

Feed Ingredient Options for Sheep Rations

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Concentrate feeds are made up of different constituents. Each constituent provides the animal with different nutrients and has a certain function within the overall diet. All foods contain water and dry matter. The dry matter of the food contains the main constituents required by the animal i.e. carbohydrates, proteins, fats, vitamins and minerals. Carbohydrate in feed comes in the form of starch or sugar or fibre. Animals get most of their energy from carbohydrate, with a small percentage of their energy coming from fat.

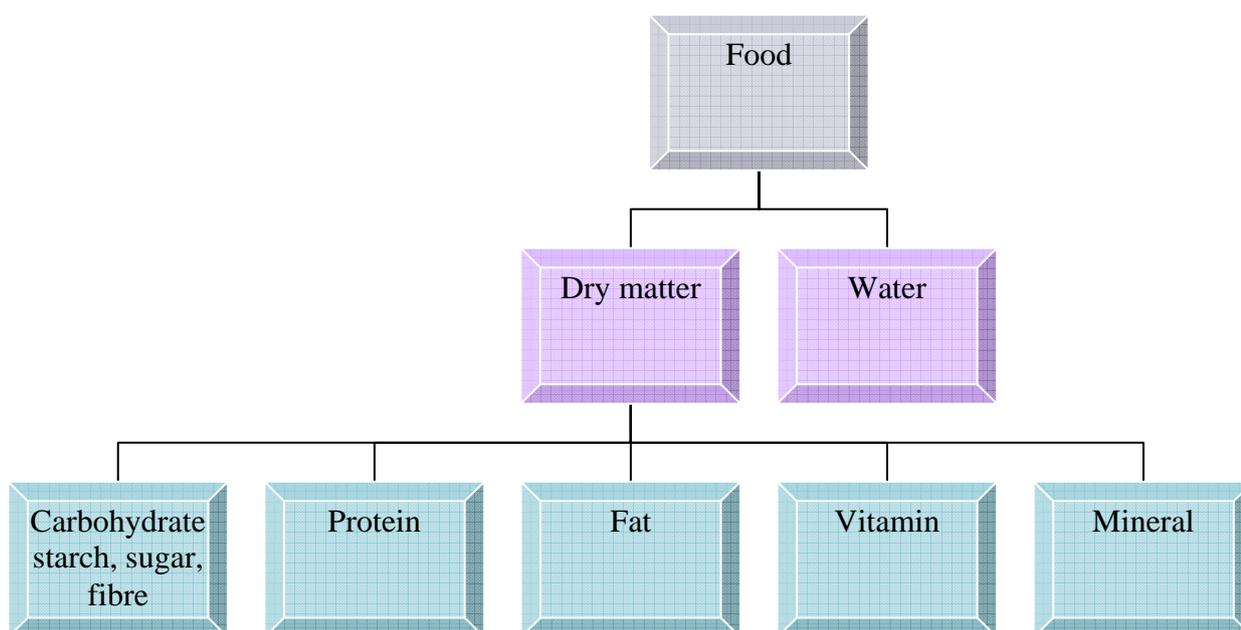


Fig 1. Constituent breakdown of concentrate feed.

Energy is the most limiting nutrient in sheep rations. Always ask for the energy content of the ration, before purchase. The target energy density of sheep rations is 0.94 UFL / kg as fed.

Common Feed Ingredients

Energy Feeds

Barley is a rich source of starch for sheep rations. Barley is a high energy feed with low protein (10% CP). There is no maximum inclusion rate in a sheep ration. Whole barley is commonly used in sheep rations and this reduces the risk of acidosis. Barley can be included at up to 40% of the ration, assuming it's correctly balanced for fibre, minerals and protein.

Wheat is a good source of energy in the form of starch but the starch is readily digested and therefore can cause digestive upsets. Its inclusion should be limited to 20% of the ration.

Oats has a 10% lower feed value than barley. This is due to a higher fibre content of oats. For this reason oats is a very safe feed for sheep. There is no maximum inclusion level but if the target is to achieve a high energy ration, then it's inclusion needs to be limited.

Beet pulp is a by-product from the sugar beet industry. Most of the beet pulp utilized in this country is now imported from the UK. It is high in digestible fibre which is an energy source. It is palatable and ideal for mixing with cereals. There is no maximum inclusion.

Citrus pulp is a by-product from the extraction of orange from citrus fruits including oranges and lemons. It is high in digestible fibre but low in protein (6% CP). It has a poor mineral balance and its inclusion should be limited to not more than 30% of the ration.

Soya hulls is a by-product of soya bean processing. It is a medium energy feed with low protein (10% CP). It is available in meal or pelleted form. The pelleted form is best. It's a good source of fibre but its inclusion (20-25%) should be limited due to it's energy content.

Wheat feed (pollard) is a by-product of flour manufacture. It is a low energy feed with 16% crude protein. Its inclusion should be severely limited, particularly if other low energy feeds are used.

Molasses is a source of sugar in the diet of sheep. Cane molasses is commonly used in this country. It has a relatively low energy and protein content. It is used to ensure pellet integrity and reduce dust in coarse rations. It is generally included in rations at 4-6%.

