcommission.gov.scot/our-work/tenant-farming/relinquishment-and-assignation

Irritancy for non-payment of rent
Irritancy Notices (a notice to quit) cannot be served for non-payment of rent on SLDT, LDT, MLDT & Repairing Tenancies unless a demand for payment within 2 months has been issued in writing by the landlord. This is not the case for 1991 Act Tenancies. For 1991 Act Tenancies, if rent is not paid, an Incontestable Notice to Quit can be served by the landowner (no rent demand is required).

Land Reform (Scotland) Act 2016 reforms that have not commenced *(at the time of writing)*

Repairing Tenancies
A Repairing Tenancy has a minimum term of 35 years. The lease requires the tenant during the "repairing period" to improve the land into a state capable of being farmed. The repairing period will last 5 years, or

longer if agreement between landlord and tenant or it can be extended by the Land Court.

Tenants' rights to buy

The requirement for a 1991 Act Tenant to register a right to buy has been removed. Tenants will now have a pre-emptive right to buy if a landlord "proposes to transfer the land or any part of it to another person". Until this section becomes live, the requirement for tenants to register their right with the Registers of Scotland continues. For more information see: https://www.ros.gov.uk/

Sale where landlord in breach

This provision allows a tenant to apply to the Land Court for an "Order of Sale" if a landlord fails to comply with an order or award of the Land Court, regarding a material breach of the landlord's obligations in relation to the tenant. The "order of sale" gives the tenant the right to buy the land comprised in the lease through the tenant's pre-emptive right.

Rent review (1991 Act Tenancies)

The rent is to be a "fair rent", which is to be a move away from the "open market" rent which has operated over recent years. The "fair rent" is to take account of the productive capacity of the holding; the open market rent of any surplus residential accommodation provided by the landlord; and the open market rent of any fixed equipment provided by the landlord or any land forming part of the holding not used for agriculture.

In the absence of agreement on rents, either party may apply to the Land Court to determine the rent.

The Scottish Government has appointed a group to carry out rent modelling. The favoured model will then undergo "road-testing" prior to being implemented. In the interim period, the industry has agreed to hold rents to inflationary rises only, this is being overseen by the Tenant Farming Commissioner. This is a voluntary agreement, supported by the industry stakeholders.

Rent review (LDT's, Modern LDT's and Repairing Tenancies)

The rent is to be set under the same guidance as the 1991 Act Tenancies. If there is no rent review provision in the lease, or the lease stipulates upward or landlord only initiated rent reviews, the statutory alternative applies.

Tenanted agricultural land rental figures (Scotland)
The following tables show median rental values for agricultural land by farm type and by tenancy agreement in Scotland for 2018-2020.

Rents for farm type (all agreements excluding crofts and seasonal lets):

	2020		2019		2018	
	£/ha	***£/ac***	***£/ha***	***£/ac***	***£/ha***	***£/ac***
Cereals	137	55	134	54	137	55
General Cropping	143	58	149	60	143	58
Dairy	144	58	129	52	92	37
Cattle & Sheep non-LFA	127	51	121	49	129	52
Cattle & Sheep LFA	47	19	51	21	52	21
Mixed	123	50	123	50	118	48
Pigs & Poultry	125	50	154	62	124	50

Rents for tenancy agreement types:

		2020		2019		2018	
		£/ha	***£/ac***	***£/ha***	***£/ac***	***£/ha***	***£/ac***
Crofts/Small L'holdings		3	1	3	1	3	1
1991 Act	*LFA*	47	19	52	21	55	22
	nLFA	141	57	138	56	136	55
	P'ship	75	30	75	30	83	34
SLDT		110	45	104	42	108	44
LDT		90	36	104	42	97	39
MLDT		86	35	87	35	87	35
Seasonal LFA		113	46	115	47	118	48
Seasonal nLFA		161	65	150	61	151	61

It must be noted that there will be a wide variation in rental values within each category illustrated above. Variables will include topology of the land, remoteness, length of tenancy, age of tenancy, facilities (e.g., houses, farm-buildings and equipment) included, and the amount of land rented. More detail can be sourced from:
https://www.gov.scot/publications/results-december-2020-agricultural-survey/

Charges for Short-Term Lets and Services

Short-term let charges for arable crops, grass and buildings across Scotland vary greatly from year to year and area to area. The price will also be dependent on local practice, quality of facilities, season, market and land being offered.

Typically, for short-term lets of grassland, the period of let would be from 1 May until 31 October.

The prices shown below should be used only as a general guide and local advice should be taken for specific circumstances.

		Range	Average
		£/ha (£/ac)	
Grass park lets:	rotational grass	75 - 740 (30 - 306)	348 (141)
	permanent pasture	50 - 494 (20 - 283)	178 (72)
Rough grazing		25 - 123 (5 - 50)	64 (26)
Barley land let (unploughed)		100 - 296 (40 - 120)	232 (94)
Potato land let (seed and ware)		741 - 1,606 (300 - 650)	870 (352)
Vegetables - human consumption [1]		370 - 1,750 (150 - 708)	996 (403)
		£/head/week	
Sheep winter grazing		0.30 - 0.90	0.50
Sheep grazing forage crops		0.35 - 0.70	0.55
		£/head/week	
Cattle grazing - improved pasture [2]		2.60 - 7.00	5.00
Cattle grazing - rough grazing [2]		1.00 - 5.00	3.20
Letting courts [2, 3]		5.00 - 16.00	9.75
Letting courts only [2]		0.50 - 3.00	1.85
		£/t/week	
Grain storage [4]		0.20 - 0.25	0.24
		£/tonne/month	
Potato storage (ambient air) [4, 5]		1.00 - 2.00	1.43
Potato storage (refrigerated) [4, 5]		4.00 - 6.40	5.53

1 Including vining peas and beans, salads, brassicas, carrots/parsnips.

2 Price range covers the type of stock grazed/housed, e.g. store calves, dry cows, cows with calves at foot.

3 Inclusive of bedding, silage and labour. Concentrates and vet/med additional.

4 Handling charges may be charged above base price.

5 In addition, £1.00 - 1.50/t box/month where potato boxes provided.

Basis of data: limited survey

Space Requirements for Livestock and Storage

The following space requirements are included here as a guide (minimum area required) only. For livestock, appropriate welfare codes and quality assurance regulations should be referred to in all cases.

Cattle space requirements

	Total floor area (m^2/hd)						
Liveweight (kg)	***200***	***300***	***400***	***500***	***600***	***700***	***800***
Beef cattle - solid floors	3.00	3.95	4.90	5.85	6.80	7.75	8.70
Beef cattle - slatted courts	1.10	1.50	1.80	2.10	2.30	2.50	-
Cow and calf - straw *	-	-	-	5.00	6.00	6.50	7.30
Cow and calf - slats *	-	-	-	2.50	2.75	3.00	3.25
Dairy cows - solid floors	3.00	3.95	4.90	5.85	6.80	7.75	8.70

*excluding creep area

	Total floor area (m^2/hd)					
Liveweight (kg)	***60***	***85***	***140***	***200***	***250***	***400***
Calves - loose housed	1.10	1.80	2.40	3.00	-	-

	Cubicle/pen dimensions (m)						
		Calf pens				***Cow cubicles***	
Liveweight (kg)	***< 60***	***60-80***	***400***	***500***	***600***	***700***	***800***
Long	1.50	1.80	2.05	2.35	2.40	2.50	2.55
Wide	0.75	1.00	1.05	1.12	1.15	1.18	1.20

	Trough/access length requirements (mm/hd)							
Liveweight (kg)	***100***	***200***	***300***	***400***	***500***	***600***	***700***	***800***
Simultaneous feeding	350	400	500	550	600	670	700	870
Ad-lib feeding	150	150	150	190	240	280	320	340

Sheep space requirements

	Total floor area (m^2/hd)		
	Hoggs	***Pregnant ewes***	***Ewes w/ lambs***
Sheep - bedded courts	0.75 - 0.90	1.00 - 1.40	1.80 - 2.20
Sheep - slatted courts	0.40 - 0.60	0.80 - 1.10	1.00 - 1.70

	Trough/access length requirements (mm/hd)	
	Hoggs (45-65kg)	***Ewes (60-90kg)***
Simultaneous feeding	300	450 - 500
Ad-lib feeding	100 - 125	120 - 225

Pig space requirements

	Total floor area (m^2/hd)						
Liveweight (kg)	***<10***	***10-20***	***20-30***	***30-50***	***50-85***	***85-110***	***>110***
Group loose housed	0.15	0.20	0.30	0.40	0.55	0.65	1.00

	Trough/access length requirements (mm/hd)						
Liveweight (kg)	***5***	***10***	***15***	***35***	***60***	***90***	***120***
Restricted feeding	100	130	150	200	230	280	300

Poultry space requirements

Laying Hens		
Enriched Cages	Stocking density	750 cm^2 (approximately 13 birds/m^2)
	Nest/perch length	150 mm/bird
	Feed trough length	120 mm/bird
Barn or free range	Stocking density	9 birds/m^2
	Minimum litter area	0.025 m^2/bird
	Nest/perch length	150 mm/bird
	Feed trough length	100 mm/bird
	Nest space (only)	120 birds/m^2
Free range	Range area	<2500 birds/ha

Broiler Chickens		
Conventional	Stocking density	<33 kg/m^2
	Possible with permission	>33 - <39 kg/m^2
Free range	Stocking density	27.5 kg/m^2
	Range area	1 m^2/bird
Organic fixed housing	Stocking density	21 kg/m^2
	Range area	4 m^2/bird
Organic mobile housing	Stocking density	30 kg/m^2
	Range area	2.5 m^2/bird

Storage space requirements for crops, feeds and manures

Product	**Space requirement**
Wheat - whole grain	1.35 m^3 / t
Barley - whole grain	1.45 m^3 / t
Oats - whole grain	1.95 m^3 / t
Oilseed rape	1.45 m^3 / t
Beans and peas (combined)	1.16-1.19 m^3 / t
Distillers dark grains	1.82 m^3 / t
Draff (highly variable)	0.95-1.25 m^3 / t
Potatoes - bulk	1.42-1.59 m^3 / t
Potatoes - boxes	2.00-2.30 m^3 / t
Turnips/swedes	1.80 m^3 / t
Farm yard manure	1.1 m^3 / t

Weight and dimensions of hay, straw and silage bales

The weight of baled forages can vary a lot depending on the material being baled, type of baler and packing density, so weighing a selection of

bales, if possible, is the best estimate. Allowance should also be made for spoilage. The following table can be used as a guide.

Bale Type	Average weight (kg) *Hay*	*Straw*	*Silage*
Round:			
1.20m x 1.20m	220-250	200-220	400-750
Rectangular:			
0.36m x 0.40m x 0.80m	19	16	36
0.40m x 0.46m x 0.90m	26	19	-
0.80m x 0.90m x 2.50m - mini hesston	290	250	350-650
1.20m x 1.30m x 2.50m - hesston	860	600	-
1.20m x 0.70m x 2.50m - quadrant	380	330	450-600
1.20m x 0.90m x 2.50m - 187	450	410	500

Silage density

To calculate the fresh weight of silage (tonnes) in pits (clamps) the following equation should be used:

Silage (t FW) = [pit volume (m^3) x density (kg/m^3)]/1000

The following table provides estimates for the density (kg/m^3) for silages by considering the dry matter of the silage and the height of the pit. Grass, maize and wholecrop silages are of similar density.

Silage dry matter (%)	Clamp height (m) 2.0	2.5	3.0	4.0
20	780	840	890	950
25	690	730	775	830
30	620	660	690	740
35	570	600	625	670
40+	520	550	570	610

Source: DairyCo.

Water storage requirements

Water requirement for livestock and crops on farm will depend on various factors including animal size, feed intake, feed DM content, stage of production, crop type, rainfall, ground conditions, environmental temperature and management practices.

Significant volumes of water can be used on farm amounting to high water charges if metered mains water is the only water supply. The main water usage on farms includes, livestock drinking, dairy machinery (plate coolers), machinery (plant) and yard washing, crop spraying and irrigation and domestic use. There is potential to reduce annual water charges by investigating other water sources. These include boreholes, reservoirs (lagoons) and rainwater harvesting. With increasing climate change concerns, such systems will improve business efficiencies with both economic and environmental benefits (for more information see the Carbon section on page 329).

There are pros and cons to alternative water sources and planning and preparation is important when investigating new systems. Monitoring water use and ensuring there are no 'leaks' in the system (wastage, e.g. broken pipes, entry into slurry systems) is a key starting point. For further information on water use and for saving water on farms, see the following resources:

- https://ahdb.org.uk/water-supply-problems-a-guide-for-livestock-farms
- https://ahdb.org.uk/knowledge-library/protecting-the-water-supply-for-your-crops
- http://www.ukia.org/

Simple water storage tanks up to 10,000 litres cost in the region of £1,000 while a rain water harvesting system will be up to £2,600 for a large tank. These costs are ex VAT and do not include delivery and installation. For all the systems it is important to source specialist advice on storage requirements, regulation (local council, SEPA and quality assurance), design specifications (including water filters and treatment equipment) and installation.

The data below may be useful to help calculate water storage requirements on farm. All livestock figures are given as the volume of drinking water for one animal of the type described.

Cattle	
Dairy cow (in milk)	75-125 litres/day
Dairy cow (dry)	40-75 litres/day
Suckler cow (spring calving)	14-40 litres/day
(autumn calving)	40-70 litres/day
Calves	5 litres/day
Store cattle	15-50 litres/day
Finishing cattle	25-75 litres/day
Bulls	30-80 litres/day

Sheep	
Pregnant ewe	3-6 litres/day
Rams	3-6 litres/day
Intensively finished lamb	2 litres/day

Pigs	
Newly weaned	1.0-1.5 litres/day
Up to 20kg	1.0-2.0 litres/day
20-40kg	2.0-5.0 litres/day
Finishing pigs up to 100kg	5.0-6.0 litres/day
Sows and gilts (pre-serve and in-pig)	5.0-8.0 litres/day
Sows and gilts (in lactation)	15.0-30.0 litres/day
Boars	5.0-8.0 litres/day

Poultry	
Pullets	0.09 litres/day
Laying hens - caged	0.19-0.20 litres/day
Laying hens - non caged	0.19-0.22 litres/day
Broilers	0.19-0.20 litres/day
Ducks	1.22 litres/day
Turkeys	0.45-0.71 litres/day

Hose wash	
High pressure hose - typical flow rate (pumped)	1-2 m^3/hr
Volume wash hose - typical flow rate (pumped)	5-10 m^3/hr
Mains fed tap (example)	2.5 m^3/hr
General parlour usage	18-45 litres/cow

Crop irrigation		
Spray gun	to apply 25 mm of water per ha	250 m^3/ha
Spray boom		126 m^3/ha
Drip tape		18 m^3/ha

Planning Permission and Building Warrant

In all cases of building work or change of use, it is advisable to consult with the local planning authority or take professional advice before development progresses.

As a rule, planning permission is required for all new developments and extensions including buildings, engineering, mining and other operations in, on, over or under land and for change of use of buildings or land.

Under the planning legislation, certain developments including proposed agricultural or forestry building works, demolition, freestanding domestic micro-wind turbines and domestic air-source heat pumps are considered permitted development. A developer must notify the planning authority of proposals using a Prior Notification form to determine whether prior approval in the form of a planning application is or is not required before exercising these rights.

Changes to the planning legislation which came into force on the 1st April 2021, significantly increases the size limit for agricultural buildings erected or extended (see requirements below) and also allows for the conversion of existing agricultural and forestry buildings to:

- Up to 5 dwellings (houses or flats), none of which may exceed 150m²
- Up to 500m² flexible commercial space

Scottish Planning Policy sets out the following requirements and fee structures:

Prior Notification and Prior Approval
You should apply for prior notification and prior approval if any of the following apply:

a) build or significantly alter/extend agricultural or forestry buildings. A significant alteration or extension is one which would result in:
    - the cubic content of the original building being increased by more than 20%, or
    - the height of the building exceeding the height of the original building
b) form or alter a private way
c) carry out excavation or engineering operations in relation to a farm or forestry undertaking

Application Fee is £100. The planning authority has 28 working days from receipt of application to respond and may request for a full planning application to be made if it considers that the development is likely to have a significant impact on the surroundings.

Prior Notification and Approval in relation to Agricultural and Forestry Private Ways
A developer should also apply for prior notification and prior approval to the relevant planning authority for the formation, or alteration, of agricultural or forestry private ways. No fee is applicable.

Planning Permission
Planning permission is always required if any of the following apply to the proposed development:

a) carried out on farm holdings of less than 0.4 ha
b) the construction, alteration or extension of a building (excluding permitted development)
c) any buildings or works not designed for the purpose of agriculture
d) the construction, extension or alteration of any building or structure or plant over:
    i. 1000m^2 in area unless within National Parks or National Scenic Areas (this is calculated by adding the area of the proposed development and the area of any development within the unit that is to occur or has occurred within the preceding 2 years and would be within 90m of the proposed development), or
    ii. 12m in height, or
    iii. 3m in height where the building is within 3 km of an aerodrome
e) within 25m of a metalled trunk or classified road
f) the construction or carrying out of any works to a building used, or to be used, for housing intensive livestock or for storage of slurry or sewage sludge where that building is within 400m of a protected building (a building normally occupied by people but buildings which form part of a working farm or certain specialist industrial buildings).

Planning fees, effective from 1st April 2022, are outlined below:

Dwellinghouses	
Planning permission in principle	
- one dwellinghouse	£600
- more than one dwellinghouse and the site area does not exceed 2.5 ha	£600 for each 0.1 ha
- more than one dwelling house and site area exceeds 2.5 ha	£600 for each 0.1 ha up to 2.5 ha plus £300 for each 0.1 ha in excess (maximum £75,000)
Detailed planning permission	
- dwellinghouses: not exceeding 10	£600 each dwellinghouse
- dwellinghouses: 11 – 50	£450 each dwellinghouse
- dwellinghouses: in excess of 50	£250 each dwelling to maximum £150,000)
- enlargements, improvements or alterations to an existing dwelling house or flat and development within the cartilage of an existing dwelling house	£300
- erection or extension of buildings (other than dwelling houses or plant and machinery)	
- not exceeding 50m^2	£300
- 51-100m^2	£600
- 101-4,000 m^2	£600 for each 100 m^2 (maximum £24,000)
- exceeds 4000m^2	£300 for each 100 m^2 (maximum £150,000)
- ancillary buildings, fences, walls, roads, carparks etc.	£300

Agricultural buildings	
Planning permission in principle	
- agricultural building (excluding glasshouses) based on area covered by development	£600 for each 0.1 ha up to 2.5 ha of site area plus £300 for each 0.1 ha in excess (maximum £75,000)
Detailed planning permission	
- buildings up to 500 m^2 floor area	£500
- buildings in excess of 500 m²	£500 for each 100 m² (maximum £25,000)

Agricultural buildings (continued)	
- erection, alteration or replacement of plant or machinery	
- not exceeding 5ha	£500
- in excess of 5ha	£25,000 plus £250 for each 0.1 ha (maximum £150,000)
- glasshouses or polytunnels used for agricultural purposes	£100 for each 100 m² (maximum £5,000)
- change of use	£401

Land	
Winning, working or storage of minerals and waste disposal	
- site area not exceeding 0.1ha	£1000
- site area 0.1ha – 15ha	£1000 plus £500 for each 0.1 ha
- site area 15ha+	£75,000 plus £250 for each 0.1ha (maximum £150,000)
Winning and working of peat	£500 per 0.1 ha (maximum £6,000)
Vehicular access, car parks, service roads for existing uses	£500
Other engineering works or operations on land e.g. installation of floodlights, car parks, roads etc. not serving existing uses	£1000
- site area not exceeding 0.1 ha	£1,000 plus £500 for each 0.1 ha
- site area 0.1 ha – 15 ha	£8,500 plus £250 for each 0.1ha (maximum
- site area exceeding 15 ha	£150,000)

Planning permission is valid for 3 years and you are required to notify the local authority on commencement and completion of the works.

Building Warrant

A building warrant is a legal permission to erect, convert, alter, extend or demolish a building. It ensures that the building or structure is built in accordance with the standards set out by the Building (Scotland) Regulations 2004 and that it protects people's health, safety and welfare. Permission must be obtained from your local authority for most types of building and alterations works.

All agricultural buildings on agricultural land in Scotland are exempt from the need for a building warrant except for the following:

- Buildings used to any extent for retail purposes (including storage of goods or exhibiting).
- Buildings over 280m^2 in area.
- Buildings within 6m or the equivalent of its height (whichever is less) of a boundary.

- A dwelling, residential building, office, canteen, or visitor centre.
- A dungstead, slurry or farm effluent tank.

Some non-agricultural buildings and extensions such as small garages and porches do not require a building warrant (refer to the Scottish Governments Non-Domestic Technical Handbook 2020 for further guidance, see:
http://www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech

In general terms, there is no building warrant requirement for agricultural buildings in England and Wales. There is a responsibility to check whether the development is compliant with building regulations which falls under Building Control Bodies. For further information, refer to online guidance found in: www.planningportal.gov.uk.

Fees payable with applications for building warrants depend on the estimated cost of the building. As from July 2017, the fees are:

Building cost (£)	***Fee***
Up to 5,000	£150
5,001-20,000	£169 + £19 per every £500 thereafter
20,001-100,000	£593 + £63 per every £10,000 thereafter
100,001-500,000	£1,137 + £103 per every £50,000 thereafter
500,001-1,000,000	£3,272 + £178 per every £50,000 thereafter
1,000,001+	£5,127 + £253 for every additional £100,000 or part thereof
Amendment of warrant (if additional cost is less than original or increases by no more than £5,000)	£100
Extension to warrant	£100
Conversion only	£150
Demolition only	£150
Amendment of warrant for demolition or conversion only	£100
Application for late building warrant (where work has already started)	200% of the fees above
Application for late building warrant (demolitions only)	£200
Submission of a completion certificate (where no building warrant has been obtained)	300% of the fees above
Submission of completion certificate (demolitions or conversion only)	£300

It is worth considering that the fees above may be reduced where certificates from approved certifiers of design and construction are presented with a warrant application. For further guidance please contact your local Building Standards department.

Building warrant permission is valid for 3 years and you must notify the local authority on commencement and completion of the works. You will also be issued with a Construction Compliance and Notification Plan

(CCNP) which will provide details of the keys stages of works which are required to be inspected by your local Building Standards department.

Wayleaves and Easements

What is a Wayleave?

- In general terms, it is a contractual licence which gives operators the right to install, use and maintain its equipment and the owner/ occupier is compensated by annual payments to cover the financial impact of having equipment on their land.
- A Wayleave is a temporary right for the operators to use a portion of land, including the right of ingress and egress across the property/ land to reach the parcel of land.
- A Wayleave does not automatically transfer to a new owner or occupier.
- Landowners/occupiers are restricted from building or growing anything which may adversely impede access to the installed equipment and it may mean the parcel of land is not eligible for BPS (Basic Payment Scheme).
- It is recommended to seek advice from an experienced professional to negotiate and agree the payment rates. Landowners/occupiers affected should be paid for the losses incurred when any operations are carried out on their land including construction or ongoing maintenance, typical losses include loss of crops; reinstatement costs; general disturbance and damage; and extra costs incurred working around the site.

What is Deed of Servitude?

