Section 6

Feeding **the Dairy Cow** (Concentrates)

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Introduction

With concentrated prices expected to remain high, they must be used prudently.

1. What should I look out for in concentrate mixes?
2. How do I investigate nutrition related problems?

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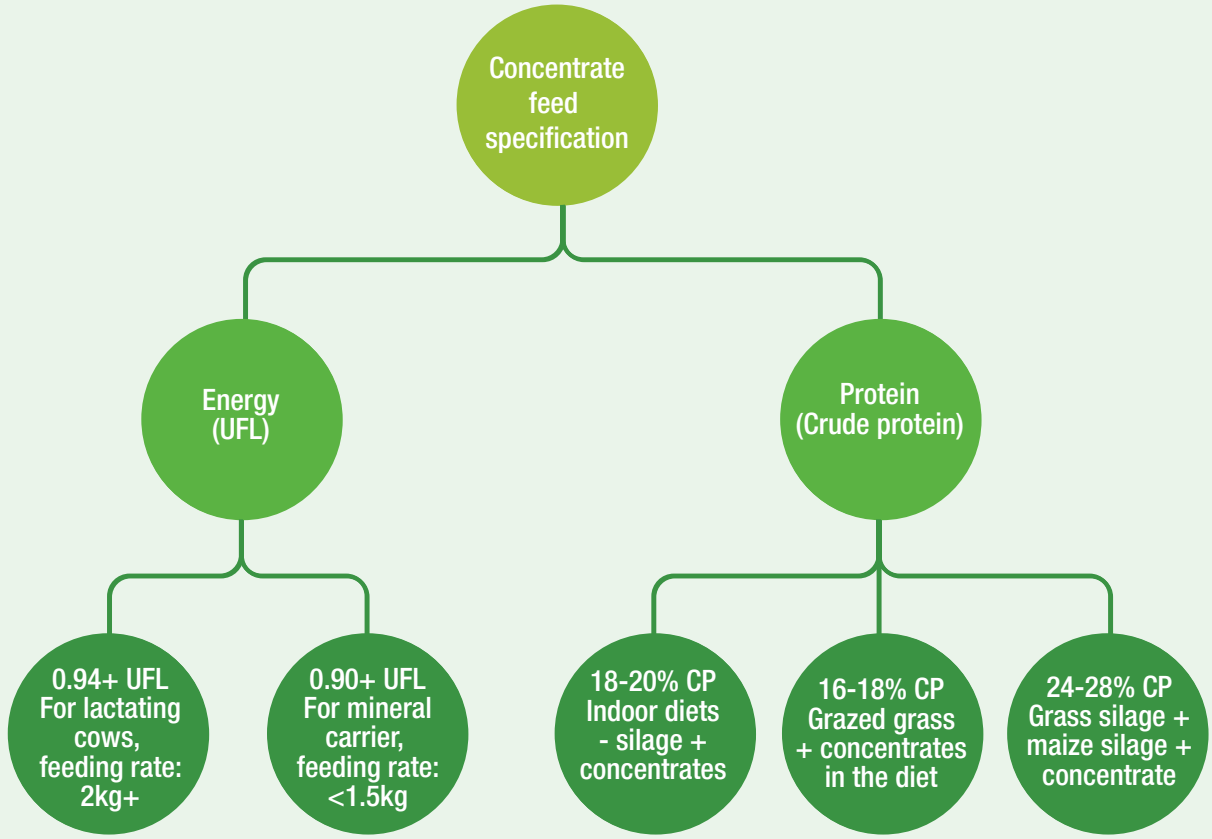
1 What should I look out for in concentrate mixes?

How to

Choose the concentrate mix that is right for you



1. Energy is the most limiting nutrient in dairy diets - always check the energy content of the concentrate. The energy density of concentrate mixes for high levels of performance should be 0.94 UFL/kg or greater as fed.

2. Check the protein content of the concentrate. This will vary with type of animal, stage of lactation and the base forage being offered. Always balance the protein content of the concentrate with the protein content of the forage.

3. 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. calmag inclusion to match feeding rate during the high tetany risk period.

