Profile

The FEEDS Directory has been designed by CONTEXT to save you time searching for information and to improve your knowledge of feed raw materials.

The FEEDS Directory is a simple, comprehensive, clear and up to date guide that will assist you in your every day feed decisions.

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The FEEDS Directory has been written by Dr Wesley Ewing who is both an accredited nutritionist and a registered marketer. He has a broad working knowledge of oils/fats, liquid feed supplements, dry feedstuffs and is a manager for a leading international raw material producer. This extensive knowledge allows him to explain the relevant facts in a clear and concise fashion. Combine this with the design and production skills of Context and you have 'All you need to know on feedstuffs in a simple and easy to use guide'.

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Disclaimer

The FEEDS Directory is an introductory guide to feedstuffs and as such is not an alternative to nutritional advice. We recommend that a suppliers analysis is used and that all rations are formulated by an experienced nutritionist.

Context accepts no responsibility for errors or omissions in this guide. If you have corrections or suggestions to improve The FEEDS Directory we would welcome your comments.

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Categories

Colour coded sections

- Cereals and By-Products
- Forages and Stock Feeds
- Legumes and By-Products
- Oilseeds and By-Products
- Roots, Fruits and By-Products
- Miscellaneous

Icons to depict suitability

 Sheep

 Cattle

 Pigs

 Poultry

 Ideal for feeding straight on farm

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Product Analysis

The analysis given are a best estimate for the commodity products listed. Large variations occur in product analysis especially in forages. Always get a suppliers analysis.

NOTE: ALL Analysis quoted are on a Dry Matter basis.

Abbreviation	Full Name	Units
DM	Dry Matter	%
MER	Metabolisable Energy Ruminants	MJ/kg
MEP	Metabolisable Energy Poultry	MJ/kg
DE	Digestible Energy Pigs	MJ/kg
Oil EE	Oil - Ether Extract	%
Oil AH	Oil - Acid Hydrolysis	%
EFA	Essential Fatty Acids	%
NCGD	Neutral Cellulase Gamanase Digestibility	%
NDF	Neutral Detergent Fibre	%
ASH	Ash	%
FME	Fermentable Metabolisable Energy	MJ/kg
ERDP @ 2	Effective Rumen Degradable Protein at rumen outflow at 0.02 h/1	%
ERDP @ 5	Effective Rumen Degradable Protein at rumen outflow at 0.05 h/1	%
ERDP @ 8	Effective Rumen Degradable Protein at rumen outflow at 0.08 h/1	%
DUP @ 2	Digestible Undegradable Protein at rumen outflow 0.02 h/1	%
DUP @ 5	Digestible Undegradable Protein at rumen outflow 0.05 h/1	%
DUP @ 8	Digestible Undegradable Protein at rumen outflow 0.08 h/1	%
PDIA	Protein undegraded in the rumen and digestible in the small intestine	%
PDIN	Microbial Protein supply where Nitrogen is limiting	%
PDIE	Microbial Protein supply where Energy is limiting	%
Met DI	Digestible Methionine supply to small intestine	%
Lys DI	Digestible Lysine supply to small intestine	%

Inclusion Rates

Suggested inclusion rates are given. However combinations of like products will limit individual inclusion rates eg. Peas vs Beans. When formulating diets other nutritional interactions may occur. It is therefore essential that the advice of a qualified nutritionist is taken.

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Cereals and By-Products

Introduction

Grains of Hordeum vulgare L.

Widely grown around the world, with many feed by-products resulting. Barley is usually grown for malting but also grown for animal feed. Top quality products are used in the brewing and distilling industry, with lower quality sold for animal feed. It is an angular grain with a fibrous outer coat.

Origin/Place of Manufacture

Throughout the world, in temperate countries, especially Europe.

Nutritional Benefit

Ideal as a ruminant and non-ruminant feed, with a protein level varying between 6 and 14%, but on average 11-12%. Ruminants benefit from it being high in energy, in the form of starch, making it highly fermentable, encouraging milk protein and fast growth. It is also useful in pig and poultry diets, providing energy from starch. It contains more fibre and less starch than wheat and may be indigestible for young poultry. Nutritional value will depend on the variety, protein level and bushel weight (1000 grain weight). A small proportion (approx 10%) of barley can bypass the rumen unfermented but, as with all cereals, the protein is of average quality being particularly deficient in lysine. Barley is ideal to complement forages but needs careful mineral/vitamin balancing, particularly treated grains. It is especially low in Vitamin A, D, E and calcium. Processing of moist grains with propionic acid reduces the Vitamin E content further.

Colour/Texture Pale yellow elongated grains.

Palatability Less palatable than other cereals.

Limits to Usage (Anti-Nutritional Factors)

Ruminants may suffer acidosis (drop in rumen pH) and/or bloat if fed high levels in a feed. Lambs may produce soft fat in their carcass if dietary inclusion is excessive. The presence of beta-glucans cause sticky droppings in poultry and a suitable enzyme should be included (eg. Beta-glucanase). Total feed intakes will reduced if fed finely ground.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	50	**Creep**	20	**Chick**	25
Dairy	50	**Weaner**	25	**Broiler**	70
Beef	50	**Grower**	30	**Breeder**	55
Lamb	25	**Finisher**	30	**Layer**	55
Ewe	50	**Sow**	25		

Storage/Processing

Stores well at moisture below 13%. Normally processed by rolling, grinding, flaking or micronisation which improves the digestibility. Sheep can digest whole barley grain. High inclusion rates will affect compound pellet quality and greater than 70% barley will not pellet easily. It is often treated with propionic acid to preserve it, if high in moisture.

Alternative Names

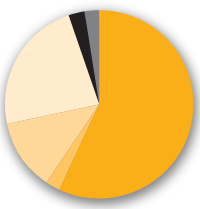
Bulk Density

Flaked Barley 350 - 390 Kg/m^3
Barley Whole 600 - 670 Kg/m^3
Barley Meal 400 - 450 Kg/m^3

Typical Analysis

Dry Matter	86.0	NCGD	86.0	DUP (@ 5)	1.6	Avail Lysine	0.37
Crude Protein	12.3	NDF	23.1	DUP (@ 8)	1.8	Methionine	0.20
DCP	9.0	ADF	6.4	Salt	0.25	Meth & Cysteine	0.43
MER	13.2	Starch	57.0	Ca	0.1	Tryptophan	0.14
MEP	13.6	Sugar	2.5	Total Phos	0.4	Threonine	0.45
DE	14.5	Starch + Sugars	59.5	Av Phos	0.18	Arginine	0.45
Crude Fibre	5.1	FME	11.0	Magnesium	0.13	PDIA	3.0
Oil (EE)	2.5	ERDP (@ 2)	10.5	Potassium	0.52	PDIN	7.8
Oil (AH)	3.0	ERDP (@ 5)	9.6	Sodium	0.03	PDIE	9.5
EFA	1.1	ERDP (@ 8)	9.3	Chloride	0.16	Met DI	0.18
Ash	2.6	DUP (@ 2)	0.08	Total Lysine	0.42	Lys DI	0.36

Starch 57%
Sugars 2.5%
Protein 12.3%
NDF 23.1%
Ash 2.6%
Oil 2.5%
Other 0%



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Forages and Stock Feeds

Introduction

Cabbages can be grown for ruminant animal feed. However more usually they are found in the feed market due to oversupply for human consumption, misshapes, or waste leaves. They have a low proportion of stem to leaf compared to kale and are therefore less fibrous. Usually only seasonally available.