- A Deed of Servitude (or Servitude for short) is a legally binding agreement between the landowner and the utility provider which provides operators rights over land which they do not own, providing greater security than a temporary Wayleave for the operator.
- A single capital payment is paid to the owner/occupier providing permanent access.
- Once granted a Servitude cannot be rescinded by the landowner/occupier.
- A Servitude can be registered in the Title Deeds at the Land Registry.
- It is worthwhile considering timescales in negotiating a Servitude which may affect your works.
- Different utilities have varying requirements when it comes to Servitude areas and rights. For example, underground cables within arable land do not prevent all normal agricultural activities taking place above, however there are restrictions on buildings within the servitude area. Gas pipes have wider areas of restricted development. These restrictions may mean the parcel of land is not eligible for BPS (Basic Payment Scheme).

- It is recommended to seek advice from an experienced agricultural professional who can advise on the implications of the easement in terms of farming operations to help negotiate and agree capital payment.
- Landowners can ask for previously agreed Wayleave agreements to be replaced with a one-off payment by processing a Servitude, but not the reverse.

Guide to Building Costs

For up-to-date building cost information please contact your local contractor/supplier. There is considerable fluctuation in some component and material prices at present from impacts on the supply chain and labour market due to factors including the global pandemic, Brexit and war in Ukraine. This has led to significant increases in the cost of construction and delays in the delivery of components. BCIS Materials Cost Index has recorded an increase in the cost of timber and steel of over 77% during 2021, with an increase of over 20% in the cost of bricks, tiles, cement, and aluminium over the same period.

In practice, the contractor's estimates will vary according to:

- site location, conditions and access
- area of the country
- specification and standard of finish of the building
- how familiar the contractor is with the type of work
- the contractor's current workload
- changes in cost of components and materials

To ensure you get an accurate estimate for the works, a detailed appraisal of the site conditions, services and existing building(s), together with detailed design drawings and a viable and appropriate specification should be provided.

Pollution and the Environment

Introduction

Scotland has a strong environmental brand, promoting wild open spaces, clean air, and clear abundant waters. However, these environmental assets can be easily degraded through unintended actions or poor management of routine operations. A range of legislative requirements are in place across all sectors to help reduce pollution risk and protect and enhance our environment.

Environmental legislation covers most farming activities. A useful starting point for all businesses is NetRegs (www.netregs.org.uk), an initiative to help small businesses reduce pollution risks and improve their environmental performance. NetRegs has a section specific to agriculture providing free, clear guidance on environmental legislation.

The PEPFAA (Prevention of Environmental Pollution From Agricultural Activities) code of good practice is currently being updated. The code provides a useful reference source and will be available on the Farming and Water Scotland website at www.farmingandwaterScotland.org

This section summarises some of the main impacts on air, water and land quality from agricultural practices and provides links for further information.

Protecting air quality

Scotland's air quality has notably improved over the last few decades, with monitoring data showing that our air now is cleaner than at any time since the start of the industrial revolution. That said, a renewed focus is being placed on air quality as more is being understood about its impact on human health, climate change and the wider environment. Ammonia, dust, odour and smoke can all cause issues leading to reduced air quality and negative environmental impacts. There is growing acknowledgement of the role that ammonia plays in climate change; for more information on gases contributing to climate change, see Carbon section, page 329-344.

Ammonia

Agricultural practices account for around 90% of ammonia emissions in Scotland. Ammonia can lead to plant damage and changes to sensitive surrounding habitats. Ammonia may create an odour nuisance impacting on farming neighbours, to a wider source of concern for human health in urban settings when mixed with other pollutants from industrial processes and vehicle pollution, resulting in tiny particles that can damage the lungs and enter the bloodstream.

Ammonia is a gaseous form of nitrogen, contributing to the formation of nitrous oxides driving climate change. Loss of ammonia, for example from livestock housing, slurry and manure management and application, and use of inorganic fertilisers, could lead to nitrogen oxide deposition

many miles from the source and impact on sensitive habitats which require nutrient-poor conditions to survive e.g., heathlands and bogs.

There are several mitigation measures farmers can consider to help reduce ammonia emissions, for example the use of protected urea, low trajectory slurry spreading techniques, which are now required for most slurry applications, appropriate manure management in livestock buildings and inclusion of nitrogen fixers such as clover in grass swards.

Large intensive pig and poultry units above certain capacities are classed as industrial installations and are already regulated under the Industrial Emissions Directive and the Pollution Prevention and Control (Scotland) Regulations in terms of ammonia management.

Production of dust and odours

Odour and dust concentrations are not necessarily related, however activities that produce dust and odour could all constitute a 'nuisance' and have a negative impact on health and amenity, which could lead to legal action, a fine, or notice from your local council to restrict or stop business activities.

Good site management and maintaining high standards of cleanliness on farm will help to minimise odour and dust. Aside from measures to prevent creation of polluting particles at source, planting shelterbelts of trees and shrubs can be effective at screening out low levels of dust and odour.

For businesses already regulated under the Pollution Prevention and Control (PPC) regime, the permit will include relevant emissions controls covering dust and odour, including Best Available Techniques (BAT).

There is growing concern around the impact of very small dust particles on human health. Particles of this size are subject to Air Quality Standards (Scotland) Regulations 2010, based on the current understanding of health effects and exposure to air pollutants.

Burning

Since January 2019, burning on-farm waste is no longer an acceptable practice for most materials, with only a few exemptions remaining for woody/plant debris or untreated wood produced on site. Reuse, recover, recycle, or correct disposal are now the preferred options.

Scotland's Farm Advisory Service have produced a Technical Note on minimising plastic waste on farms at www.fas.scot/publication/technical-note-tn724-minimising-plastic-waste-on-farms/. There is additional information for farmers and land managers at www.sepa.org.uk/regulations/waste/agricultural-waste/burning-on-farm-waste/

For those that have secured an exemption to burn materials on site, the process should not produce any dark smoke; the NetRegs website notes

that "*you cannot use a defence of lack of visual evidence, if you burn materials at night for example. Evidence of burnt materials that could cause dark smoke, such as steel reinforcement from tyres, or plastic residues is sufficient".* For more detail on exemptions around burning waste, visit the NetRegs site at www.netregs.org.uk/environmental-topics/waste/burning-waste-what-you-need-to-know/exemptions-for-burning-waste/

Muirburn operations can also have a negative impact on air quality. The Muirburn Code, updated in 2017, outlines what measures are required under both good practice and legislation. For more details regarding safe Muirburn practices, see www.fas.scot/environment/biodiversity/muirburn-code/. Cutting or swiping could be a practical alternative to burning for consideration on some sites.

For more information on issues and legislation around air pollution, see www.netregs.org.uk.

Protecting soil quality

Both climate change and changes in land use and land management will have an impact on soil quality. Poor soil management practices can increase the loss of organic matter, change soil biodiversity, and increase erosion risk. Increased urban development such as roads and housing can reduce the land area available to deliver the important services that a well-managed topsoil can provide.

For farmers and land managers, the booklet 'Valuing Your Soils' is an excellent resource providing cases studies and information on practical measures other farmers have taken to improve and protect farm soils, plus field sheets on how to carry out a visual evaluation of soil structure (VESS). You can download a copy at www.farmingandwaterscotland.org/downloads/valuing-your-soils-booklet-pdf/

In addition, the Scotland's Soils website provides useful information, including the National Soil Map of Scotland and a range of resources for land managers and developers at https://soils.environment.gov.scot/.

Several resources around soil protection and management are available through Scotland's Farm Advisory Service website, including information on soil biodiversity, soil structure, nutrient budgeting and soil pH. See www.fas.scot/crops-soils/soils/ for more details.

Protecting water quality

Scotland's water quality is generally good, with huge improvements having been made over the last 50 years primarily due to the introduction of controls and regulation on point source discharges such as treatment

plants and factories. As a result, diffuse pollution from agricultural sources is now recognised as the largest source of pollution affecting Scotland's waters.

Diffuse pollution is the release of potential pollutants from a range of activities that, individually, will have only a small effect on the water environment but, at the scale of a catchment, can have a significant cumulative effect. Examples of rural diffuse pollution risks include loss of fertilisers through field run-off or poor application techniques, and livestock access to and significant poaching around watercourses, leading to erosion, soil loss, and contamination of water with faecal bacteria.

The Water Environment (Controlled Activities) (Scotland) Regulations 2011, more commonly known as the Controlled Activities Regulations (CAR), apply regulatory controls over activities which may affect Scotland's rivers, lochs, transitional waters (estuaries), coastal waters groundwater, and groundwater dependant wetlands. There is a section focused on reducing diffuse pollution risks from land management activities which include forestry, agricultural and amenity uses.

The measures under CAR have been designed to be proportionate to risk; there are three tiers of authorisation:

- **General Binding Rules (GBRs)** - provide statutory controls over low-risk activities and were revised and updated in 2022. For land managers, the Diffuse Pollution GBRs (DP GBRs) include minimum working distances for activities bordering watercourses, such as, application of manures and slurry or in-field cultivation practices. Compliance with the GBR rules act as authorisation to carry out the activity; you don't need to contact SEPA before conducting activities controlled by GBRs, but you must understand and follow the rules. The amendments to the rules have been summarised at www.farmingandwaterscotland.org/know-the-rules/

- **Registration** - covers low risk activities which cumulatively pose a risk to the water environment. An example of an activity requiring a registration would be abstracting between 10 to 50m^3 water in any 24hrs from the water environment. A one-off fixed registration fee is payable.

- **Licence** – required for site-specific controls, particularly if constraints upon the activity are to be imposed. For example, the construction and operation of a borehole which will be or is intended to be greater than 200m in depth will require a licence from SEPA with a fee which may be payable on an annual basis, depending on the activity.

The CAR Practical Guide provides more detail at www.sepa.org.uk/media/34761/car_a_practical_guide.pdf

Further information

Further guidance on funding, environmental policies, statutory requirements, and good practice guides are available at the following websites:

- Diffuse Pollution Priority Catchments: www.sepa.org.uk/environment/water/river-basin-management-planning/actions-to-deliver-rbmp/priority-catchments/
- Farming and Water Scotland; practical information for farmers to protect and improve water quality on the farm. Visit Farming and Water Scotland at www.farmingandwaterscotland.org or find on Facebook and Twitter @FarmWaterScot
- FAS Technical Notes: wide range of information aimed at both farmers and consultants. Contains a suite of Technical Notes focused on nutrient management www.fas.scot/publication/technical-notes/
- Nitrates Directive and Nitrate Vulnerable Zones (NVZ): Sets out. what is required from farmers to comply with the NVZ rules. www.gov.scot/policies/agriculture-and-the-environment/nvz/
- Pollution Prevention and Control (PPC) Regulations. Large pig and poultry units are covered by the PPC Regulations: www.sepa.org.uk/regulations/pollution-prevention-and-control/
- PLANET Scotland, free nutrient management computer software: www.planet4farmers.co.uk
- SEPA Scottish Environment Protection Agency www.sepa.org.uk

Pollution accidents or incidents should be directed to SEPA's 24/7 pollution hotline: 0800 80 70 60.

New Entrants

Introduction

This section provides some vital information for those looking to get started in farming including starting an agricultural business, business planning, financial planning, and farming opportunities including joint ventures. There are also links and signposts to further information resources and initiatives.

Starting Up an Agricultural Business

There are specific rules and regulations that must be adhered to when managing land and keeping livestock. The following information provides key points of contact and measures that need to be considered when starting up an agricultural business at any level.

Business registration

A new agricultural business should be registered with the Scottish Government Rural Payments and Inspections Division (SGRPID). This can be done online (https://www.ruralpayments.org), by completing a registering a business form (PF01 – https://www.ruralpayments.org/topics/your-business/forms/pf01-registering-a-business/) or by contacting the local SGRPID office (https://www.ruralpayments.org/publicsite/futures/topics/contact-us/). To register a business the following information is required:

- Business details (name, start date, business type).
- Responsible person (name, address, contact information).
- Other personnel involved in the business (if more than three additional members need to complete a PF02 – https://www.ruralpayments.org/topics/your-business/forms/pf02-additional-business-member/).
- Intention to keep livestock (types of livestock).
- Land associated with the business.
- Feed business details - for council/trading standards purposes. Register with Food Standards Scotland.

If applying for funding, a PF03 registering your bank details form – Sterling, will also need to be completed: (https://www.ruralpayments.org/topics/your-business/forms/pf03-register-your-bank-details-form---sterling/). All Scottish Government payments are now given in Sterling.

If the land has not previously been registered for agricultural use before, or the land is being transferred from another party following sale or lease, this will have to be done using a PF06 Land Maintenance Form (LMF) (https://www.ruralpayments.org/topics/your-business/forms/pf06-land-maintenance-form/).

On completion and submission of the above information, the business will be allocated a unique Business Reference Number (BRN).

The land associated with the business will either have or be allocated a Main Location Code (MLC) which is a unique identification which encompasses numbers associated with the county, parish and holding (CPH) location of the land. Both the BRN and MLC are important identifiers when corresponding with various regulatory bodies.

If you have croft land you are required to notify the Crofting Commission (www.crofting.scotland.gov.uk) of the change in landowner/tenant. You also must inform the crofting register of Scotland (www.crofts.ros.gov.uk).

Registering to keep livestock

When keeping livestock or if intending to keep livestock, the business must also register with the Animal and Plant Health Agency (APHA) (https://www.gov.uk/government/organisations/animal-and-plant-health-agency). This requires details about the keeper, the business, the type of animals and the land. The MLC of the business is required when registering with APHA, so the above SGRPID registration process needs to have been completed first. Registering with APHA allows for a unique flock/herd mark to be allocated. The flock/herd mark is required, by law, for animal identification and traceability. For more information on livestock traceability see pages 114-119.

Other registrations

Registering for tax, national insurance, PAYE, VAT with HM Revenue & Customs will also need to be considered. Advice from an accountant should be sought, while some information can be found in the Taxation section, page 503, or at: www.hmrc.gov.uk/courses/syob/farm/index.htm
In addition, registering with industry bodies such as quality assurance schemes, health schemes for livestock or farmers associations should be considered as part of good farming practice.

To aid with setting up your business, building a key network of advisors is essential including a banker, accountant, and solicitor. Invest time to source these individuals and work on building a good relationship with them. They have the potential to really benefit your business and will assist in matters that can save money, aid investments, and decision making.

Compliance measures

Farmers and land managers must comply with various regulatory measures which are related to the environment, public health, animal health and welfare and plant health. There are two main measures of cross compliance which include Statutory Management Requirements (SMRs) (see pages 488–489 for more information) and Good Agricultural and Environmental Conditions (GAECs) (more information can be found in pages 528–531). Linked to these requirements, the following records should be held and/or submitted:

- Integrated Administration and Control System (IACS) Single Application Form (SAF)

- Nitrate Vulnerable Zone (NVZ) records
- Livestock registers including sheep annual inventory
- Spray records
- Livestock medicine records
- Agricultural survey and census returns

In addition and depending on the nature of the business, there may be other statutory requirements to consider including:

- HMRC - business annual taxation accounts, personal tax returns, VAT returns
- Employment - national insurance (NI), pay as you earn (PAYE), pensions
- Insurance - personal, employers, public
- Health and safety
- Quality assurance

Record keeping
Land managers and/or keepers of livestock are encouraged to keep records to, not only comply with regulation, but for management purposes to help monitor and improve business performance.

Additional records you may need to keep as a livestock keeper/land manager are:

- Nutrient management plan
- Farm waste management plan
- Crop records
- Livestock feed use records
- Property repairs inventory
- SEPA licences e.g. sheep dipping, waste disposal, water abstraction/irrigation
- Enterprise financial records
- Pest control

Business Planning

For new entrants, business plans are commonly required when tendering for tenancies and/or seeking finance from a bank or an investment partner. Developing a business plan provides a potential landlord or lender with the knowledge that operational, personnel, marketing and financial aspects of the business have been considered thoroughly to make the business succeed.

A comprehensive business plan will address the financial viability of the proposed business, as well as describing what you want to achieve, how you will get there and the things you need to do along the way to be successful. The financial section of a business plan should document current and expected income and expenses, along with the ability to repay any debts such as borrowings.

Uncertainty will always be a feature of farming businesses. There are simply too many factors that are out with control of the business e.g., weather, supply and demand, world markets, etc. Factoring sensitivity into the financial aspects of the business by including a "plan B" or contingency scenario will show that the business is adaptable, and resilience has been built in. The impact of weather on livestock and crop yields and performance, and the price of inputs and outputs, e.g., if purchased feed increases by 10% in the year or if lambing percentage is 5% lower, are obvious factors to consider.

A business plan should contain the following:

- A clear executive summary, summarising all the key points of the plan and the individuals involved. This will be the first thing a potential landlord or funder will see and will create their first impression. Remember they are investing in you, and they want to know who you are, what your skills are, your background, etc at the start.
- An overview of the business - a description of the farm (land and buildings), type of business structure operated, and the enterprises practiced/planned.
- Information about the management team and staff – ownership, skills, experience, capabilities.
- Business objectives – short, mid, and long-term.
- Financial position and forecasts - likely profitability when fully established (worthwhileness) and annual budgets detailing expected cash flow for a 1-3 year period, and changes in equity in the years taken to establish the business (feasibility). A lender will also require a clear statement of capital provided at the outset alongside funding required.
- Marketing and sales strategy - planned approach of marketing and selling your chosen product(s) including the businesses' unique selling point (USP).
- SWOT analysis - Strengths, Weaknesses, Opportunities and Threats that show an awareness of internal, external, personal, physical, or financial influences and risks on the business.

New entrants, or even well-established farmers proposing a new enterprise, will find preparing and presenting a business plan very beneficial, as they communicate their ideas to lenders. Business plans can also be used to monitor progress and ensure the team are all working towards the same vision.

Financial Planning

Financial analysis and planning is a key aspect of any agricultural business no matter what size. The finances help to provide an overview of what has happened over the period of analysis or when budgeting what is going to happen.

The key points to consider are:

- Profit (loss) - this is used to express annual financial performance as part of the profit and loss account at one point in the financial year (often the year end) showing trading output (adjusted for valuations) less inputs (adjusted for valuation changes). The profit before depreciation is available to cover drawings, tax, and capital investment (the "cash needs" of the business).
- Capital - the net worth is shown on the balance sheet giving a snapshot of the assets and the liabilities of the business at one point in the financial year (often the year end). Assets should be based on market values to provide a true estimate of net worth.
- Cash - cashflow gives a clear indication, on an ongoing basis throughout the year, of the business bank account and, unlike the profit statement, includes VAT and is not adjusted for valuation changes, debtors, creditors, personal and capital transactions.

Whole farm budgeting

Taking into account farm enterprise information (either historical or predicted using the Farm Management Handbook), a business can benchmark both technically and financially. This information in conjunction with the financial descriptions for profit, capital and cash should help a business to prepare a whole farm budget.

A whole farm budget acts as a model of the business predicting income and expenditure over a period (usually the 12 months of the financial year of the business) and this can be monitored against actual income/expenditure during the year. This information allows the business to analyse performance and to make decisions about future strategies.

Some basic budgeting features are shown in the following text. Any figures that are presented in a budget must be supported by clear assumptions adjusted for sensitivities where applicable.

Profit (loss)

The trading profit and loss account of a business is often expressed in the following format:

OUTPUT

less

VARIABLE COSTS

equals

GROSS MARGIN

less

FIXED COSTS

equals

NET PROFIT/LOSS

Monetary values under the above headings do not necessarily represent all or exact cash transactions through the bank. The profit and loss account also includes adjustments for valuations, debtors, creditors, depreciation, personal income or expense, and capital transactions. Further definitions can be found on pages 1 and 2 while financial data for particular farm types can be found in the Whole Farm Data section on page 445.

Capital

The capital position of the business is shown by the balance sheet in the following format:

ASSETS
(e.g. land/buildings/machinery valuations, cash at hand, stocks, debtors)

less

LIABILITIES
Long/medium term and Current
(e.g. loans/mortgages, overdraft, hire purchase, other creditors)

equals

NET WORTH or OWNER EQUITY

The net worth of the business is essentially the value of assets available to the business after all liabilities have been cleared. When the net worth is valued against the total assets as a percentage, the resultant figure gives a clear indication of the business' capital position. While net worth and owner equity are used interchangeably, the percentage owned/owner equity is specifically a measure of the proportion of the business owned by the proprietor and is calculated using the net worth of the business divided by the total assets.

Cash

It is vital to know the cash position of the business as this relates to the bank balance. The cashflow considers the cash values of sales and expenses that would appear in the profit and loss account. In addition, the cashflow also takes into account cash items such as personal drawings, tax payments, and capital repayments for loans and hire purchases. The opportunity to save for future reinvestment can be identified by taking account of the cash needs of the business.

Financial targets and benchmarks

As well as technical enterprise performance targets/benchmarks, such as yield and lambing/calving percentages, a farm business will have financial targets/benchmarks that it should consider while analysing performance or planning.

Analysis of the profit and loss account is an ideal starting point to prepare business figures to allow comparison to industry benchmarks. Businesses should analyse and present their accounts in a similar format to that presented below allowing an easy comparison. The whole figures

under each analysis heading, e.g., variable costs, can then be converted to a Gross Output Analysis (GOA) which takes output at 100% and each analysis heading is divided by the output and multiplied by 100 to get a percentage. Current GOA targets are:

	Dairy	General (excl. pigs and poultry)
Output	100%	100%
Variable costs	< 40%	< 30%
Gross margin	> 60%	> 70%
Fixed costs	< 30%	< 45%
Profit	> 30%	> 25%

Pig and poultry farms are similar to dairy farms in that they typically generate high output, high variable costs (because of feed costs) and relatively low fixed costs owing to high output or turnover.

Target levels for owner equity to ascertain business performance and sustainability are:

- owner occupier > 60%
- tenant > 50%

The Whole Farm Data figures on pages 445-465 are industry figures based on real farms thus provide an ideal starting point for benchmarking. A business should consider the upper 25% performing categories as the main goal. Nevertheless, due to the nature of farming and the varying characteristics (e.g., geography, land quality, local climate, type of stock, etc.) that influence performance, a flexible approach should be taken when benchmarking. Once a farm is up and running and has its own data, benchmarking internally will provide additional information to help assess performance.

Business Structure

The most appropriate business structure for a new rural business depends on the plans for the business, the people involved and issue of land tenure. This will result in different legal, liability, and taxation implications, meaning professional advice from an accountant is recommended from the outset.

There are three common types of business structure:

- Sole trader - This is the simplest form of business since it can be established without legal formality. However, the business of a sole trader is not distinguished from the proprietor's personal affairs.
- Partnership - A partnership is similar in nature to a sole trader but because more people are involved it is advisable to draw up a written

agreement and for all partners to be aware of the terms of the partnership. As for a sole trader, the business and personal affairs of the partners are not legally separate. A further possibility is to use what is known as a Limited Liability Partnership (LLP).

- Company - The business affairs are separate from the personal affairs of the owners, but this entails compliance with greater regulations.

Farming Opportunities

Availability of land is often mentioned as the main hurdle for new entrants entering agriculture as well as finance and sourcing capital.

Purchase

Farmland tends to have a high asset value relative to its income earning potential, requiring capital, a deposit, or security of a guarantor to buy. Land purchase can, therefore, be a substantial financial barrier to entry for aspiring farmers and expanding businesses alike

The value of land has shown strong growth in recent years, driven by limited supply and increased demand, particularly from non-farming investors. The data below compares 2011 to 2021 average land values for various types of land in Scotland (data: Knight Frank Scottish Farmland Index).

