A STEP-BY-STEP GUIDE TO FORAGE AND FEED BUDGETING

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Introduction to forage and feed budgeting

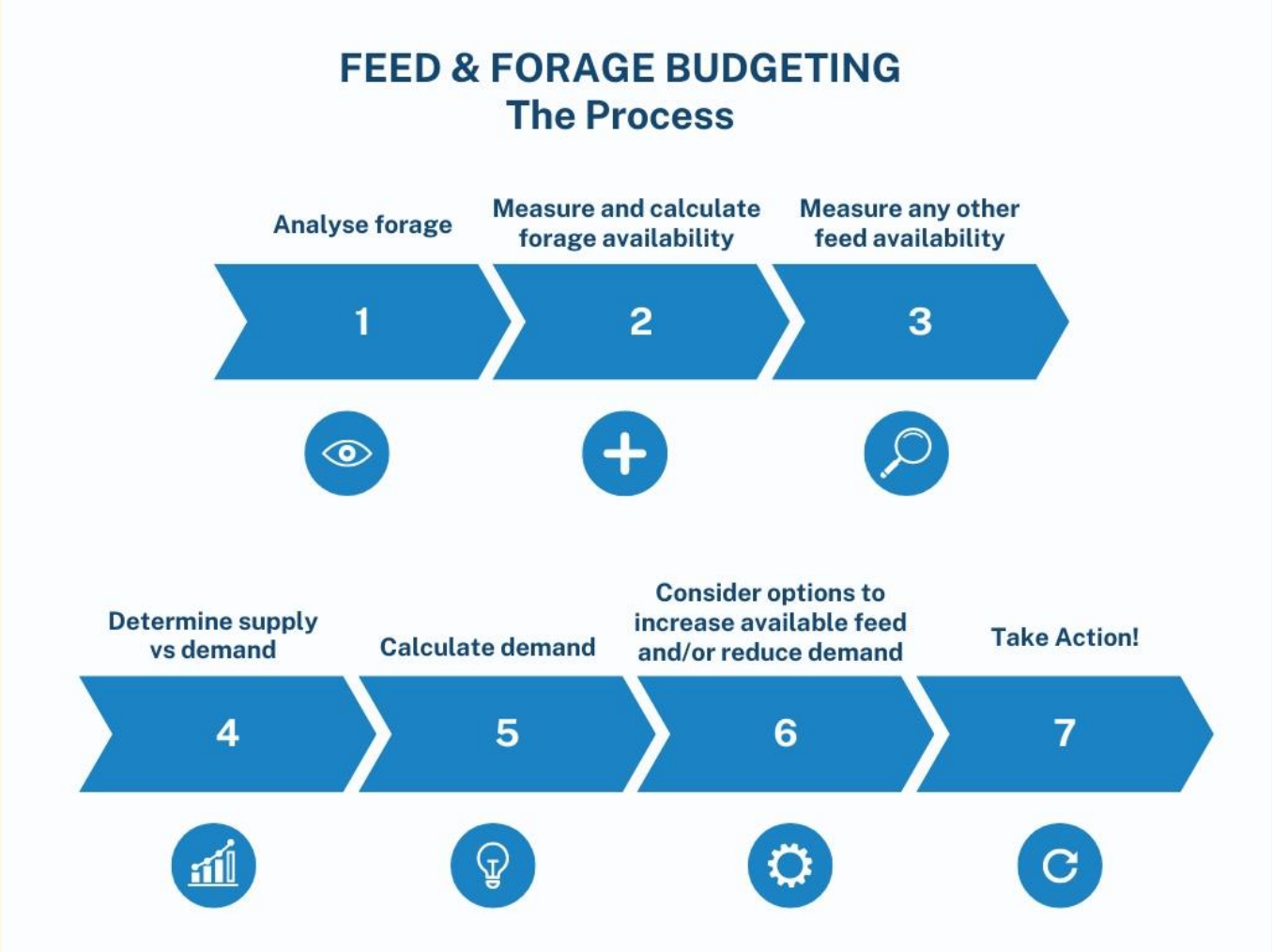
Forage and feed budgeting is simply assessing the feed and forage availability on the farm against the livestock demand. This can be a useful tool, particularly before going into the winter months and when grazing availability is in short supply. There are many reasons why forage and feed budgeting can be essential in a business including:

- Giving peace of mind that the supply of on-farm resources will match the expected demand of the farm.
- Identify any shortfalls in supply early allowing for early intervention.
- Reduce the risk of any sudden dietary changes which can be detrimental to production.
- Help to minimise expensive feed purchases later in the season or allow for forward bulk buying, reducing cost volatility.
- Allowing the farm to make the best use of resources available.

