



# The Mini Feeds Directory



Produced by

## Disclaimer

Welcome to the Mini Feeds Directory which has been compiled to give you an introduction to the key feeds used on farm.

With rising feed costs farmers are looking more to alternative feeds for including in rations for beef cattle and sheep. This booklet will become a useful reference and provides information on the feed value of a range of alternative and more traditional feedstuffs. It also includes a section on the typical feed values of forage crops used on Welsh farms.

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This guide covers a range of feeds that are suitable for inclusion in beef and sheep rations. It is not a comprehensive list of all feeds available, but provides a summary of the more common ones.

Feed is a vitally important input to livestock production systems. Not only does it make up the majority of variable costs but it contributes to determining how well animals perform and the profitability of the system. Choosing the right feed will depend on the nutritional requirements of the cattle and sheep concerned, other ingredients in the diet, the facilities available on farm and feed

price. Getting a better return from feed relies on providing a well-balanced ration that meets the nutritional needs of the cattle. It is dependent on making the right choices about feed purchasing, storage and targeted rationing.

This guide will help farmers to make decisions about the most appropriate feed for different systems, highlighting some of the issues that need to be considered. It includes useful, practical information about storage requirements, palatability, inclusion rates and nutrient composition of feeds suitable for inclusion in beef and sheep rations.

# Implications of Different Feeding Options

## Getting the Most Out of Alternative Feeds

As well as the traditional feeds included in beef and sheep rations there is an increasing range of 'alternative feeds' available and worth considering. The term 'alternative feeds' encompasses a huge range of different dry, moist and liquid feeds and blends that tend to be derived from human food and drink manufacturing processes and possibly biofuel production in the future. These feeds can offer farmers the opportunity to purchase cost effective feed products for their cattle that will enable high levels of performance to be achieved when included as part of a properly balanced ration. However it is important that a number of factors are taken into consideration:

### Part of a Balanced Ration:

Alternative feeds rarely provide a complete feeding solution for beef/sheep and therefore often rely on good quality home grown feeds to provide a well-balanced ration. Alternative feeds can vary in terms of physical form and nutritional analysis depending upon their source. It is advisable to seek the advice of a professional nutritionist when feeding these products.

### Dry, Moist or Liquid Feeds:

Alternative feeds are generally categorised by their physical form – dry, moist or liquid. Dry feeds tend to be in either a pellet or meal form with specific handling and storage characteristics depending on their origin. Moist and liquid feeds, as their name suggests, have a lower dry matter content, which means that good storage facilities are required to minimise waste. Blended feeds are also available which incorporate a range of different alternative feeds into a pellet or meal blend (always ask for the list of ingredients and composition to be sure you know what you are getting).

### Storage and Minimising Waste:

Dry feeds have the most flexible storage options with bins, hoppers, on-floor, and in a trailer, all being suitable.

For longer-term storage of moist feeds, ensiling is required. Clean side and top sheets are recommended, held down by material such as bales that ensure all the sheet is in contact with the feed. Moist feed can be capped with potato slurry or citrus wet press, which will also ward off some vermin. Alternatively, moist feeds may be clamped with forages or mixed with dry feeds for storage as a complete feed e.g. grain-beet is a mixture of brewers grains and molassed sugar beet feed. All liquid feeds require storage in either tanks or drums.

### Cost Effectiveness:

Regardless of feed type, price will be reduced by being able to order and handle large loads. There may also be opportunities to make savings through forward buying, based on a judgement made about price fluctuations throughout the year.

### Farm Assurance:

Most farm assurance schemes stipulate that animals sold as farm assured must have been fed purchased feeds supplied by certified feed companies. Check the details of your own assurance scheme for specific details of feed source assurance specifications.

# Implications of Different Feeding Options

## Formulating Beef Finishing Diets

Finishing diets should be high in energy and also contain the right balance of protein to ensure efficient feed utilisation. Starch tends to be the most common source of energy in intensive diets but a source of sugar is helpful to utilise the starch effectively. The majority of the fibre in cattle diets is provided by forage, and is important for optimizing rumen function. In all diets, ensure the cattle are fed a balanced ration tailored to the breed type, sex and stage of production.