Origin/Place of Manufacture

Eastern UK.

Nutritional Benefit

As a forage supplement.

Colour/Texture

Dark green leaves.

Palatability

Eaten readily by most ruminant animals.

Limits to Usage

Forage Inclusion % per species

	Inc %		Inc %		Inc %
Calf	0	**Creep**	0	**Chick**	0
Dairy	30	**Weaner**	0	**Broiler**	0
Beef	30	**Grower**	0	**Breeder**	0
Lamb	0	**Finisher**	0	**Layer**	0
Ewe	20	**Sow**	0		

Storage/Processing

Feed immediately after delivery.

Alternative Names

Bulk Density

Typical Analysis

Dry Matter	11.0	NCGD	88.0	DUP (@ 5)	2.0	Av Lysine	-
Crude Protein	23.0	NDF	29.0	DUP (@ 8)	2.7	Methionine	-
DCP	14.0	ADF	25.0	Salt	1.1	Meth & Cysteine	-
MER	11.5	Starch	0.5	Ca	0.8	Tryptophan	-
MEP	-	Sugar	26.0	Total Phos	0.3	Threonine	-
DE	-	Starch + Sugars	26.5	Av Phos	-	Arginine	-
Crude Fibre	12.0	FME	10.0	Magnesium	0.2	PDIA	4.0
Oil (EE)	2.0	ERDP (@ 2)	18.0	Potassium	3.5	PDIN	12.6
Oil (AH)	2.3	ERDP (@ 5)	17.0	Sodium	0.3	PDIE	10.8
EFA	-	ERDP (@ 8)	16.0	Chloride	0.8	Met DI	-
Ash	11.5	DUP (@ 2)	1.0	Total Lysine	-	Lys DI	-

Starch 0.5%
NDF 29%
Other 0%
Sugars 26%
Ash 10%
Protein 23%
Oil 11.5%

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Calcined Magnesite

Miscellaneous

Introduction

Technically pure magnesium oxide (MgO).

Extracted from mineral quarries and finely ground, this powder is widely used in ruminant rations as a source of magnesium.

Origin/Place of Manufacture

Temperate countries, Turkey, China.

Nutritional Benefit

A good provider of supplemental magnesium.

Colour/Texture

Grey powder.

Palatability

Will make feed unpalatable at high inclusion levels, eg. higher than 2% of concentrate.

Limits to Usage (Anti-Nutritional Factors)

May be contaminated with naturally occurring heavy metals and the necessary guarantees should be requested before using it.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	0	Creep	0	Chick	0
Dairy	1.0 - 5.0	Weaner	0	Broiler	0
Beef	0	Grower	0	Breeder	0
Lamb	0	Finisher	0	Layer	0
Ewe	1.0 - 4.0	Sow	0		

Storage/Processing

Dry storage.

Alternative Names

Cal. Mag., Magnesium Oxide, Mag. ox.

Bulk Density

800 kg/m^3

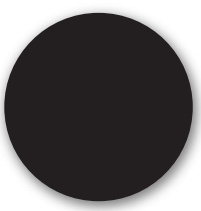
	% added Magnesium in Compound Feed	kg of added Cal Mag in 1 tonne of Compound Feed	Total % Magnesium in Compound Feed
2oz in 16lbs	0.4	8.0	0.6
2oz in 12lb	0.52	10.4	0.72
2oz in 10lb	0.65	13.0	0.85
2oz in 8lb	0.78	15.6	0.98
2oz in 6lb	1.20	24.0	1.40
2oz in 4lb	1.56	31.3	1.76
2oz in 2lb	3.10	62.5	3.30

NB. 2kg Cal. Mag. = 1kg Magnesium

Typical Analysis

Dry Matter	99.5	NDF	0	DUP (@ 8)	0	Methionine	0
Crude Protein	0	ADF	0	Salt	0	Meth & Cysteine	0
MER	0	Starch	0	Ca	0	Tryptophan	0
MEP	0	Sugar	0	Total Phos	0	Threonine	0
DE	0	Starch + Sugars	0	Av Phos	0	Arginine	0
Crude Fibre	0	FME	0	Magnesium	51.0	PDIA	0
Oil (EE)	0	ERDP (@ 2)	0	Potassium	0	PDIN	0
Oil (AH)	0	ERDP (@ 5)	0	Sodium	0	PDIE	0
EFA	0	ERDP (@ 8)	0	Chloride	0	Met DI	0
Ash	100.0	DUP (@ 2)	0	Total Lysine	0	Lys DI	0
NCGD	0	DUP (@ 5)	0	Avail Lysine	0		

Starch 0%
Sugars 0%
Protein 0%
NDF 0%
Ash 100%
Oil 0%
Other 0%



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Cereals and By-Products

Introduction

These are the residues from the processing, storage and shipping of cereal grain and can contain broken or small grains, hulls and other seeds. This is a broad term, as they can come from many grain sources and therefore differ widely in physical nature and nutritive value. They are usually sold separately as barley, wheat, maize or sorghum screening with quality dependent on the time of year and the amount of processing carried out.

Origin/Place of Manufacture

Throughout the world.

Nutritional Benefit

Good quality product but always wise to take a sample for analysis as loads can vary. Ideal for livestock feed and can be close to the original grain in nutritional value when they consist mainly of broken or small grains. However, the fibre content may be increased compared to the original grains.

Colour/Texture

Pale cream, usually a pellet.

Palatability

If dusty, intakes can be reduced.

Limits to Usage (Anti-Nutritional Factors)

Old processed grains may produce a product with moulds present, which will affect performance and even fertility. Inclusion rates for pellets can depend on the particle size of the grain screening. Avoid products with excessive weed seed included.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	10	**Creep**	0	**Chick**	0
Dairy	20	**Weaner**	5	**Broiler**	0
Beef	30	**Grower**	15	**Breeder**	10
Lamb	15	**Finisher**	25	**Layer**	15
Ewe	20	**Sow**	25		

Storage/Processing

Can be very low in bulk density and take up a lot of storage space. Pelleting helps its handling.

Alternative Names

Wheat Screening.

Bulk Density

270 - 370 kg/m³

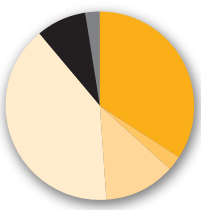
Typical Analysis

Dry Matter	88.0	NCGD	74.0	DUP (@ 5)	3.1	Avail Lysine	-
Crude Protein	12.2	NDF	40.0	DUP (@ 8)	3.8	Methionine	0.15
DCP	9.1	ADF	-	Salt	0.2	Meth & Cysteine	-
MER	12.0	Starch	34.3	Ca	0.1	Tryptophan	0.2
MEP	9.3	Sugar	2.5	Total Phos	0.15	Threonine	0.4
DE	10.3	Starch + Sugars	36.8	Av Phos	0.06	Arginine	0.7
Crude Fibre	15.0	FME	9.5	Magnesium	0.15	PDIA	-
Oil (EE)	2.0	ERDP (@ 2)	9.5	Potassium	1.2	PDIN	-
Oil (AH)	2.5	ERDP (@ 5)	8.0	Sodium	0.1	PDIE	-
EFA	1.0	ERDP (@ 8)	7.2	Chloride	0.5	Met DI	-
Ash	8.5	DUP (@ 2)	1.8	Total Lysine	0.45	Lys DI	-

Starch 34.3% | NDF 40% | Other 0%

Sugars 2.5% | Ash 8.5%

Protein 12.2% | Oil 2.5%



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Coconut Meal

Oil seeds and By-Products

Introduction

By-product of oil manufacture, obtained by pressing the dried kernel (endosperm) and outer husk (tegument) of the seed of the coconut palm.