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

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

Checklist

Getting value for money

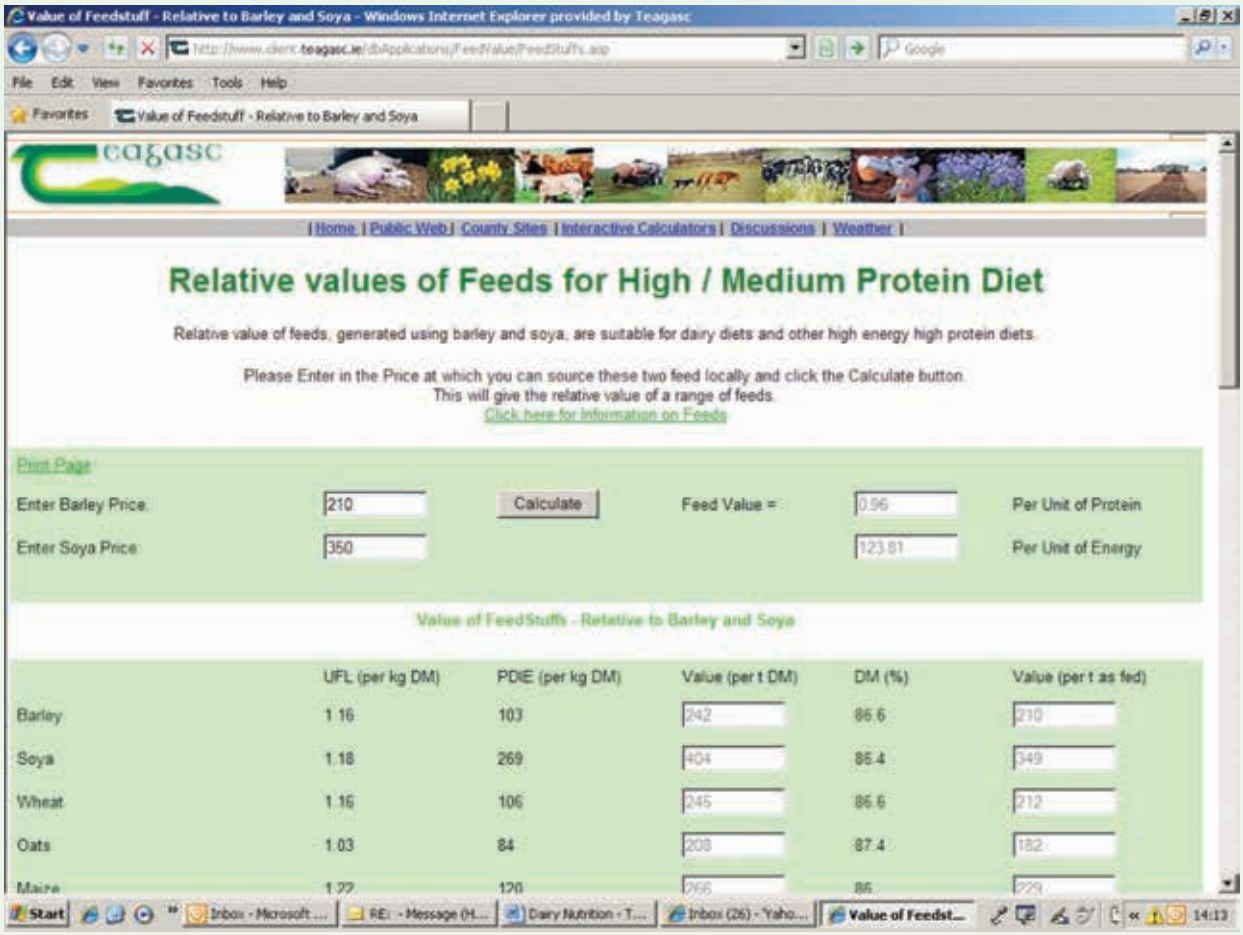
1. Always ask for information on the nutrient content of the concentrate i.e. energy, protein, minerals and fibre.
2. Shop around – there can be a lot of variation in price but always ensure that price differentials are not explained by variations in nutrient content i.e. compare like with like.
3. The cheapest concentrate mix may not be the best value. Consider the value of the feed based on its feeding value relative to its cost.
4. 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.
5. 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.
6. Only buy from appropriately licensed suppliers.