When is the best time to budget?

Roughly around six to eight weeks after all homegrown forage has been harvested in mid to late summer. This allows optimum time for the silage to ferment and stabilise before analysis and sufficient time to address potential shortfalls before feed availability from grazing reduces into winter. It is always useful to revisit the feed budget during the winter period, especially before crucial times in the livestock production cycle such as calving or lambing.

The process


FEED & FORAGE BUDGETING
The Process
Analyse forage
Measure and calculate forage availability
Measure any other feed availability
1
2
3
Determine supply vs demand
Calculate demand
Consider options to increase available feed and/or reduce demand
Take Action!
4
5
6
7

Equipment Needed

- Forage analysis.
- Measuring tape or wheel (for pit).
- Bale weight (if using bales).
- Note pad & pen.

How to do a forage budget

Step 1: Calculating Supply- Clamp Silage

Calculate Clamp Volume

Pit: (pit length (m) × pit breadth (m) × pit height (m) = Total Volume (m^3)
- don't forget to add a ramp if you have one ((length × breadth × height)/2))

Calculate Fresh Weight Available

Volume (m^3) × Density / 1000 = Fresh Weight (FW, t)
Silage densities can be found in table 1 below.

Calculate Dry Matter (DM) Available

Dry matter is the total proportion of the feed left once all water is removed this proportion will contain the total fraction of carbohydrate, fibre, protein and minerals in the feed.

FW (t) × Dry Matter (%) / 100

Silage Density (kg fresh weight per m^3)

Dry Matter (%)	Clamp Height (m)			
	2	**2.5**	**3**	**4**
20	790	840	890	950
25	690	730	780	830
30	620	660	690	740
35	570	600	630	670
40+	520	550	570	610

Note: crop bulk density is similar for grass, wholecrop and maize silage. Bulk densities are a guide, which also depends on level of silage compaction, chop length and fibre content.

	Example	Silage 1	Silage 2
(A) Pit length (m)	25		
(B) Pit Breadth (m)	12		
(C) Pit Height (m)	3		
(D) Total Available (A×B×C) m^3	900		

Dry Matter (%) (from analysis)	**25%**		
Density (See above table)	780		

Total tonnes fresh weight (D × density) / 1000)	**702**		
Total Tonnes Dry Matter ((FW (t) × DM (%) / 100)	175.5		

Space for additional working:

Step 2: Calculating Supply- Baled Silage

Calculate Fresh Weight Available

Number of Bales × Bale Weight (kg) = Total FW (kg) / 1000 = FW (t)

- Bales weight should be calculated by taking an average weight of 5 bales.
- Bales can be weighed using calibrated weigh bars, feed wagon or via a local weight bridge.

Calculate Dry Matter Available

FW (t) × Dry Matter (%) / 100

	Example	Bales 1	Bales 2	Bales 3
(A) No of Bales Available	879			
(B) Weight of Bales (kg)	675			
(C) Total Tonnes Fresh weight ((A×B)/1000))	593.3			

Dry Matter (%)	**35**			
Total Tonnes Dry Matter ((FW (t) × DM (%) / 100)	207.7			

Space for additional working:

Step 3: Calculating Demand (Both Pit / Baled Silage)

Forage Dry Matter Intakes – Winter

	Total Intake (% Bodyweight)	Example Total Dry Matter Intake	% of Dry Matter Intake from Forage	Example dry matter intake from forage
Suckler Cow (Spring)	1.5	(700 kg × 1.5)/100 = 10.5 kg DM	100%	10.5 kg
Suckler Cow (Autumn)	2	(700 kg × 2)/100 = 14 kg DM	90-100%	12.6 - 14 kg
Finishing Cattle	2	(500 kg × 2)/100 = 10 kg DM	40-80%*	4 – 8 kg
Growing Cattle	2.25-2.5	(250 kg × 2.4)/100 =6 kg DM	50-90%*	3 – 5.4 kg
Dry Ewe	1.5	(70 kg × 1.5)/100 = 1.05 kg DM	100%	1.05 kg
Late Pregnancy Ewe	2-2.5	(70 kg × 2.25)/100 = 1.6 kg DM	60 - 80%	1.1 kg
Lamb	2.5-4	(30 kg × 4)/100 = 1.2	60-100%	0.8 kg

*Forage intakes may vary depending on forage quality, level of production and additional supplementation offered. Note straw only diets will differ, please consult a nutritionist for further advice.