Copra Expeller is produced from the flesh of dried coconuts after oil expulsion and extraction (60-70% oil), which is used for foods and soaps. The oil is highly saturated, meaning any remaining in the meal is hard enough for animal feeding.

Origin/Place of Manufacture

Equatorial regions, especially Caribbean, Philippines, Kenya, India, S.E. Asia.

Nutritional Benefit

Reasonable levels of digestible fibre make it more suitable for ruminants than non-ruminants. High in protein quality but poor amino acid profile and especially low in lysine and histidine. It is high in fibre (12.5%) reducing the inclusion rate in pigs and poultry. Good Undegradable Protein content. Fat present is saturated and supplies good energy levels.

Colour/Texture

Pale brown meal, pellets or cake.

Palatability

Palatable to ruminants, but poor to others classes of livestock.
Will depend on rancidity/freshness of product.

Limits to Usage (Anti-Nutritional Factors)

Antioxidants should be added and Vitamin E levels monitored.
Oil type may reduce milk fat level. No anti-nutritive factors, but the product should be introduced and removed slowly. Low in methionine and cysteine means careful amino acid supplementation is essential.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	5	**Creep**	0	**Chick**	0
Dairy	10	**Weaner**	0	**Broiler**	0
Beef	15	**Grower**	5.0	**Breeder**	2.5
Lamb	10	**Finisher**	5.0	**Layer**	2.5
Ewe	15	**Sow**	7.5		

Storage/Processing

Care should be taken to avoid product going rancid due to high oil content.
Provides good physical quality to finished product.

Alternative Names

Copra, Coconut Expeller Meal.

Bulk Density

650 - 700 kg/m^3

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Coffee Grounds Meal

Miscellaneous

Introduction

Coffee seeds are removed from the outer coating, dried and then roasted. Roasted coffee beans have the coffee extracted into a liquor/syrup for drying to form instant coffee products. Coffee residue remains.

Origin/Place of Manufacture

Processed throughout UK, Europe and USA from beans grown in tropical countries. However, the by-product is usually used in the country of manufacture.

Nutritional Benefit

Very low in energy, high in fibre and of low nutritional quality. It can contain high oil levels, and care should be taken to avoid interference with fibre digestion.

Colour/Texture

Dark brown/black, fine meal.

Palatability

A bitter product which is not usually included at more than 2-4% of the concentrate as intakes will be reduced.

Limits to Usage (Anti-Nutritional Factors)

Can encourage urinary nitrogen and sodium losses and has a strong diuretic effect. Tannins form part of the protein reducing its digestibility, and possibly that of other diet components. Not suitable for horse feeds as it contains caffeine.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	0	**Creep**	0	**Chick**	0
Dairy	4	**Weaner**	0	**Broiler**	0
Beef	4	**Grower**	0	**Breeder**	0
Lamb	0	**Finisher**	0	**Layer**	0
Ewe	2	**Sow**	0		

Storage/Processing

Care should be taken to avoid the oil going rancid.

Alternative Names

Spent Coffee Grounds Meal, Spent Coffee Residue, Dried Coffee Grounds or Cherco.

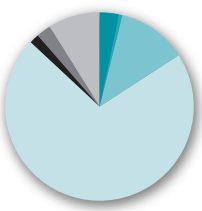
Bulk Density

500 - 550 kg/m^3

Typical Analysis

Dry Matter	91.0	NDF	71.0	Salt	0.05	and Cysteine	0.21
Crude Protein	12.0	ADF	55.0	Ca	0.23	Tryptophan	0.4
DCP	8.5	Starch	3.5	Total Phos	0.07	Threonine	0.3
MER	4.0	Sugar	0.5	Av Phos	0.04	Arginine	0.04
MEP	2.5	Starch + Sugars	4.0	Magnesium	0.03	PDIA	2.5
DE	4.4	FME	5.0	Potassium	0.05	PDIN	7.4
Crude Fibre	44.0	ERDP (@ 2)	6.6	Sodium	0.03	PDIE	7.2
Oil (EE)	2.5	ERDP (@ 5)	5.7	Chloride	0.02	Met DI	0.1
Oil (AH)	2.6	ERDP (@ 8)	5.2	Total Lysine	0.16	Lys DI	0.1
EFA	10.3	DUP (@ 2)	2.2	Avail Lysine	0.10		
Ash	1.7	DUP (@ 5)	3.0	Methionine	0.18		
NCGD	56	DUP (@ 8)	3.6	Methionine			

Starch 3.5%
NDF 71%
Other 8.7%
Sugars 0.5%
Ash 1.7%
Protein 12%
Oil 2.6%



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Distillers Dark Grain (Barley)

Cereals and By-Products

Introduction

By-product of alcohol distilling obtained by drying solid residues of fermented grain (Hordeum vulgare L.) to which pot ale syrup or evaporated spent wash has been added.

A by-product usually from malt whisky production. Barley is allowed to germinate to produce the malt and is then soaked to release the starch reserves for fermentation. An enzyme is produced in the malting which converts the starch to simpler sugars; yeast is added, fermentation occurs, and the alcohol is distilled off. The grain which remains after the liquor is removed is often called wet draff. This can be pressed, dried, and the spent yeast liquor (Pot Ale Syrup) added back to produce barley dark grain. The product from UK manufacture is usually pelleted.

Origin/Place of Manufacture

Scotland.

Nutritional Benefit

High digestible fibre levels mean these grains are not generally used in pig and poultry rations. As a mid-protein feed, barley distillers are high in Undegraded Protein (UDP) and low in starch due to its extraction. They usually contain copper at approximately 50ppm on a dry matter basis.

Colour/Texture

Dark brown, usually pelleted.

Palatability

Good.

Limits to Usage (Anti-Nutritional Factors)

Many contain high levels of copper (50 ppm) as a result of the equipment used in the brewing industry. This may make barley distillers dark grains unsuitable for certain breeds of sheep. The oil being cereal derived is unsaturated.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	20	**Creep**	0	**Chick**	0
Dairy	30	**Weaner**	0	**Broiler**	0
Beef	30	**Grower**	0	**Breeder**	0
Lamb	10	**Finisher**	0	**Layer**	0
Ewe	10	**Sow**	0		

Storage/Processing

Stores well.

Alternative Names

Barley Distillers, Malt Distillers.