	2011	2021	% change over last decade
	Per acre		
Good arable	£6,825	£10,605	+55%
Average arable	£4,501	£5,848	+30%
Ploughable pasture	£3,500	£4,212	+20%
Improved permanent pasture	£2,500	£3,140	+26%
Hill	£600	£1,013	+69%
Unweighted average	£3,585	£4,963	+38%

The value of land will depend on the land grade, the location, access, neighbours, and available alternative uses. Natural capital, forestry potential and carbon sequestration are becoming increasingly important influences in land valuation.

When looking to purchase it is essential to understand how borrowing money works, for example how much will the lender provide, how much deposit is required, what value of the property will be lent against, etc.

There are several other costs to think about when purchasing and should be budgeted for in a business plan. These include land and building

transition tax (LBTT), legal fees, independent valuation fees, and advisor fees. Land and building transition tax (LBTT) is complex and there are numerous different scenarios for each purchase, more details can be found at https://www.gov.scot/policies/taxes/land-and-buildings-transaction-tax/.

When buying land, to avoid problems such as issues on the title and to negotiate Basic Payment and access rights it is extremely important to involve a legal expert with experience of agricultural land transactions.

Once purchased, the land and property will become an asset to the business. Every opportunity should be evaluated to maximise the output and to increase the value of the asset e.g., diversification, grants, adding value, renewables.

There are numerous other routes to occupying land if purchasing is not a feasible option. The various routes are described below.

Tenancies
This is the most common route for new entrants to access land. It involves a landowner letting an area of land (often including sheds and a dwelling house) to a tenant for an agreed period of time and rent. The types of tenancies available include the following:

- Short Limited Duration Tenancy (SLDT)
- Modern Limited Duration Tenancy (MLDT)
- Seasonal Grazing or mowing tenancies

These are described in detail on pages 398-403.

Joint ventures
There is growing popularity in joint ventures as an alternative route to entry. These include:

- Contract farming
- Share farming
- Business equity partnerships

A joint venture can be considered as some form of co-operation, formed in a legal manner, between two or more parties to form a business relationship, other than as landlord and tenant. There are various benefits and reasons for the creation of these collaborative agreements including sharing risk, improving return on capital through combined resources and expertise, and accelerated growth. They can also avoid the need to create a formal farm tenancy. Examples of common circumstances in which joint ventures can be beneficial include:

- Land coming back in-hand after being let out. The owner may be inexperienced but wishes to retain vacant possession.
- The farm may not be large enough to be a viable holding on its own.
- The farmer may wish to release equity.

- To obtain economies of scale through splitting the cost of farming with others.
- The business may be in need of large capital investment.
- The owner may want to retire, not having a natural successor, but not ready to sell.
- There may be a substantial tax advantage.

Genuine joint venture agreements work well but must be more than a written document. Each party must be made aware of the associated advantages and disadvantages, as well as being provided with a clear definition of their role. In practice, it is important for both parties to abide by the governing rules to retain the advantages (including tax benefits) and avoid it being construed as an alternative legal entity such as a tenancy, partnership, or employer/employee relationship. The foundation to success with joint venture farming is finding the right mix of people, regular communication, and use of an independent advisor. Investment in advice from legal and financial specialists is highly recommended.

Contract farming

A standard Contract Farming Agreement (CFA) is the terms of understanding between two parties. That is, a landowner/occupier (known as the "farmer") who has engaged the services of another (known as the "contractor") to undertake farming operations over a fixed period (typically 3 to 5 years) on pre-arranged terms – it may be more simply understood as farming with contractors.

The farmer normally provides the land, buildings, fixed equipment (if required or agreed), a dedicated bank account, finance to administer the agreement and pay the required bills, and any farm knowledge. For this, they will receive what is commonly termed a basic retention/fee. This is agreed with the contractor in advance of the start of the agreement.

The contractor provides the labour, machinery (including its incurred costs) and management expertise. The contractor could be a neighbouring farmer, large farming company or traditional contractor. For this, they receive a basic contractor's fee (usually quarterly or half-yearly).

Either party, via a separate livestock hire agreement, can supply breeding livestock (if applicable). Both parties agree the farming policy and the share of any divisible surplus in advance and meet regularly throughout the duration of the agreement to make management decisions and monitor progress.

For working examples of real contract farming case studies see https://www.fas.scot/rural-business/new-entrants/inspirational-stories/inspirational-stories/

Share farming

Share farming is an arrangement between two independent businesses. It is often confused with contract farming but there are some differences, for example:

- They are two entirely separate businesses working the same land.
- As separate businesses they share the value of the farms output (typically sales) rather than a fee plus share of net profit.

There is no standard share farming agreement. The details are a matter for the parties involved but each party needs to bring complementary resources and skill sets. The share farming structure is not as popular as contract farming in the UK but is commonplace in New Zealand. It is possible to start as a share farmer with only a small share then progressively build equity share (within the terms of the agreement) until owning most or all the stock and/or equipment. There are three conceivable paths for the agreement:

1. It may be a step towards farm succession.
2. If agreed, share farmer equity in livestock could be increased on renewal of the agreement.
3. Terminate the agreement:
    a. allowing the share owner to follow an alternative plan.
    b. to allow the share farmer to buy into another or larger farm.
    c. liquidate to enable the share farmer to purchase their own farm and likely become a share owner.

Typically, the share owner/occupier provides the land, buildings, fixed equipment, fixed machinery, major maintenance of buildings and expertise along with paying a certain percentage of certain input costs. The share farmer/operator will provide the working machinery, moveable equipment, and technical ability and pay the balancing cost of inputs. Livestock are usually held in undivided shares. Output and certain input costs (direct costs) are split using pre-agreed allocations.

Equity partnerships

An equity partnership is an alternative way to invest in farming for those who are unable to finance a farm tenancy or ownership as an individual. It can also be an opportunity for outside investors and for existing farmers to grow their business. It may also benefit those wanting to release capital from land for alternative investments or allow partial retirement as part of a structured succession, particularly with non-family members.

An equity partnership is most likely formed as a company, with potentially multiple investors. These shareholders will pool their capital (equity), and possibly skills or resources, in the aim of generating higher investment growth. The company will identify and assess an investment option, purchase the land, livestock plus necessary machinery and plant. This is funded through shareholder equity and bank debt, borrowed by the company.

There are various structures and the most appropriate will depend on the type of investor. Often one of the partners is employed as the farm manager, known as an equity manager. The board of directors will run governance. Each partner normally appoints one director to the board. This works well provided directors have the necessary and complementary skills. This responsibility or process can be contracted out, particularly where investor(s) are time limited, remote from the operation or opt to be a 'sleeping partner'.

Finance

Sourcing finance to develop and grow a fledgling business can be challenging. There are various lenders who are especially supportive of new entrant businesses. It is essential that the business has a track record and credit history and setting up a bank account as soon as possible facilitates this. The lender will require a business plan and cash flows, demonstrating what the immediate and future plans are for the business as well as the cash requirements. The funding sought should match the requirements of the business. For short-term working capital e.g. seed, fertiliser, feed, etc. an overdraft should be requested, whereas capital for more permanent structures or machinery, asset finance or loan funding should be investigated.

Finance can be sourced through various means including, overdraft, short- and long-term loans and hire purchase agreements (see pages 499-501). Finance can often be negotiated, e.g., longer payment terms for purchasing seed and fertiliser and market finance for purchasing livestock. Some livestock markets have special terms which favour new entrants.

Finance comes with an interest rate, which is a charge for borrowing the money. This is calculated as a percentage of your borrowings, so if you borrow £10,000 and the interest rate is 3% you repay £10,300. The interest rate is calculated on the bank rate, also called the Bank of England Base Rate, along with other factors. If the bank rate rises, then normally banks increase their interest rates on borrowing (and saving).

The capital demand of a business can be minimised to reduce the reliance on borrowing. Such methods would include using machinery rings to hire in equipment when it is required, rather than purchasing. In return labour can be hired out to offset the payment.

New Entrants Initiatives

Scottish Land Matching Service (SLMS)

This was launched in October 2019 in response to growing industry concern at the lack of opportunities for new entrants entering the industry

because of limited availability of agricultural land for purchase or tenancies and difficulty in accessing capital funding.

The aim of the SLMS is to restructure our industry by encouraging young people into farming and bringing new skills, new ideas and the next generation into agriculture. Joint Ventures are operational structures that allow for young people to start or develop a farming business; they also allow an existing farmer to further develop their business and/or reduce their day-to-day role on the farm. This free service is open to all and matches people looking for, and offering, opportunities and provides a service to facilitate workable arrangements.

The service has a website where both people seeking opportunities and available opportunities are shown. Both parties can register their interest in the service through six simple steps:

1) Register online and specify what you are looking for.
2) Your basic requirements will be added to the database, please note - no personal information will be displayed.
3) The service will contact you to arrange a confidential discussion, to get more detail about your background, aims and objectives.
4) If there are any potential matches on the database, the service will facilitate an introduction and a discussion.
5) If the initial discussion is successful and both parties wish to pursue, the service will facilitate further discussions to aid in developing the best agreement for all parties.
6) Once an agreement is secured, the service will continue to be a source of free and independent advice as the venture and relationship develops.

For more details and to register either an opportunity or as a seeker, visit the SLMS website at https://slms.scot/

Farm Advisory Service – New Entrants to Farming Programme

The SRDP Farm Advisory Service (FAS) has a dedicated theme for new entrants to agriculture. The FAS provides information and resources aimed specifically at new entrants to farming across Scotland. These resources include inspirational stories, fact sheets, guidance notes, newsletters, webinars, and regional new entrant meetings across Scotland. For more information visit the FAS website at https://www.fas.scot/rural-business/new-entrants/

In addition to the above there is grant support for one-to-one mentoring and specialist advice is available from experienced peers. For more details see https://www.fas.scot/mentoring-new-farmers-crofters/

Forestry and Land Scotland

Forestry and Land Scotland (FLS) is the executive agency of the Scottish Government responsible for managing forests and around 30,000 hectares of agricultural land on the National Forest Estate (NFE). One of the priorities within Scotland's Forestry Strategy is to 'expand the area of

forests and woodlands, recognising wider land-use objectives' which requires an integrated approach to land-use policy that seeks to maximise the synergies and reduce the potential conflicts between different land uses.

Under their commitment to provide opportunities to attract new entrants into agriculture, FLS offer several Starter Units on a 5 years SLDT, although some agreements may be shorter due to the longer term aims of the land. These are typically grazing land but there is generally no house or buildings associated with them. The resources and conditions vary with each site and will have a focus of enhancing the Scottish Government's environmental objectives, necessitating low input/output farming systems.

More details on these initiatives can be found at:
https://forestryandland.gov.scot/business-and-services/starter-farms

NFU Scotland
NFU Scotland's Next Generation Committee is comprised of a diverse range of young farmers, new entrant farmers and crofters who meet regularly to discuss opportunities and challenges faced by their peers and work to influence positive change and speak with one voice. For more information visit https://www.nfus.org.uk/policy/new-generation.aspx

Scottish Government assistance
The Scottish Government is extremely supportive in encouraging the next generation to farming, and to overcome barriers.

New entrants to agriculture and young farmers can apply to the National Reserve for allocation of entitlements for the basic payment scheme. This can be done while submitting a single application form online, the deadline is 15th May on the year of application. To be eligible, new entrants must have started agricultural activity in 2013 or later and not have had agricultural activity in their own name in the five years preceding the start of the activity. To qualify as a young farmer, you must be under 41 years of age on the 31st December on the year of application and be setting up as head of the agricultural holding for the first time. Documentary evidence of date of birth and proof of status as head of business or having control of the partnership/legal person will also be required at time of first application.

Further details can be found at:
https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/national-reserve/national-reserve-full-scheme-guidance/

New entrants to agriculture and young farmers applying for BPS are also eligible for the Young Farmer Payment, which is based on a maximum of 90 eligible hectares and paid at 25% of the average value of payment entitlements held for the scheme year concerned. This is available to applicants under 41 years old on 31st December in the first year they

apply for BPS and lasts 5 years from the date the new entrant/young farmer took control of the business. Applications can be completed while submitting a single application form online by 15th May each year.

The Scottish Government has formed a working group to develop and coordinate Farming Opportunities for New Entrants (FONE) aimed at identifying publicly and privately owned land that could be released for new entrants to farming.

For more details see:
https://www.gov.scot/groups/farming-opportunities-for-new-entrants-fone/

Whole Farm Data

Introduction

This section provides whole farm benchmarking data for typical farm types in England and Scotland.

Benchmarking is a valuable tool to appraise the financial performance of a business year on year, or in relation to the wider industry. In addition, the benchmarks in the following pages, particularly the fixed costs, when used in conjunction with the livestock and crop gross margin budgets shown earlier in the Farm Management Handbook are useful to budget potential future business plans.

Source of Contents for 2022

The data for England and Scotland has been produced using information from the Farm Business Survey 2020/2021(conducted by six University Research Centres in England) and the Farm Accounts Survey 2020/2021 (conducted by SRUC in Scotland).

Data has been sourced from the publications listed below:

- Farm Accounts in England 2020/2021, March 2022
- Scottish farm business income: annual estimates 2020/2021, March 2022

Full information can be found at:

- https://www.gov.uk/government/statistics/farm-accounts-in-england
- https://www.fas.scot/whole-farm-benchmarks/

England

The Farm Business Survey (FBS) is an annual survey providing information on the financial position and physical and economic performance of commercial farm businesses in England. It covers all types of farming in all regions of England and incudes owner occupied, tenanted, and mixed tenure farms. FBS only includes farm businesses with a standard output of at least 25,000 Euros, based on activity recorded in the previous June Survey of Agriculture and Horticulture.

Farms are allocated to performance bands according to the output and input values for farm type. The performance bands reported represent the top 25 per cent (higher) and bottom 25 per cent (lower) against the average for the farm type.

English data is expressed as Farm Business Income (FBI). FBI reflects actual incomes of farm businesses and is, in most cases, very similar to net profit. FBI is the gross margin less the sum of the fixed costs, less Basic Farm Payment (BPS) and net margin from diversification enterprises that use farm resources.

The tables present the data on a £ per farm basis. In addition, FBI has been presented as £/ha or £/100 ewes.

Scotland
The benchmark data for Scotland is shown in the following tables for the upper 25% performing farms per farm type.

The Scottish data is shown as a profit figure. This is based on management principles rather than those used for tax accountancy purposes.

The data is represented on a £ per farm, £ per 100 ewe equivalents, £ per adjusted hectare, and % per output basis.

Average benchmarks for each farm type as well as more detailed physical and technical data are published on the FAS website https://www.fas.scot/whole-farm-benchmarks/

Description of Farm Types

The farm types are characterised with reference to European Commission (EC) typology.

The data for the farm types in England is measured and represented by Standard Output (SO). The data for farm types in Scotland, shown in the following pages, are distinguished by standard gross margin (SGM).

Note: Scottish data excludes specialist pig, specialist poultry and horticulture. English data excludes specialist sheep and specialist beef.

England farm types
LFA grazing livestock farms: Farms with 50% or more of total area in the Less Favoured Area (both Disadvantaged and Severely Disadvantaged) and with more than two-thirds of the total SO coming from sheep and beef cattle together.

Lowland grazing livestock farms: Farms with less than 50% of total area in the less favoured area and with more than two-thirds of the total SO coming from sheep and beef cattle together.

Dairy farms: Farms where the dairy enterprise, including followers, accounts for over two-thirds of the total SO.

Cereal farms: Farms where cereals, oilseeds, peas, and beans harvested dry account for more than two-thirds of the total SO.

General cropping farms: Farms with over two-thirds of the total SO coming from arable crops (including field scale vegetables) or a mixture of arable and horticulture crops; and where arable crops account for more than one third of total SO and no other group account for more than one third.

Specialist Pig farms: Farms on which pigs account for over two-thirds of the total SO.

Specialist Poultry farms: Farms on which poultry account for over two-thirds of the total SO.

Horticulture farms: Other farms where over two-thirds of the total SO comes from fruit, hardy nursery stock, glasshouse flowers and vegetables, market-garden-scale vegetables and outdoor bulbs and flowers.

Mixed farms: Farms where crops account for one-third, but less than two-thirds of the total SO and livestock accounts for one-third but less than two-thirds of total SO. It includes holdings with mixtures of cattle, sheep, pigs and poultry, and holdings where one or other of these groups is dominant.

Scotland farm types
Specialist sheep (mainly hard hill): Farms in the less favoured areas with more than two-thirds of the total Standard output coming from sheep.

Specialist beef (LFA): Farms in the less favoured areas with more than two-thirds of the total standard output coming from beef cattle.

Cattle and sheep (LFA): Farms in the less favoured areas with more than two-thirds of the total standard output coming from beef cattle and sheep together.

Dairy: Farms where more than two-thirds of the total standard output comes from dairy cows.

Specialist cereals: Farms where more than two-thirds of the total standard output comes from cereals and oilseeds.

General cropping: Farms where more than two-thirds of the total standard output comes from all crops.

Mixed: Farms where no enterprise contributes more than two-thirds of the total standard output.

Definition of Terms

Enterprise output
Returns for an enterprise plus the value of transfers out and the value of produce used or consumed for which no cash is receivable (by the business) less expenditure on, and the value of transfers in of livestock.

Agri-environmental payments have been detailed in the English data however this was not available for Scotland. Subsidy output and diversification surplus is shown separately from enterprise output.

Variable costs
Those costs, which can both be readily allocated to a specific enterprise and will vary in approximately direct proportion to changes in the scale of that enterprise. Examples of variable costs are:

- Seeds, fertilisers, and lime.
- Sprays and sundry crop expenses.
- Concentrate feeding stuffs (purchased or home-grown).
- Sundry livestock expenses (vet, medicine, tags etc). Purchases of livestock are not treated as variable costs but deducted in the calculation of the appropriate enterprise outputs.

Gross margin
The Gross Margin is the Total Farm Output less the sum of Variable Costs of the business enterprises.

Fixed costs
Examples of fixed costs include:

- Labour - regular and casual labour.
- Power and machinery - repairs, fuel (including drying fuel), oil, electricity, contracting, crop and livestock haulage, machinery leasing and hire.
- Overheads - property repairs, rates, insurance, and miscellaneous (e.g., office expenses).
- Depreciation * - machinery and property depreciation
- Rent and finance - interest (bank, HP, and loans) and rent (excluding keep)

* *Machinery depreciation is calculated on a replacement cost basis. Rates of depreciation are intended to reflect the degree of deterioration of the asset.*

England - LFA Grazing Livestock Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Crops	2,300	4,800	2,600
Livestock	33,100	71,000	111,500
Agri-environment	2,000	9,000	31,400
Other	1,535	4,151	4,500
	38,935	88,951	150,000
VARIABLE COSTS			
Crop Specific Costs	2,800	5,900	6,300
Livestock Specific Costs	17,900	30,500	40,900
Contract costs	2,500	4,200	6,100
Casual labour	400	2,200	5,000
Sundry costs	61	140	123
	23,661	42,940	58,423
GROSS MARGIN	15,274	46,011	91,577
FIXED COSTS			
Labour	700	3,114	10,800
Power and machinery	12,720	17,268	22,500
Overheads	16,700	23,800	32,600
	30,120	44,182	65,900
FARM BUSINESS INCOME	-14,846	1,829	25,677
(excl. BPS and diversification)			
BPS	11,200	23,300	47,900
Diversification surplus	1,000	2,700	5,000
FARM BUSINESS INCOME	- 2,646	27,829	78,577
Farm Business Income £/ha	- 37	193	272
No. of farms in sample	31	109	62
Average farm size (ha)	71	144	289
No. of ewes	194	361	610
No. of breeding cows	13	26	27

England - Lowland Grazing Livestock Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Crops	2,800	6,900	16,000
Livestock	31,700	55,900	92,200
Agri-environment	2,000	4,400	8,600
Other	2,800	6,300	10,100
	39,300	73,500	126,900
VARIABLE COSTS			
Crop Specific Costs	3,600	6,100	8,900
Livestock Specific Costs	15,500	23,900	32,900
Contract costs	3,500	5,000	7,500
Casual labour	400	1,200	1,600
Sundry costs	11	382	134
	23,011	36,582	51,034
GROSS MARGIN	16,289	36,918	75,866
FIXED COSTS			
Labour	2,800	1,500	6,300
Power and machinery	14,438	16,788	19,856
Overheads	20,900	23,900	31,000
	38,138	42,188	57,156
FARM BUSINESS INCOME	-21,849	- 5,270	18,710
(excl. BPS and diversification)			
BPS	9,400	14,400	22,000
Diversification surplus	1,000	6,800	11,200
FARM BUSINESS INCOME	-11,449	15,930	51,910
Farm Business Income £/ha	- 185	202	396
No. of farms in sample	46	134	105
Average farm size (ha)	62	79	131
No. of ewes	97	107	262
No. of breeding cows	18	24	24

England - Dairy Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Crops	17,400	36,200	36,900
Livestock	295,000	635,400	611,300
Agri-environment	5,000	6,400	7,100
Other	3,600	18,600	6,500
	321,000	696,600	661,800
VARIABLE COSTS			
Crop Specific Costs	19,900	39,800	34,600
Livestock Specific Costs	151,400	287,400	218,100
Contract costs	18,300	43,600	28,000
Casual labour	3,600	7,100	7,400
Sundry costs	24	370	22
	193,224	378,270	288,122
GROSS MARGIN	127,776	318,330	373,678
FIXED COSTS			
Labour	25,200	68,200	50,900
Power and machinery	48,519	78,600	65,121
Overheads	70,400	127,600	97,200
	144,119	274,400	213,221
FARM BUSINESS INCOME	- 16,343	43,930	160,457
(excl. BPS and diversification)			
BPS	19,900	33,400	33,200
Diversification surplus	2,200	1,700	9,300
FARM BUSINESS INCOME	5,757	79,030	202,957
Farm Business Income £/ha	52	462	1,166
No. of farms in sample	68	98	55
Average farm size (ha)	111	171	174
No. dairy cows	113	213	217

England - Cereal Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Crops	95,900	198,400	299,500
Livestock	6,200	7,300	9,700
Agri-environment	2,100	6,900	11,100
Other	8,350	29,507	54,700
	112,550	242,107	375,000
VARIABLE COSTS			
Crops specific costs	46,100	74,100	99,300
Livestock specific costs	4,200	4,000	3,800
Contract costs	10,800	24,700	21,900
Casual labour	2,200	1,900	4,900
Sundry costs	294	1,800	2,800
	63,594	106,500	132,700
GROSS MARGIN	48,956	135,607	242,300
FIXED COSTS			
Labour	8,863	19,600	19,278
Power and machinery	37,104	47,838	54,718
Overheads	46,600	73,100	84,400
	92,567	140,538	158,396
FARM BUSINESS INCOME	- 43,611	- 4,931	83,904
(excl. BPS and diversification)			
BPS	24,700	41,500	58,700
Diversification surplus	3,600	21,700	39,800
FARM BUSINESS INCOME	- 15,311	58,269	182,404
Farm Business Income £/ha	-111	272	633
No. of farms in sample	69	182	90
Average farm size (ha)	138	214	288
Cereals (ha)	67	135	155