Vegetable fat is a source of energy in animal feed but is used in very small quantities, relative to the cereals and pulps. Its inclusion should be limited as high levels of unprotected fat can reduce fibre digestibility and consequently, intake.

PROTEIN FEEDS

Soya bean meal is the "Rolls Royce" of protein feeds. The soya commonly used in this country has 48% CP. The protein is of good quality with a high proportion of by-pass protein. It is an ingredient of consistent quality and useful for home mixing. Its inclusion is generally limited by price.

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	

Some common feed ingredients

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	

Some common feed ingredients

Distillers grains is a by-product from the distillery industry. Corn (or maize) distillers grains, imported from the US, is commonly used in the country. But other sources include barley and wheat distillers grains from the UK and Europe. It is high in protein (26% CP) and energy. However, due to high concentrations of copper levels, its inclusion in a ration should not exceed 30%.

Maize gluten feed is a by-product of the manufacture of maize starch. It is a moderate protein source (20% CP) but its protein quality can be variable. Due to high concentrations of copper a maximum inclusion rate of 30% is advisable.

Rapeseed meal is a by-product of oil manufacture. It is a medium energy, high protein (34% CP) feed. Its inclusion should be limited to 20% of the ration due to palatability issues.

Sunflower meal is a by-product of oil manufacture. It is a very poor energy source and while its crude protein is 25%, the quality of the protein is poor. Its inclusion should be severely limited, particularly if other low energy feed are being used in the ration.

Peas are a good source of energy and moderate source of protein (21% CP). Inclusion rate should be limited to 20-25% due to anti-nutritional factors.

Beans are a good source of energy and protein (25% CP). Beans are commonly used to replace distillers grains in rations. The inclusion rate should be limited to 20-25% due to anti-nutritional factors.

Minerals & vitamins are a necessary component of any sheep ration. Inclusion rate will vary from 2-4%. Always check that the mineral correctly balances the ingredients used.

Table 1 presents the energy and protein content of a range of feed ingredients. The energy content of the feed ingredient is expressed in UFL's. Barley has an energy value of 1.00 UFL and all other ingredients are expressed relative to barley.

Table 1. Energy & Protein Content of Common Feed Ingredients

Feed/Ingredient	Energy (UFL)	Protein (%)
Energy Feeds		
Barley	1.0	9.7
Maize meal	1.05	8.7
Beet pulp	1.0	8.8
Citrus pulp	1.0	6
Soya hulls	0.88	10.5
Wheat feed (pollard)	0.77	16.2
Molasses	0.74	4.5
Protein Feeds		
Soyabean meal	1.02	48
Distillers grains	1.03	26.6
Rapeseed meal	0.91	34
Maize gluten feed	0.90	20
Sunflower meal	0.58	24.6
Peas	1.03	21.0
Beans	1.01	24.6

How to: Calculate the monetary value of an energy feed, relative to barley

On an energy basis, all feeds are expressed relative to barley. Barley has an energy value of 1,00 UFL / kg as fed. Therefore, if a feed ingredient has a UFL = 0.88 / kg as fed, then its monetary value is 88% of the value of barley. Likewise, if an ingredient has a UFL = 1.05, then its monetary value is 105% of the value of barley.

Example

How do I calculate the monetary value of soya hulls, when rolled barley is €230 / tonne?

1. Soya hulls has a UFL of 0.88 / kg as fed. Therefore, it is valued at 88% of the value of barley
2. To get the monetary value of soya hulls, multiply the price of barley by (0.88 / 1.0)

$$= \text{€}230 * (0.88 / 1.0)$$

$$= \text{€}230 * 0.88$$

$$= \text{€}202$$

This calculation takes no account of protein, mineral or fibre content of the ingredient

Sample Rations

Table 2 presents sample rations suitable for ewes pre-lambing and finishing lambs.

Table 2. Sample Rations

	Ewe Pre-Lambing	Lamb Finishing
Barley (%)	40	40
Beet pulp (%)	28.5	34.5
Soyabean meal (%)	26	
Rapeseed meal (%)		20
Molasses (%)	3	3
Minerals (%)	2.5	2.5
Energy (UFL)	0.97	0.95
Crude protein (%)	19.0	13.8

The mineral content of the ration is just one of the risk factors associated with urinary calculi. High levels of salt are regularly included in rations to encourage water intake and reduce the risk of urinary calculi. A Ca/P ratio of 2/1 or more is desirable.

Summary

1. The constituents of sheep rations include energy (carbohydrate & fat), protein, minerals & vitamins
2. Energy is the most limiting nutrient in sheep rations. Always ask for the energy content of the ration, before purchase. The target energy density of sheep rations for high producing animals is 0.94 UFL or greater.
3. The primary high energy sources used in sheep rations include cereals and pulps (beet pulp and citrus pulp). Low energy ingredients should be avoided, particularly when home mixing.
4. Soyabean meal is the “Rolls Royce” of protein feeds and because of its consistent quality is most suited to home mixing. Other reliable protein sources include distillers grains (watch for copper levels) and rapeseed meal (watch for palatability issues).
5. The monetary value of energy feeds should be calculated on the basis of their energy value, relative to standard barley.