## Diets for Sheep

Care should be taken with the selection of feeds for sheep. They should be free from mould/not rotting especially moist feeds or forages where *Listeria* could grow. *Listeria* can affect sheep of all ages, but it tends to effect young lambs, causing neurological problems, and pregnant ewes, which may abort as a result of infection. The correct particle/chop size is important to avoid choking and when using distillery or brewery feeds always check the copper level is not too high especially from older facilities using copper equipment.

## Using the Information in this Guide

Information is presented about nutritional and utilisation characteristics of common feeds used in the beef and sheep industries but these are by no means the only feeds that can or should be fed.

### Category:

Breaks the feeds down into groups. Ideally the ration would contain feeds from a couple of different categories, although this is not essential, and would depend on the basal forage.

### Nutritional Notes:

Provides key nutritional information about the feed, highlighting any potential problems.

### Palatability:

Indicates how readily cattle will eat the feed.

### Upper Inclusion Rate:

A suggested upper limit for inclusion of the feed in a ration on a dry matter basis. Exceeding this limit may cause rumen upset and potential acidosis problems.

### Storage/Processing:

An indication of whether a feed needs further processing before feeding. This will effect the overall feed cost, and also storage requirements if processing is carried out on-farm.

### Bulk Density:

A guide to how much space will be required for storage per tonne of fresh-weight.

### Typical Analysis:

A summary of the average key nutrient composition of feeds. This should be used as a guide only to inform decision-making. A declaration of feed analysis should be sought at purchase to ensure correct diet formulation.

# Cereals

## Barley

Cereal Grain

### Appearance



### Bulk Density

Whole 650 kg/m<sup>3</sup>

Rolled 370 kg/m<sup>3</sup>

Crimped 900 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, high in starch, low in fibre, low in protein. Should be fed little and often to avoid acidosis, particularly when processed into small particles. When moist, supplementation with vitamin E and selenium is essential.

### Palatability

Good

### Upper Inclusion Rate (DM)

50%

### Storage/Processing

Range of options: dry, moist, wet, whole, ground, rolled and crimped. Dry matter may be less if not dried.

Normally they are fed whole to sheep.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
86.0	13.2	12.1	21.1	3.0	59.0	3.0

## Wheat

Cereal Grain

### Appearance



### Bulk Density

Whole 730 kg/m<sup>3</sup>

Rolled 420 kg/m<sup>3</sup>

Crimped 950 kg/m<sup>3</sup>

### Nutritional Notes

Very high in energy, very high in starch, very low in fibre, low in protein. Must be supplemented with digestible fibre and fed little and often to avoid acidosis, particularly when processed into small particles. When moist, supplementation with vitamin E and selenium is essential.

### Palatability

Good

### Upper Inclusion Rate (DM)

30%

### Storage/Processing

Range of options: dry, moist, wet, whole, ground, rolled and crimped. Dry matter may be less if not dried.

Normally they are fed whole to sheep.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
86.0	13.8	12.8	14.0	2.0	69.0	3.5



# Cereals

## Triticale

Cereal Grain

### Appearance



### Bulk Density

Whole 720 kg/m<sup>3</sup>

Rolled 410 kg/m<sup>3</sup>

Crimped 950 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, high in starch, low in fibre, low in protein. As with all cereals it should be fed little and often to avoid acidosis (particularly when ground into a meal). When moist, supplementation with Vitamin E is essential.

### Palatability

Good

### Upper Inclusion Rate (DM)

40%

### Storage/Processing

Range of options: dry, moist, wet, whole, ground, rolled and crimped. Dry matter may be less if not dried.

Normally they are fed whole to sheep.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
86.0	13.4	12.0	13.2	1.9	66.5	4.0

## Maize

Cereal Grain

### Appearance



### Bulk Density

Whole 750 kg/m<sup>3</sup>

Crimped 1000 kg/m<sup>3</sup>

### Nutritional Notes

Very high in energy, very high in starch, very low in fibre, very low in protein. The starch in maize is digested further down the digestive tract than other cereals which it complements very well in a mixed cereal diet. Very low in minerals.

