Section 6

Concentrate **Feeds**

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Introduction

High production and transport costs mean that concentrates are usually far more expensive per unit of feed value than grazed grass or grass silage produced on the farm. To maximise profit, animals should achieve as much of their growth from forage, preferably grazed grass, as possible. Nonetheless, concentrates are essential at key times in the animal's life

1. **When should I be using concentrates?**
2. **How can I ensure I'm getting value for money?**
3. **Should I consider home mixing?**

Concentrate Feeds

1 What should I look out for in concentrate feeds?

- In buying concentrates the nutrient content (i.e. energy, protein, minerals, fibre, starch) is more important than the individual ingredient composition. Always buy concentrates on the basis of nutrient content.

How to

Choose the toncentrate mix that is Right for You

- Energy is the most limiting nutrient in beef diets - always check the energy content of the concentrate. The energy density of concentrate mixes for high levels of performance should be a minimum of 0.94 UFL / kg as fed for suckler cows and weanlings and a minimum of UFV of 0.92 / kg as fed for finishing cattle. (UFL is the unit used for suckler cows, UFV for finishing cattle)
- Check the protein content of the concentrate. Protein requirement will vary with type of animal, stage of the production cycle and the base forage being offered. Always balance the protein content of the concentrate with the protein content of the forage.
- Unless feeding minerals separately, check that minerals are included in the concentrate mix. Check that the feeding rate of the concentrate mix supplies the correct daily amount of minerals, e.g. if the label of a ration states that it should be fed at 5 kg / animal / day, it should not be fed at 10 kg / animal / day. Why? There is a risk of toxicity from oversupplying minerals.

- As a rule of thumb: beef cattle require 20 g of a general-purpose beef mineral / 100 kg LW, pre-calver minerals typically have a feeding rate of 120 g / head / day and post calver minerals have a feeding rate of 150 g per head per day.

Crude Protein (CP) % / kg fresh weight required in concentrate mixes for grass silage and ad lib meal diets for different classes of stock

Category of Animal	Grass Silage-Based Diets 10% CP in the Silage	14% CP in the Silage	Ad Lib meals
Weanlings (1.0 -1.5 kg feeding rate)	20%	12%	-
Weanlings (2.5 feeding rate)	16%	-	-
Suckler cows (dry)	-	-	-
Autumn Suckler cows (calves at foot)	18%	12%	-
Store cattle (500 kg+)	20%	12%	-
Growing bulls	18%	12%	12-13%
Finishing cattle (steers & heifers)	14%	11-12%	11-12%
Finishing bulls	11-12%	11-12%	11-12%