No of stock × DM Consumption (kg DM/day) × Days Feeding = Demand (kg)

Livestock to be housed	Number		Silage Consumption (DMI/day) (kg)		Days Housed (predicted)		Total Silage Required (kg /1000) (t DM)
Example: Spring Calvers	120	×	10.5	×	180	=	226.8
		×		×		=	
		×		×		=	
		×		×		=	
						Total (A) (t DM)	
						Total Including wastage at 10% (A × 1.10)	

Step 4: Calculate Shortfall or Surplus

DM Available (kg) – DM Demand (kg) = shortfall / surplus

(A) Total tonnes of DM Available from Forage		
(B) Total Silage Requirement		
(C) Total DM Shortfall / Excess (A – B)		

Feed Budgeting

When doing a full feed budget other feed available should also be considered such as home-grown cereal. See the table below:

	Example – Dried Barley	Example - Moist Barley	
(A) Average Yield (t/ha)	7	7	
(B) Hectares Grown (Ha)	20	20	
(C) Total Yield (t) (A × B)	140 t	140 t	
(D) Dry Matter (%)	86%	80%	
(E) Total dry matter yield (t) (C × D)	120.4 t	112 t	
(F) Daily intake of feed (as fed per ration)	2kg	2kg	
(G) Daily Dry Matter Intake of feed (kg DM/head) ((F × D) / 100)*	1.72	1.6	
(H) Number of animals fed	100	100	
(I) Daily Dry matter Requirement (F × G) (kg)	172 kg	160 kg	
(J) Feed days available (E / (H/1000))	700	700	
(K) Daily intake of feed (as fed per ration)	2kg	2kg	
(L) Daily Dry Matter Intake of feed (kg DM/head) ((F × D) / 100)*	1.72	1.6	
(M) Number of animals fed	100	100	
(N) Daily Dry matter Requirement (F × G) (kg)	172 kg	160 kg	
(O) Feed days available (E / (H/1000))	700	700	

*Example based on a 300kg steer eating 2 kg FW barley per day

Space for additional working

Budgeting Forage Crops

The method used to calculate forage crop availability will differ for leafy brassicas and root crops that have been broadcast sown compared to root and beet crops that are planted in drills. The same equipment is required for both and includes:

Equipment Needed

- 1 m² quadrant or 2.66 m of alkathene pipe in a loop (0.5 m²).
- Bag (such as a grass seed bag).
- A pair of shears or a knife.
- A set of handheld scales.
- Tape measure.
- Note pad & pen.

Typical fresh and dry matter yields of forage crops (Ouwintering Strategies, SRUC)

	Estimated Fresh Yield (t/ha)	Typical Dry Matter (%)
Leafy Crops		
Kale	**60 – 75**	**14- 16**
Rape & Hybrids	**24 – 35**	**12-13**
Root Crops		
Stubble Turnips	**40 – 50**	**8 – 9**
Swedes	**70 – 90**	**10 - 13**
Fodder Beet Roots	**65 – 80**	**10 – 20**
Fodder Beet Tops	**10 - 20**	**10 – 13**

Note: Forage crops such as turnips, kale, swedes, and fodder beet are high in energy with low levels of functional fibre therefore it is important to include additional forage in the diet ideally 50% straw for dry sucklers and 30% forage for all other stock.

Method 1: leafy brassicas and broadcast crops

1. Place the quadrant on a representative area of the field (avoiding end rigs, poor yielding patches, etc.) If using alkathene pipe place over two areas to allow for a 1 m² reading. Another method would be to use plastic electric fence posts, where the plastic stick is 1 m length.
2. For root crops lift all roots (removing dirt) and leaves from within the area. For leafy crops, cut 1 inch from the ground within the area and place in the bag.
3. Weigh bag using a scale.
4. Multiply the weight by 10000 to give the fresh weight per hectare.
5. Multiply the result by the estimated dry matter of the crop (eg. Hybrid brassica 12%) and divide by 100 to calculate dry matter per hectare.