### Palatability

Good

### Upper Inclusion Rate (DM)

40%

### Storage/Processing

Range of options: dry, moist, wet, whole, ground, rolled and crimped. Dry matter may be less if not dried.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
86.0	14.3	8.5	12.1	4.3	71.0	2.0

# Cereals

## Oats

Cereal Grain

### Appearance



### Bulk Density

Whole 500 kg/m<sup>3</sup>

Rolled 290 kg/m<sup>3</sup>

### Nutritional Notes

Moderate in energy, moderate in starch, high in fibre, low in protein. A very safe feed, lower in energy than other cereals making them less suitable for rapid growth rates in finishing rations, but with good levels of unsaturated fat they can produce good carcase composition.

### Palatability

Good

### Upper Inclusion Rate (DM)

50%

### Storage/Processing

Range of options: dry, moist, wet, whole, ground, rolled & crimped. Normally they are fed whole to sheep.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
86.0	12.2	11.0	35.6	5.0	42.0	1.0

## Storage and Feeding of Roots

Where farm grown roots are a permanent feature, a suitable insulated, air cooled, humidity controlled store could be constructed to avoid losses. Otherwise roots need to be purchased fresh as required, particularly if they are pre-washed as that will reduce their keeping quality. Washed carrots can go off in a week in mild temperatures. Fodder beet, sugar beet, swedes and parsnips can be stored for several months outdoors in straw bale clamps with moderate losses, but are better in cool, dry, aerobic conditions, for example under a roof in an airy building, not sheeted.

If potatoes are to be kept long term, they are best kept unwashed in cool, dark conditions such as outdoor clamps covered with straw and soil.

In anaerobic conditions, washed roots can be mixed with clamped silage or brewers grains, (minimum 2 parts brewers grains to 1 part roots). Washed and chopped roots can be clamped with absorbents such as sugar beet pulp and malt pellets, (4 parts washed and chopped roots to 1 part absorbent).

# Roots

## Potatoes

Vegetable

### Appearance



**Bulk Density**

645 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, high in starch, low in fibre, low in protein. Soil contamination can be a problem and sprouted, green or rotten potatoes should not be fed. It takes 4.25 kg of potatoes to replace 1 kg of barley.

### Palatability

Very Good

### Upper Inclusion Rate (DM)

40%

### Storage/Processing

Whole or chopped (chopping can reduce risk of choking).

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
20.5	13.5	11.0	13.3	0.2	62.0	8.0

## Fodder beet

Vegetable

### Appearance



**Bulk Density**

540 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, moderate in sugar, high in fibre, very low in protein. Soil contamination can be a problem. The tops can be fed but should be wilted first.

### Palatability

Very Good

### Upper Inclusion Rate (DM)

30%

### Storage/Processing

Whole or chopped (chopping can reduce risk of choking).

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
18.0	12.1	7.0	17.5	0.8	2.0	65.0

# Roots

## Sugar Beet

Vegetable

### Appearance



**Bulk Density**

540 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, very high in sugar, low in fibre, very low in protein. Can be very hard and difficult to eat, high sugar can cause scouring. Avoid soil contamination.

#### Palatability

Very Good

#### Upper Inclusion Rate (DM)

25%

### Storage/Processing

Whole or chopped (chopping can reduce risk of choking).

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
23.0	12.3	6.0	13.6	0.4	3.0	69.0

## Swedes

Vegetable

### Appearance



**Bulk Density**

555 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, high in sugar, moderate in fibre, very low in protein. Very high in energy but low in dry matter. It takes 8 kg of swedes to replace 1 kg of barley.

#### Palatability

Very Good

#### Upper Inclusion Rate (DM)

25%

### Storage/Processing

Whole or chopped (chopping can reduce risk of choking).

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
10.5	13.8	9.4	14.5	0.5	1.0	59.1

# Roots

## Parsnips

Vegetable

### Appearance



**Bulk Density**  
630 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, moderate in sugar, high in fibre, very low in protein. Soil contamination can be a problem. It takes 6 kg of parsnips to replace 1 kg of barley.

#### Palatability

Very Good

#### Upper Inclusion Rate (DM)

20%

### Storage/Processing

Whole or chopped (chopping can reduce risk of choking).