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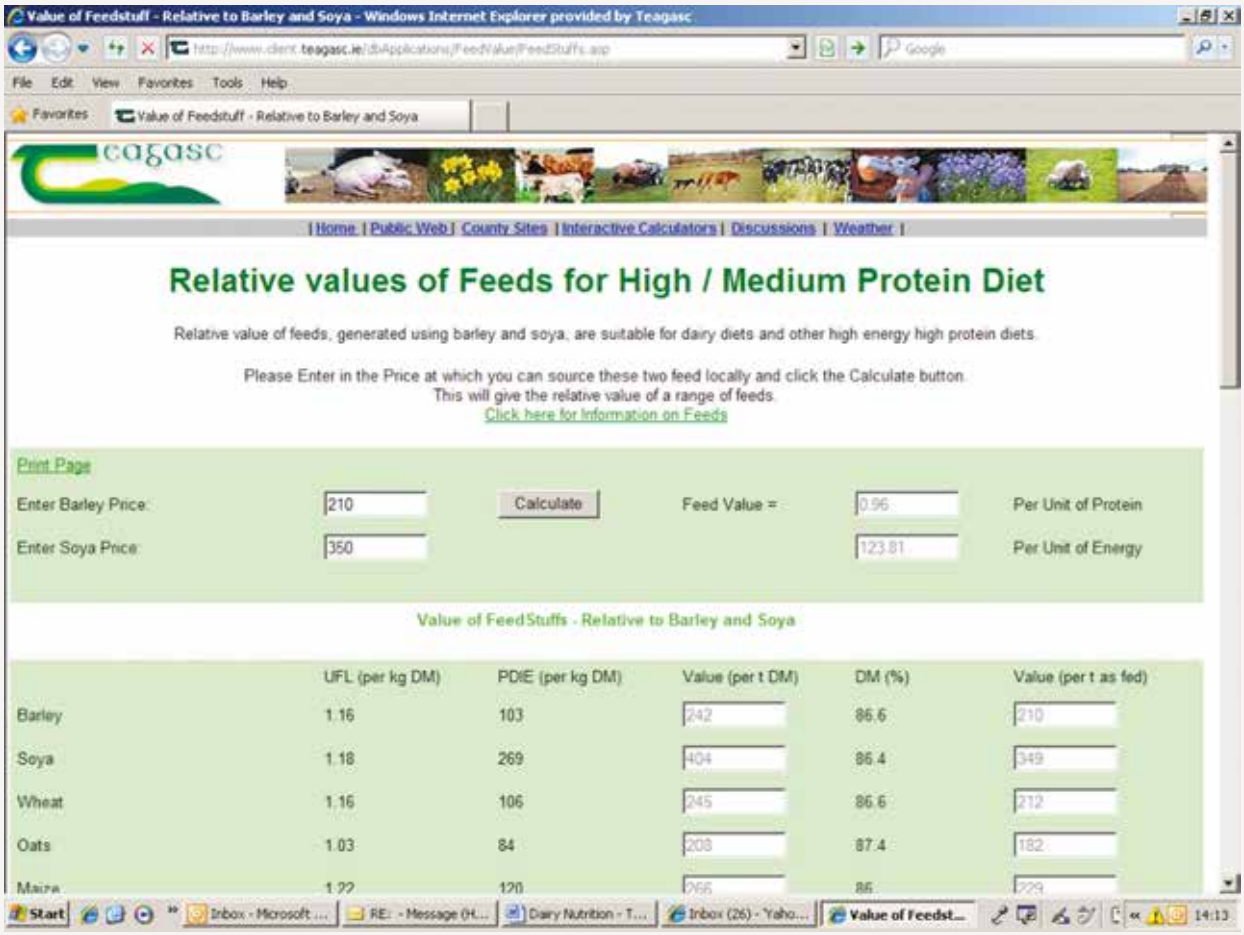
2 How can I ensure I'm getting value for money?

- Always ask for information on the nutrient content of the concentrate, i.e. energy, protein, minerals and fibre.
- Shop around – there can be a lot of variation in price but always ensure that price differentials are not explained by variations in nutrient content, i.e. compare like with like.
- The cheapest concentrate mix (€/ tonne) may not be the best value. Consider the value of the ration based on its feeding value relative to its cost.
- High-protein concentrate mixes don't necessarily have high energy content. The energy content of a 14% CP concentrate mix could be higher than an 18% CP concentrate mix.
- Don't assume that straight ingredients are better value than concentrate mixes. Always check the price of buying straights (and home mixing), relative to buying a standard concentrate mix. Only buy from licensed suppliers.
- Calculating the relative cost of different feeds can be difficult. Teagasc has an interactive calculator on the client site *www.teagasc.ie* where the price of barley and soya can be entered and the relative value of different feeds is then calculated automatically



Concentrate Feeds

What should I do if concentrate costs are high?

- Do a feed budget to work how much you will need and shop around for value (ensuring you bear quality in mind)
- Buy in bulk – buying rations in bags is much more expensive
- Consider high energy straights and simple mixes which are generally cheaper per unit of energy than compounds
- Feed to need only – monitor body condition of suckler cows, stores and weanlings throughout the winter to see if concentrate rate can be reduced or even stopped, especially in the second half of the winter.
- Buy grain directly from cereal farmers and add a protein balancer as required. With good silage, rolled barley plus minerals is adequate for store cattle and strong weanlings.
- Make best use of silage by having adequate feeding space, stocking rate in sheds, suitable feed barriers, good ventilation and parasite control.
- Aim for high performance on finishing cattle. Restrict high concentrate feeding to the final finishing period (80-100 days for steers and heifers and up to 200 days for bulls). With ad-lib concentrates a high rate of gain (1.5-1.8kg) live weight/day, is essential to cover daily feed costs. Highest rates of gain are achieved over a short finishing period.
- Plan for early turnout. Spring grass has a feeding value almost as high as concentrate feeds and costs less than one third of the price.
- Keep concentrate mixes simple.
- Sell cattle when fit for slaughter. Overfat animals cost significantly more to feed.