		Example	Forage Crop 1	Forage Crop 2
(A)	**Total Bag Weight (kg fresh weight)**	7 kg		
(B)	**Fresh weight per Ha (A × 10,000)**	70,000 kg FW/ha		
(C)	**Dry matter of crop (%)**	12%		
(D)	**Estimated dry matter (B × C)**	8,400 kg DM		
(E)	**Tonnes of dry matter per Ha (C/1,000)**	8.4 tonnes dry matter		

Method 2: Root and beet crops in drills

For this method it is important to know the row width e.g., if it is 45 cm, measure 5.5 m along the drill, if it is 50 cm, measure 5 m along the drill, to allow for 25 m².

1. Measure along the row in a random sample area using a tape measure, avoid end rigs.
2. Lift the whole plant (bulb and leaf) from both sides of the measured drill, lifting 2 rows of root.
3. Use a knife to separate leaf and bulb.
4. Weigh the leaf and bulb separately, ensuring all brown, slimy leaves are included in leaf measurement.
5. Repeat over the field (5 × sampling areas of 5 m × 1 m = 25 m²).

		Fodder Beet Bulb (Example)	Fodder Beet Leaf (Example)	Bulb	Leaf
(A)	**Sample 1** **Sample 2** **Sample 3** **Sample 4** **Sample 5**	40 kg 45 kg 48 kg 42 kg 40 kg	21 kg 22 kg 23 kg 24 kg 23 kg		
(B)	**Total Fresh Weight (kg/ 25 m²)**	215 kg	113 kg		
(C)	**Tonnes fresh weight / ha ((B × 400*)/1000)**	86	45.2		
(D)	**Dry Matter (%)**	15%	10%		
(E)	**Tonnes dry matter / ha (C×D)**	12.9	4.52		
(F)	**Tonne dry matter yield (E Bulb + E Leaf)**	17.42 t/ha			

*25 m² × 400 = 10,000 sqm = 1 ha

Calculating Demand

Typical dry matter intakes

Stock Class	Dry Matter Allocation (% bodyweight)
• **Dry, mid – late pregnancy, late lactation cows** • **Dry, mid – late pregnancy ewes** • **Mature ram / bull**	2
• **Finishing steers/ heifers & replacements** • **Early to mid lactation cows and ewes**	2.5
• **Growing cattle** • **Early lactation ewes** • **Flushing ewes and cows**	3
• **Growing lambs**	4

	Example (300kg Steer)	
(A) Estimated total dry matter intake	9 kg DM	
(B) Crop inclusion of the diet (allow for 30% fibrous forage)	70%	
(C) Daily requirement of forage crop (A × B)	6.3 kg DM	
(D) Number of animals grazed	50	
(E) Daily requirement of forage crop (C × D)	315 kg DM	
(F) Crop yield (DM/m²) (70% utilisation)	(8.4 t/10) × 0.7 = 0.59 kg DM / m²	
(G) Total grazing area required / day (E / F)	534 m²	
(H) Length of Electric Fence (feed face)	200 m	
(I) Width of fence moved per day (G / H)	2.67 m/day	

Options To Consider If Forage Or Feed Is Short.

1. Can additional forage be harvested without compromising grazing availability later in the season?
2. Source alternative feed or forage to help meet the deficit – forward buying can be beneficial depending on market conditions and help avoid unexpected costs later in the season.
3. Can youngstock be finished quicker or sold store before housing? – this will help to reduce the feed pressure on farm and prioritise feed for breeding or replacement stock on the farm.
4. Consider selling any unproductive stock such as breeding stock not being kept as a replacement or breeding animals not meeting performance goals.
5. If preserved forage is in short supply consider options to extend the grazing season or outwinter utilising later sewn forage crops such as stubble turnips or rape.

Useful Resources:

FAS Companion App – Including forage budgeting calculator available on Apple and Android.
SRUC - Outwintering Strategies for Livestock Guide
Assessing Forage Stocks
Assessing Your Forage – Part 1
Assessing Your Forage – Part 2
Formulating Rations
Assessing The Ration
Dealing With A Forage Shortage