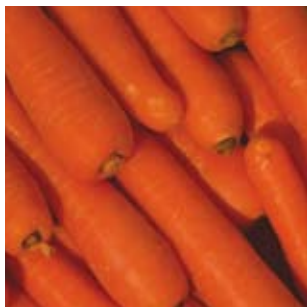
### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
15.0	13.0	8.6	14.5	1.9	3.0	8.5

## Carrots

Vegetable

### Appearance



**Bulk Density**  
700 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, moderate in sugar, high in fibre, very low in protein. Lower in energy than other roots, with a low dry matter content similar to swedes. Once washed they do not keep for more than a few days.

#### Palatability

Very Good

#### Upper Inclusion Rate (DM)

25%

### Storage/Processing

Whole or chopped (chopping can reduce risk of choking).

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
13.0	12.6	9.5	10.5	1.5	10.2	30.0

# Pulses

## Home Grown Protein Options

High protein feeds generally make up a small proportion of beef rations but can still represent a major cost. Home grown options include wholecrop silage or combined beans, peas and lupins. Pulses can be expensive to dry, so crimping has become an attractive option.

Blue lupins are slightly lower in protein than other types; for combining they are better suited to the north and west where harvest is late. White lupins are best suited for combining in the south and used for silage making mixed with other crops such as triticale. Yellow lupins suit slightly later areas for combining.

Field beans come in autumn and early spring sown varieties. The spring sown varieties are generally higher quality but can have a very late harvest particularly in the north and frequently require spraying off before combining. Peas have an earlier harvest but can be difficult to combine.

## Peas

Pulse

### Appearance



### Bulk Density

760 kg/m<sup>3</sup>

### Nutritional Notes

High in protein, moderate in starch, low in fibre. Modern varieties contain less anti-nutritional factors than older ones.

#### Palatability

Moderate

#### Upper Inclusion Rate (DM)

30%

### Storage/Processing

Flaked, rolled, ground or crimped.

Normally they are fed whole to sheep.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
86.0	12.8	24.0	19.0	2.0	47.0	6.0

# Pulses

## Beans

Pulse

### Appearance



### Bulk Density

590 kg/m<sup>3</sup>

### Nutritional Notes

High in protein, moderate in starch, low in fibre. Higher in energy than peas. Can be fed whole.

### Palatability

Variable

### Upper Inclusion Rate (DM)

30%

### Storage/Processing

Whole, flaked, rolled, ground or crimped.

Normally they are fed whole to sheep.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
86.0	13.8	29.0	17.0	2.0	43.0	4.0

## Lupins

Pulse

### Appearance



### Bulk Density

Meal 350 kg/m<sup>3</sup>

### Nutritional Notes

High in undegradable protein, moderate in starch, low in fibre. Can be used to replace soya bean meal.

Blue lupins are lowest in protein and more suited to the north/west of the country where harvest is late. White lupins can be used for silage making mixed with crops such as triticale.

### Palatability

Good in modern varieties

### Upper Inclusion Rate (DM)

15%

### Storage/Processing

Flaked, rolled, ground or crimped.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
86.0	14.3	38.0	23.0	6.2	9.0	4.0

# Dry Cereal Co-Products

## Barley Distillers Grains

Meal, crumb or pellet

### Appearance



### Bulk Density

600 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre, moderate in protein. Lower in energy than other distillers grains.

### Palatability

Good

### Upper Inclusion Rate (DM)

35%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	12.7	26.0	42.0	9.2	3.2	2.0

## Wheat Distillers Grains

Meal, crumb or pellet

### Appearance



### Bulk Density

600 kg/m<sup>3</sup>

### Nutritional Notes

Moderate in fibre, high in protein. Contains good levels of energy; being lower in oil than other distillers grains means they can be included at higher rates in diets.

### Palatability

Good

### Upper Inclusion Rate (DM)

40%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	13.5	32.0	32.0	7.5	4.6	4.0

# Dry Cereal Co-Products

## Maize Distillers Grains

Meal, crumb or pellet

### Appearance



### Bulk Density

Variable 350 - 600 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre, moderate in protein. Home produced product is very high in energy, whereas imported product is lower in energy and more variable.