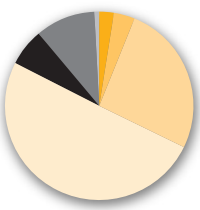
Bulk Density

600Kg/m^3

Typical Analysis

Dry Matter	90.0	NCDG	69.0	DUP (@ 5)	12.1	Avail Lysine	0.7
Crude Protein	26.0	NDF	50.3	DUP (@ 8)	13.5	Methionine	0.35
DCP	20.1	ADF	16.0	Salt	0.5	Meth & Cysteine	0.72
MER	12.7	Starch	2.6	Ca	0.15	Tryptophan	0.25
MEP	10.1	Sugar	3.7	Total Phos	0.90	Threonine	0.95
DE	11.1	Starch + Sugars	6.3	Av Phos	0.60	Arginine	1.1
Crude Fibre	13.6	FME	9.7	Magnesium	0.30	PDIA	10.3
Oil (EE)	9.1	ERDP (@ 2)	15.0	Potassium	0.94	PDIN	18.3
Oil (AH)	10.3	ERDP (@ 5)	12.1	Sodium	0.20	PDIE	15.6
EFA	3.5	ERDP (@ 8)	10.1	Chloride	0.32	Met DI	0.28
Ash	6.5	DUP (@ 2)	8.0	Total Lysine	0.9	Lys DI	0.11

Starch 2.6% | NDF 50.3% | Other 0.6%
Sugars 3.7% | Ash 6.5%
Protein 26% | Oil 10.3%



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Miscellaneous

Introduction

These are fed in the ration to provide energy and are derived from a variety of sources, which include soya bean, palm, tallow, fish oils and their derivatives.
Care should be taken to ensure only high quality oils are used.

Origin/Place of Manufacture

UK, Europe, USA.

Nutritional Benefit

Fats have three times the energy value of cereals and are therefore an ideal way of meeting energy demand. They also supply essential fatty acids. Specialist products are available to be rumen inert eg. fat prills have a bypass effect for ruminants due to the low melting point of the fats used.

Colour/Texture

Golden to grey.

Palatability

Poor.

Limits to Usage

Soft oils will reduce digestion and could produce soft fats in the animal. Harder oils, eg. palm derivatives, are more difficult for non-ruminants to digest. Black products should be avoided.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	2.5	**Creep**	5	**Chick**	5
Dairy	3	**Weaner**	4	**Broiler**	5
Beef	3	**Grower**	4	**Breeder**	5
Lamb	2	**Finisher**	2	**Layer**	2.5
Ewe	3	**Sow**	2.5		

Storage/Processing

Depending on the product's melting point, the storage tank may need to be heated.

Alternative Names

Bulk Density

Typical Analysis	Fat 50%	Fat 100% GP	Fat Flakes	**Typical Analysis**	Fat 50%	Fat 100% GP	Fat Flakes
Dry Matter	95.0	99.0	99.0	DUP (@ 5)	1.1	0	0
Crude Protein	5.0	0	0	DUP (@ 8)	1.3	0	0
DCP	4.0	0	0	Salt	0.1	0	0
MER	22.0	38.0	36.0	Ca	0.2	0	0
MEP	21.0	35.0	36.0	Total Phos	0.3	0	0
DE	29.5	39.0	40.0	Av Phos	0.1	0	0
Crude Fibre	8.5	0	0	Magnesium	0.2	0	0
Oil (EE)	55.0	98.5	99.0	Potassium	0.5	0	0
Oil (AH)	55.0	99.0	99.0	Sodium	0.02	0	0
EFA	11.0	20.0	20.0	Chlorine	0.1	0	0
Ash	8.0	1.0	1.0	Total Lysine	0.35	0	0
NCGD	80.0	95.0	95.0	Avail Lysine	0.20	0	0
NDF	0	0	0	Methionine	0.15	0	0
ADF	0	0	0	Meth & Cysteine	0.25	0	0
Starch	2.0	0	0	Tryptophan	0.1	0	0
Sugar	2.0	0	0	Threonine	0.25	0	0
Starch + Sugars	4.0	0	0	Arginine	0.8	0	0
FME	3.2	0	0	PDIA	0	0	0
ERDP (@ 2)	4.6	0	0	PDIN	0	0	0
ERDP (@ 5)	4.1	0	0	PDIE	4.7	9.2	9.2
ERDP (@ 8)	3.6	0	0	Met DI	0	0	0
DUP (@ 2)	0.7	0	0	Lys DI	0	0	0

Starch 0%
Sugars 0%
Protein 0%
NDF 0%
Ash 1%
Oil 99%
Other 0%

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Forages and Stock Feeds

Introduction

Fodder beet has a potentially higher yield of digestible nutrients than any other forage crop. The best crops may give 18 tonnes of dry matter per hectare. However, it is a crop which demands 'arable expertise' and there can be problems with late harvesting, cleaning and the feeding process. Specialist equipment for cleaning and chopping is now available and may help to increase the interest in fodder beet on many farms. Sown May/June for harvesting Oct. Dec.

Origin

UK, Ireland, Denmark, Netherlands.

Nutritional Benefit

Can produce more dry matter/acre than cereal grains. A sugar rich energy feed for ruminants but the composition can vary. Soil contamination must be avoided to prevent digestive upsets as should excessive feeding; in severe cases, this can cause hypocalcaemia and even death. The digestive upsets are due to excess sugar in the rumen, and/or mineral imbalance. Chopping enhances intake in ruminants and cattle relish the root due to its succulence and sugar content.

Colour/Texture

Grey white fleshy tuber.

Palatability

Excellent.

Limits to Usage (Anti-Nutritional Factors)

Fodder beet should be well cleaned, preferably at harvesting but certainly before feeding. Fodder beet tops can also be fed and are of a lower dry matter (12%) and energy (10 MJ/kg DM) but higher protein (16%). Tops should be wilted to avoid metabolic and digestive upsets. Root tops can be associated with milk taint in dairy cows. High FME may limit inclusion.

Forage Inclusion % per species

Ewes (70 Kg liveweight) - 2.5 kg/head/day.
Beef should be limited to 3.5 kg/100 kg liveweight.

Cows - early lactation 1.7 kg/100kg liveweight.
- mid/late lactation 3.0 kg/100 kg liveweight.

	Inc %		Inc %		Inc %
Calf	10	**Creep**	0	**Chick**	0
Dairy	20	**Weaner**	0	**Broiler**	0
Beef	20	**Grower**	0	**Breeder**	0
Lamb	15	**Finisher**	0	**Layer**	0
Ewe	20	**Sow**	0		

Storage/Processing Store on a dry, concrete apron if possible.

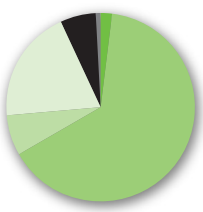
Alternative Names

Bulk Density

Typical Analysis

Dry Matter	18.0	NCGD	87.0	DUP (@ 5)	0.7	Avail Lysine	-
Crude Protein	7.0	NDF	19.5	DUP (@ 8)	1.0	Methionine	0.7
DCP	6.0	ADF	9.5	Salt	0.7	Meth & Cysteine	-
MER	12.5	Starch	2.0	Ca	0.3	Tryptophan	-
MEP	-	Sugar	64.7	Total Phos	0.25	Threonine	-
DE	-	Starch + Sugars	66.7	Avail Phos	0.2	Arginine	-
Crude Fibre	6.0	FME	11.7	Magnesium	0.15	PDIA	0.7
Oil (EE)	0.7	ERDP (@ 2)	5.2	Potassium	1.5	PDIN	3.6
Oil (AH)	0.8	ERDP (@ 5)	4.9	Sodium	0.3	PDIE	8.3
EFA	-	ERDP (@ 8)	4.7	Chloride	0.4	Met DI	0.6
Ash	6.0	DUP (@ 2)	0.5	Total Lysine	0.3	Lys DI	0.2

Starch 2% | NDF 19.5% | Other 0%
Sugars 64.7% | Ash 6%
Protein 7% | Oil 0.8%



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Grape Pulp

Roots, Fruits and By-Products

Introduction

The by-product of the processing of grapes Vitis vinifera L. after the juice has been pressed out.