3 Should I consider home mixing?

Checklist

Factors to Consider

What is the scale of the operation?

- The feed usage on the farm must be sufficiently large to justify the additional labour and costs attached to home mixing.

What are the potential cost savings?

- Buying straight ingredients is not always cheaper than buying a balanced concentrate mix.

What storage facilities are available on the farm?

- There needs to be bird-and vermin-proof storage available on the farm.

What additional capital investment in buildings and equipment is needed?

- Investment in storage facilities can cost anything from €10-40 / t of concentrate used. This may not be cost effective.

Will the system be compliant with the feed hygiene and home mixing regulations?

What level of management skill is required?

- Buying ingredients competitively requires time and skill. The skill is in ensuring that rations are correctly balanced. The effort attached to home mixing may result in more important management jobs on the farm suffering, e.g. grassland management.

Key Risk

If using straight ingredients, it is important to check that these are correctly balanced for all nutrients, particularly minerals.

How to

Make best use of home stored cereals?

Category of Animal	Feeding Rate of Cereal* (max)	Comments
Dry cows	2-3 kg	Suitable for putting condition on dry cows fed grass silage, must be balanced for minerals; If feeding a lot of straw need to balance for protein,
Weanlings	1-3 kg	Suitable as sole concentrate where grass silage protein is greater than 16%, otherwise need to balance with protein, must be balanced for minerals
Store cattle	1-2 kg	For heavy stores there is no need for additional protein, must be balanced for minerals
Finishing cattle on grass	2-3 kg	Some concern over palatability at higher feeding rates, alternatively use 50:50 cereal:digestible fibre (e.g. hulls or pulps)
Finishing steers on grass silage	5-6 kg	No requirement for protein, must be balanced for minerals
Finishing steers on ad lib meals	5-6 kg	5-6 kg is relatively safe, higher rates possible but feeding management must be excellent to avoid digestive upsets; must be balanced for minerals

*The primary focus is on barley in this table but wheat may also be used. The risk of digestive upsets is far greater and the limits on feeding rate are more stringent. Oats can be used for dry cows, weanlings and stores. For finishing cattle, oats could replace part of the digestible fibre in the ration. In all cases, the cereal must be balanced for minerals.

Concentrate **Feeds**

Common ingredients (see later table for UFL/UFV values)

Energy feeds	Comments	
Barley	High-energy, high-starch, ingredient, risk of acidosis at high feeding rates, low protein (10-11% CP), low in vitamins and calcium, limit inclusion level to 6-7 kg of finishing diets, higher inclusions possible but feeding management is critical, feed rolled rather than ground.	
Wheat	High-energy high-starch ingredient, energy content similar to barley, starch is rapidly digestible, higher risk of acidosis than with barley or maize, low in vitamins and calcium, limit inclusion to 2-3 kg, unless it's caustic treated, feed rolled only.	
Maize grain	High-energy high-starch, but slowly digestible, lower risk of acidosis than with either barley or wheat, 30% of the starch is bypass, low protein (9-10%), low in calcium, there is no limit on usage but price will limit inclusion.	
Citrus pulp	By-product of pressing citrus fruits, high energy, good source of digestible fibre and sugar, useful ingredient combined with cereal and protein source, low protein (6% CP), low in phosphorus, limit inclusion to 3-4 kg but must be balanced for minerals.	
Beet pulp	By-product of sugar processing, high energy, good source of digestible fibre, useful ingredient combined with cereal and protein source, low protein (10% CP), low in phosphorus, limit inclusion in dry matter.	
Soya hulls	By-product of dehulling soyabeans, moderate energy, good source of digestible fibre, low protein (10%), useful ingredient in ad lib concentrate diets or fodder beet diets, reduces the risk of digestive upsets, limit inclusion to 2-3 kg.	
Wheat feed **(Pollard)**	By-product of flour manufacture, low-energy digestible-fibre source, moderate protein (16% CP), Good source of phosphorus but low in calcium and vitamins, variable quality, limit inclusion to 5-10%, depending on target energy density.	