### Palatability

Good

### Upper Inclusion Rate (DM)

30%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	14.8	28.0	36.0	11.0	4.5	1.0

## Maize Gluten Feed

Meal, crumb or pellet

### Appearance



### Bulk Density

625 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre, moderate in protein. Can have very variable composition depending on source. Avoid if overheated in drying process and has black appearance.

### Palatability

Moderate

### Upper Inclusion Rate (DM)

45%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	12.5	21.7	40.0	4.0	21.0	3.0

# Dry Cereal Co-Products

## Wheatfeed

Meal, crumb or pellet

### Appearance



### Bulk Density

Meal 350 kg/m<sup>3</sup>

Pellets 560 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre, moderate in protein. Being relatively low in energy makes it unsuitable for high inclusion in finishing diets.

### Palatability

Moderate

### Upper Inclusion Rate (DM)

50%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	11.5	17.3	38.0	4.0	27.5	7.0

## Malt Pellets

Meal, crumb or pellet

### Appearance



### Bulk Density

Pellets 600 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre, moderate in protein. Being relatively low in energy makes it unsuitable for high inclusion in finishing diets.

### Palatability

Moderate

### Upper Inclusion Rate (DM)

25%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	11.5	23.5	50.0	2.5	15.1	0.4

# Moist Cereal Co-Products

## Moist Wheat Co-Product

Moist meal or crumb

### Appearance



**Bulk Density**  
925 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre, moderate in protein. High in energy and can be used as sole concentrate feed in rations containing forage. Currently known as C\*Traffordgold (new).

### Palatability

Good

### Upper Inclusion Rate (DM)

50%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
47.0	13.4	22.0	35.0	7.5	16.5	2.5

## Brewers Grains

Moist meal or crumb

### Appearance



**Bulk Density**  
930 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre, moderate in protein. Can be used as a concentrate or a forage extender. Composition can be variable depending on source, suitable for all stock. Mash filter grains can be 27% Dry Matter.

### Palatability

Good

### Upper Inclusion Rate (DM)

45%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
23.0	11.7	24.0	56.5	7.1	5.0	1.5

# Wet Cereal Co-Products

## Pot Ale Syrup

Free flowing liquid

### Appearance



**Bulk Density**  
1100 kg/m<sup>3</sup>

### Nutritional Notes

High in protein, high in energy, low in fibre. Suitable for all stock and aids the digestion of straw and fibrous forages.

### Palatability

Good

### Upper Inclusion Rate (DM)

20%

### Storage/Processing

Can ferment so ensure containers are vented. Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
45.0	14.0	37.0	0.7	0.2	1.0	2.0

## Wheat Starch Syrup

Syrup liquid

### Appearance



**Bulk Density**  
1200 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, low in fibre. Suitable for all stock and aids the digestion of straw and fibrous forages.

### Palatability

Good

### Upper Inclusion Rate (DM)

20%

### Storage/Processing

Material can become very thick in cold conditions.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
32	14.2	30	1.5	3.5	11.0	2.0

# Bakery/Confectionery Co-Products

## Biscuit Blends

Crumb or meal

### Appearance



**Bulk Density**  
250 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, low in fibre. Variable composition depending on source, excellent cereal replacer.

Palatability	Upper Inclusion Rate (DM)
Very Good	30%

### Storage/Processing

Ready to feed. Avoid storing for long periods due to high oil level.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
88.0	15.0	9.5	20.0	11.0	49.0	9.0

## Bread

Crumb or meal

### Appearance



**Bulk Density**  
200 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, low in fibre. Avoid very high inclusion rates and supplement with digestible fibre.

Palatability	Upper Inclusion Rate (DM)
Good	30%

### Storage/Processing

Ready to feed. Short shelf life.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
65.0	14.0	14.0	10.0	3.3	69.0	4.7

# Bakery/Confectionery Co-Products

## Breakfast Cereal Blends

Crumb or meal

### Appearance



### Bulk Density

250 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, low in fibre. Variable composition depending on source and excellent cereal replacer.

### Palatability

Very Good

### Upper Inclusion Rate (DM)

30%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
90.0	14.0	12.0	11.0	2.0	52.0	6.0

## Different Types of Soya Bean Meal

Soya is generally grown in North and South America, but also other parts of the world. The oil is partially removed by crushing, which is known as the expeller process, with the remaining oil removed by solvent extraction.