England - General Cropping Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Crop	120,800	339,400	402,700
Livestock	3,500	12,500	16,900
Agri-environment	2,300	6,700	7,500
Other	8,900	40,610	42,546
	135,500	399,210	469,646
VARIABLE COSTS			
Crop specific costs	56,100	132,500	133,100
Livestock specific costs	2,400	7,100	4,500
Contract costs	14,200	29,800	26,400
Casual labour	9,500	19,100	4,600
Sundry costs	88	100	1,080
	82,288	188,600	169,680
GROSS MARGIN	53,212	210,610	299,966
FIXED COSTS			
Labour	15,501	35,300	32,200
Power and machinery	33,118	73,136	83,183
Overheads	42,489	109,300	107,100
	91,108	217,736	222,483
FARM BUSINESS INCOME	- 37,896	- 7,126	77,483
(excl. BPS and diversification)			
BPS	19,100	43,300	61,800
Diversification surplus	3,800	19,400	29,700
FARM BUSINESS INCOME	- 14,996	55,575	168,983
Farm Business Income £/ha	- 144	239	535
No. of farms in sample	27	83	36
Average farm size (ha)	104	233	316
Cereals (ha)	38	98	124
Potatoes (ha)	5	9.9	10
Other crops (ha)	45	84	116

England - Specialist Pig Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Crops	-	66,200	53,800
Livestock specific costs	-	723,300	498,200
Agri-environment	-	2,200	4,700
Other	-	8,308	58,200
	-	800,008	614,900
VARIABLE COSTS			
Crop specific costs	-	22,700	15,600
Livestock specific costs	-	486,400	138,300
Contract costs	-	21,400	7,000
Casual labour	-	3,100	900
Sundry costs	-	77	13,515
	-	533,677	175,315
GROSS MARGIN	-	266,331	439,585
FIXED COSTS			
Labour	-	88,300	102,100
Power and machinery	-	78,859	86,122
Overheads	-	121,360	79,800
	-	288,519	268,022
FARM BUSINESS INCOME	-	- 22,188	171,563
(excl. BPS and diversification)			
BPS	-	15,500	12,400
Diversification surplus	-	11,300	9,300
FARM BUSINESS INCOME	-	4,612	193,263
Farm Business Income £/ha	-	47	2,247
No. of farms in sample	-	41	19
Average farm size (ha)	-	98	86
No. of sows	-	248	134
No. of other pigs	-	3,191	4,030

England - Specialist Poultry Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Crop	9,600	49,400	134,500
Livestock	137,600	994,700	981,600
Agri-environment	600	3,400	2,100
Other	5,900	6,600	7,000
	153,700	1,054,100	1,125,200
VARIABLE COSTS			
Crop Specific Costs	2,700	19,500	52,400
Livestock Specific Costs	131,000	687,400	582,900
Contract costs	6,400	15,400	29,300
Casual labour	7,100	6,800	9,400
Sundry costs	66	103	7
	147,266	729,203	674,007
GROSS MARGIN	6,434	324,897	451,193
FIXED COSTS			
Labour	18,100	68,200	63,901
Power and machinery	19,402	60,977	63,545
Overheads	77,137	175,140	142,828
	114,639	304,317	270,274
FARM BUSINESS INCOME	-108,205	20,580	180,919
(excl. BPS and diversification)			
BPS	3,600	12,500	26,700
Diversification surplus	21,400	35,100	47,200
FARM BUSINESS INCOME	- 83,205	68,180	254,819
Farm Business Income £/ha	- 3,200	1,003	1,807
No. of farms in sample	17	47	25
Average farm size (ha)	26	68	141
No. hens and pullets in lay	10,262	23,081	16,280
Other poultry	855	68,250	106,156

England - Horticulture Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Crop	52,500	485,700	393,400
Livestock	6	700	400
Agri-environment	11	1,500	600
Other	3,200	9,028	12,700
	55,717	496,928	407,100
VARIABLE COSTS			
Crop Specific Costs	24,700	206,600	119,100
Livestock Specific Costs	4	500	100
Contract costs	1,500	10,900	4,600
Casual labour	6,800	70,300	36,200
Sundry costs	-	409	1
	33,004	288,709	160,001
GROSS MARGIN	22,713	208,219	247,099
FIXED COSTS			
Labour	13,400	89,209	69,001
Power and machinery	8,073	38,510	25,510
Overheads	21,600	63,250	48,183
	43,073	190,969	142,694
FARM BUSINESS INCOME *(excl. BPS and diversification)*	-20,360	17,250	104,405
BPS	1,000	6,200	2,200
Diversification surplus	5,700	14,900	42,000
FARM BUSINESS INCOME	-13,660	38,350	148,605
Farm Business Income £/ha	- 1,518	1,036	7,821
No. of farms in sample	26	87	34
Average farm size (ha)	9	37	19

England - Mixed Farms

	Lower £/farm	Average £/farm	Higher £/farm
OUTPUT			
Crops	33,600	95,600	187,500
Livestock	40,800	131,600	124,400
Agri-environment	3,700	6,300	15,700
Other	7,900	10,800	25,500
	86,000	244,300	353,100
VARIABLE COSTS			
Crop specific costs	16,200	41,900	67,100
Livestock specific costs	28,800	81,000	54,100
Contract costs	6,100	13,900	23,400
Casual labour	900	2,100	3,300
Sundry costs	73	883	1,000
	52,073	139,783	148,900
GROSS MARGIN	33,927	104,517	204,200
FIXED COSTS			
Labour	6,000	22,225	26,884
Power and machinery	22,349	45,813	64,596
Overheads	30,500	60,400	77,900
	58,849	128,438	169,380
FARM BUSINESS INCOME	- 24,922	- 23,921	34,820
(excl. BPS and diversification)			
BPS	14,200	30,200	49,900
Diversification surplus	3,300	11,500	44,800
FARM BUSINESS INCOME	- 7,422	17,779	129,520
Farm Business Income £/ha	- 82	110	516
No. of farms in sample	31	83	49
Average farm size (ha)	90	162	251
No. of ewes	81	149	185
No. of breeding cows	10	16	22
No. of dairy cows	0.6	7.8	0
No. of sows	2	5.3	7.8
Cereals (ha)	24	71	109

Scotland - Specialist Sheep (LFA) Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	44,778	383	52
Crops	510	4	1
Subsidies	31,489	269	38
Diversification surplus	776	7	1
Other	7,507	64	9
	85,060	726	100
VARIABLE COSTS			
Livestock expenses	21,861	187	27
Crop expenses	2,404	21	2
	24,265	209	29
GROSS MARGIN	60,795	517	71
FIXED COSTS			
Labour	8,020	69	9
Power and machinery	6,750	58	8
Overheads	12,805	109	15
Depreciation	10,212	87	12
Rent and finance	1,317	11	2
	39,104	333	46
FARM PROFIT	21,691	184	26
No. of farms in sample	7		
Average farm size (ha)	117		
No. of ewes	544		
No. of breeding cows	-		

Scotland - Specialist Beef (LFA) Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	80,074	732	59
Crops	8,551	78	6
Subsidies	33,810	309	24
Diversification surplus	3,972	36	3
Other	11,637	106	8
	138,050	1,261	100
VARIABLE COSTS			
Livestock expenses	27,597	252	19
Crop expenses	12,644	116	9
	40,241	368	28
GROSS MARGIN	97,809	893	72
FIXED COSTS			
Labour	3,862	35	3
Power and machinery	17,387	159	13
Overheads	16,667	152	12
Depreciation	21,445	196	16
Rent and finance	2,804	26	2
	62,165	568	46
FARM PROFIT	35,644	325	26
No. of farms in sample	23		
Average farm size (ha)	109		
No. of ewes	184		
No. of breeding cows	62		

Scotland - Cattle and Sheep (LFA) Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	60,848	483	49
Crops	1,134	9	2
Subsidies	37,003	293	30
Diversification surplus	2,604	21	2
Other	20,281	161	17
	121,870	966	100
VARIABLE COSTS			
Livestock expenses	26,783	212	21
Crop expenses	5,865	46	5
	32,648	259	26
GROSS MARGIN	89,222	707	74
FIXED COSTS			
Labour	6,078	48	5
Power and machinery	15,238	121	13
Overheads	14,321	114	12
Depreciation	21,034	167	17
Rent and finance	3,399	27	3
	60,070	477	50
FARM PROFIT	29,152	230	24
No. of farms in sample	13		
Average farm size (ha)	126		
No. of ewes	376		
No. of breeding cows	34		
No. of other cattle	41		

Scotland - Dairy Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	587,310	3,094	92
Crops	7,420	39	1
Subsidies	39,683	209	6
Diversification surplus	515	3	-
Other	7,969	42	1
	642,897	3,387	100
VARIABLE COSTS			
Livestock expenses	206,790	1,089	33
Crop expenses	30,485	161	4
	237,275	1,249	37
GROSS MARGIN	405,622	2,138	63
FIXED COSTS			
Labour	64,615	340	10
Power and machinery	69,586	367	11
Overheads	40,235	212	6
Depreciation	61,695	325	10
Rent and finance	16,812	89	3
	252,943	1,333	40
FARM PROFIT	152,679	805	23

No. of farms in sample	10
Average farm size (ha)	190
No. of dairy cows	221
Output yield per dairy cow (lt)	7,810
Revenue value (ppl)	29.10

Scotland - Specialist Cereal Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	2,757	19	1
Crops	175,924	1,236	60
Subsidies	30,850	217	11
Diversification surplus	16,501	116	6
Other	64,527	453	22
	290,559	2,042	100
VARIABLE COSTS			
Livestock expenses	721	5	-
Crop expenses	57,060	400	19
	57,781	405	19
GROSS MARGIN	232,778	1,637	81
FIXED COSTS			
Labour	11,485	81	4
Power and machinery	32,418	228	11
Overheads	23,426	165	8
Depreciation	43,167	303	15
Rent and finance	6,517	46	2
	117,013	823	40
FARM PROFIT	115,765	814	41
No. of farms in sample	11		
Average farm size (ha)	142		
Cereals (ha)	98		

Scotland - General Cropping Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	3,833	25	2
Crops	174,572	1,141	70
Subsidies	33,373	218	13
Diversification surplus	14,977	98	6
Other	21,258	139	9
	248,013	1,620	100
VARIABLE COSTS			
Livestock expenses	1,744	11	1
Crop expenses	50,481	330	20
	52,224	342	21
GROSS MARGIN	195,789	1,278	79
FIXED COSTS			
Labour	3,597	24	1
Power and machinery	41,718	273	17
Overheads	23,178	151	9
Depreciation	39,253	257	16
Rent and finance	6,001	39	2
	113,747	744	45
FARM PROFIT	82,042	534	34
No. of farms in sample	8		
Average farm size (ha)	153		
Cereals (ha)	84		
Potatoes (ha)	5		
Other crops (ha)	8		

Scotland - Mixed Farms

	£/farm	Upper 25% £/adj. ha	% output
OUTPUT			
Livestock	120,349	792	43
Crops	90,650	596	33
Subsidies	38,545	253	14
Diversification surplus	9,054	60	3
Other	18,821	124	7
	277,419	1,823	100
VARIABLE COSTS			
Livestock expenses	48,227	317	17
Crop expenses	37,160	244	13
	85,387	561	31
GROSS MARGIN	192,032	1,262	69
FIXED COSTS			
Labour	9,166	60	3
Power and machinery	29,557	194	11
Overheads	23,361	154	8
Depreciation	42,450	279	15
Rent and finance	5,354	35	2
	109,888	722	40
FARM PROFIT	82,144	540	30

No. of farms in sample	23
Average farm size (ha)	152
No.of ewes	101
No. of breeding cows	50
No. of other cattle	139
Cereals (ha)	56

Rural Aid Schemes

Introduction

Following the UK's departure from the EU, support schemes are being funded by the UK Government and the devolved administrations rather than being funded by the EU.

Over the next few years, UK administrations will implement transition periods whereby direct payments will be phased out and new policies and support frameworks will be put in place. The following sections provide an overview of the current schemes for each UK administration, with an indication of potential changes for the future. Relevant government websites should be viewed for more detailed information and up-to-date guidance.

Scotland

As part of the eligibility for some rural aid schemes livestock units are used by the Scottish Government to calculate stocking densities, these are as follows:

Type of stock	Livestock units (per head)
Beef cows (including suckling calves)	1.0
Dairy cows used for milk production	1.0
Other cattle (24 months and over)	1.0
Other cattle (6-24 months)	0.6
Ewes and gimmers (including suckling lambs)	0.15
Ewe hoggs	0.15
Other sheep	0.15
Goats (over 6 months old)	0.15
Alpacas (over 6 months old)	0.30
Farmed deer - stags (over 27 months)	0.40
Farmed deer - hinds, including suckling calves (over 27 months)	0.30
Farmed deer - juveniles (6-27 months)	0.20

The calculations of stocking densities using these figures should be carried out with the same methodology as is detailed on page 114.

Single Application Form

The Single Application Form (SAF) is the form that must be completed in order to claim payments under the following schemes:

- Basic Payment Scheme, including Greening and Young Farmer payments.
- Scottish Suckler Beef Support Scheme (Mainland and Islands).
- Scottish Upland Sheep Support Scheme.
- Less Favoured Area Support Scheme (LFASS).
- Agri-Environment Climate Scheme – annual recurrent options.
- Forestry Grant Scheme – annual maintenance and management grants.

- Rural Development Contracts – Rural Priorities annual recurrent options.

The SAF should be submitted online via Rural Payments and Services. A hand-written paper SAF will only be considered by RPID following a written request to the local area office stating the exceptional circumstances that prevent you or a mandated representative from submitting an online application. The deadline for submitting applications is generally the 15th of May each year.

The SAF is a declaration of all the permanent and seasonal agricultural and non-agricultural land parcels farmed. Information declared includes:

- Areas of crops grown, on an individual land parcel basis, used to claim the Basic Payment Scheme and LFASS.
- EFA options and areas used to meet greening requirements.
- Agri-Environment Climate Scheme, Forestry Grant Scheme and Rural Development Contracts options and areas.
- Livestock numbers on the holding on 1 March.

Within the SAF, there is also the option to claim for Young Farmer Payment, LFASS and the National Reserve.

The Scottish Government introduced legislation in November 2019 which proposes to keep farm support approaches broadly the same until 2024 i.e. during the transition period. However, within this period, they have been seeking to streamline the process of applying for payments and have and will be operating some Pilot schemes.

Direct Payments

Direct Payment schemes implemented in Scotland in the 2022 scheme year included the Basic Payment Scheme (BPS), Young Farmer Scheme, National Reserve and Voluntary Coupled Support (i.e. Scottish Suckler Beef Support Scheme (Mainland and Islands) and Scottish Upland Sheep Support Scheme).

Basic Payment Scheme

To take part in the BPS and receive funding farmers and crofters need to:

- Be an active farmer and be involved in agricultural activity.
- Hold BPS entitlements.
- Submit a claim via a Single Application Form (SAF).
- Farm a minimum of three hectares of eligible land and have this land at their disposal on 15 May of the claim year.
- Have one eligible hectare of land for each BPS entitlement.
- Comply with Greening and a range of Statutory Management Requirements (SMRs) and standards on Good Agricultural and Environmental Condition (GAEC) i.e. Cross Compliance.
- Keep comprehensive, accurate, and up-to-date records.

Active farming

Applicants to the BPS must meet the definition of a 'farmer' i.e. be a natural or legal person (or a group of natural or legal persons) whose holding/production units is/are situated within Scotland. They must also exercise an agricultural activity, for example the production, rearing or growing of agricultural products including harvesting, milking, breeding animals and keeping animals for farming purposes.

If the farmer or crofter has land that is naturally kept in a state suitable for cultivation and grazing, there are rules on exercising a minimum activity which must also be met, see page 471.

Entitlements

Based on the areas of eligible land claimed on the 2015 SAF, BPS Regions 1, 2 and 3 entitlements were allocated to eligible farmers and crofters. For Payment Regions 2 and 3 farmers were allocated 10% fewer entitlements than the area of land declared, this is due to a reduction co-efficient having been applied. Further information about the Payment Regions can be found in the following section.

All BPS entitlements must be used in at least one year out of two.

Eligible New Entrants to farming can apply to the National Reserve for entitlements; other farmers and crofters can obtain entitlements by purchasing, leasing, inheriting them or due to whole holding transfers, business splits or mergers. Entitlements can be transferred by sale or lease, with or without land to another active farmer.

Payment regions and rates

Land parcels in Scotland are allocated to one of three payment regions:

Payment Region	Land use category
1	Arable, temporary and permanent grass.
2	Rough grazing designated as LFA grazing category B, C or D and non-LFA rough grazing land.
3	Rough grazing designated as LFA grazing category A.

Farmers and crofters receive the same Basic Payment (BP) entitlement value per payment region.

The Greening payment rates remain the same for all farmers and crofters depending on the payment region.

The actual entitlement value for each year will be worked out once the total number of hectares of eligible land claimed for in each payment region is known and the overall budget for that period will be divided up according to the hectares claimed. The payment rates for 2021 are shown in the following table. 2022 rates are expected to be announced in November 2022.

Payment Region	2021 BPS rate (€/ha)	2021 Greening rate (€/ha)	2021 Combined rate (£/ha)*
1	164.52	84.82	222.14
2	36.27	14.34	45.09
3	10.54	4.82	13.68

* *based on euro/sterling exchange rate of €1 = £0.89092*

BPS and greening payments are made in sterling.

Minimum activity

The minimum agricultural activities farmers or crofters must undertake to make the land eligible for the BPS is related to the Payment Region(s) applicable to the land, as follows:

Payment Region 1:

- Where agricultural production activities are undertaken these can include the production, rearing or growing of agricultural products including harvesting, milking, breeding animals and keeping animals for farming purposes.
- Where no agricultural production activities are undertaken, the land must be maintained in a state suitable for grazing or cultivation, i.e. take action to control injurious weeds and maintain access for livestock or machinery. On permanent grassland, demonstrate the maintenance of existing stock-proof boundaries and water sources for livestock; whilst on arable land, take action to prevent encroachment of scrub.

Payment Regions 2 and 3:

- The normal minimum agricultural activity is to undertake an average level of stocking of 0.05LU/ha on all hectares for 183 days in each scheme year, or where justified, a lower minimum stocking density, in terms of numbers or period, which is in line with the carrying capacity of the land or as a result of an environmental management agreement may be acceptable.
- As an alternative to minimum stocking levels, an annual Environmental Assessment can be carried out.

Capping

Capping is the reduction of payments above a certain level. All Basic Payment Scheme and Voluntary Coupled Support Scheme payments are capped at €600,000; payments over €150,000 will be reduced by 5%.

The Scottish Government has the option to make amendments to capping and may make changes during the transition period.

Greening

Permanent grassland - the area of permanent grassland must be maintained, i.e. the ratio of permanent grassland compared to the total agricultural area declared must not decrease by more than 5%; this is managed at a national level. At the individual farm level, Environmentally Sensitive Grassland Areas must not be converted to arable production.

Applicants must prepare a Nitrogen Fertiliser and Lime Plan detailing how much inorganic nitrogen fertiliser and lime for land parcels that contain permanent grassland (PGRS) or open grazed woodland (WDG). Parcels that also contain areas of arable and/or rough grazing do not need to be included. The plan must be prepared by 9 June each year, retained on the farm and made available on request to any inspector as part of the land inspection or validation of the SAF.

Ecological Focus Areas (EFAs) - businesses with more than 15 hectares of arable land need to ensure that 5% of this land is managed as EFA unless the exemptions below apply:

- Land certified as organic or in organic conversion.
- Businesses where more than 75% of the arable land is used to grow temporary grass, herbaceous forage, leguminous crops, or fallow.
- Businesses where more than 75% of eligible agricultural area is permanent or temporary grass or herbaceous forage.

There are seven EFA options that can be used in Scotland to contribute to farmer's or crofter's EFA commitments. Each option must be located on, adjacent to, or within five metres of arable land and be weighted according to the level of environmental benefit they deliver, see below.

EFA option		Location	Weighting factor	EFA area
Fallow land	(/ha)	On arable land	1	1ha
Margins	(/ha)	On, adjacent to, or within 5m of arable land or contiguous to a claimed EFA option	1.5	1.5ha
Nitrogen-fixing crops	(/ha)	On arable land	0.7	0.7ha
Catch crop	(/ha)	On arable land	0.3	0.3ha
Green cover	(/ha)	On arable land	0.3	0.3ha
Agro-forestry land	(/ha)	Eligible land	1	1ha
Hedges – right to claim whole hedge	(/1m)	On, adjacent to or within 5m of arable land or contiguous to a claimed EFA option	10	10m^2
Hedges – right to claim half hedge	(/1m)	On, adjacent to or within 5m of arable land or contiguous to a claimed EFA option	5	5m^2

Full details on Scottish greening measures and requirements can be found at the following webpage: https://www.ruralpayments.org/topics/all-schemes/basic-payment-scheme/basic-payment-scheme-full-guidance/

Young Farmer Payment
Under the current Scheme rules, young farmers are entitled to a top-up payment of 25% of the average value of BP entitlements.

To qualify the applicant must be:

- A sole trader or head of the farm business and be less than 41 years of age on 31 December of the first year they apply to the BPS. For businesses where the young farmer is head of the business, this means that the applicant is the main shareholder/partner in the business, takes the majority share of any profits and makes the key business decisions.

The Young Farmer payment is applied for on the SAF and evidence of eligibility also needs to be submitted i.e. date of birth, % share of business profits. The payment is limited to 90 hectares.

National Reserve
The National Reserve is used to allocate BPS entitlements to eligible:

- Young farmers - farmers or crofters who are less than 41 years of age on 31 December in the year of application and are setting up for the first time an agricultural holding as head of the holding.
- New entrants - farmers or crofters who started their farming activity in 2013 or later, who have not had any agricultural activity in their own name or at their own risk in the five years before the start of their current farming action.

There is no paper application for the National Reserve; applications are completed online at the same time as the SAF.

BPS entitlements awarded from the National Reserve must, over a two-year period, be used in at least one year.

Voluntary Coupled Support (VCS)
The Scottish Government use coupled payments to support the beef and sheep sectors. To claim for coupled payments applicants must complete a SAF each year; the Main Location Code used in the coupled payments claim forms must be the same as the one on the SAF.

Scottish Suckler Beef Support Scheme - Mainland and Islands (SSBSS)
Payments are made on owned or leased homebred calves that are at least 75% beef bred. The calves must be born on or after 2 December in the year before the claim is made and remain on the holding of birth for at least 30 days. The payment rates for the 2021 scheme year were as follows:

£/calf		
	Mainland	***Islands***
2021	103.48	146.87

Claims can be made online or by post until 31 December each year.

Scottish Upland Sheep Support Scheme (SUSSS)
To qualify for the scheme, 80% or more of the agricultural land must be in Payment Region 3 and less than 200ha of the agricultural land must be in Payment Region 1. Payments are made on homebred ewe hoggs that are retained on the holding (including away wintering) from 1st December in the year claimed to 31 March the following year. Ewe hoggs must be less than 12 months old at the start of the retention period. The payment rate for the 2021 scheme year was as follows:

	£/hogg
2021*	61.65

* *based on euro/sterling exchange rate of 0.89092*

Claims can be made online or by post between 1 September and 30 November each year.

Rural Development Programme
The Scottish Rural Development Programme (SRDP) will continue to be used to enhance the rural economy, support agricultural businesses, protect and improve the natural environment, address the impact of climate change, and support rural communities.

Current schemes under the SRDP are detailed in the following pages. Full details of the schemes, including further information on payments rates and application deadlines can be found at: https://www.ruralpayments.org/topics/all-schemes/

Less Favoured Area Support Scheme (LFASS)
LFASS is an area-based scheme claimed for on the SAF at the same time as claiming for the BPS and is paid to applicants who actively farm forage land in the LFA area which has been given a grazing category. The main eligibility criteria include:

- Declaring at least three hectares of eligible land on the SAF.
- Actively farming land declared on the SAF for at least 183 days or periods totalling 183 days in the year of claim. To count as forage this land must be available and accessible for use for maintaining livestock or producing a forage crop for at least seven months including 15 May.