Molasses	Moderate energy, good source of sugar, useful for binding pelleted concentrates, reducing dust and improves palatability of concentrate mixes.	
Protein Feeds		
Soyabean meal	High quality protein feed (48% CP) with high energy content, high in by-pass protein, good amino acid profile, being high in lysine but low in methionine, no limit on inclusion, limited by protein requirement and price.	
Maize distillers	By-product of alcohol distilling, moderate protein (25% CP) and high energy, high in digestible fibre and by-pass protein, high oil which can affect fibre digestibility and intake if the diet exceeds 5% fat, limit inclusion to 3.0-3.5 kg.	
Maize gluten feed	By-product of the manufacture of maize starch, moderate protein feed (20% CP)with moderate energy, variable quality, limit inclusion to 2.5-3.0 kg.	
Rapeseed meal	By-product of oil manufacture, high protein (34% CP), good source of rumen-degradable protein, moderate energy, palatability issues at high inclusion rate, limit inclusion to 2 kg.	
Palm kernel meal*	By-product of oil manufacture, moderate protein (16% CP) but protein is poor quality, low-energy feed, limit inclusion to 5-10%, depending on target energy density.	
Sunflower meal*	By-product of oil manufacture, very low energy high-fibre feed, high protein (25% CP) but protein of moderate quality, high in phosphorus, limit inclusion to 5-10%, depending on target energy density.	

*The combined maximum inclusion of these ingredients in high energy rations should not exceed 10-15%.

Concentrate Feeds

Sample concentrate mixes[1]

	Energy Specification (Minerals must be added to these mixes)	Energy Sucklers, Stores Weanlings UFL	Energy Finishing Steers, heifers, bulls UFV	Crude Protein	Comments
1. General Purpose (14% CP)	Barley (33.3%), citrus pulp (33.3%), distillers grains (33.3%)	0.98	0.94	13.8%	Suitable for suckler cows post calving, weanlings, finishing cattle
2. Cereal balancer or fodder beet balancer	Rapeseed meal (45%), soya hulls (55%)	0.92	0.87	20.0%	65% cereal + 35% of this mix will generate a ration of 13.5% CP, 50% cereal + 50% of this mix will generate a ration of 16% CP; suitable for feeding with 20 kg of fodder beet to finishing cattle
3. Ad lib feeding 1	Barley (60%), distillers grains (20%), soya hulls (20%),	0.96	0.94	13.2%	High-energy ration suitable for all classes of stock and ad lib diets
4. Ad lib feeding 2	Barley (40%), maize meal (20%), distillers grains (20%), soya hulls (20%)	1.00	0.98	13.0%	Very high energy ration and slightly safer ration with maize meal included

[1]Minerals must be added to all mixes

Database of feed ingredients used in beef concentrate mixes (Analysis/kg as fed)

	DM %	Suckler Cows & Weanlings UFL	Energy Finishing Cattle UFV	Crude Protein %	Crude Fibre %
Wheat (rolled)	86.6	1.00	1.00	9.7	2.3
Barley (rolled)	86	1.00	1.00	9.7	4.1
Beans	86	1.01	1.01	24.6	7.9
Beet pulp unmolassed	88.1	1.00	0.93	8.8	18.0
Citrus pulp	87.5	1.00	0.92	6.0	11.6
Fat (vegetable)	98	2.85	2.80		
Maize grain	86	1.05	1.04	8.7	2.3
Maize distillers	89	1.03	1.00	26.6	8.9
Maize gluten feed	86.5	0.92	0.86	20.3	7.8
Molasses cane	73.5	0.74	0.76	4.5	
Oats	87.4	0.90	0.85	9.7	11.8
Palm kernel exp.	89	0.85	0.84	14.6	21.2
Peas	85.6	1.03	0.99	21.1	5.1
Wheat feed (pollard)	88.1	0.77	0.64	16.2	8.7
Rapeseed meal	86.4	0.91	0.83	33.8	11.7
Soya hulls	87.9	0.89	0.87	10.5	35.4
Soyabean meal	86.4	1.02	1.02	48.1	4.5
Sunflower meal	88.6	0.58	0.50	24.6	29.1
Urea	95	-	-	273.1	

Database of commonly used forages/wet feeds (Analysis/kg DM) Consult the Teagasc website for current relative value of feeds