There are three types of soya bean meal available for purchase, Hi-pro soya, Brazilian soya and Argentinean soya. Hi-pro soya is generally the better quality soya bean meal, with a crude protein content between 45 - 55%. Argentinean soya contains more fibre, has a lower crude protein level of around 40 - 45% CP, and is slightly lower in energy than the other two. Brazilian soya has a feeding quality between that of Hi-pro and Argentinean. All the types of soya are similar in appearance and available as a meal or in some instances containing some nuts/pellets depending on original source.

# Oilseed Co-Products

## Soya Bean Meal

Meal

### Appearance



**Bulk Density**  
625 kg/m<sup>3</sup>

### Nutritional Notes

High in undegradable protein. Variable composition depending on source and extraction process, only requires a low inclusion rate.

#### Palatability

Good

#### Upper Inclusion Rate (DM)

15%

### Storage/Processing

Ready to feed.

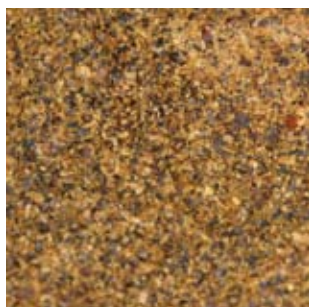
### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
88.0	13.8	52.0	13.0	2.4	4.0	10.0

## Rapeseed Meal

Meal

### Appearance



**Bulk Density**  
660 kg/m<sup>3</sup>

### Nutritional Notes

High in protein. Lower in energy than soya bean meal so ideal in growing rations including low protein forage.

#### Palatability

Moderate

#### Upper Inclusion Rate (DM)

20%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
88.0	12.1	38.5	36.0	3.5	5	9.5

# Oilseed Co-Products

## Linseed

Meal, Cake or Lozenge

### Appearance



### Bulk Density

600 kg/m<sup>3</sup> Linseed Meal

750 kg/m<sup>3</sup> Linseed Cake

### Nutritional Notes

High in undegradable protein. Similar to rapeseed meal but contains some residual oils that can increase coat shine.  
Picture is of linseed cake.

### Palatability

Good

### Upper Inclusion Rate (DM)

20%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
88.0	13.0	37.0	20.0	8.0	5.5	5.5

## Soya Hulls

Pellet or Meal

### Appearance



### Bulk Density

500 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre. Can be used to supplement cereals and cereal co-products that are low in fibre.

### Palatability

Moderate

### Upper Inclusion Rate (DM)

25%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	11.9	12.2	67.5	2.4	5.0	3.0

# Oilseed Co-Products

## Palm Kernel Meal

Meal

### Appearance



**Bulk Density**  
415 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre. Can be used to supplement cereals and cereal co-products that are low in fibre.

Palatability	Upper Inclusion Rate (DM)
Poor	20%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	12.3	18.0	68.0	9.0	4.0	3.0

## Sunflower Meal

Pellets with Meal

### Appearance



**Bulk Density**  
600 kg/m<sup>3</sup>

### Nutritional Notes

Low in energy, high in protein, high in fibre. It has a role in growing rations as a low quality protein or at very low inclusion rates for finishers. Sometimes available in a Hipro version with the hulls removed, containing 11.5 MJ ME and 45% crude protein, but the protein is still very degradable.

Palatability	Upper Inclusion Rate (DM)
Good	20%

### Storage/Processing

Ready to feed, should be bought fresh as it does not keep well.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
88.0	9.5	36.0	47.0	2.5	1.5	6.0

# Sugar Co-Products

## Cane Molasses

Viscous liquid

### Appearance



### Bulk Density

1400 kg/m<sup>3</sup>

### Nutritional Notes

High in sugar, low in fibre. Can be used at a variety of inclusion rates as an energy source, protein carrier, aid to palatability, aid to avoiding separation of mixes or dust reducer.

