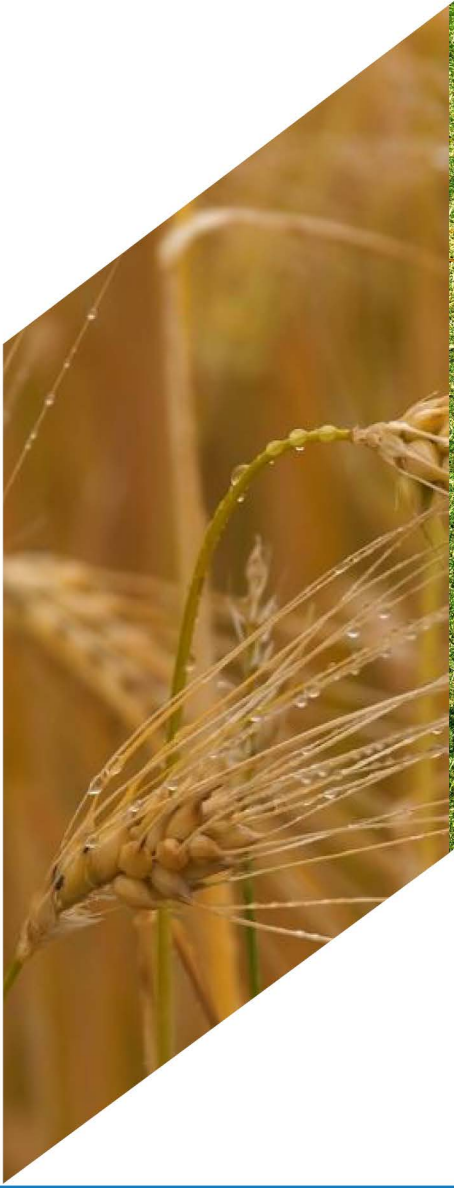
The Farm Management Handbook

Farm Advisory Service

Crop Inputs



The UK reference for farm business management

SAC CONSULTING

Part of Scotland's Rural College (SRUC)

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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 summer 2024. Fertiliser costs used in the gross margins are shown in the table below.

	Fertiliser Price	Nutrient Cost
Nitrogen (Ammonium Nitrate)	£331.00 /t	£0.96/kg N
Phosphate (Triple Super Phosphate)	£471.00 /t	£1.02/kg P2O5
Potassium (Muriate of Potash)	£358.00 /t	£0.6/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
£40/t	3.7t/ha	4 years	£37.00/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	0.96	5.76
		P_2O_5	3.2	1.02	3.28
		K_2O	8.0	0.60	4.77
					13.81
Cattle Slurry	6	N	2.6	0.96	2.49
		P_2O_5	1.2	1.02	1.23
		K_2O	3.2	0.60	1.91
					5.63
Sheep FYM (Fresh)	25	N	7.0	0.96	6.72
		P_2O_5	3.2	1.02	3.28
		K_2O	8.0	0.60	4.77
					14.77
Pig FYM (Fresh)	25	N	7.0	0.96	6.72
		P_2O_5	6.0	1.02	6.14
		K_2O	8.0	0.60	4.77
					17.63
Pig Slurry	4	N	3.6	0.96	3.45
		P_2O_5	1.8	1.02	1.84
		K_2O	2.4	0.60	1.43
					6.73
Layer manure	35	N	19.0	0.96	18.23
		P_2O_5	14.0	1.02	14.33
		K_2O	9.5	0.60	5.67
					38.23
Broiler/turkey litter	60	N	30.0	0.96	28.78
		P_2O_5	25.0	1.02	25.60
		K_2O	18.0	0.60	10.74
					65.12

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/news/nitrates-action-programme-nap-activity-calendar

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 the previous page. 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	15.03	7.52
Rapeseed meal or cake	5.77	2.33	1.55	9.95	4.97
Beans	4.53	1.03	1.39	8.22	4.11
Peas	3.52	1.15	1.14	6.81	3.41
Fish meal	10.50	7.63	1.03	11.65	5.83
Wheat	1.75	0.65	0.47	2.99	1.50
Barley	1.78	0.79	0.52	3.29	1.64
Oats	1.48	0.67	0.52	3.13	1.57
Maize	1.42	0.60	0.37	2.41	1.20
Bran & other offals of wheat	2.54	2.36	1.49	8.61	4.30
Maize gluten 60%	9.68	0.58	0.12	4.05	2.03
Brewers' & distillers' grain (wet)	1.07	0.23	0.02	0.55	0.28
Brewers' and distillers' grain (dried)	3.42	1.03	0.06	1.89	0.95
Hay	1.49	0.51	2.16	10.40	5.20

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	14.34	7.17
Grass silage	0.69	0.19	0.79	3.85	1.93
Wheat straw	0.54	0.15	1.07	5.04	2.52
Barley straw	0.58	0.22	1.53	7.14	3.57
Oat straw	0.46	0.18	1.82	8.38	4.19
Straw treated with ammonia	0.96	0.18	1.22	5.86	2.93
Swedes	0.15	0.06	0.24	1.15	0.58
Turnips	0.19	0.08	0.20	1.00	0.50
Potatoes	0.30	0.09	0.58	2.74	1.37
Dried sugar beet pulp (molasses)	1.55	0.15	1.92	9.18	4.59
Pot ale syrup	2.52	2.26	1.25	7.48	3.74
Molasses (sugar cane)	0.65	0.20	3.42	15.61	7.81
Compound cakes & meals for each 1% crude protein	0.16	0.08	0.06	0.36	0.18
Feed additives containing urea for each 1% crude protein	0.16	0.00	0.00	0.05	0.03

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	0.96	17.08	35	5.98	2.99
P_2O_5	7.9	1.02	8.09	45	3.64	1.82
K_2O	5.2	0.60	3.10	75	2.33	1.16
			28.27		11.94	5.97

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	0.96	191.88	nil	nil	nil
P_2O_5	100	1.02	102.39	51.20	25.60	12.80
K_2O	100	0.60	59.67	nil	nil	nil
			353.94	51.20	25.60	12.80

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	0.96	5.76	1.15	0.58	nil
P_2O_5	3.2	1.02	3.28	1.64	0.82	0.41
K_2O	8.0	0.60	4.77	nil	nil	nil
			13.81	2.79	1.39	0.41

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	0.96	1.66	0.33	0.17	nil
P_2O_5	1.2	1.02	1.23	0.61	0.31	0.15
K_2O	3.2	0.60	1.91	nil	nil	nil
			4.80	0.95	0.47	0.15

* 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 SAC 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. 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 2024 (or online at www.plantprotection.co.uk) and also at Pesticides Register of Authorised Plant Protection Products.

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 Extension of Authorisation - Search Page (pesticides.gov.uk).

Pesticides no longer authorised

Pesticide product authorisations may be reviewed, amended, suspended or revoked at any time. Several pesticides are withdrawn each year. 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 Pesticides Register of Authorised Plant Protection Products.