The LFASS payment is calculated by adjusting the eligible (claimed) land from the SAF to work out a payable area. This payable area is then multiplied by the payment rate(s) for farmers and crofters fragility area.

Grazing categories are set based on historical stocking densities for the land being claimed and are fixed. The categories are:

Category	Stocking density (LU/ha)	Hectare value	Minimum stocking density (LU/ha)	Maximum stocking density (LU/ha)
A	up to 0.19	0.167	0.09	1.4
B	0.20 - 0.39	0.333	0.15	1.4
C	0.40 - 0.59	0.667	0.30	1.4
D	0.60 or more	0.800	0.45	1.4

An enterprise mix multiplier is used as a way of recognising the environmental benefits of a mixed stocking regime. Hectares claimed are multiplied by 1.35 if at least 10% but less than 50% of livestock units are cattle or 1.7 if 50% or more of livestock units are cattle. This multiplier rate also remains fixed.

LFASS payment rates are designated based on land category as well as grazing categories. The provisional 2022 payment rates are given below:

Land category	Standard[1]	Fragile[2]	Very fragile[3]
	payment per adjusted hectare (£)		
More disadvantaged land (grazing categories A and B)	52.16	62.10	71.35
Less disadvantaged land (grazing categories C and D)	34.12	54.51	63.00

1 Standard areas on the mainland with lower transport costs
2 Fragile areas on the mainland where there is disadvantage resulting from higher transport costs
3 Very fragile areas on islands

An example calculation is shown below for illustrative purposes.

Assumptions:

- Farm in Standard area
- Less disadvantaged land, grazing category D
- 600ha eligible land declared on SAF
- Historic stocking density 0.5 LU/ha, 100% cattle

	eligible hectares from SAF		600 ha
x	hectare value for Cat D	x	0.80
=	adjusted hectares	=	480 ha
x	the enterprise uplift	x	1.7
=	payable hectares	=	816 ha
x	standard less disadvantaged rate	x	34.12
=	final payment pre deductions	=	£26,242.56

For further detail see full scheme guidance at:
https://www.ruralpayments.org/topics/all-schemes/lfass/

Agri-Environment Climate Scheme

The Agri-Environment Climate Scheme (AECS) promotes land management practices which protect and enhance Scotland's magnificent natural heritage, improve water quality, manage flood risk, improve public access, preserve historic sites and mitigate and adaption to climate change.

The main 2022 application round which closed on the 29th of April 2022 included support payments for conversion to and maintenance of organic land, alongside a suite of other measures aimed at promoting low carbon farming and protecting the environment. Most Agri-environment applications require a full Farm Environment Assessment (FEA) covering the entire holding.

Many Agri-Environment-Climate Scheme management options are spatially targeted in order to make them available in the locations where they will deliver the greatest benefit. To find out what management options are available for your holding, please see online at:
http://targeting.ruralpayments.org/

AECS is expected to continue until 2024, subject to future budgetary decisions. Details of the Management and Capital options and payment rates can be found at:
https://www.ruralpayments.org/topics/all-schemes/agri-environment-climate-scheme/

Sustainable Agriculture Capital Grant Scheme (SACGS)

The Sustainable Agriculture Capital Grant Scheme (SACGS) provides support to businesses to invest in equipment to reduce harmful ammonia emissions and reduce adverse impacts on water quality resulting from the storage and spreading of livestock slurry and digestate.

The main objectives/expected outcomes of the scheme is to support Scotland's statutory emissions reductions targets through:

- protecting and improving the natural environment,
- reducing ammonia emissions from farming operations,
- supporting sustainable farming, and
- supporting sustainable land use

Under the scheme rules, the maximum amount of aid a single farm business can receive is £20,000. The standard grant rate is 40%. For eligible businesses in the Highlands and Islands (HIE area), to acknowledge the higher cost involved with transporting goods to these areas, the grant rate is 50%. Only one application and claim is allowed per business/Business Reference Number (BRN) per funding round. Applicants are required to have obtained or agree to obtain a Carbon Audit or Nutrient Management Plan at the point of claiming their grant.

The 2022 SACGS application period closed on the 1st of June 2022. Grant claims together with supporting evidence of the capital goods purchased must be submitted by 28 February 2023.

Further scheme details are available online at:
https://www.ruralpayments.org/topics/all-schemes/sustainable-agriculture-capital-grant-scheme--sacgs-/

Forestry Grant Scheme (FGS)
Funding is available for woodland creation, agroforestry, tree health, woodland improvement, sustainable management of forests, harvesting, and processing of forest products, forest infrastructure and co-operation (Please see Forestry and Farm Woodlands section on page 305 for more details).

Crofting Agricultural Grant Scheme
This scheme provides grants for crofters to make improvements to their crofts and help to sustain their businesses. Funds can be used for capital projects, such as the construction or improvement of agricultural buildings and for the establishment of Common Grazings Committees. Funding for eligible capital projects can cover all aspects of the project, including the cost of materials, transportation of materials, costs of contractors and own labour. See pages 272-273 for more detail.

Croft House Grant Scheme
This scheme provides grants for crofters to improve and maintain the standards of crofter housing, with the aim of attracting and retaining people within the crofting areas of Scotland. Funding can be used for the construction of a new house and the rebuilding and improvement of an existing house. See pages 273-275 for more detail.

Small Farms Support Scheme
This scheme provides support to eligible farmers or crofters for investments related to development, modernisation or adaptation of small farms, i.e. holdings that have between 3 and 30ha of eligible agricultural area. Funds can be used to erect or improve agricultural buildings, provision of slurry stores, field drainage, handling facilities, shelter belts, electrical equipment and for access. See page 273 for more detail.

Food Processing, Marketing and Co-operation Scheme
This scheme provides grant funding to businesses within the Scottish food and drink sector and supports Scotland's journey towards becoming a Good Food Nation. Through this scheme, applicants can apply for start-up grants for a new food processing business or development grants for an existing food processing business. Capital projects include the development and creation of food processing facilities, including buildings and equipment; and non-capital projects include marketing, running of co-operative ventures and improving supply-chain efficiency.

The 2022 funding round of the Food Processing Marketing and Cooperation Grant Scheme closed on the 19th of June 2022. As the FPMC now operates as a single year scheme, all projects awarded funding must be completed with all costs claimed by 31st March 2023.

Further scheme details are available on line at:
https://www.ruralpayments.org/topics/all-schemes/food-processing--marketing-and-co-operation/

SRDP Farm Advisory Service

The Farm Advisory Service (FAS) provides one-to-one and one-to-many advice and support, aimed at increasing the profitability and sustainability of farms and crofts.

The one-to-one component comprises of:

- Integrated land Management Plans (ILMPs)
- Specialist advice plans
- Mentoring of new entrants

Funding of 80% (up to a maximum of £1,200) is available to help cover the costs of the preparation of an ILMP. Additional funds of up to £2,000 are also available for two specialist advice plans.

The one-to-many component of the FAS delivers innovative and integrated advice to crofters and farmers via:

- Scotland wide events i.e. workshops, network farm meetings, conferences and training courses.
- Publications i.e. technical notes, newsletters.
- Crofts and small farms subscription service.
- A national advice line which operates between 9am and 5pm Monday to Friday (Tel: 0300 323 0161).

Women in Agriculture

The Scottish Government has committed £300,000 per year until 2024/25 to support women through implementing the recommendations of the Women in Agriculture Taskforce. The recommendations, contained in the Final Report of the Women in Agriculture Taskforce, are a series of practical actions to bring about cultural change within the agricultural industry. Women in Scottish agriculture can access financial support directly for practical skills training, by applying to the Women in Agriculture Practical Training Fund administered by Lantra. Further information can be found at: https://www.scotland.lantra.co.uk/women-agriculture-practical-training-fund

Future Support Payments for Scotland

National Test Programme and Preparing for Sustainable Farming

In October 2021, the Scottish Government announced that a National Test Programme (NTP) was being developed to support farmers and

crofters to play their part in Scotland becoming a global leader in sustainable and regenerative agriculture.

Preparing for Sustainable Farming (PSF), the first part of this Programme was launched in spring 2022 aimed at ensuring that when the new rural support regime is introduced, enhanced conditionality of at least half of all funding for farming and crofting will be integrated by 2025 and that as part of this conditionality, recipients of support payments will be expected to deliver on targeted outcomes for biodiversity gain and low emissions production.

As part of the recently published guidance on National Test Programme **(NTP): Track 1 – Preparing for Sustainable Farming (PSF)** the Scottish Government has announced support funding for:

- Carbon Audits
- Soil Sampling and Analysis

Carbon Audits: Businesses with an online Rural Payments and Services (RPS) account can apply for funding up to £500 for a carbon audit, if they do not already have one or it is more than 3 years old. Under the guidance notes, the carbon audit must be created using a recognised tool such as SAC's Agricultural Resource Efficiency Calculators (AgRE Calc (©) and be aligned to Publicly Available Specification PAS 2050 standard. The report must have carbon management and emissions mitigation recommendations for the business going forward.

Soil Sampling & Analysis: Businesses wishing to apply for funding for soil testing will need to have the land included in the current year's Single Application Form (SAF) and must confirm that they have a carbon audit that is less than three years old, and as noted above, using an approved tool and aligns to PAS 2050.

Funding of up to £30 per hectare for Region1 land is available for soil testing for pH, phosphate, potash, and carbon. Testing for pH and carbon can be at either sample or land parcel level. Testing for magnesium and trace elements is recommended, but voluntary.

Each year, applicants can apply for funding to soil test up to 20 percent of the available Region 1 land on the holding. The maximum will be determined by the SAF claim for the same year. To ensure all suitable farming/crofting businesses can benefit, a minimal soil sampling allowance of £300 will be available to small businesses whose area of Region 1 land means they would otherwise receive less than this amount. Analysis will be paid at cost plus an additional £4 per sample where gathering these is not included in the analysis cost.

To encourage all applicants to spend time researching best practice for soil sampling and nutrient management, a standard cost 'Development' payment of £250 will be paid to eligible businesses during the first soil

sampling claim process. Claims in subsequent years will not include a payment for development.

Through Track 1, suckler beef producers will also receive access to YourHerdStats, a new online tool within the ScotEID system that will securely present herd management information and highlight opportunities for further improvement.

For up to date details, please see online at https://www.ruralpayments.org/topics/all-schemes/preparing-for-sustainable-farming--psf-/preparing-for-sustainable-farming/

England

Direct Payments
Currently, Direct Payment Schemes implemented in England include the Basic Payment Scheme (BPS), Young Farmer Scheme and the National Reserve.

Basic Payment Scheme
The 2022 Scheme closed on the 16th of May 2022. The 2023 Scheme year is expected to open on the 15th of March 2023.

To apply to the BPS and receive funding eligible farmers need to:

- Submit a BPS application either online using the Rural Payments service or on paper using a BP5 application form by 15 May. Supporting documentation can be submitted until 11 June.
- Have at least five hectares of eligible land at their disposal on 15 May of the claim year.
- Declare one eligible hectare of land for each BPS entitlement.
- Qualify as an 'active farmer'.
- Follow Cross Compliance rules

Activity
Under the current scheme rules, to be eligible for the BPS farmers must undertake at least one of the following on their holding:

- Produce, rear, or grow agricultural products – including harvesting, milking, breeding animals and keeping animals for farming purposes.
- Keep some land in a state suitable for grazing or cultivation by keeping it clear of any scrub that cannot be grazed.

Payment Rates
As shown in the following table, the Basic Payment Scheme payments will be progressively reduced until 2028 when BPS payments will cease. Funds from the reduced payments will be invested back into new schemes to support farming and the countryside.

Payment Band - Deductions	2022	2023	2024	2025	2026	2027	2028
Up to £30,000	20%	35%	50%	65%	80%	95%	100%
£30,000 - £50,000	25%	40%	55%	70%	85%	100%	100%
£50,000 - £150,000	35%	50%	65%	80%	95%	100%	100%
More than £150,000	40%	55%	70%	85%	100%	100%	100%

Delinked Payments

Payments will be delinked from land from 2024. 'Delinked' payments will be made from 2024 through to 2027. To simplify the payment process, businesses will not need any land or entitlements to receive the payments. Delinked payments will be based on a business's BPS payments in the reference period (BPS 2020 to 2022 scheme years). Delinked payments for 2024 to 2027 scheme years will not be affected if a farm size changes, or if a business changes what the land is used for after BPS 2022. Businesses can receive delinked payments even if they choose to stop farming. However, businesses must claim, and be eligible for, BPS payments in the 2023 scheme year to receive delinked payments for 2024 to 2027. During this period businesses can also apply for any other schemes they are eligible for, including environmental land management schemes.

Entitlements

In England, as there is no longer the need for entitlements to be used once every two years; entitlements do not need to be sold or leased to avoid losing them. Entitlements can be transferred by sale or gift, by lease or sub lease, through inheritance or as part of a business merger or split. New and young farmers who do not have BPS entitlements can apply to the National Reserve for new entitlements or lease or purchase entitlements.

Payment Regions, Rates and Greening

England has three payment regions:

Payment Region	Land use category
1	Non-Severely Disadvantaged Area (NSDA)
2	Severely Disadvantaged Area (SDA)
3	SDA Moorland

English Basic Payment (BP) entitlement values for 2021 are illustrated overleaf; actual payment rates for 2022 will be worked out once the total number of hectares of eligible land claimed for in each region is known.

From the 2021 scheme year, all three greening requirements: crop diversification, Ecological Focus Areas and the greening permanent grassland rules were withdrawn. As a result, businesses will no longer receive a separate greening payment; the greening funds will be included in the value of BPS entitlements.

Payment Region	BPS 2021 incl. Greening
	£/ha
1 Non Severely Disadvantaged Area	233.30
2 Severely Disadvantaged Area	231.60
3 Severely Disadvantaged Areas Moorland	64.00

Payment rates are expected to be announced in November 2022. 2022 BPS payments will be made in sterling.

Young Farmer Scheme

Young farmers can apply for a top-up payment, equivalent to 17.5% of their entitlement values, limited to 90 hectares. To qualify for the payment, young farmers need to show that they:

- Are at least 18 years of age when they make their BPS application but not older than 40 years of age when the first successful BPS application was made.
- Are in 'control' of the farm business that is applying for the BPS.
- Set up or took 'control' of their business for the first time during the five years preceding their first BPS application.

Young farmers can apply for the payment each year, via their BPS application, for a maximum of five years starting from the year in which they first claimed the Young Farmer Payment, provided that the first application was made within five years of them starting or taking control of their business.

To qualify as in 'control' of the farm business, the young farmers must have more than 50% of the shares and votes in the business.

For the 2022 scheme year, any land acquired after midnight on 17 May 2021 (the 2021 BPS application deadline) will not be considered when the number of new entitlements for 2022 is calculated. New and young farmers were only able to apply for entitlements if they had already acquired land by midnight on 17 May 2021.

National Reserve

The National Reserve will be used to allocate BPS entitlements to eligible:

- Young farmers - defined under the Young Farmer Scheme.
- New farmers - farmers who started an agricultural activity in 2013 or later and have not carried out or been in control of carrying out 'agricultural activity' in the five years before the start of their current

activity. In addition, new farmers need to show that they are at least 18 years old when they make their BPS application and are in 'control' of the business and they are making, or have made, their first successful BPS application no later than 2 years after the calendar year in which the business started farming.

Further details of the Basic Payment Scheme, including Young Farmer Scheme and the National Reserve can be found at:
https://www.gov.uk/government/collections/basic-payment-scheme#bps-2022

Rural Development Programme
While in 2022, the Rural Development Programme for England (RDPE) has continued to provide funding for communities, businesses, and people across the country to support the Programme's economic and environmental priorities; the following schemes are now closed:

- Environmental Stewardship (ES) annual claims
- LEADER funding

Countryside Stewardship Scheme
The Countryside Stewardship scheme provides income to farmers and land managers who deliver environmental benefits on their land, including habitats for wildlife, pollinator plots and increased biodiversity.

Mid-Tier
The Mid-Tier provides funding for a range of options and capital items that will deliver a broad range of environmental benefits, for example protect and enhance the natural environment in particular, the diversity of wildlife and water quality. The Mid-Tier application deadline for the 2022 scheme year was the 29th of July 2022. Further scheme guidance can be found online at:https://www.gov.uk/guidance/mid-tier-and-wildlife-offers-manual-countryside-stewardship

Higher Tier
The Higher Tier provides funding for more complex land in environmentally significant sites, commons or woodlands which requires support from Natural England or the Forestry Commission. The Higher Tier initial application deadline for the 2022 scheme year was the 29th of April 2022. Further scheme guidance can be found online at: https://www.gov.uk/guidance/higher-tier-manual-countryside-stewardship

Wildlife Offers
Wildlife Offers provide a simpler set of options to help improve wildlife on applicant's farms. Offers are split into different packages depending on farm types - arable, lowland grazing, upland, and mixed farming. The scheme is non-competitive and is designed to help guide farmers to the most straightforward options for their farm type. The application deadline for the 2022 scheme year was the 29th of July 2022. Further scheme guidance can be found online at:
https://www.gov.uk/guidance/wildlife-offers-countryside-stewardship

Woodland Support Grants

- The Woodland Management Plan grant.
- Woodland Tree Health grant.

The Woodland Support grants available through the Countryside Management Scheme are open all year round.

The Woodland Management Plan grant is for financial support to produce a woodland management plan that meets UK Forestry Standard requirements. The plan must cover a minimum of 10 years.

The Woodland Tree Health grant provides one-off payments towards the cost of:

- restocking woodland after a tree health problem.
- felling diseased trees or rhododendron control.

Further woodland scheme guidance can be found online at :
https://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management#woodland-support-grants

Capital Grants

Applications for Countryside Stewardship Scheme Capital Grants are open all year. The 2022 scheme year opened on the 8th of February 2022. The scheme offers two-year grants for capital works in three areas:

- Boundaries, Trees, and Orchard
- Water Quality, and
- Air Quality to deliver specific environmental benefits.

The maximum grant available for any application is £60,000. However, there is a limit of £20,000 within each item grouping. Further Capital grant scheme guidance can be found online at:
https://www.gov.uk/guidance/countryside-stewardship-2022-capital-grants-manual-from-8-february-2022/2-how-the-capital-grants-work.

New Support Schemes for England

Environmental Land Management (ELM) Scheme

From 2022 onwards, under the umbrella of the Environmental Land Management (ELM) Scheme, the existing agricultural support payments in England will be replaced by three new schemes:

1. Sustainable Farming Incentive (SFI)
2. Local Nature Recovery (LNR)
3. Landscape Recovery (LR) Scheme

The three schemes have been developed to seek to achieve the following outcomes:

- bringing soil under sustainable management,
- reducing agricultural emissions,

- woodland creation,
- halting the decline in species,
- reducing the main agricultural pollutants that enter watercourses,
- restoration of rivers, lakes, and other freshwater habitats.

All the schemes will be voluntary; it will be for farmers to decide what the right combination of actions is for their particular setting.

Sustainable Farming Incentive

To have the most impact, Sustainable Farming Incentive will focus on making agricultural activities more sustainable and will pay for actions that can be taken at scale across the whole farmed landscape. This includes reducing inorganic fertiliser and pesticide use, taking care of soils and improving farmland biodiversity, water quality, air quality and carbon sequestration. Farmers who are eligible for the Basic Payments Scheme (BPS) will be eligible for the Sustainable Farming Incentive.

Farmers can choose how many of their fields to enter into the Sustainable Farming Incentive – they do not have to enter their whole farm – and they can add more land, standards or levels of ambition into their agreement each year. Agreements will be for 3 years.

Under the Sustainable Farming Incentive, in addition to the Annual Health and Welfare Review, three environmental standards are being introduced:

1. The Arable and Horticultural Soils Standard (AHSS)
2. The Grassland Soils Standard (GSS)
3. The Moorland and Rough Grazing Standard (MRGS)

In 2022, SFI aims to:

- encourage actions that improve soil health,
- recognise how moorland provides benefits to the public (public goods), and
- improve animal health and welfare by helping farmers with the costs of veterinary advice for livestock.

Payment Rates

£ / ha / year	AHSS	GSS	MRGS
Introductory level	£22	£28	£148/agreement + £6.45/ha
Intermediate level	£40	£58	n/a

For further details of the Sustainable Farming Incentive Scheme terms and conditions, please see online at:
https://www.gov.uk/government/collections/sustainable-farming-incentive-guidance#summary-of-sfi-in-2022

Local Nature Recovery

Local Nature Recovery will be the successor to the Countryside Stewardship scheme. The scheme will pay for locally-targeted actions to

make space for nature in the farmed landscape and the wider countryside, alongside food production. It is expected that this scheme will be rolled out by the end of 2024. For further details, please see online at:
https://www.gov.uk/government/publications/local-nature-recovery-more-information-on-how-the-scheme-will-work

Landscape Recovery Scheme
This scheme is aimed at landowners and managers who want to take a more radical and large-scale approach to producing environmental and climate goods on their land. The scheme will initially focus on biodiversity, water quality and net zero. The proposal is to launch two rounds over the next 2 years with the first round of projects focusing two themes:

- Recovering and restoring England's threatened native species. Projects under this theme would seek to recover priority habitats, habitat quality and species abundance,
- Restoring England's streams and rivers: improving water quality, biodiversity and adapting to climate change – these projects could restore water bodies, rivers, and floodplains to a more natural state, reduce nutrient pollution, benefit aquatic species, and improve flood mitigation and resilience to climate change.

Landscape Recovery is open to any individuals or groups who want to come together to deliver large (500 – 5000 ha) scale projects. For further details, please see online at:
https://www.gov.uk/government/publications/landscape-recovery-more-information-on-how-the-scheme-will-work/landscape-recovery-more-information-on-how-the-scheme-will-work

Wales

Direct Payments
Direct Payment schemes implemented in Wales for the 2022 scheme year included the Basic Payment Scheme (BPS), Redistributive Payment Scheme, Young Farmer Scheme and the National Reserve.

Under current proposals, the current direct payments schemes will continue into 2023 Scheme year subject to funding being available. For further details of the direct payment schemes and other support schemes including woodland, forestry, organic conversion, environmental and nutrient management schemes plus small grants linked to improving business efficiency and supporting new horticultural enterprises, please view online at: https://gov.wales/rural-grants-payments

Future Support Payments for Wales

Sustainable Farming Scheme

Following a further consultation period in 2023, the Welsh Government is planning to launch a new Sustainable Farming Scheme in January 2025. The new support scheme will be primarily designed to encourage sustainable food production, address biodiversity loss and climate change, and to hit clean air and water targets. Future payments will be linked to good farming practice, protecting/enhancing the environment, wildlife and the Welsh scenery.

The Sustainable Farming scheme is expected to have three layers:

- Universal Actions – aimed at farms becoming more sustainable,
- Optional Actions – targeted at specific land or landscape feature issues, and
- Collaborative Options – aimed at delivering greater benefits that could be achieved by the sum of individual parts.

The Scheme will also be underpinned by bringing together agricultural legislation to create a set of National Minimum Standards. The Standards will initially be based on the existing legislation which underpins Cross Compliance requirements.

Support will be provided through training and farmer-to-farmer knowledge sharing and innovation. This will be provided through a new Farming Connect programme including a re-designed advisory service to ensure that the advice provided to farmers meets future needs.