### Palatability

Very Good

### Upper Inclusion Rate (DM)

20%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
75.0	12.6	6.0	0	0.2	0.0	65.0

## Molasses-based and other Liquid Feeds

There is a huge range of blended liquid feeds available that are more free flowing than cane molasses. Most are branded products containing cane or beet molasses and other syrup products from the food and drink industry; full nutritional specifications are available from distributors. Products are available to suit a variety of requirements; crude protein level can range from 6% to 60%, some products are enhanced with minerals and trace elements, some with oil, some are specifically designed to suppress dust and all will help improve palatability.

There are numerous options for on-farm storage, e.g. 1000 litre containers, 3000 litre former orange juice containers, industrial tanks that can hold a full lorry load. Feeding can be as part of a home mixed ration or on its own through lick feeders. These feeds are ideal for dampening down dusty meals or encouraging intakes of less palatable forages.

# Sugar Co-Products

## Molassed Sugar Beet Pulp

Pellet, nut or shred

### Appearance



### Bulk Density

Pellets 550 kg/m<sup>3</sup>

Shreds 250 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, moderate in fibre. Well known rumen conditioner which aids the digestion of other feeds.

### Palatability

Very Good

### Upper Inclusion Rate (DM)

45%

### Storage/Processing

Ready to feed.

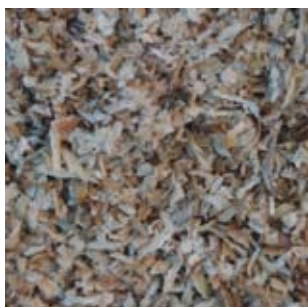
### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	12.5	10.0	32.0	1.0	1.0	20.0

## Pressed Sugar Beet Pulp

Moist shred

### Appearance



### Bulk Density

1000 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre. Used as a forage extender or concentrate replacer and, like the dried sugar beet pulp, is a rumen conditioner.

### Palatability

Very Good

### Upper Inclusion Rate (DM)

30%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
28.0	12.7	9.0	42.0	0.3	0.4	5.5

# Citrus Products

## Citrus Pulp

Pellets

### Appearance



**Bulk Density**

365 kg/m<sup>3</sup>

### Nutritional Notes

High in fibre, very low in protein. Can be used to supplement cereals and cereal co-products that are low in fibre.

#### Palatability

Variable

#### Upper Inclusion Rate (DM)

30%

### Storage/Processing

Ready to feed.

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
89.0	12.5	7.0	21.0	2.9	6.5	24

## Wet Citrus Pulp

Moist brown/orange coarse porridge

### Appearance



**Bulk Density**

1000 kg/m<sup>3</sup>

### Nutritional Notes

High in energy, very low in protein, high in fibre. Can be used to extend forage and supplement cereals and cereal co-products that are low in fibre.

#### Palatability

Orange and lemon good,  
lime and grapefruit moderate.

#### Upper Inclusion Rate (DM)

25%

### Storage/Processing

Ready to feed, can be clamped on its own or with an absorbent, if well clamped and sealed can be kept for 6 months.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
24.0	12.2	6.5	37.0	3.0	0	25.5

# Forages

## Grass (Grazed)

Rich green forage

### Appearance



Bulk Density

### Nutritional Notes

Grass can be rich in protein, fibre and sugars but its quality varies dramatically depending on sward, location, weather, time of year, ley, age and fertiliser application rates.

Palatability	Upper Inclusion Rate (DM)
Good	100%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
18	11.3	16	6.2	3.3	1.0	9.0

## Grass Silage

Green leafy to fibrous forage

### Appearance



Bulk Density

### Nutritional Notes

Analyse to find the true nutritional value as this varies depending on the conserved grass quality, dry matter and the fermentation which takes place.  
It is a good source of protein and fibre.

Palatability	Upper Inclusion Rate (DM)
Good	100%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
24	11.0	13.7	54	3.0	1.0	2.0

# Forages

## Grass Hay

Green and fibrous forage

### Appearance



Bulk Density

### Nutritional Notes

Good levels of digestible fibre with some protein and sugar if well conserved. Its quality is very dependent on the forage used and on the moisture level being below 15%. Quicker drying helps retain nutritional value. Analysis varies.