The pulp remaining after grape juice extraction. Normally, pulp consists of 60% pulp and 40% seeds.

Origin/Place of Manufacture

Grown around the world, especially in Europe: Italy, Spain and Germany.

Nutritional Benefit

Similar in digestible energy to nutritionally improved straw (NIS) and useful as a feed extender. Contains digestible cell walls, making it high in fibre, low in protein and energy.

Colour/Texture

Green/brown, meal/pellet.

Palatability

Average.

Limits to Usage (Anti-Nutritional Factors)

Tannins and copper levels may be high.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	0	**Creep**	0	**Chick**	0
Dairy	10	**Weaner**	0	**Broiler**	0
Beef	10	**Grower**	0	**Breeder**	0
Lamb	0	**Finisher**	0	**Layer**	0
Ewe	5	**Sow**	0		

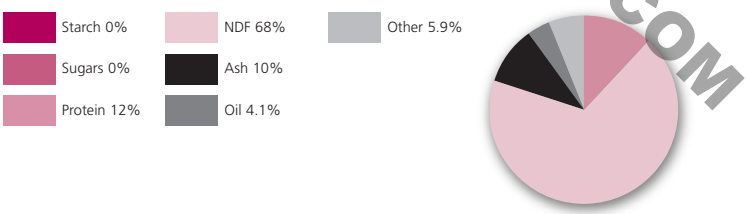
Storage/Processing

Alternative Names

Bulk Density

Typical Analysis

Dry Matter	86.0	NCDG	-	DUP (@ 5)	-	Avail Lysine	-
Crude Protein	12.0	NDF	68.0	DUP (@ 8)	-	Methionine	-
DCP	-	ADF	-	Salt	0.2	Meth & Cysteine	-
MER	5.5	Starch	0	Ca	0.8	Tryptophan	-
MEP	-	Sugar	0	Total Phos	0.15	Threonine	-
DE	-	Starch + Sugars	0	Av Phos	0.05	Arginine	-
Crude Fibre	26.0	FME	-	Magnesium	1.0	PDIA	-
Oil (EE)	4.0	ERDP (@ 2)	-	Potassium	-	PDIN	-
Oil (AH)	4.1	ERDP (@ 5)	-	Sodium	0.05	PDIE	-
EFA	-	ERDP (@ 8)	-	Chlorine	0.1	Met DI	-
Ash	10.0	DUP (@ 2)	-	Total Lysine	-	Lys DI	-



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Forages and Stock Feeds

Introduction

Product obtained by drying and milling young forage plants.

Manufactured by drying the fresh forage at high temperatures (800ºC) for a short period (60 seconds) in a large volume of air, to reduce the moisture from 80% to 10%, whilst maintaining the feed value. Usually manufactured from 'Italian' and perenial ryegrass with lucerne (alfalfa) increasing in importance.
(Clover and sanfoin are also used). It is usually rough ground and then pelleted.

Origin/Place of Manufacture

UK, Europe.

Nutritional Benefit

Rich in crude protein (17% home produced, 15% continental) and digestible fibre. A good feed which retains most of the nutritional value of grass with some claims of enhancement. Quality depends on grass and the stage at which it was cut. Does not depress rumen pH, so ideal with cereals. Contains beta- carotene. The drying process has been claimed to reduce the degradability of the protein, providing more nutrients for digestion in the small intestine (DUP). 85-90% of the Metabolisable Energy is also available for fermentation in the rumen.

UK production tends to be higher in protein levels than imported meal/pellets which may have been sun-dried and of lower nutritional quality.

Colour/Texture

Green meal/pellet.

Palatability

Good.

Limits to Usage (Anti-Nutritional Factors)

If finely ground, it can reduce milk fat content of milk. Avoid dark products where over-heating may affect the protein quality.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	10	**Creep**	0	**Chick**	0
Dairy	30	**Weaner**	0	**Broiler**	0
Beef	30	**Grower**	2.5	**Breeder**	5
Lamb	15	**Finisher**	2.5	**Layer**	5
Ewe	30	**Sow**	2.5		

Storage/Processing

Alternative Names

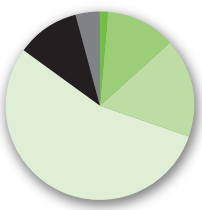
Bulk Density

Nuts 600 - 650 kg/m³
Meal 250 - 275 kg/m³

Typical Analysis

Dry Matter	90.0	NCGD	92.0	DUP (@ 5)	3.9	Avail Lysine	0.7
Crude Protein	17.0	NDF	54.5	DUP (@ 8)	5.3	Methionine	0.3
DCP	11.6	ADF	28.0	Salt	0.3	Meth & Cysteine	0.45
MER	10.8	Starch	1.5	Ca	1.0	Tryptophan	0.3
MEP	6.0	Sugar	12	Total Phos	0.5	Threonine	0.8
DE	8.5	Starch + Sugars	13.5	Av Phos	0.4	Arginine	0.8
Crude Fibre	24.0	FME	8.0	Magnesium	0.3	PDIA	5.5
Oil (EE)	3.5	ERDP (@ 2)	12.2	Potassium	2.6	PDIN	11.2
Oil (AH)	4.0	ERDP (@ 5)	9.9	Sodium	0.3	PDIE	9.5
EFA	1.0	ERDP (@ 8)	9.1	Chloride	0.1	Met DI	0.2
Ash	11.0	DUP (@ 2)	1.8	Total Lysine	0.9	Lys DI	0.7

Starch 1.5%
Sugars 12%
Protein 17%
NDF 54.5%
Ash 11%
Oil 4%
Other 0%



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Groundnut Meal/Cake

Oilseeds and By-Products

Introduction

By-product of oil manufacture, obtained by expelling and/or extraction of partially decorticated groundnuts (Maximum crude fibre content 16% in the dry matter).

Groundnuts, often known as peanuts or monkey nuts, are dehulled and crushed for their oil for human consumption. The seed contains 25-30% Crude Protein and 35-60% oil. When crushed, the meal contains approximately 7% oil. This is reduced further if an extraction process is used.

Origin/Place of Manufacture

Grown in sub-tropical countries, eg. China, India and even USA.

Nutritional Benefit

A good source of protein and energy. Less degradable than rape meal, but more so than soya bean meal. Higher in fibre and energy and lower in protein and of a poorer quality (lower in lysine and methionine) than soya bean meal, with the analysis varying widely by source. Palatability can be reduced and the meal can even be toxic as it oxidises in warm, humid conditions at origin. The major concern in the past has been due to fungal attack of seeds and meal and resultant toxins produced. Deficient in Vitamin B12.

Colour/Texture

Mid brown pellets, cake or meal.

Palatability

Average.

Limits to Usage (Anti-Nutritional Factors)

Aflatoxin contamination is common. Specialist plants can potentially detoxify the material. Undecorticated meals have a lower energy value.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	5	**Creep**	0	**Chick**	0
Dairy	15	**Weaner**	2.5	**Broiler**	2.5
Beef	15	**Grower**	2.5	**Breeder**	4.0
Lamb	5	**Finisher**	2.5	**Layer**	4.0
Ewe	10	**Sow**	2.5		

Storage/Processing

Needs careful storage and shipping to avoid aflatoxin contamination.

Alternative Names

Peanut/Monkey Nut Meal/Cake.