Key fact

Calculating the relative cost of different feeds can be difficult. Teagasc has an interactive calculator on its website www.teagasc.ie where the price of barley and soya can be entered and the relative value of different feeds is calculated automatically.

Rule of thumb

Rolled barley has a UFL of 1.00. All other feeds are expressed relative to barley. For example, soya hulls has a UFL of 0.88, which is 88% of the value of barley, on an energy basis.



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Common ingredients

Energy feeds	Comments	
Barley	High starch, risk of acidosis at high feeding rates, do not feed at high rates in grazing concentrate mixes	
Wheat	High starch and rapidly digestible, higher risk of acidosis than with barley or maize, high substitution rate at grass	
Maize grain	High starch but slowly digestible, risk of acidosis less than barley or wheat	
Citrus pulp	Good source of digestible fibre and sugar, suitable supplement at grass	
Beet pulp	Good source of digestible fibre, high energy, suitable supplement at grass	
Soya hulls	Good source of digestible fibre, moderate energy content, suitable supplement at grass	
Wheat feed (pollard)	By-product from flour processing, low energy feed	

Soyabean meal	The best quality protein feed, high in by-pass protein, not necessary in a grazing situation unless cost competitive	
Molasses	Useful for binding pelleted concentrates, reducing dust and improves palatability of concentrate mixes. Typical inclusion of 3-6% in the concentrate mix	

Protein Feeds

Maize distillers grains	High energy, moderate protein, high oil which can affect milk fat if percentage of total unprotected fat in the diet exceeds 6%	
Maize gluten feed	Moderate energy, moderate protein, variable quality	
Rapeseed meal	High protein, a good source of rumen degradable protein, palatability issues at high inclusion rate	
Palm kernel meal	Low energy feed; limit its use in high energy mixes	
Sunflower meal	Low energy feed, high protein content but protein is of poor quality	

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Rule of thumb

1 kg DM of grass is the equivalent of 1 UFL/kg DM. Concentrate mixes will have a UFL varying from 0.85–0.95 UFL/kg as fed (or 0.98-1.09/kg DM). Target energy density for high quality concentrate mixes is 0.94 UFL/kg as fed, depending on the quality of the ingredients used.

2 How do I investigate nutrition related problems?

1. Excessive body condition loss

1. Low dry matter intake (see checklist for factors causing low dry matter intake).
2. Inadequate supplementation.
3. Poor quality supplement.
4. Metabolic diseases.
5. Inadequate trough space indoors.
6. Excessive dietary protein.
7. Cows overfat at calving.
8. Disease.

2. Low milk protein

- Cows may not be genetically capable (see EBI score) of producing high milk protein.
- Low energy intake limits protein digestion in the rumen and limits milk protein production. Low energy intake can be due to:
  - inadequate dry matter intake due to a limited supply of grass, low grass digestibility, overestimation of grass supply and poor grazing conditions.
  - grazing high pre-grazing covers of grass (>1,600 kg DM/ha), resulting in low digestibility, low energy grass
  - poor quality forages e.g. low digestibility silage.
- Stage of lactation – milk protein % dips 4-6 weeks after calving due to dilution (i.e. peak milk yield dilutes the % of fat + protein). This is most notable where compact calving was achieved. Always calculate the total production of milk solids, milk protein % may have dropped but total kg of milk solids production may be high.
- Mean calving date – late calved cows tend to have lower milk protein in mid-season.
- High levels of oil in the complete diet will depress intake and consequently milk protein. This is only likely to be a problem in indoor diets.
- Ingredient type – high energy feeds such as grass will stimulate milk protein production. In indoor feeding systems, maintaining starch levels at 20-25% of total intake will help maintain milk protein levels.