For further information, please see online at:
https://gov.wales/sustainable-farming-scheme

Northern Ireland

Direct Payments

The Department of Agriculture, Environment & Rural Affairs, Northern Ireland (DAERA) offers payments to farm businesses through 'Area-based Schemes (ABS) based on the land they farm, or actions they take on their land. The ABS for the 2022 scheme year included the Basic Payment Scheme (BPS), Young Farmers' Payment, Regional Reserve and the Protein Crops Scheme. ABS payments are made annually and must be applied for on the corresponding year's Single Application Form (SAF). For further details of the Area Based Schemes, please view online at: https://www.daera-ni.gov.uk/topics/grants-and-funding/area-based-schemes

Payments for the Environmental Farming Scheme, Forest Expansion Scheme (Annual Premia), and the Small Woodland Grant Scheme can also be claimed via the Single Application Form. Scheme details can be found online at https://www.daera-ni.gov.uk/topics/grants-and-funding/

The current support system is expected to continue into 2023, with the plan to introduce new support schemes from 1 January 2024.

Future Support Payments for Northern Ireland
From 1 January 2024, new support schemes will be introduced aimed at delivering four key outcomes:

- increased productivity,
- environmental sustainability,
- improved resilience, and
- an effective supply chain.

Farm Sustainability Payment
The proposed new Farm Sustainability Payment will be an area based payment based on the ownership of entitlements and linked to 'farm sustainability standards' and participation in a new Soil Nutrient Health Scheme. There will be a minimum claim size of 5ha and a progressive cap on payments of more than £60,000 per farm business.

The Beef Sustainability Package will be made up of Suckler Cow Measures and a beef carbon reduction measure aimed at increasing productivity and driving down carbon emissions.

A Farming with Nature package will be developed with a focus on creating and restoring habitats important for species diversity. Further measures will be introduced with regards farm investment, knowledge transfer, innovation, the development of supply chain measures, and a 'generational renewal programme' aimed at encouraging succession and new entrants into the industry.

For further details of the proposed new schemes, please see online at:
https://www.daera-ni.gov.uk/grants-and-funding

Cross Compliance

To receive support payments Statutory Management Requirements (SMRs) and Good Agricultural and Environmental Condition (GAEC) standards must be met; together they are known as "Cross Compliance".

Under the current regulations, the following SMRs apply in **Scotland**:

Environment and climate change

SMR 1 Nitrate Vulnerable Zones (NVZ)
SMR 2 Conservation of wild birds
SMR 3 Conservation of flora and fauna

Public health, animal health and plant health

SMR 4 Food and feed law
SMR 5 Restrictions on the use of substances having hormonal or thyrostatic action and beta-agonists in farm animals

Public health, animal health and plant health

SMR 6 Pig identification and registration
SMR 7 Cattle identification and registration
SMR 8 Sheep and goat identification
SMR 9 Prevention and control of transmissible spongiform encephalopathies (TSEs)
SMR 10 Restriction on the use of plant protection products

Animal welfare

SMR 11 Welfare of calves
SMR 12 Welfare of pigs
SMR 13 Welfare of farmed animals

The GAEC requirements are as follows:

GAEC 1 Buffer strips along watercourses
GAEC 2 Abstraction of water for irrigation
GAEC 3 Protection of groundwater against pollution
GAEC 4 Minimum soil cover
GAEC 5 Minimum land management reflecting site specific condition to limit erosion
GAEC 6 Maintenance of soil organic matter
GAEC 7 Retention of landscape features

See page 528 for specific details on some of these GAEC requirements.

Rules in England, Wales and Northern Ireland may differ. To ensure compliance with current SMRs and GAEC in each region, further information can be found at:

Scotland:
https://www.ruralpayments.org/publicsite/futures/topics/inspections/all-inspections/cross-compliance

England:
https://www.gov.uk/guidance/cross-compliance-2022

Wales:
https://gov.wales/cross-compliance-2022

Northern Ireland:
https://www.daera-ni.gov.uk/publications/cross-compliance-2022

Credit

Amortisation Table

The table below can be used to estimate the annual charge to service the repayment of loan capital and interest per £1,000 borrowed.

	Percentage rate of interest								
Years	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1,020	1,030	1,040	1,050	1,060	1,070	1,080	1,090	1,100
2	515	523	530	538	545	553	561	568	576
3	347	354	360	367	374	381	388	395	402
4	263	269	275	282	289	295	302	309	315
5	212	218	225	231	237	244	250	257	264
6	179	185	191	197	203	210	216	223	230
7	155	161	167	173	179	186	192	199	205
8	137	142	149	155	161	167	174	181	187
9	123	128	134	141	147	153	160	167	174
10	111	117	123	130	136	142	149	156	163
11	102	108	114	120	127	133	140	147	154
12	95	100	107	113	119	126	133	140	147
13	88	94	100	106	113	120	127	134	141
14	83	89	95	101	108	114	121	128	136
15	78	84	90	96	103	110	117	124	131
20	61	67	74	80	87	94	102	110	117
25	51	57	64	71	78	86	94	102	110
30	45	51	58	65	73	81	89	97	106
40	37	43	51	58	66	75	84	93	102

Example:
The annual charge to service the interest and capital repayments on £8,000 repayable over 10 years at 5% would be £130 x 8 = £1,040. The payment at 6% would be £136 x 8 = £1,088.

The annual charge is given by:

$$C \times \left(\frac{r(1+r)^n}{(1+r)^n - 1} \right)$$

where: C = capital investment
r = rate of interest (to 2 decimal places)
n = years of repayment

Sinking Fund Table

The following table can be used to estimate the capital accruing to a regular annual investment of £100.

	Percentage rate of interest								
Years	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**10**	**12**
1	100	100	100	100	100	100	100	100	100
2	202	203	204	205	206	207	208	210	212
3	306	309	312	315	318	321	325	331	337
4	412	418	425	431	437	444	451	464	478
5	520	531	542	553	564	575	587	611	635
6	631	647	663	680	698	715	734	772	812
7	743	766	790	814	839	865	892	949	1,009
8	858	889	921	955	990	1,026	1,064	1,144	1,230
9	975	1,016	1,058	1,103	1,149	1,198	1,249	1,358	1,478
10	1,095	1,146	1,201	1,258	1,318	1,382	1,449	1,594	1,755
11	1,217	1,281	1,349	1,421	1,497	1,578	1,665	1,853	2,065
12	1,341	1,419	1,503	1,592	1,687	1,789	1,898	2,138	2,413
13	1,468	1,562	1,663	1,771	1,888	2,014	2,150	2,452	2,803
14	1,597	1,709	1,829	1,960	2,102	2,255	2,421	2,797	3,239
15	1,729	1,860	2,002	2,158	2,328	2,513	2,715	3,177	3,728
20	2,430	2,687	2,978	3,307	3,679	4,100	4,576	5,727	7,205
25	3,203	3,646	4,165	4,773	5,486	6,325	7,311	9,835	13,333
30	4,057	4,758	5,608	6,644	7,906	9,446	11,328	16,449	24,133

Example:
The capital accruing after 10 years to the regular annual investment of £600 at 5% would be £1,258 x 6 = £7,548. At 6%, the capital accrued would be £1,318 x 6 = £7,908.

The terminal sum is given by:

$$d \times \left(\frac{(1 + r)^{n} - 1}{r} \right)$$

where: d = regular annual investment
r = rate of interest (to 2 decimal places)
n = years of repayment

Approximate Annual Percentage Rates of Annual Nominal Rates

As an aid to assessing finance deals, the following table estimates the equivalent annual percentage interest rates (APR's) for a range of nominal annual rates (e.g. 2% above base rate of 1% = 3%) and various charging regimes.

	Approximate annual percentage rate equivalent (%)		
Annual nominal rate (%)	**Monthly charging**	**Quarterly charging**	**Half-yearly charging**
2	2.0	2.0	2.0
3	3.0	3.0	3.0
4	4.1	4.1	4.0
5	5.1	5.1	5.1
6	6.2	6.1	6.1
7	7.2	7.2	7.1
8	8.3	8.2	8.2
9	9.4	9.3	9.2
10	10.5	10.4	10.3
11	11.6	11.5	11.3
12	12.7	12.6	12.4
13	13.8	13.6	13.4
14	14.9	14.8	14.5
15	16.1	15.9	15.6

Example:
A nominal interest rate of 5% with monthly charging gives an approximate annual percentage rate of 5.1%. A nominal rate of 6%, gives an annual percentage rate (APR) of 6.2%.

The approximate annual percentage rate is given by:

$$[(1 + \frac{n}{p})^{p} - 1] \times 100$$

where: n = nominal interest rate (expressed as a decimal)
p = number of instalments per year

Approximate Annual Percentage Rates of Annual Flat Rates

Where interest on finance is quoted as flat rate on the original amount borrowed, the following table can be used to estimate the equivalent annual percentage rate (APR) for equal monthly repayments of interest and capital.

Annual flat rate (%)	Approximate annual percentage rate equivalent (%) for loans over: 1 year	5 years	10 years	15 years
4	7.5	7.6	7.3	7.0
5	9.4	9.5	9.0	8.6
6	11.4	11.4	10.7	10.1
7	13.4	13.2	12.3	11.6
8	15.4	15.0	13.9	13.0
9	17.4	16.8	15.5	14.4
10	19.5	18.7	17.0	15.8
11	21.6	20.5	18.6	17.2
12	23.6	22.3	20.1	18.6

Example:
The APR for a loan at an annual flat rate of 6% repaid by monthly instalments over 5 years will be 11.4%.

Compounding Table

This table estimates the future monetary value of £100 after *n* years at various interest rates.

	Percentage rate of interest									
Years	**3**	**4**	**5**	**6**	**7**	**8**	**10**	**12**	**14**	**16**
1	103	104	105	106	107	108	110	112	114	116
2	106	108	110	112	114	117	121	125	130	135
3	109	112	116	119	123	126	133	140	148	156
4	113	117	122	126	131	136	146	157	169	181
5	116	122	128	134	140	147	161	176	193	210
6	119	127	134	142	150	159	177	197	219	244
7	123	132	141	150	161	171	195	221	250	283
8	127	137	148	159	172	185	214	248	285	328
9	130	142	155	169	184	200	236	277	325	380
10	134	148	163	179	197	216	259	311	371	441
11	138	154	171	190	210	233	285	348	423	512
12	143	160	180	201	225	252	314	390	482	594
13	147	167	189	213	241	272	345	436	549	689
14	151	173	198	226	258	294	380	489	626	799
15	156	180	208	240	276	317	418	547	714	927
20	181	219	265	321	387	466	673	965	1,374	1,946
25	209	267	339	429	543	685	1,083	1,700	2,646	4,087
30	243	324	432	574	761	1,006	1,745	2,996	5,095	8,585

Example:
The value of £1,200 at 5% after 8 years would be £148 x 12 = £1,776. At 6%, it would be £159 x 12 = £1,908.

The compounding factor is given by: $(1 + r)^n$

where: r = rate of interest (expressed as a decimal)
n = number of years

Annuity Tables

Discount factors for calculating the present value of future cash flows where cash flows are **regular**.

	Percentage											
Years	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	0.99	0.98	0.97	0.96	0.95	0.94	0.94	0.93	0.92	0.91	0.90	0.89
2	1.97	1.94	1.91	1.89	1.86	1.83	1.81	1.78	1.76	1.74	1.71	1.69
3	2.94	2.88	2.83	2.78	2.72	2.67	2.62	2.58	2.53	2.49	2.44	2.40
4	3.90	3.81	3.72	3.63	3.55	3.47	3.39	3.31	3.24	3.17	3.10	3.04
5	4.85	4.71	4.58	4.45	4.33	4.21	4.10	3.99	3.89	3.79	3.70	3.61
6	5.80	5.60	5.42	5.24	5.08	4.92	4.77	4.62	4.49	4.36	4.23	4.11
7	6.73	6.47	6.23	6.00	5.79	5.58	5.39	5.21	5.03	4.87	4.71	4.56
8	7.65	7.33	7.02	6.73	6.46	6.21	5.97	5.75	5.53	5.34	5.15	4.97
9	8.57	8.16	7.79	7.44	7.11	6.80	6.52	6.25	6.00	5.76	5.54	5.33
10	9.47	8.98	8.53	8.11	7.72	7.36	7.02	6.71	6.42	6.15	5.89	5.65
11	10.37	9.79	9.25	8.76	8.31	7.89	7.50	7.14	6.81	6.50	6.21	5.94
12	11.26	10.58	9.95	9.36	8.86	8.38	7.94	7.54	7.16	6.81	6.49	6.19
13	12.13	11.35	10.64	9.99	9.39	8.85	8.36	7.90	7.49	7.10	6.75	6.42
14	13.00	12.11	11.30	10.56	9.90	9.30	8.75	8.24	7.79	7.37	6.98	6.63
15	13.87	12.85	11.94	11.12	10.38	9.71	9.11	8.56	8.06	7.61	7.19	6.81
20	18.05	16.35	14.88	13.59	12.46	11.47	10.59	9.82	9.13	8.51	7.96	7.47
25	22.02	19.52	17.41	15.62	14.09	12.78	11.65	10.67	9.82	9.08	8.42	7.84
30	25.81	22.40	19.60	17.29	15.37	13.76	12.41	11.26	10.27	9.43	8.69	8.06

	Percentage											
Years	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**25**	**30**	**35**	**40**
1	0.89	0.88	0.87	0.86	0.85	0.85	0.84	0.83	0.80	0.77	0.74	0.71
2	1.67	1.65	1.63	1.61	1.59	1.57	1.55	1.53	1.44	1.36	1.29	1.22
3	2.36	2.32	2.28	2.25	2.21	2.17	2.14	2.11	1.95	1.82	1.70	1.59
4	2.97	2.91	2.86	2.80	2.74	2.69	2.64	2.59	2.36	2.17	2.00	1.85
5	3.52	3.43	3.35	3.27	3.20	3.13	3.06	2.99	2.69	2.44	2.22	2.04
6	4.00	3.89	3.78	3.68	3.59	3.50	3.41	3.33	2.95	2.64	2.39	2.17
7	4.42	4.29	4.16	4.04	3.92	3.81	3.71	3.60	3.16	2.80	2.51	2.26
8	4.80	4.64	4.49	4.34	4.21	4.08	3.95	3.84	3.33	2.92	2.60	2.33
9	5.13	4.95	4.77	4.61	4.45	4.30	4.16	4.03	3.46	3.02	2.67	2.38
10	5.43	5.22	5.02	4.83	4.66	4.49	4.34	4.19	3.57	3.09	2.72	2.41
11	5.69	5.45	5.23	5.03	4.84	4.66	4.49	4.33	3.66	3.15	2.75	2.44
12	5.92	5.66	5.42	5.20	4.99	4.79	4.61	4.44	3.73	3.19	2.78	2.46
13	6.12	5.84	5.58	5.34	5.12	4.91	4.71	4.53	3.78	3.22	2.80	2.47
14	6.30	6.00	5.72	5.47	5.23	5.01	4.80	4.61	3.82	3.25	2.81	2.48
15	6.46	6.14	5.85	5.58	5.32	5.09	4.88	4.68	3.86	3.27	2.83	2.48
20	7.02	6.62	6.26	5.93	5.63	5.35	5.10	4.87	3.95	3.32	2.85	2.50
25	7.33	6.87	6.46	6.10	5.77	5.47	5.20	4.95	3.98	3.33	2.86	2.50
30	7.50	7.00	6.57	6.18	5.83	5.52	5.23	4.98	4.00	3.33	2.86	2.50

Example:
The present value of £350 received each year for 6 years at 5% discount rate is £350 x 5.08 = £1,778. At 6%, the present value is £350 x 4.92 = £1,722.

The discount factor is given by:

$$\frac{1 - (1 + r)^{n}}{r}$$

where: r = rate of discount
n = number of years

Discount Tables

Discount factors for calculating the present value of future cash flows where cash flows are **irregular**.

	Percentage											
Years	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.482	0.452
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059

	Percentage											
Years	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**25**	**30**	**35**	**40**
1	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833	0.800	0.769	0.741	0.714
2	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694	0.640	0.592	0.549	0.510
3	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579	0.512	0.455	0.406	0.364
4	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482	0.410	0.350	0.301	0.260
5	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402	0.328	0.269	0.223	0.186
6	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335	0.262	0.207	0.165	0.133
7	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279	0.210	0.159	0.122	0.095
8	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233	0.168	0.123	0.091	0.068
9	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194	0.134	0.094	0.067	0.048
10	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162	0.107	0.073	0.050	0.035
11	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135	0.086	0.056	0.037	0.025
12	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112	0.069	0.043	0.027	0.018
13	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093	0.055	0.033	0.020	0.013
14	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078	0.044	0.025	0.015	0.009
15	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065	0.035	0.020	0.011	0.006
20	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026	0.012	0.005	0.002	0.001
25	0.047	0.038	0.030	0.024	0.020	0.016	0.013	0.010	0.004	0.001	0.001	0.000

Example: To find the present value of the following cash flows at 5% discount rate of interest.

Year	Cash flow (£)	Discount factor	Present value (£)	
1	250	0.952	238	
2	300	0.907	272	The Present Value of
3	180	0.864	155	this series of cash
4	400	0.823	329	flows is £995

The discount factor is given by

$$\frac{1}{(1 + r)^n}$$

where: r = rate of discount

n = number of years

Long-Term Loans

Long-term finance might be obtained from banks, mortgage providers, insurance companies, finance companies, solicitors, or by private arrangement. These loans are generally secured against the value of existing property and other business assets.

Long-term loans tend to be used for purchasing fixed assets and are structured as an agricultural mortgage or secured loans typically extending between 5 and 25 years at fixed and/or variable interest. Interest payments can be arranged to tie in with cashflow but would usually be charged monthly or quarterly, however, there are alternative options e.g. of paying interest in half-yearly or annual instalments although this tends to be more expensive. Interest only periods are potentially available prior to moving to capital repayments. Frequency of capital repayments will be subject to negotiation with the lender. Capital repayments are generally packaged together with accrued interest in monthly payments. It maybe agreeable with the lender to defer capital repayment or repay a lump sum on a fixed date each year.

It is necessary for the business borrowing the money to be deemed financially secure and demonstrate the ability to service the loan. This will be determined based on past financial performance, an updated balance sheet, cash flow budgets and perceived risk of the proposed venture.

Long-term loans can typically pass from generation to generation. In other words a loan is not repayable on the death of a borrower and cannot be recalled for the term of the loan provided that obligations continue to be met.

Medium-Term and Short-Term Credit

Banks
Banks, the primary source of medium and short-term capital, may agree to grant farmers an overdraft to meet business financial requirements.

Overdrafts are reviewed annually; the interest rate, subject to the security available, is competitive, and interest is charged daily only on the daily balance outstanding. Generally, an arrangement fee will be charged and, in some cases, a renewal fee.

In terms of medium term loans, 10-year term loans are most common. Interest is related to commercial and market factors but have historically been lower than overdraft rates (particularly if adjusted for any overdraft rearrangement fees).

Merchants and tradesmen
A popular form of short-term financing. Finance is often in the form of credit allowed by merchants, auctioneers, tradesmen and dealers over a

wide range of commodities and farm requisites, including livestock and implements. Rates of interest vary widely and can be relatively cheap over one or two months, but can rise to as high as 4% per month on accounts outstanding for several months.

Mart credit
Farmers buying livestock can obtain up to 12 months credit. Interest rates quoted vary depending on term and amount borrowed. Other arrangements are possible whereby a farmer may borrow capital from a mart for finishing stock purchased from the mart. Interest will be charged on the stock during the finishing period which is then deducted from the sale price achieved for the stock. The stock remains the property of the mart and must be resold through the mart or to an associated abattoir/meat processing company.

Hire purchase
Hire purchase is currently the most popular form of finance used by UK farmers. This type of finance covers identifiable products such as plant and machinery, and livestock. It offers 100% ownership at the end of the repayment period.

Credit is supplied by a finance company but the arrangements are often carried out through the dealer who made the sale. Repayment periods are usually from two to four years with payment by standing order. Payments are for capital and interest and are usually offered on a fixed rate basis. However, this form of finance can be more expensive than an overdraft, because the lender is offering less security.

Contract hire and leasing
Leasing is usually used for equipment or vehicles. Breeding livestock can also be leased. However, leasing costs can vary considerably and the details of a contract should be studied carefully before entering into an agreement. The tax aspects should be discussed with an accountant. Two types of leasing exist:

Finance Lease - Offers use of an asset for an agreed period without ownership. Payments are normally fixed for a defined period of time (usually 2 to 5 years). After this period, the farmer can either continue to use the equipment at a nominal rent (which can vary from nothing to 1.5% of capital cost), or, with the finance company's permission, sell the equipment. Dependent on arrangements, the farmer may obtain 90% to 100% of the sale value to be used as a refund or a down-payment.

Operating Lease - Appropriate for the use of equipment for less than its full economic life. The farmer takes the risk of the equipment becoming obsolete and is responsible for all repairs, maintenance and insurance. The residual value of the asset is usually set at the outset, based on the estimated use throughout the term. In most cases, this is more expensive than a finance lease.

The advantages of leasing schemes (machinery and livestock) depend on the individual's circumstances. Leasing is a complex subject and it is advisable to seek professional advice to assess the best financial alternative.

Taxation

Introduction

This section is designed to provide background information on how tax may affect the farm business and contains a summary of how the system operates. Tax is an increasingly complex subject and there are thirteen tax rates that could apply to income and capital gains of a Scottish Taxpayer.

The tax year which started on 6 April 2018 was the first year in which the Scottish Government's devolved powers were used to any significant impact. Before then, despite some tinkering with rate bands, the Scottish Rate of Income Tax (SRIT) had been kept the same as the rest of the UK (RUK). Now we have five specific rates/bands imposed by the Scottish Government and the table shown on page 524 illustrates the complexities involved.

Although every effort has been made to provide accurate details, no responsibility can be taken for any omissions that may have occurred in the treatment of this specialised field.

The Taxation section of the Handbook has been updated by Chiene + Tait LLP. Chiene + Tait is an independent accountancy firm which offers an extensive range of personal, business and advisory services to a wide range of clients and has a significant agricultural practice. If you would like to discuss the range of services provided by Chiene + Tait please contact Michelle Fallon or Lisa Travers (0131 558 5800) in Edinburgh, or Jackie Fraser (01463 251730) in Inverness.

Income Tax

Income tax is calculated by applying the appropriate rates to taxable income. The amount of a person's income chargeable to tax in any year is calculated according to the specific rules applicable to the various types of income. Farming profits are assessed as trading income.

The net profit in the accounts usually requires an adjustment because some costs may appear in the accounts which are not allowable for tax purposes (e.g. depreciation) and some income may not be subject to income tax at all, or not taxed as trading income.

Amounts received under the Self Employment Income Support Scheme (SEISS), that was implemented in response to the COVID-19 crisis, count as taxable turnover when determining amounts liable to income tax (and class 4 national insurance contributions). These payments are taxable on a receipts basis and therefore are taxable in the tax year they are received. They should not be accrued across accounting periods.

All taxpayers are entitled to £1,000 allowances for both property income and trading income. This means that the first £1,000 gross of most sources of property income and/or trading income is exempt from income

tax. If gross income exceeds £1,000, then the taxpayer can either deduct the £1,000 allowance or deduct allowable expenses.