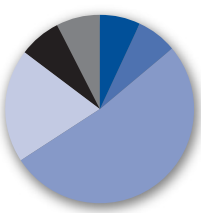
Bulk Density

Meal 525 - 700 kg/m^3

Typical Analysis

Dry Matter	87.0	NCGD	80.1	DUP (@ 5)	8.0	Avail Lysine	1.4
Crude Protein	52.0	NDF	19.5	DUP (@ 8)	10.0	Methionine	0.6
DCP	45.0	ADF	14.0	Salt	0.1	Meth & Cysteine	1.2
MER	12.9	Starch	7.0	Ca	0.2	Tryptophan	0.5
MEP	12.9	Sugar	7.0	Total Phos	0.7	Threonine	1.4
DE	17.8	Starch + Sugars	14.0	Av Phos	0.3	Arginine	5.2
Crude Fibre	9.0	FME	11.5	Magnesium	0.5	PDIA	23.0
Oil (EE)	6.5	ERDP (@ 2)	43.2	Potassium	1.5	PDIN	36.0
Oil (AH)	7.5	ERDP (@ 5)	35.1	Sodium	0.03	PDIE	25.0
EFA	0.5	ERDP (@ 8)	33.0	Chloride	0.02	Met DI	0.3
Ash	7.0	DUP (@ 2)	3.4	Total Lysine	1.6	Lys DI	1.2

Starch 7%
Sugars 7%
Protein 52%
NDF 19.5%
Ash 7%
Oil 7.5%
Other 0%



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Lentils

Legumes and By-Products

Introduction

Seeds of Lens culinaris a.o. Medik.

Grown for human food with substandard lentils and/or lentil bran available for animal feed.

Origin/Place of Manufacture

Asia, India, Eastern Europe.

Nutritional Benefit

Often considered close to beans or peas in analysis and also as a protein source. The bran is higher in fibre and lower in protein.

Colour/Texture

Orange/green seed.

Palatability

Good.

Limits to Usage (Anti-Nutritional Factors)

Can contain trypsin inhibitors and/or haemagglutinins at low level.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	5	**Creep**	5	**Chick**	5
Dairy	10	**Weaner**	7.5	**Broiler**	5
Beef	12.5	**Grower**	10	**Breeder**	5
Lamb	5	**Finisher**	10	**Layer**	7.5
Ewe	10	**Sow**	12.5		

Storage/Processing

Stores well.

Alternative Names

Split peas, Red dahl.

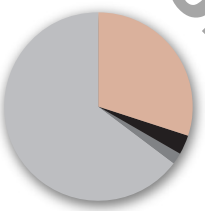
Bulk Density

760 - 790 kg/m³

Typical Analysis

Dry Matter	88.0	NCDG	-	DUP (@ 5)	-	Avail Lysine	-
Crude Protein	29.0	NDF	-	DUP (@ 8)	-	Methionine	0.5
DCP	-	ADF	-	Salt	-	Meth & Cysteine	0.7
MER	4.0	Starch	-	Ca	-	Tryptophan	0.3
MEP	-	Sugar	-	Total Phos	0.3	Threonine	1.2
DE	-	Starch + Sugars	-	Av Phos	0.2	Arginine	2.5
Crude Fibre	4.0	FME	-	Magnesium	-	PDIA	-
Oil (EE)	1.7	ERDP (@ 2)	-	Potassium	-	PDIN	-
Oil (AH)	1.9	ERDP (@ 5)	-	Sodium	-	PDIE	-
EFA	-	ERDP (@ 8)	-	Chlorine	-	Met DI	-
Ash	3.0	DUP (@ 2)	-	Total Lysine	1.9	Lys DI	-

Starch -
Sugars -
Protein 29%
NDF -
Ash 3%
Oil 1.9%
Other 62.1%



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Lucerne Silage

Forages and Stock Feeds

Introduction

Lucerne, a deep rooted legume, is now being grown as a forage crop in many areas where shallow soil or poor rainfall produces poor summer grass growth. Lucerne can be grown as a straight crop or undersown with spring barley or forage maize.

Origin/Place of Manufacture

Mid and Southern UK, Europe.

Nutritional Benefit

The crop is usually wilted to 25-30% dry matter. It is a higher protein content (19% in DM) than grass silage. The silage is claimed to be high in Undegradable Protein compared to grass silage, and also to result in higher intake levels due to lower cell wall content. Cattle readily consume well made lucerne silage.

Colour/Texture

Dark green silage.

Palatability

Good.

Limits to Usage

High fibre levels may reduce nutrient density in high yielding rations.

Forage Inclusion % per species

	Inc%		Inc%		Inc%
Calf	100	**Creep**	0	**Chick**	0
Dairy	100	**Weaner**	0	**Broiler**	0
Beef	100	**Grower**	0	**Breeder**	0
Lamb	100	**Finisher**	0	**Layer**	0
Ewe	100	**Sow**	0		

Storage/Processing

Alternative Names

Alfalfa silage

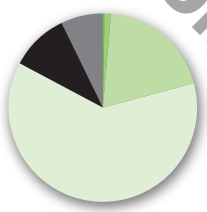
Bulk Density

600 - 650 kg/m³ after consolidation.

Typical Analysis

Dry Matter	35.0	NCGD	-	DUP (@ 5)	-	Avail Lysine	-
Crude Protein	19.5	NDF	62.0	DUP (@ 8)	0	Methionine	0.25
DCP	17.5	ADF	37.2	Salt	0.05	Meth & Cysteine	0.45
MER	8.5	Starch	0.5	Ca	1.5	Tryptophan	0.2
MEP	-	Sugar	1.0	Total Phos	0.3	Threonine	0.7
DE	-	Starch + Sugars	1.5	Av Phos	-	Arginine	0.5
Crude Fibre	30.0	FME	7.3	Magnesium	0.2	PDIA	-
Oil (EE)	7.0	ERDP (@ 2)	-	Potassium	0	PDIN	-
Oil (AH)	7.0	ERDP (@ 5)	-	Sodium	0.02	PDIE	-
EFA	-	ERDP (@ 8)	13.0	Chloride	0	Met DI	-
Ash	10.0	DUP (@ 2)	-	Total Lysine	0.8	Lys DI	-

Starch 0.5%
NDF 62%
Other 0%
Sugars 1%
Ash 10%
Protein 19.5%
Oil 7%



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Roots, Fruits and By-Products

Introduction

Roots of Manihot esculenta crantz, regardless of their presentation.

Manioc is a tuberous root of a sub-tropical shrub which is processed before feeding to destroy the cyanide present. It is grown for its starch content and the roots are peeled, chopped and dried after harvesting. The material may come as a meal or pellet, depending on processing method. Its usage depends on price and availability of cereal. Availability may also be affected in Europe by import quotas.

Origin/Manufacture

Tropical and sub-tropical Far East.

Nutritional Benefit

Low in protein and oil but high in starch. The protein is heavily made up of non-protein nitrogen (up to 35%). The analysis will also vary depending on the extent of processing. Ideal for ruminants as starch is slowly degraded.

Colour/Texture

Muddy white meal/pellet or chips.

Palatability

Can vary depending on cyanide content.