	DM (%)	Crude Protein (%)	Neutral Detergent Fibre (%)	Energy (UFL)	Energy (UFV)	Calcium (%)	Phosphorus (%)
Grass (autumn)	18.6	20.7	45.0	0.95	0.95	0.69	3.50
Grass (spring)	16.4	21.0	42.0	1.06	1.03	0.69	3.50
Grass (summer)	17.2	20.5	45.0	1.01	0.98	0.69	3.50
Grass silage 64% DMD	24.0	11.5	55.0	0.71	0.66	0.69	3.50
Grass silage 68% DMD	24.0	11.5	46.1	0.76	0.71	0.69	3.50
Grass silage 72% DMD	24.0	11.5	46.1	0.81	0.77	0.69	3.50
Baled silage 64 DMD	30	11.5	55.0	0.71	0.66	0.69	3.50
Baled silage 68 DMD	30	11.5	46.1	0.76	0.71	0.69	3.50
Baled silage 72 DMD	30	11.5	46.1	0.81	0.77	0.69	3.50
Hay	85.0	9.9	66.0	0.69	0.60	0.70	2.80
Maize silage 25% starch	32.0	8.5	48.0	0.80	0.75	0.20	2.00
Whole crop cereal silage, fermented	45.0	9.0	55.0	0.80	0.75	0.20	2.40
Whole crop cereal silage, processed	75.0	14.0	55.0	0.80	0.75	0.20	2.40
Straw–barley	88.0	3.8	84.4	0.44	0.33	0.38	0.90
Sugar beet	23.2	5.0	19.5	1.15	1.17	0.28	1.70
Potatoes	20.0	10.8	13.3	1.20	1.22	0.12	2.40
Fodder beet	19.0	8.0	13.6	1.12	1.14	0.26	1.80
Kale	14.0	16.0	25.0	1.05	1.05	2.50	3.00
Rape	13.0	22	25.0	0.91	0.91	0.90	0.50

Concentrate Feeds

Grain Preservation Options

Ammonia treated grain (20% moisture content) is treated with a urea based additive (+enzymes), stored rolled or unrolled. Well sealed under plastic, Advantage of increasing the crude protein to 14-15% / kg DM.

Acid treated grain (18-28% MC) is treated with propionic acid, stored rolled or unrolled, increase acid application rate by 10-15% if rolling before storing. Where grain has a variable MC, apply the acid at the rate for the higher MC grain.

Untreated grain must be under 15% moisture content (MC) for long term storage. Store at 15-17% MC, where the heaps are kept low and there is adequate ventilation to keep the grain in good condition. No additive, roll at feedout.

Alkali treated grain (15-30% MC) is treated with sodium hydroxide. No requirement for rolling. High pH product, reducing the risk of digestive upsets in live stock.

Crimped grain (28-35% MC) is harvested 3-4 weeks before normal harvest, window for treatment can be narrow, if drying rapidly. Treat with additive and process the grain using a crimping machine. Ensile anaerobically

Key terms

UFLs (Unite forragere lait) the energy in feed and forage are expressed in UFLs.

UFV (Unite forragere viande) the energy in feed and forage are expressed in UFV's. The UFV value is used for finishing cattle

Crude protein: expressed as a percentage (%).

PDI: Protein digestible in the intestine (expressed as g/kg of dry matter), a better measure of protein as it reflects the quality of the protein.

PDIN: Measures the PDI which can be produced from the available N.

PDIE: Measures the PDI which can be produced from the available energy.

Macro minerals: The main minerals - including calcium, phosphorus, magnesium, sodium, potassium and sulphur. These are measured in g per head per day or g per kg diet DM.

Trace elements: Copper, selenium, iodine, cobalt, zinc and manganese. These are measured in mg per head per day or mg per kg diet DM.

Dry matter intake (DMI, kg DM): this is the weight (kg) of feed material consumed, excluding the moisture it contains.

Alternative Feed Sources

There are a number of alternative feed sources, co-products from the baking, confectionary, vegetable and brewing industries. These may have a role to play on some larger units but a number of factors must be considered in examining them.

- What is the variation in dry matter?
- What is the nutritive value & how variable is this?
- What particular nutrients is it high / low in, for example, starch or oils.
- What are the limits on inclusion rate?
- How much, when and where is the feed available? Is there a consistent supply of the product available?
- How is it stored?
- What extra handling and storage facilities are needed on the farm? Are there large storage losses associated with it?
- Don't automatically assume that it will be cheaper than a purchased ration.
- Does it contain chemical residues or other banned compounds?, e.g. waste oil from chippers.