Main Income Tax reliefs

Allowed at top rate of tax	*2022/23*	*2021/22*
Personal Allowance [1]	£12,570	£12,570
Blind Person's Allowance	£2,600	£2,500
Marriage Allowance [2]	£1,260	£1,260
Dividend Tax Allowance (DTA) [3]	£2,000	£2,000
Personal Savings Allowance (PSA) [4]		
- Basic Rate Taxpayer	£1,000	£1,000
- Higher Rate Taxpayer	£500	£500

Allowed only at 10%		
Married Couple's Allowance (MCA) [5]	£9,415	£9,125
Income limit for age-related allowances	£30,400	£30,400

1 The personal allowance is withdrawn at £1 for every £2 by which total income exceeds £100,000 such that allowances become nil at income of £125,000.

2 Up to 10% of the personal allowance can be transferred to a spouse who is no more than a basic rate taxpayer. Not available if the married couple's allowance is being claimed.

3 The DTA taxes the first £2,000 of dividend income at 0%.

4 The PSA operates as a nil rate band for interest income.

5 Only available if born before 6th April 1935.

UK Income Tax bands and rates

	2022/23	*2021/22*
Basic rate band	£37,700	£37,700
Higher rate band	£37,701 - £150,000	£37,701 - £150,000
Additional rate band	over £150,000	over £150,000

The tax rates differ for General income (G - salary, pensions, business profits, rent), Savings income (S - interest) and Dividend income (D).

	2022/23			*2021/22*		
	G	*S*	*D*	*G*	*S*	*D*
Basic rate	20%	20%	8.75%	20%	20%	7.5%
Higher rate	40%	40%	33.75%	40%	40%	32.5%
Additional rate	45%	45%	39.35%	45%	45%	38.1%

New Dividend Rates

From the 2022/23 tax year, the basic rate dividend tax will be charged at 8.75%, an increase from 7.5%. Higher rate dividend taxpayers will be charged 33.75%, an increase from 32.5% and additional higher rate dividend taxpayers will pay 39.35%, an increase from 38.1%.

Scottish Rate of Income Tax (SRIT)
Since April 2017, the Scottish Parliament has had the authority to vary the rate bands as well as the actual tax rates. The SRIT will apply to General Income belonging to a "Scottish Taxpayer" regardless of where that income arises. The rules for defining a "Scottish Taxpayer" can be complicated but will broadly apply where the individual's main family home is in Scotland.

From 2017/18 onwards, a Scottish Taxpayer who has General income (salary, pensions, business profits, rents) as well as Savings income and Dividend income will need to consider both the UK tax rates and tax bands and the Scottish tax rates and tax bands in order to work out their income tax liability.

For 2022/23 the Scottish rates of income tax and tax bands are as follows:

	Tax Band	***2022/23***
Starter Rate	£12,570 - £14,732	19%
Basic Rate	£14,733 - £25,688	20%
Intermediate Rate	£25,689 - £43,662	21%
Higher Rate	£43,663 - £150,000	41%
Top Rate	Over £150,000	46%

Important investment annual limits

	2022/23	***2021/22***
Individual Savings Account (ISA)	£20,000	£20,000
Junior ISA [1]	£9,000	£9,000
Enterprise Investment Scheme (EIS) [2]	£2,000,000	£2,000,000
Venture Capital Trust (VCT) [2]	£200,000	£200,000
Seed Enterprise Investment Scheme (SEIS) [3]	£100,000	£100,000

1 Available from 20 November 2011 to all UK resident children who do not have a Child Trust Fund account. From 6 April 2015 it has been possible to transfer a Child Trust Fund to a Junior ISA.
2 Income Tax relief at 30% for both EIS and VCT
3 Income Tax relief at 50% for SEIS

Full details of the rates of income tax and the main allowances can be found on the HM Revenue and Customs (HMRC) website at www.gov.uk.

Property Rental Income

Since 6 April 2017 tax relief on finance costs for rental businesses with residential property has been restricted. Until 5 April 2017, any finance costs incurred annually were offset against rental income when calculating taxable profits. For the 2020/21 tax year onwards, taxpayers can only treat finance costs as a tax reducer at the basic rate of tax.

Tax Credits

The system of tax credits is a method by which financial support is given to those in work, or with children, on low incomes. Tax credits comprise working tax credits and child tax credits. The term tax credit is a misnomer: tax credits are a form of financial support, and they are administered by HMRC. The financial support (itself tax-free) consists of payments to claimants, and not offsets against tax liabilities. The income tax system treats members of a family independently. By contrast, tax credits are based, where appropriate, on the circumstances of couples living together, whether married or not. Tax credits are being replaced by the Universal Credit, and the move to the Universal Credit is expected to be completed by the end of 2024.

Further information on tax credits can be found on the tax credit website at www.gov.uk.

Pensions

It is recognised that state pensions do not provide an adequate income in old age and it is for this reason that individuals may wish to contribute to pensions other than under the state pension scheme. Pension contributions attract tax relief up to set limits and the contributions are accumulated in a fund that is free of income tax and capital gains tax.

The rules for tax relief on pension contributions have undergone significant changes over the years with a view to simplification. Complications remain with rules for the carry forward of unused relief and advice should be taken on the tax implications before a pension contribution is made. Broadly, however, anyone can contribute up to £3,600 (gross) each year, regardless of earnings. Pension payments are made net of basic rate tax relief so the individual would pay £2,880 and the government would add £720 to the pension fund to bring the total up to the £3,600 figure. Higher rate tax relief if applicable is then given through the individual's self-assessment tax return or PAYE code. For 2022/23, the maximum tax-efficient contribution will generally be £40,000 (gross) or 100% of current earnings unless there is unused pension relief available to carry forward from the previous tax years. With effect from 6 April 2020 the maximum contribution is tapered where 'adjusted income' (i.e. including pension contributions) is more than £240,000. The reduction is £1 for every £2 of income over £240,000 and the minimum allowance will be £4,000.

There is also a lifetime limit to the value an individual can contribute to a pension fund tax efficiently. For 2022/23, the "lifetime allowance" is £1,073,100.

Occupational schemes are available to employees who have an employer offering such a scheme and the Pensions Act 2008 included provisions requiring employers to set up pension arrangements for all employees. The rules for compulsory work pensions include a government "auto-enrolment" scheme called the National Employment Savings Trust (NEST). There are now alternative private pension providers offering auto-enrolment scheme options in addition to the government NEST scheme. The implementation date for compulsory pensions is phased according to the number of employees. Staging dates started in the final quarter of 2012 for the largest employers and all existing employers should now be complying.

From 6 April 2015, those with a money purchase pension (i.e. not final salary schemes) will be able to have unrestricted access to the full value of their pension fund. Any withdrawals above the level of the tax-free amount (currently 25%) will be taxed at the individual's marginal rate of income tax. To prevent recycling funds into another pension to increase the tax relief available, a Money Purchase Annual Allowance (MPAA) was introduced. Until 5 April 2017 the MPAA was £10,000, however, with effect from 6 April 2017 it has been £4,000.

Recent tax changes have resulted in pensions becoming increasingly beneficial for inheritance tax planning matters.

Capital Allowances

Main capital allowances - plant and machinery	***Allowance %***
Annual Investment allowance: £1,000,000 (from 1 Jan 2019 to 31 March 2023)	100
Certain energy and water efficient equipment, cars with zero emissions	100
Writing down allowance: general pool	18
Writing down allowance: special rate pool*	6

* The special rate pool includes long life assets, integral plant in buildings, thermal insulation, solar shading and cars with CO_2 emissions over 50g/km.

In the accounts it is normal practice to write-off part of the cost of plant, machinery, vehicles and buildings as depreciation each year. In calculating taxable income, this depreciation is added back to profit, and capital allowances are deducted.

Since 6 April 2008, it has been possible to claim the 100% Annual Investment Allowance (AIA) for plant and machinery (excluding cars). On 1 January 2019, the AIA increased to £1,000,000 and will remain at this level until 31 March 2023.. The AIA is available to partnerships made up of individuals but it is not available to 'mixed partnerships', i.e. partnerships that include a company or a trust.

Capital allowances for new cars are related to the CO_2 rating of the car. New electric cars or cars with zero emissions enjoy a 100% first year allowance. Cars with a rating up to 50g/km will go into the general pool and receive 18% allowances (restricted to £3,000 per annum if the car cost more than £3,000). Cars with higher ratings will go into the special rate pool and only receive 6% allowances.

Capital allowances can no longer be claimed for expenditure on agricultural buildings or works.

Expenditure on integral features of a building such as electrical and lighting systems, cold water and water heating systems and expenditure on solar panels qualifies for special rate allowances at 6%.

A 'Structures and Building Allowance' ('SBA') is available at a rate of 3% per annum on a straight-line basis for qualifying expenditure on the construction of qualifying commercial property.

Farmers should review their expenditure on buildings to ensure that any expenditure which may qualify for plant and machinery or integral features allowances are identified. It is also important to review the timing of capital expenditure to maximise allowances.

Losses

When an individual makes a trading loss for a tax year, the loss can be relieved against any other income of the same tax year, against any other income of the previous tax year, against capital gains of either year or by carry forward against future trading profits from the same trade. There are also special loss relief rules for losses made in the early years of a business and the last twelve months before the cessation of trade.

However, from 6 April 2013, the amount of *income tax* loss relief available to an individual in a tax year in respect of a trade loss is capped at the greater of £50,000 or 25% of income.

In addition, the amount of loss relief that a sole trader or partner may claim against general income has been limited to £25,000 if the loss is from *non-active trades*. An individual is deemed to be non-active if they spend an average of less than 10 hours per week personally engaged in the trade's activities. The existing rules for restricting tax relief for losses incurred for more than five consecutive tax years under the "hobby farming" provisions also still apply.

For companies, trading losses can be offset against other profits in the same group or carried forward indefinitely and are available for offset against profits of the same trade.

Relief for Fluctuating Profits (Averaging)

Relief for fluctuating profits (averaging) is available to any individual or partnership carrying on a trade of farming or market gardening. Prior to April 2016, it was possible to average two consecutive years of assessment where the profits of one year are at least 30% below the profits of the other. From April 2016, it has been possible to choose to average over a five-year period.

Averaging claims can result in significant savings of tax and national insurance contributions. Averaging is a valuable relief for farmers, particularly now that income tax rates can be as high as 46%.

Herd Basis of Livestock Valuation

Under the herd basis of livestock valuation, fluctuations in the value of production animals are not taken into account in computing profits, nor is the cost of the original herd or flock deductible. The values of the original production stock numbers are held constant throughout the period that the herd is in existence.

An election to adopt the herd basis of livestock valuation can normally only be made at a time when a production herd is first kept and provided that a herd of that class has not been kept in the preceding five years. Once made, an election is irrevocable and will come to an end only on ceasing to keep a production herd of the particular class for a period of five years or on a change of business structure, e.g. when a sole trader introduces a partner to the business. The time limit for making an election to adopt the herd basis of valuation is two years after the end of the first tax year affected by the purchase of the herd.

The advantage of the herd basis is the exclusion from taxable profit of changes in value of production animals. In addition, when a whole herd or a substantial part of it (over 20%) is sold without replacement, any difference between sale value and book value is not taxable for income tax or capital gains tax purposes.

Self-Assessment Procedures

Every personal tax return carries a self-assessment section in which the taxpayer is normally expected to calculate his or her own income tax and capital gains tax liability. The submission deadline for paper tax returns is 31 October following the end of the tax year. The submission deadline for tax returns delivered electronically is 31 January following the end of the tax year. Penalties are imposed for the late submissions of tax returns.

Tax liabilities are settled via two interim payments on account and a final balancing payment. The two interim payments on account are payable

on 31 January during the tax year and 31 July following the end of the tax year. The balance of any income tax due and the full amount of any capital gains tax due is payable on 31 January following the end of the tax year. Interest and surcharges will be due on tax paid late.

Records of personal income, such as bank interest and dividend income should be retained for a period of one year and ten months following the year of assessment to which they relate unless the taxpayer also has a business or let property in which case all records must be kept for five years and ten months.

Corporation Tax Procedures

Companies have 12 months from the end of the accounting period to file their tax return. For most companies, tax payments are due nine months and 1 day after the end of the accounting period and large companies pay tax in instalments.

Corporation Tax Rates

Year to 31 March 2023

Main rate	19%

From 1 April 2023, the Corporation Tax main rate for non-ring-fenced profits will be increased to 25% applying to profits over £250,000. A small profits rate (SPR) will also be introduced for companies with profits of £50,000 or less so that they will continue to pay Corporation Tax at 19%. Companies with profits between £50,000 and £250,000 will pay tax at the main rate reduced by a marginal relief providing a gradual increase in the effective Corporation Tax rate.

If the farm trade is carried on through the medium of a company, corporation tax on the profits has to be paid by the company. Corporation tax is charged on the trading profits, capital gains and other income of an accounting period. Directors' salaries and fees are a charge against profit. Capital allowances are deducted where expenditure is incurred on the acquisition of qualifying plant and machinery.

Annual Tax on Enveloped Dwellings

From 1 April 2013 an annual tax charge has been imposed on certain "non-natural persons" (broadly, companies, partnerships with a corporate partner and collective investment schemes) which hold UK residential dwellings. From 1 April 2016 properties valued at more than £500,000 on specific valuation dates are subject to the charge. For 2022/23 the charge is determined as follows:

Property Value	*Annual Tax Charge*
£500,000 - £1,000,000	£3,800
£1,000,001 - £2,000,000	£7,700
£2,000,001 - £5,000,000	£26,050
£5,000,001 - £10,000,000	£60,900
£10,000,001 - £20,000,000	£122,250
More than £20,000,000	£244,750

A capital gains tax charge may also arise on disposal and a 15% SDLT or LBTT charge may arise on the acquisition of such properties.

A new valuation will be required for 2023/24 ATED returns. Residential properties owned by non-natural persons must be revalued on 1 April 2022. This value will then apply to ATED returns for the next five chargeable periods (starting from 2023/2024).

Capital Gains Tax

The annual exempt amount for 2022/23 for individuals is £12,300, and for most trustees is £6,150. The Capital Gains Tax (CGT) rates for 2022/23 are 10% (for the element within the basic rate band) and 20%. Gains on residential property attract the higher 18%/28% rates.

CGT is a tax on the increase in value of certain property which is sold or given away in a lifetime. It applies to the sale or gift of assets such as land, shares, or other capital assets. CGT does not apply to transfers of cash or the disposal of trading stock. Lifetime gifts between spouses do not give rise to a chargeable gain.

Capital losses are set against other capital gains of the same year or carried forward to reduce gains in excess of the annual exemption in future years. Capital losses cannot be carried back unless they arise in the year of death.

From, 1 April 2013, CGT is payable at 28% in respect of any gain arising from the disposal of residential property owned by UK resident or non-UK resident “non-natural persons”.

From 6 April 2015, CGT is payable on the disposal of UK residential property by non-resident individuals. On sale, there are two options. The property value can be rebased at 5 April 2015 and the chargeable gain arising on disposal will be the difference between the 5 April 2015 valuation and the value at date of sale. Alternatively, the gain arising over the whole period of ownership can be calculated and apportioned, with only the element of the gain arising after 6 April 2015 being liable to CGT.

From 6 April 2019, CGT is payable on the disposal of all UK residential and non-residential property (i.e. commercial property) by non-resident

individuals. In determining the CGT position it is possible to rebase the property to reflect its value at 6 April 2019.

From 6 April 2020, there is a new reporting and payment requirement for a UK resident individual who disposes of a residential property and the disposal gives rise to a charge to CGT, i.e. the gain is not covered by a relief (such as main residence relief), losses or the annual exemption. The individual is required to make a return in respect of the disposal to HM Revenue & Customs within 60 days, and at the same time make a payment on account of capital gains tax.

Business Asset Disposal Relief was known as Entrepreneurs' Relief before 6 April 2020.

Business Asset Disposal Relief applies to disposals of a sole trade or interest in a partnership trade or shares in a trading company where the shareholder owns at least 5% of the ordinary share capital **and** has at least 5% of the voting rights **and** is entitled to 5% of the profits on winding up and is an officer or employee of the company. There is a requirement to meet the qualifying criteria for a minimum period of 24 months (previously the minimum ownership period was 12 months). Qualifying gains are taxed at 10% up to a lifetime maximum of £1m.

Principal Private Residence Relief (PPR) will generally exempt the gain arising on the sale of the farmhouse and up to half a hectare of grounds. The relief will be restricted if any part of the residence is used solely for business purposes. Where a property had been occupied as the owner's only or main residence, the last 9 months of ownership will qualify for PPR even if the property was no longer occupied.

Gift Relief is available on the gift of assets used in a trade carried on by the transferor, agricultural property (including tenanted land) or shares in an unquoted company. The capital gain is calculated as normal but does not become chargeable if both the transferor and the transferee agree to "hold over" the gain. If an election is made, the transferee will be deemed to acquire the asset at its open market value less the gain held over. In this way the tax charge is deferred until the transferee sells the asset at arm's length. Gift relief is restricted if there has been any non-business use of the asset. Previously only agricultural land in the UK qualified for relief, however, from 22 April 2009 land anywhere in the European Economic Area can qualify.

Roll Over Relief can be claimed when a capital asset which has been used for trade purposes (e.g. a building) is sold at a gain and the whole of the sales proceeds are invested in other qualifying assets to be used for trade purposes. The value of the new asset is deemed to be reduced by the amount of the gain arising on the sale of the first asset. The sale proceeds must be reinvested in the period commencing twelve months before and three years after the sale of the original asset. If the entire

proceeds of the sale are not reinvested, only partial roll-over relief is available.

Inheritance Tax

Nil Rate Band (NRB)	£325,000
Rate above NRB	40% [1]
Lifetime transfers to certain trusts	20%
Annual exemption for lifetime gifts	£3,000
Small gifts - annual amount per donee	£250

[1] There is a reduced rate of 36% for an estate leaving 10% or more to charity on or after 6 April 2012

Tapering relief applies to reduce the tax on transfers within 7 years of death. The reduction in tax is 20% for survivorship of 3-4 years, 40% for 4-5, 60% for 5-6 and 80% for 6-7 years.

It should be noted that it is now possible for a nil rate band which is unused on a person's death to be transferred to the estate of their spouse or civil partner. Chargeable transfers at death are subject to IHT, but there is no IHT charged on lifetime gifts to individuals. Such transfers are known as potentially exempt transfers (PETs). Where the donor dies within seven years of making a PET, the transfer is taxed on its value at the date of the gift, using the death rate scale applicable at the date of death.

An additional tax-free band worth £175,000 per individual (£350,000 per married couple) applies from April 2020 in respect of the transfer of an individual's main home on death. The £350,000 allowance applies where the property is passed between spouses on first death and then on to children or grandchildren.

The combination of this new allowance and the existing IHT Nil Rate Band of £325,000 per individual means that a married couple now has a combined NRB of £1millon. However, this new allowance is only available in full where the value of the deceased estate is under £2million. In deceased estates with a value of over £2million, the allowance is reduced by £1 for every £2 over £2million. This means that deceased estates with a value of more than £2.35million will not benefit from the allowance.

Several transfers are left out of account in arriving at the cumulative total on which a person is chargeable. These include transfers between spouses, lifetime transfers made in a year up to a value of £3,000 and transfers to charities.

Wide ranging changes to IHT were announced in 2006 which have had a significant impact on UK estate planning using trusts. As a result of the scope and complexity of these trust rules it is not possible to consider the

detail here. Farmers would be advised to consult their tax advisers to review the terms of existing trusts and their wills.

Agricultural and business property relief can in some circumstances reduce the value of the chargeable transfer to Nil.

Agricultural Property Relief (APR)

Nature of property	*Rate of Relief*
Vacant possession or right to obtain vacant possession within 12 months	100%
Agricultural land let after 1 September 1995	100%
Any other circumstances *	50%

* The 100% relief can apply in certain circumstances where land has been owned and let since before 10 March 1981 and by Extra Statutory Concession F17.

Agricultural Property Relief (APR) only applies to the agricultural value of farmland. Where the farm has additional development value this may qualify for Business Property Relief (BPR).

Agricultural property includes "such cottages, farm buildings and farmhouses, together with the land occupied with them, as are of a character appropriate to the property". To qualify for APR, the transferor must either have farmed the agricultural property for two years before the transfer or have owned it for seven years before the transfer, during the whole of which time it has been occupied for the purposes of agriculture. As with gift relief, land anywhere within the EEA will qualify.

In order to obtain APR for a farmhouse it is necessary to show that the farmhouse is of a character and size appropriate to the property and the requirements of the farming activities conducted on the agricultural land. Relief may therefore be denied where the farmhouse is excessively large in relation to the farm. The definition of farmhouses and other agricultural property has been considered in a number of cases. HMRC will review APR claims more or less as a matter of course and specialist advice may be needed now, i.e. on a proactive basis, or in the event of an HMRC challenge.

Business Property Relief (BPR)

Nature of property	*Rate of Relief*
Business or interest in a business	100%
Controlling shareholding in quoted company	50%
Shareholding in unquoted company	100%
Controlling holding in unquoted securities	100%
Settled property used in the business of a life tenant	100%/50%*
Land, buildings, plant used in company or partnership	50%

* 100% relief is available where the property is transferred with the

business on death otherwise the 50% rate applies.

BPR is a relief against IHT on business assets, including a tenant's capital items such as machinery and livestock. To qualify for BPR, the property should have been owned by the claimant for two years before the transfer (or it must have replaced other qualifying assets owned for at least two out of the five years before the transfer). BPR is not available if the business or company is one of "wholly or mainly" dealing in securities, stocks or shares, land or buildings or in the making or holding of investments. Some business activities are borderline and particular care will be needed for mixed estates comprising farming and letting activities.

Value Added Tax

Value added tax (VAT) is an indirect tax on sales of goods and services. In general, a taxable business pays VAT on its purchases (input tax) and charges VAT on its sales (output tax). Taxable businesses are required to pass on the output tax to HMRC and may reclaim input tax. From 1 April 2022 businesses with an annual turnover of taxable goods and services of more than £85,000 are required to register for VAT. Businesses with a turnover of less than £83,000 may elect to deregister. It is also possible to voluntarily register for VAT where turnover is below £85,000 if this is seen to be beneficial. Once registered VAT returns are normally submitted to HMRC quarterly (although it is possible to apply for monthly VAT returns subject to certain conditions - see below).

Standard rate (1/6 of VAT-inclusive price)	20.0%
Registration level from 1 April 2022	£85,000 per annum
Deregistration level from 1 April 2022	£83,000 per annum

There are three rates of VAT applicable to taxable income: a standard rate, a reduced rate of 5% and a 0% rate. The standard rate is currently 20% and has been at this level since 4 January 2011.

Some income streams are not taxable, and are exempt from VAT. This can include supplies made in connection with land, i.e. renting or selling land or property. It is possible to 'opt to tax' land or property so that you can make the lease, licence or sale taxable. This is beneficial if there is input VAT to claim on expenditure connected with the property. The option to tax does not apply to residential accommodation.

Since farm businesses often have zero rated taxable income they can often be in a position where VAT being reclaimed from HMRC exceeds output VAT paid. In such situations, it is advisable to apply to HMRC to submit monthly rather than quarterly returns to aid cashflow. This can be done online.

Farmers may deregister for VAT and elect to use the "flat rate" farmers' scheme. A "flat rate" farmer cannot reclaim VAT on inputs, but charges and retains a flat rate addition of 4% on designated farming activities.

This applies even if some of the goods would otherwise be zero rated. If the farmer is involved in other non-farming activities (e.g. bed and breakfast) which have a turnover above the VAT threshold, the flat rate scheme may not be available.

The following is a brief summary of the VAT rates as they apply to typical farming activities and expenditure.