Limits to Usage (Anti-Nutritional Factors)

Linamarin (a glucoside) present releases cyanamide. Hydrocyanic acid is limited by law and users should consider permitted levels in the Feeding Stuff Regulations.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	5	**Creep**	0	**Chick**	5
Dairy	30	**Weaner**	10	**Broiler**	10
Beef	30	**Grower**	15	**Breeder**	10
Lamb	5	**Finisher**	30	**Layer**	15
Ewe	30	**Sow**	25		

Storage/Processing

Alternative Names

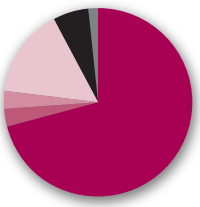
Cassava, Tapioca, Manihot.

Bulk Density

Typical Analysis

Dry Matter	87.0	NCGD	80.1	DUP (@ 5)	0.45	Avail Lysine	0.05
Crude Protein	3.0	NDF	15.4	DUP (@ 8)	0.63	Methionine	0.05
DCP	1.1	ADF	6.4	Salt	0.2	Meth & Cysteine	0.07
MER	13.2	Starch	71.0	Ca	0.2	Tryptophan	0.03
MEP	14.9	Sugar	3.0	Total Phos	0.2	Threonine	0.07
DE	15.15	Starch + Sugars	74.0	Av Phos	0.15	Arginine	0.15
Crude Fibre	5.0	FME	13.3	Magnesium	0.15	PDIA	0.8
Oil (EE)	0.6	ERDP (@ 2)	2.1	Potassium	1.1	PDIN	1.9
Oil (AH)	1.4	ERDP (@ 5)	1.8	Sodium	0.05	PDIE	8.5
EFA	-	ERDP (@ 8)	1.6	Chloride	0.15	Met DI	0.02
Ash	6.2	DUP (@ 2)	0.16	Total Lysine	0.1	Lys DI	0.05

Starch 71%
Sugars 3%
Protein 3%
NDF 15.4%
Ash 6.2%
Oil 1.4%
Other 0%



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80/20 Blend (CMS - Molasses)

Typical Analysis

Dry Matter	72.0	NCGD	80.0	DUP (@ 5)	1.2	Avail Lysine	0.01
Crude Protein	10.0	NDF	0	DUP (@ 8)	1.35	Methionine	0.02
DCP	4.0	ADF	0	Salt	1.25	Meth & Cysteine	0.03
MER	12.2	Starch	0	Ca	1.0	Tryptophan	0.01
MEP	9.0	Sugar	53.0	Total Phos	0.15	Threonine	0.05
DE	11.6	Starch + Sugars	53.0	Av Phos	0.7	Arginine	0.01
Crude Fibre	0	FME	10.8	Magnesium	0.6	PDIA	0.1
Oil (EE)	0.1	ERDP (@ 2)	7.2	Potassium	5.0	PDIN	4.8
Oil (AH)	0.1	ERDP (@ 5)	6.0	Sodium	0.5	PDIE	6.6
EFA	0	ERDP (@ 8)	6.0	Chloride	2.5	Met DI	0.01
Ash	15.0	DUP (@ 2)	0.7	Total Lysine	0.02	Lys DI	0.02

Condensed Molasses Solubles (CMS)

Typical Analysis

Dry Matter	60.0	NCGD	-	DUP (@ 5)	-	Avail Lysine	-
Crude Protein	35.0	NDF	-	DUP (@ 8)	-	Methionine	-
DCP	-	ADF	-	Salt	4.8	Meth & Cysteine	-
MER	10.0	Starch	0	Ca	1.5	Tryptophan	-
MEP	-	Sugar	5.0	Total Phos	0.65	Threonine	-
DE	8.3	Starch + Sugars	-	Av Phos	0.25	Arginine	-
Crude Fibre	-	FME	-	Magnesium	0.2	PDIA	-
Oil (EE)	0.5	ERDP (@ 2)	-	Potassium	7.0	PDIN	-
Oil (AH)	0.5	ERDP (@ 5)	-	Sodium	2.5	PDIE	-
EFA	-	ERDP (@ 8)	-	Chloride	3.5	Met DI	-
Ash	23.3	DUP (@ 2)	-	Total Lysine	-	Lys DI	-

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Olive Pulp

Oilseeds and By-Products

Introduction

By-product of oil manufacture, obtained by extraction of pressed olives (Olea europaea L.) separated as far as possible from parts of the kernel.

Olives are processed for the oil which is seen as a 'healthy' vegetable oil. Olive pulp is the residue from oil extraction.

Origin/Place of Manufacture

Grown in the Mediterranean, Northern African and parts of America.

Nutritional Benefit

A digestible fibre feed of variable nutritional quality due to different processing techniques. Unsuitable for pigs and poultry due to high fibre content. Low to medium protein content and deficient in minerals.

Colour/Texture

Dark brown pellets.

Palatability

Low.

Limits to Usage (Anti-Nutritional Factors)

Palatability will limit inclusion rates.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	0	**Creep**	0	**Chick**	0
Dairy	10	**Weaner**	0	**Broiler**	0
Beef	10	**Grower**	0	**Breeder**	0
Lamb	0	**Finisher**	0	**Layer**	0
Ewe	10	**Sow**	0		

Storage/Processing

Alternative Names

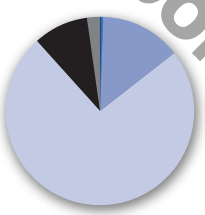
Bulk Density

700 - 750 Kg/m³

Typical Analysis

Dry Matter	88.0	NDF	59.2	DUP (@ 8)	1.9	Methionine	-
Crude Protein	11.0	ADF	50.0	Salt	0.7	Meth & Cysteine	-
DCP	8.0	Starch	0.3	Ca	1.5	Tryptophan	-
MER	5.1	Sugar	0.3	Total Phos	0.1	Threonine	-
MEP	-	Starch + Sugars	0.6	Av Phos	-	Arginine	-
DE	-	FME	3.5	Magnesium	0.1	PDIA	-
Crude Fibre	20.0	ERDP (@ 2)	6.9	Potassium	0.5	PDIN	-
Oil (EE)	1.5	ERDP (@ 5)	6.6	Sodium	3.0	PDIE	-
Oil (AH)	1.7	ERDP (@ 8)	6.2	Chloride	-	Met DI	-
Ash	7.5	DUP (@ 2)	1.1	Total Lysine	-	Lys DI	-
NCGD	34.0	DUP (@ 5)	1.6	Avail Lysine	-		

Starch 0.3%
Sugars 0.3%
Protein 11%
NDF 59.2%
Ash 7.5%
Oil 1.7%
Other 0%



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Pot Ale Syrup

Cereals and By-Products

Introduction

This is the rich liquid remaining after the first distillation in malt whisky production. It contains spent yeast and unfermented soluble components. The liquid is drawn off and concentrated by evaporation. If mixed with draff and dried, the result is distillers dark grains. If not added back to the grains, it is often used as a straight liquid feed or mixed with high sugar products, eg. molasses.

Origin/Place of Manufacture

Scotland.

Nutritional Benefit

A highly palatable and nutritious liquid feed for ruminants with a salty taste and malty smell which is known to encourage forage intake. Contains highly rumen degradable protein and lysine. It has been claimed to improve digestion and utilisation of low protein fibrous feeds. High in phosphorus, magnesium and other minerals.

Pot ale syrup is an ideal supplement in many beef and sheep diets, especially for feeding with straw or low protein roughage. High ME content (14.2 MJ/kg DM) and high crude protein content (35 % DM). It has been fed successfully to pigs in liquid feed systems in quantities up to 30% of their Dry Matter intake.

Colour/Texture

Golden brown viscous liquid (variable).