#### Palatability

Good

#### Upper Inclusion Rate (DM)

100%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
87	8.5	10.4	68	1.0	0.3	11.0

## Maize Silage

Brown yellow green fibrous forage

### Appearance



Bulk Density

### Nutritional Notes

Rich in starch but low in protein with a higher dry matter than grass silage. Ideal to mix with other forages and has been shown to increase combined forage intakes.

#### Palatability

Good

#### Upper Inclusion Rate (DM)

90%

### Storage/Processing

Ready to feed.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
55	10	25	54	2.0	25	2.5

# Forages

## Whole Crop Silage (WSC) - Fermented and Urea Treated.

Yellow brown fibrous forage

### Appearance



Bulk Density

### Nutritional Notes

Fermented WSC has a high DM content and balances well low DM/high protein legume silages. Urea treated whole crop however is high in protein (mainly ammonia) and its alkalinity makes it ideal to balance acidic silages. Barley, oats and wheat cereals are all used.

### Palatability

Good

### Upper Inclusion Rate (DM)

50%

### Storage/Processing

Ready to feed, but usually mixed with another forage. When urea treated avoid lumps which will be toxic.

### Typical Analysis Fermented WSC (and Urea Treated Whole Crop Silage) (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
40(55)	10.5(10)	9.5(25)	54	2.5	25	2.0

## Straw

Pale yellow fibrous forage

### Appearance



Bulk Density

### Nutritional Notes

A good source of long fibre but low in protein and energy. Its composition is influenced by the stage of maturity of the crop. Its nutritional value can be improved by treatment with alkalis eg caustic soda

### Palatability

Urea treated- Average

### Upper Inclusion Rate (DM)

30%

### Storage/Processing

Ready to feed, but usually mixed with another forage. Avoid lumps of urea as they will be toxic to livestock.

### Typical Analysis Straw (and Caustic Treated Straw) (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
87(86)	6.5(7.5)	4	84(78)	1.2	1	2

# Small Inclusion Ingredients

## Feed Grade Urea

Small Prill

### Appearance



### Bulk Density

600 kg/m<sup>3</sup>

### Nutritional Notes

A very concentrated source of non-protein nitrogen that can be used by ruminants to make microbial protein. It contains 46% nitrogen, which is equivalent to 287% crude protein. Must be mixed thoroughly into rest of the ration, as it is fatally toxic if ingested in more than very small quantities. Must be fed alongside readily available energy and introduced gradually into the diet. It is not suitable for animals under 3 months of age.

### Palatability

Poor

### Upper Inclusion Rate (DM)

1%

### Storage/Processing

Store bags in dry conditions. Must be mixed with other feeds. Water soluble and can be stored as a liquor. Can be used as a preservative for moist grain, straw and wholecrop.

### Typical Analysis (% DM or MJ/kg DM for ME)

DM	ME	CP	NDF	Oil (AH)	Starch	Sugars
99.5	0	287.0	0	0	0	0

## Fats and Oils

Concentrated sources of energy, containing three times as much energy as cereals. They are used to help increase weight gain in finishing cattle or reduce weight loss and aid fertility in lactating cows. Processing into prills reduces the free oil in the rumen but more effective methods of rumen protection are available e.g. Calcium or Magnesium soaps made from palm oil.

## Vitamins & Minerals (Specialist guidance should be sought for specific recommendations)

Major Minerals (%) - Calcium (Ca), Phosphorous (P), Magnesium (Mg) and Sodium (Na).

Minor Minerals (mg/kg or ppm) - Copper (Cu), Selenium (Se), Iodine (I), Manganese (Mn), Zinc (Zn) and Cobalt (Co).

Vitamins - A, D<sub>3</sub> and E (IU/kg), Vitamin B<sub>12</sub> (mg/kg).

Sometimes other B vitamins are included in supplements, particularly for young calves, and listed by name e.g. Thiamine (B<sub>1</sub>), Riboflavin (B<sub>2</sub>), Niacin (B<sub>3</sub>), Pantothenic Acid (B<sub>5</sub>), Biotin (B<sub>7</sub>), Folic Acid (B<sub>9</sub>).

## Direct Fed Microbials

Also called probiotics and include yeasts and lactic acid bacteria. They may help rumen microbes break down fibre and raise rumen pH alleviating acidosis.