VAT - exempt Items
Banking
Certain subscriptions
Cottage rents other than for holiday purposes
Granting of credit and loans
Instalment credit finance charges on a hire-purchase
Insurances
Land let for growing grain, etc*
Postal services
Purchase or sale of land and existing buildings*
Rent*
Easements, Wayleaves, Servitudes, Rights of Way*

* The grant of a lease, licence or sale of land and property is exempt from VAT. Therefore, the above activities marked with a * are exempt from VAT unless an option to tax is in place. If an option to tax is in place these supplies are standard rated.

VAT - standard rated goods and services
Accountants' fees
Artificial insemination
Binder twine
Business activities of a Government Department
Camping facilities and car parks
Charges for storage of goods in enclosed spaces
Commission
Consultants' fees
Contract work for which a payment is in cash or kind
Cottage rents if let as holiday accommodation
Domestic fuel (special rate of 5% - provided supplied for "qualifying use")
Farmyard manure
Fencing and drainage
Fertilisers
Fishing and shooting rights
Fuel - petrol, diesel, and other heavy oil (for road use)
Grazing wintering and land let (with care of animals)
Haulage
Hire of machine or implements
Horses and ponies
Leasing charges
Machinery and vehicle repairs

MLC recording fees
New or second-hand machinery
Non-edible horticultural products
Non-residential construction
Property repairs
Quota sales and leases
Room lettings where catering is included
Sheep dogs
Soil and silage sampling charges
Sprays
Subscriptions, if association VAT registered
Telephone accounts
Tourist accommodation and meals
Trees and hedgerow timber
Paint
Pet foods
Veterinary services and medicines
Wood
Wool

VAT - zero rated goods and services
Animal feeding stuffs
Bees
Crops
Energy Saving Materials installed in residential properties (from 1 April 2022 to 31 March 2027)
Eggs
Sale of new residential buildings
Construction services in relation to a new dwelling
Grazing and wintering (no service included)
Livestock but excluding working animals
Milk
Newspapers, books and periodicals (including online since 1 May 2020)
Seeds of food and seed plants
Trees and bushes if used for production of edible fruit

Outside the scope of VAT
Grants
Compensation
Insurance Claims
Dilapidation payments

Car fuel scale charges
Other than farm vehicles, where fuel is purchased for vehicles which are used for private and business purposes, VAT is only partially recoverable. To make things simpler businesses can use the VAT Fuel Scale Charge. When using this system the business reclaims all VAT incurred on fuel

and then accounts for the private use using the fuel scale charge. Alternatively, the business can elect to not recover any VAT incurred on fuel.

The VAT road fuel scale charges are based on the emissions rating of the vehicle and were updated with effect from 1 May 2022. These figures should be used only from the start of the next VAT accounting period beginning on or after that date. These figures along with previous years can be found on the HMRC website at https://www.gov.uk/government/publications/vat-road-fuel-scale-charges-table

Basic Payment Scheme Entitlements
The receipt of BPS from the Scottish Government is outside the scope of VAT.

The sale or lease of BPS entitlements by a VAT registered business is treated as a supply. This means that the purchase price would be subject to VAT at the standard rate and farmers would be looking to recover this input VAT.

Brexit
The UK's transition period with the European Union came to an end on 31 December 2020 and therefore new rules came into force from 1 January 2021 for trading with suppliers and customers based in the EU.

Businesses that trade with EU suppliers and customers should consider their position following the exit from the EU to make sure the correct treatment is followed.

Energy Saving Materials
A new zero rating was introduced from 1 April 2022 for the supply and installation of energy saving materials into residential property including solar panels, heat pumps and roof insulation. The zero-rate will be available for five years and will revert to the 5% reduced VAT rate from 1 April 2027.

National Insurance Contributions (NICs)

Class 1 (employees)	***Main rate***
6 April 2022 to 5 July 2022	
Employee contributions	
- on earnings £190 - £967.00 pw	13.25%
- on earnings above £967.00 pw	3.25%
Employer contributions	
- on all earnings above £170.00 pw	15.05%

Class 1 (employees)	*Main rate*
6 July 2022 to 5 April 2023	
Employee contributions	
- on earnings £242 - £967 pw	13.25%
- on earnings above £967pw	3.25%
Employer contributions	
- On all earnings above £175 pw	15.05%

Employer contributions (at 15.05%) are also due on most benefits in kind and on tax paid on an employee's behalf under a PAYE settlement agreement.

Class 2 (self-employed)	
Flat rate per week	£3.15
Small earnings exception: profits per annum	£6,725

Class 3 (voluntary)	
Flat rate per week	£15.85

Class 4 (self-employed)	
On profits £11,909 - £50,270	10.25%
On profits over £50,270	3.25%

From 6 April 2014, every business or charity in the UK is entitled to benefit from an "allowance" in respect of their employer Class 1 NIC liability. This "allowance" remains at £4,000.

Self-employed individuals will pay both Class 2 and Class 4 NICs and these will be collected through the Self-Assessment tax return. No NIC is levied if the individual is over state pension age.

Stamp Duty (SD)

	% of Total Consideration
Shares and marketable securities (nil if value up to £1,000)	0.5%

Stamp Duty Land Tax (SDLT)/Land Building Transaction Tax (LBTT) in Scotland

SDLT/LBTT imposes a charge on land transactions. LBTT applies in Scotland only. SDLT applies in England and Northern Ireland. The tax is calculated as a percentage of chargeable consideration with different amounts applicable to residential and non-residential transactions. The person liable to pay the tax is the purchaser. In general, the tax must be

paid at the same time the return is made. Interest is charged on late paid tax, and on late paid penalties.

Commercial Property			
LBTT		***SDLT***	
Up to £150,000	0%	Up to £150,000	0%
Over £150,000 to £250,000	1%	Over £150,000 to £250,000	2%
Over £250,000	5%	Over £250,000	5%

Residential Property (First Property)			
LBTT ***Rates to 31 March 2022***		***SDLT*** ***Rates to 31 March 2022***	
Up to £145,000	0%	Up to £125,000	0%
Over £145,001 to £250,000	2%	Over £125,001 to £250,000	2%
Over £250,001 to £325,000	5%	Over £250,001 to £925,000	5%
Over £325,001 to £750,000	10%	Over £925,001 to £1.5m	10%
Above £750,001	12%	Above £1.5m	12%

A supplement applies for both SDLT and LBTT purposes where a second residential property is purchased by an individual for more than £40,000. The rate is 3% for SDLT purposes and 4% for LBTT purposes (increased from 3% from 25 January 2019). The 4% supplement also applies for LBTT purposes when certain "non-natural persons" (broadly, companies, partnerships, collective investment schemes) purchase a residential property, even if it is their first and only residential property.

Single Farm Payment Scheme/Basic Payment Scheme

The European Union Common Agricultural Policy has introduced new reforms across all EU member states. From 1 January 2015, the Single Farm Payment Scheme (SFPS) which has been in existence since January 2005 has been replaced with the Basic Payment Scheme (BPS). The Milk Quota system has also been abolished with effect from 31 March 2015.

The BPS is a regional area-based scheme. BPS receipts will be liable to income tax or corporation tax (if paid to a company) and should be included in the taxable trading income in the relevant accounting period.

For more information on the BPS, see pages 467-489.

Commercial Woodlands

Commercial woodlands enjoy a tax favoured status.

For income tax purposes, sales of timber from commercial woodland can be outside the scope of income tax. However, in circumstances where land is predominantly occupied for another purpose, receipts from the

sale of timber may fall outside the exemption. For example, receipts from the sale of trees planted on a farm should be included as part of farming profits. An owner of commercial woodlands who simply lets the land will receive income in the form of rent and this would be classed as profits from a rental business.

In relation to capital gains tax, profits from the sale of trees are exempt, but there may be a charge to capital gains tax on a profit on the sale of land (i.e. the solum). Furthermore, the occupation of commercial woodlands is a qualifying activity for roll-over and hold-over reliefs.

Inheritance tax exemption is potentially available through 100% Business Property Relief once a two-year period of ownership of commercial woodlands has been established. Agricultural Property Relief would potentially be available on woodlands whose occupation is ancillary to the agricultural land. An example of this would be a woodland shelter belt.

For more information see the Forestry and Farm Woodlands section on page 305.

Anti-Avoidance

The “General Anti-Abuse Rule” (“GAAR”) came into force with the enactment of the Finance Act 2013 on 17 July 2013. The rule counteracts abusive tax avoidance schemes and applies to income tax, national insurance contributions, corporation tax, capital gains tax, inheritance tax, petroleum revenue tax and stamp duty land tax.

The measure supports the Government's objective of promoting fairness in the tax system by deterring taxpayers from entering into abusive schemes that might succeed under current law. The GAAR provides that tax advantages arising from such arrangements are counteracted on a just and reasonable basis.

The UK GAAR legislation has a 'safety net' arrangement in that there is a requirement for HM Revenue & Customs to seek opinion from an independent panel before invoking the GAAR legislation. There is now a separate Scottish GAAR which initially will only apply to the two devolved taxes (Land and Buildings transaction tax (LBTT) and Scottish landfill tax). The Scottish GAAR has no requirement to bring in an independent perspective and, therefore, gives much more power to Revenue Scotland. It is intended that the Scottish GAAR will extend to all devolved taxes in the future.

Making Tax Digital

In the March 2015 Budget, the Government announced its vision for a new digital tax administration and there was much publicity about this

being the death of the annual self-assessment tax return. The transformation of the tax system, to be fully in place by April 2020, was hailed by HMRC as being simpler, more effective, and more efficient.

Under Making Tax Digital (MTD) there will be a requirement to keep accounting records in a digital format and to submit income details, expenditure details and tax computations to HMRC using MTD compatible software on at least a quarterly basis. The new system will have a fundamental impact on record-keeping and businesses/landlords will be required to use digital tools such as cloud software or apps, which will have the ability to upload information to HMRC. Each taxpayer will have an online 'digital account' where they will be able to view their payments.

For VAT periods beginning on or after 1 April 2022 it is now compulsory to keep VAT records in a digital format and to file VAT returns using MTD compatible software. Sole traders and landlords with income of more than £10,000 will need to file income tax self-assessment information through MTD from 6 April 2024.

Eventually all businesses and organisations will have to comply with MTD. Quarterly MTD returns will replace the annual corporation tax return and the business pages of self-assessment tax returns. A quarterly return will need to be made for each tax a business pays. Therefore, there will eventually be a requirement to submit a quarterly VAT return, as well as a quarterly corporation tax or income tax return.

Summary of Income Tax and Capital Gains Tax Rates

8.75%	Basic Rate for Dividend Income
10%	Capital Gains Tax Rate for gains attracting Business Asset Disposal Relief
10%	Capital Gains Tax Rate for gains up to Basic Rate limit
18%	Capital Gains Tax Rate for gains on Residential Property up to Basic Rate limit
19%	Starter Rate for Scottish NSND (non-savings/non-dividend) Income
20%	Capital Gains Tax Rate for gains above Basic Rate limit
20%	Basic Rate for Scottish NSND Income
20%	Basic Rate for RUK NSND income
20%	Basic Rate for Savings Income
21%	Intermediate Rate for Scottish NSND Income
28%	Capital Gains Tax Rate for gains on Residential Property above Basic Rate limit
33.75%	Higher Rate for Dividend Income
39.35%	Top Rate for Dividend Income
40%	Higher Rate for RUK NSND Income
40%	Higher Rate for Savings Income
41%	Higher Rate for Scottish NSND Income
45%	Top Rate for RUK NSND Income
45%	Top Rate for Savings Income
46%	Top Rate for Scottish NSND Income

Notes

The Scottish Rate of Income Tax (SRIT) only applies to certain types of income. This is non-savings/non-dividend income (NSND) which is broadly salaries, self-employment profits, pension income and rental income.

Rates applying to NSND for Scottish Taxpayers.
Rates applying to NSND for the rest of the UK (RUK).
Rates for other income sources such as dividends and bank, etc. interest are taxed at the same rate throughout the UK. Capital gains are also taxed at the same rate throughout the UK.

Miscellaneous

Summary of Farm Management Practices (including useful dates and timings)

Good Agricultural and Environmental Conditions (GAEC) - Scotland

Buffer strips (GAEC 1)

- no cultivations and application of pesticides within 2m of the top of the bank of watercourses — 1 Jan - 31 Dec

Water abstraction (GAEC 2)

- submit annual data return — by 31 Dec

Muirburn (GAEC 6)

- permitted between and inclusive — 1 Oct - 15 Apr (or 30 Apr with the landowner's permission)

Hedges and trees (GAEC 7)

- no trimming between and inclusive — 1 Mar - 31 Aug (or 31 Jul if hedge/tree in field to be sown with WOSR or TGRS)
- no cultivations and application of fertilisers and pesticides within 2m from the centre line of hedges — 1 Jan - 31 Dec

Greening

Permanent grassland

Nitrogen fertiliser and lime plan	prepared by 9 Jun

Ecological Focus Areas (EFAs)

EFA fallow period	15 Jan - 15 Jul
Establish EFA green cover	by 1 Nov
Maintain EFA green cover	until 31 Dec
Establish EFA catch crop	in 'spring'
Maintain EFA catch crop	until 31 Dec
Harvest of EFA nitrogen fixing crops	after 1 Aug
Cut or graze EFA margins (buffers; cut only, not graze)	after 15 Jul
EFA map	submit by 15 May

Diffuse Pollution General Binding Rules (DP GBRs) - Scotland

Minimum legal working distances from watercourses:

Within 2m of a watercourse

- no application of inorganic fertiliser
- no application of pesticides
- no cultivation (from top of bank)

Within 5m of a watercourse

- prevent significant poaching

Within 5m of spring, well or borehole

- no fertiliser application
- no cultivation
- no livestock

Within 10m of a watercourse

- no slurry or manure application
- no storage of fertiliser (including temporary field middens)
- no livestock feeders

Within 50m of spring, well or borehole

- no storage of fertilisers (including temporary field middens)
- no slurry or manure application

NVZ - Scotland (SMR 1)

NVZ fertiliser and manure management plan — prepared before 1 Mar

NVZ closed periods (organic manures with a high available N content):

	Grassland	***Other land***
Shallow or sandy soils	1 Sep - 31 Dec	1 Aug - 31 Dec
All other soil types	15 Oct - 31 Jan	1 Oct - 31 Jan

NVZ closed periods (manufactured nitrogen fertiliser):

	Grassland	***Other land***
Moray, Aberdeenshire, Banff & Buchan NVZ	15 Sep - 20 Feb	1 Sep - 20 Feb
All other Scottish NVZ areas	15 Sep - 15 Feb	1 Sep - 15 Feb

NVZ - England, Wales and Northern Ireland

NVZ closed periods (organic manures with a high available N content):

	Grassland	***Other land***
Shallow or sandy soils	1 Sep - 31 Dec	1 Aug - 31 Dec
All other soil types	15 Oct - 31 Jan*	1 Oct - 31 Jan*

*(15 Oct - 31 Jan NI)

NVZ closed periods (manufactured nitrogen fertiliser):

	Grassland	***Other land***
England and Wales	15 Sep - 15 Jan	1 Sep - 15 Jan
Northern Ireland	15 Sep - 31 Jan	15 Sep - 31 Jan

Business Management

Tax Return	
▪ paper forms	submit by 31 Oct
▪ online	submit by 31 Jan
IACS forms (Scotland)	submit by 15 May
AECS annual management options claim	submit by 15 May
Scottish Suckler Beef Support Scheme claim	submit by 31 Dec
Scottish Upland Sheep Support Scheme claim	submit 1 Sep - 30 Nov

Agricultural and horticultural census (Scotland) at 1st Monday in June	complete within 14 days
Agricultural survey (Scotland) at 1st Monday in December (DAS)	complete within 14 days

Livestock Management

Physiological values and breeding cycles for livestock:

	Cow	*Ewe*	*Red Deer*	*Sow*	*Poultry*
Gestation (days)					
- mean	285	150	231	114	21
- range	269-299	140-160	226-238	109-125	-
Oestrus period (days)					
- mean	21	16	19	21	-
- range	18-24	14-20	17-21	19-23	16-24

Cattle (Scotland SMR 7):

Tagging calves (after birth):	
▪ beef	within 20 days
▪ dairy - one tag	within 36 hours
▪ dairy - second tag	within 20 days
Replace illegible or lost tags	within 28 days of discovery
Registering calves with ScotEID	within 7 days of tagging
Cattle deaths to be reported to ScotEID	within 7 days
Cattle movements to be reported to ScotEID	within 3 days
Cattle within business movements reported to ScotEID	within 48 hours
Retention of cattle records	at least 10 years

Sheep and goats (Scotland SMR 8):

Identify all animals (after birth):	
▪ intensive systems	within 6 mths
▪ extensive systems (or before they leave the holding whichever is soonest)	within 9 mths
All animals double tagged (one tag must be EID)	from 12 mths of age
Replace illegible or lost tags	within 28 days of discovery
Record details of identification, illegible or lost tags and movements	within 48 hours
Movements sent to SAMU	within 3 days
Retention of sheep records	at least 3 years
Annual inventory for animals kept (SGAI)	at 1 Dec

Pigs (Scotland SMR 6):

Register with local APHA office	within 30 days of the date pigs are first kept
Notify APHA changes of details	within 30 days of the change
Notify off movements to ScotEID	before or on the day of the movement
Notify on movements to ScotEID	within 3 days of arrival
Record on and off movements	within 48 hours of the movement date

Shooting open seasons for birds *

	England, Scotland & Wales	***Northern Ireland***
Pheasant	1 Oct - 1 Feb	1 Oct - 31 Jan
Partridge	1 Sep - 1 Feb	1 Sep - 31 Jan
Grouse	12 Aug - 10 Dec	12 Aug - 30 Nov
Ptarmigan (Scotland only)	12 Aug - 10 Dec	-
Common snipe	12 Aug - 31 Jan	1 Sep - 31 Jan
Woodcock (except Scotland)	1 Oct - 31 Jan	1 Oct - 31 Jan
Woodcock (Scotland)	1 Sep - 31 Jan	-
Wild duck and geese:		
- below high water mark	1 Sep - 20 Feb	1 Sep - 31 Jan
- elsewhere	1 Sep - 31 Jan	1 Sep - 31 Jan

Shooting open seasons for ground game *

	England, Wales & Northern Ireland	***Scotland***
Brown hare (not NI)	1 Jan - 31 Dec	1 Oct - 31 Jan
Brown hare (NI)	12 Aug - 31 Jan	-
Mountain hare	-	1 Aug - 28/29 Feb
Rabbit (not NI)	1 Jan - 31 Dec	1 Jan - 31 Dec

Shooting open seasons for deer *

	England, Wales & Northern Ireland	***Scotland***
Red deer:		
- stags	1 Aug - 30 Apr	1 Jul - 20 Oct
- hinds	1 Nov - 31 Mar	21 Oct - 15 Feb
Sika deer & red/sika hybrids:		
- stags	1 Aug - 30 Apr	1 Jul - 20 Oct
- hinds	1 Nov - 31 Mar	21 Oct - 15 Feb
Fallow deer:		
- bucks	1 Aug - 30 Apr	1 Aug - 30 Apr
- does	1 Nov - 31 Mar	21 Oct - 15 Feb
Roe deer (not NI):		
- bucks	1 Apr - 31 Oct	1 Apr - 20 Oct
- does	1 Nov - 31 Mar	21 Oct - 31 Mar

* all dates inclusive

Imperial-Metric Conversion

Conversion factors

	Imperial	A	Metric	B
Length	inch	25.4	mm	0.03937
	foot	0.3048	m	3.281
	yard	0.9144	m	1.094
	chain	20.12	m	0.04971
	mile	1.609	km	0.6214
Area	acre	0.4047	ha	2.471
	ft^2	0.0929	m^2	10.76
	yd^2	0.8361	m^2	1.196
Volume	ft^3	0.02832	m^3	35.31
	yd^3	0.7646	m^3	1.308
	pint	0.5682	litre	1.76
	gal	4.546	litre	0.22
	gal	0.004546	m^3	219.969
	fl oz	28.41	ml	0.0352
Weight	oz	28.35	g	0.03527
	lb	0.4536	kg	2.205
	cwt	50.8	kg	0.01968
	ton	1.016	t	0.9842
Energy	therm	105.5	MJ	0.009478
	kWh	3.6	MJ	0.2778
	btu	1.055	KJ	0.9478
	hp	745.7	W	0.001341
Temperature	°F	(°F-32) x0.5556	°C	(°Cx1.8) +32
Rate of use	lb/ac	1.121	kg/ha	0.8922
	cwt/ac	125.5	kg/ha	0.007966
	ton/ac	2511	kg/ha	0.0003983
	lb/gal	99.78	g/litre	0.01002
	gal/ac	11.23	litre/ha	0.08902
	units (fert)/ac	1.25	kg/ha	0.8
Unit cost	£/ft^2	10.76	£/m^2	0.0929
	£/yd^2	1.196	£/m^2	0.8361
	£/ac	2.471	£/ha	0.4047
	£/yd^3	1.308	£/m^3	0.7646
	£/gal	0.220	£/litre	4.546
	£/ton	0.9842	£/t	1.016
	£/cwt	0.01968	£/kg	50.8
	£/lb	2.205	£/kg	0.4536

Note: Imperial unit x A = Metric unit
Metric unit x B = Imperial unit

	Imperial	Metric
Length	foot = 12 inches	cm = 10 mm
	yard = 3 feet	m = 100 cm
	mile = 1,760 yards	km = 1,000 m
Area	ft^2 = 144 $inches^2$	m^2 = 10,000 cm^2
	yd^2 = 9 ft^2	km^2 = 1,000,000 m^2
	acre = 4,840 yd^2	km^2 = 100 ha
	$mile^2$ = 640 acres	ha = 10,000 m^2
Volume	pint = 20 fluid ounces	litre = 1,000 ml
	gallon = 8 pints	
	fluid ounce = 1.734 $inches^3$	
	pint = 34.6774 $inches^3$	
	gallon = 277.42 $inches^3$	
	$foot^3$ = 1,728 $inches^3$	cm^3 = 1,000 mm^3
	$yard^3$ = 46,656 $inches^3$	m^3 = 1,000,000 cm^3
Weight	lb = 16 oz	kg = 1,000 g
	stone = 14 lb	tonne = 1,000 kg
	cwt = 112 lb	
	ton = 2,240 lb	
Milk	1litre = 1.03 kg	1 kg = 0.971 litre
Irrigation	1 inch/acre = 102.75 m^3	25 mm/ha = 250 m^3
Energy	hp = 550 ft lb force/sec	hp = 75 m kg force /sec
Velocity	mph = 1.609 km/hr	km/hr = 0.6214 mph
		m/sec = 3.281 ft/sec
Volume	ft^3/second = 0.02832 m^3/sec	m^3/sec = 35.31 ft^3/sec
Flow rate	gallon/min = 0.07577 litres/sec	litre/sec = 13.2 gallons/min
Specific volume rate	ft^3/ton min = 0.02787 m^3/t min	m^3/t min = 35.88 ft^3/ton min
Mass flow rate	ton/hr = 0.2822 kg/sec	kg/sec= 3.543 ton/hr

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SRUC Veterinary and Analytical Laboratory

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SRUC Disease Surveillance Centres

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Thurso	Janetstown, Thurso, Caithness KW14 7XF Tel: 0131 535 3130 E-mail: vetservices.north@sruc.ac.uk

SRUC Veterinary Surveillance Hubs

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SRUC Specialist Units

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SRUC Campuses

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