3. Low milk fat

Insufficient fibre in the diet is the most common cause of low milk fat. What might cause low milk fat:

- cows grazing low covers of lush grass with little fibre. (Providing cows with a source of fibre such as straw or hay may help. Don't overreact to a short-term drop in milk fat content.)
- high levels of concentrate feed with grass of low fibre content
- high levels of cereal/rapidly degradable carbohydrates in the concentrate feed (Grazing concentrate mixes should be based on a high fibre ingredients such as pulps and hulls.)

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4. Low milk lactose

As milk yield declines, so too does milk lactose. Low milk lactose is generally a problem in late lactation.

- Dry the herd off when production averages less less than 8-9 litres. Dry off any cow producing less than 6.5 litres/day.
- Where grass quality and/or grazing conditions are poor, feeding 2-3kg of concentrates helps maintain milk yield and consequently lactose levels.
- High somatic cell count results in low lactose content, irrespective of stage of lactation.

5. Milk fever (clinical/sub-clinical) – Always consult your veterinarian about treatment of these diseases)

Clinical milk fever is easily diagnosed with the classical 'downer' collapsed cow, but sub-clinical milk fever is more difficult to diagnose. Signs of sub-clinical milk fever include slow, difficult calvings, retained cleanings, low dry matter intake and uterine infections.

To reduce the risk of milk fever (clinical & sub-clinical):

- Avoid having cows at a condition score greater than 3.5 (or less than 2.5) as they are at higher risk of both types of milk fever. Late calving cows are at greater risk of being over-conditioned due to the long dry period.
- Watch the age profile of the herd. Milk fever is more prevalent in 3rd calvers and older cows.
- Ensure animals have adequate feeding space (2ft/0.6m per cow).
- Offer cows fixed rate minerals. Fixed rate feeding of minerals is most accurate.
- Supplement with 15-25g/day of magnesium. Check the pre-calver mineral to ensure the feeding rate is correct.
- Avoid high potassium levels in the base forage. High potassium levels in grass silage, due to excessive spreading of slurry on silage ground in late spring can limit the uptake of magnesium from the gut, increasing the risk of milk fever.

Treatment: Inject, as soon as possible, with a bottle of calcium under the skin. If it's a particularly bad case of milk fever, injection into a vein may be necessary but this should be left to a veterinarian as it can cause sudden death if not carried out properly.

Retained cleanings

Retained placenta is when the foetal membranes fail to separate from the womb of the cow within 24 hours of calving. Cows with retained cleanings are at higher risk of developing metritis, ketosis and mastitis and are at increased risk at subsequent calvings.

This can be prevented by:

- having cows fit (BCS = 3.25), but not fat calving down.
- ensuring the diet is correctly balanced for minerals, particularly magnesium and trace elements. (Iodine and selenium have an important role to play in reducing the risk of retained cleanings. Supplement with 60mg and 5mg of iodine and selenium, respectively.)
- reducing the risk of clinical and sub-clinical milk fever.

Treatment: Do not intervene unless the cow is running a high temperature. Use of washouts etc. can have a negative effect on reproductive performance. If the cow is running a high temperature, she may need to be treated with antibiotics and anti-inflammatories. Get the cow to cycle as soon as possible, conception rate after 1st heat will be poor.

Ketosis

Ketosis occurs when energy intake is not adequate to meet the requirements of the cow and she mobilises fat to meet her energy requirements. (Continued overleaf)

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Prevent by:

- having cows at BCS 3.25 at calving.
- maximising dry matter intake after calving.
- minimising cow stress at turnout to grass.
- avoiding sudden changes in the diet - increase concentrate intake slowly after calving, avoiding acidosis problems.

Treatment: A quick-acting glucose supplement is required immediately. Intravenous administration of a dextrose solution by a veterinarian is effective in the short-term, but follow-up treatment is essential if relapses are to be avoided. Drenching with propylene glycol or glycerine has longer term effects. It also has the benefit of ease of administration. Treatment should be continued for two to four days. Several commercial compounds contain propylene glycol and glycerine.

Displaced abomasum (DA)

Displaced abomasums occur when the rumen fill is not adequate to keep the abomasum in place and it 'flips over'. Left DA is the most common.

Prevented by:

- ensuring gut fill is maximised within 10 days of calving i.e. adequate intake
- ensuring there is enough fibre in the diet
- avoiding sudden changes in diet – e.g. turnout to grass immediately after calving in poor grazing conditions
- feeding a maximum of 4kg concentrates in one feed
- avoiding milk fever problems around calving. Cows with clinical or sub clinical milk fever are more prone to DA's
- limiting concentrate feeds to 60% of the total dry matter intake of the cow in winter herds

Treatment: Displaced abomasum can be treated using treatments such as rolling the cow, altering the diet and treating concurrent disease, but failure and recurrence rates are quite high. Surgical correction is very successful for displaced abomasum but is expensive.

Pica

Pica includes persistent licking, chewing or eating of wood (fence posts, tree-bark, sticks, wood partitions), soil (dirt, clay, stones), rags, bones etc.

Possible contributory factors include:

- energy or protein deficiency– check the diet for energy and protein supply
- lack of fibre - if fibre shortage is suspected, feed extra roughage (some straw or hay).
- mineral deficiency - ensure there are no underlying mineral deficiency problems (P, Na, Cu, Co etc).

Treatment: The provision of an additional supply of energy, protein or long fibre (e.g. straw) may help to alleviate the problem. If minerals are the cause of the problem, supply additional minerals in the feed or through water, or boluses.

How to

Diagnose a mineral deficiency problem.

- Establish the symptoms of the problem.
- Analyse all feeds used on the farm for mineral status (major and trace elements).
- Calculate the mineral intake of the animal from forage and concentrate feeds. Compare cow requirements to supply from the diet.
- If needed, analyse blood samples (preferable to milk samples) to establish the mineral status of the animal. Samples should be taken at the time of the problem.

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Database of feed ingredients used in dairy concentrate mixes (Analysis/kg DM) (See list of terms overleaf)

	DM (%)	Crude protein (%)	Crude fibre (%)	PDIN (g)	PDIE (g)	Energy (UFL)	Calcium (%)	Phosphorus (%)
Barley (rolled)	86.0	11.3	4.8	74	103	1.16	0.06	0.39
Beans	86.0	28.6	9.2	166	102	1.18	0.13	0.64
Beet pulp unmolassed	88.1	10.0	20.4	64	110	1.14	0.76	0.09
Citrus pulp	87.5	6.9	13.3	46	91	1.14	1.7	0.11
Cottonseed exp	91.5	38.8	19.0	263	201	0.86	0.28	1.07
Fat (vegetable)	98	-	-	140	120	2.91	-	-
Maize grain	86.0	10.1	2.7	83	120	1.22	0.06	0.28
Maize distillers	89.0	29.9	10.0	200	134	1.16	0.2	0.75
Maize gluten feed	86.5	23.5	9.0	158	125	1.04	0.18	0.88
Molasses cane	73.5	6.1	-	32	68	1.00	1.2	0.09
Oats	87.4	11.1	13.5	74	84	1.03	0.12	0.38
Palm kernel exp.	89.0	16.4	23.8	131	143	0.96	0.33	0.65
Palm kernel ext.	86.6	19.7	26.8	157	171	0.93	0.31	0.72
Peas	85.6	24.6	6.0	149	102	1.20	0.12	0.48
Wheat feed (pollard)	88.1	18.4	9.9	115	90	0.87	0.07	1.4
Rapeseed meal	86.4	39.1	13.5	254	151	1.05	0.72	1.09
Soya hulls	87.9	11.9	40.3	77	107	1.01	0.43	0.18
Soyabean meal	86.4	55.7	5.2	396	269	1.18	0.38	0.71
Sunflower meal	88.6	27.8	32.9	179	100	0.66	0.42	1.01
Urea	95	287.5	-	1472	-	-	-	-
Wheat (rolled)	86.6	11.2	2.6	77	106	1.16	0.05	0.41
Wheat caustic	75.0	11.2	2.6	77	106	1.16	0.05	0.41

Database of commonly used forages/wet feeds (Analysis/kg DM)

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

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Key terms

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

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.