Palatability

Good.

Limits to Usage (Anti-Nutritional Factors)

High in copper (avoid feeding to sheep already on other copper supplements), with a low pH 3.5 - 4.0. These factors reduce inclusion rates. High in potassium which may cause scouring. Can be highly viscous.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	10	**Creep**	0	**Chick**	0
Dairy	25	**Weaner**	0	**Broiler**	0
Beef	20	**Grower**	10	**Breeder**	0
Lamb	0	**Finisher**	0	**Layer**	0
Ewe	10	**Sow**	10		

Storage/Processing

Stores well as it is acidic.

Alternative Names

Burnt Ale Syrup, Barley Distillers Solubles.

Bulk Density

1050 - 1150 Kg/m^3

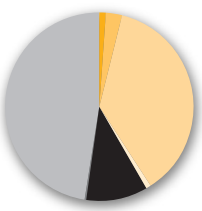
Typical Analysis

Dry Matter	45.0	NCDG	79.0	DUP (@ 5)	9.5	Avail Lysine	1.0
Crude Protein	37.0	NDF	0.7	DUP (@ 8)	14.6	Methionine	0.3
DCP	28.0	ADF	0.3	Salt	0.2	Meth & Cysteine	0.8
MER	14.2	Starch	1.3	Ca	0.15	Tryptophan	0.3
MEP	11.5	Sugar	2.8	Total Phos	2.1	Threonine	1.1
DE	12.0	Starch + Sugars	4.1	Av Phos	1.6	Arginine	1.0
Crude Fibre	0.4	FME	13.3	Magnesium	0.6	PDIA	14.5
Oil (EE)	0.2	ERDP (@ 2)	29.0	Potassium	2.2	PDIN	25.1
Oil (AH)	0.25	ERDP (@ 5)	28.8	Sodium	0.1	PDIE	21.0
EFA	0.2	ERDP (@ 8)	28.5	Choride	0.1	Met DI	0.1
Ash	10.5	DUP (@ 2)	3.5	Total Lysine	1.5	Lys DI	0.05

Starch 1.3% | NDF 0.7% | Other 47.4%

Sugars 2.8% | Ash 10.5%

Protein 37% | Oil 0.3%



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Salseed Meal

Oilseeds and By-Products

Introduction

Produced from the nuts of the Sal Tree which is widely grown in India and South East Asia. The kernel of the nut contains about 10-15% oil, which is removed and used locally in food or sold to the worldwide confectionery industry. The remaining product is either dumped or dried for local use and/or exported.

Origin/Manufacture

Asia, and processed in Europe.

Nutritional Benefit

Low nutritive value and used in relatively small amounts.

Colour/Texture

Pale yellow.brown meal or pellets.

Palatability

Poor.

Limits to Usage (Anti-Nutritional Factors)

It contains high levels of tannins, which are unpalatable and interact with other components of the ration, reducing nutritional availability. The use of ammonia, caustic soda or other alkalis will reduce tannin levels considerably.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	0	**Creep**	0	**Chick**	0
Dairy	2.5	**Weaner**	0	**Broiler**	0
Beef	5.0	**Grower**	0	**Breeder**	0
Lamb	0	**Finisher**	0	**Layer**	0
Ewe	2	**Sow**	0		

Storage/Processing

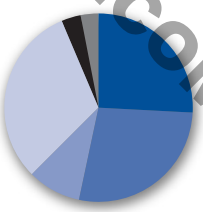
Alternative Names

Bulk Density

Typical Analysis

Dry Matter	90.0	NCGD	55.0	DUP (@ 5)	2.6	Avail Lysine	0.3
Crude Protein	9.0	NDF	31.2	DUP (@ 8)	3.3	Methionine	0.6
DCP	6.0	ADF	20.0	Salt	0.05	Meth & Cysteine	0.8
MER	8.2	Starch	26.0	Ca	0.3	Tryptophan	0.3
MEP	8.1	Sugar	27.5	Total Phos	0.25	Threonine	0.6
DE	8.4	Starch + Sugars	53.5	Av Phos	0.1	Arginine	0.5
Crude Fibre	4.2	FME	7.7	Magnesium	0.2	PDIA	-
Oil (EE)	2.3	ERDP (@ 2)	6.7	Potassium	1.0	PDIN	-
Oil (AH)	2.8	ERDP (@ 5)	4.9	Sodium	0.02	PDIE	-
EFA	0.5	ERDP (@ 8)	4.4	Chloride	0.05	Met DI	-
Ash	3.5	DUP (@ 2)	1.2	Total Lysine	0.6	Lys DI	-

Starch 26%
NDF 31.2%
Other 0%
Sugars 27.5%
Ash 3.5%
Protein 9%
Oil 2.8%



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Sodium Bicarbonate

Miscellaneous

Introduction

Sodium bicarbonate is used in ruminant diets to buffer the rumen while in monogastrics it is used as a sodium source.

Origin/Place of Manufacture

UK and around the world.

Nutritional Benefit

Ideal to stabilise the rumen pH. Tends to increase butterfat by increasing the buffering capacity. Used in poultry to provide sodium without chloride thereby reducing potential for wet litter.

Colour/Texture

White powder.

Palatability

If used heavily, spices may be required to encourage intake.

Limits to Usage (Anti-nutritional factors)

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	1	**Creep**	0	**Chick**	0.1
Dairy	2	**Weaner**	0	**Broiler**	0.2
Beef	1	**Grower**	0	**Breeder**	0.1
Lamb	1	**Finisher**	0	**Layer**	0.1
Ewe	1	**Sow**	0		

Storage/Processing

Alternative Names

Bulk Density

Typical Analysis

Dry Matter	98.0	NDF	0	DUP (@ 8)	0	Meth & Cysteine	0
Crude Protein	0	ADF	0	Salt	-	Tryptophan	0
DCP	0	Starch	0	Ca	0	Threonine	0
MER	0	RRS	0	Total Phos	0	Arginine	0
MEP	0	Sugar	0	Av Phos	0	PDIA	0
DE	0	Starch + Sugars	0	Magnesium	0	PDIN	0
Crude Fibre	0	FME	0	Potassium	0	PDIE	0
Oil (EE)	0	ERDP (@ 2)	0	Sodium	28.0	Met DI	0
Oil (AH)	0	ERDP (@ 5)	0	Chloride	0	Lys DI	0
EFA	0	ERDP (@ 8)	0	Total Lysine	0		
Ash	60.0	DUP (@ 2)	0	Avail Lysine	0		
NCDG	0	DUP (@ 5)	0	Methionine	0		

Starch 0%
Sugars 0%
Protein 0%
NDF 0%
Ash 60%
Oil 0%
Other 40%

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Cereals and By-Products

Introduction

Grains of Sorghum bicolor (L.) Moench s.i.

One of the most widely used straight feed grains in the United States of America. Most sorghum by-products from processing are reportedly unpalatable and not widely used.

Origin/Manufacture

USA, Africa, China, India, Pakistan.

Nutritional Benefit

The grain is mainly used for feed, although as a grass the total plant could be used as forage. The seeds are low in fibre and nutritionally similar to maize grain, but lacking in the xanthophylls required for layers rations.

Colour/Texture

Dark brown.

Palatability

Relatively palatable. High tannin level could reduce intake.

Limits to Usage (Anti-Nutritional Factors)

Dark brown or purple seeds contain a lot of tannin, and will reduce protein digestibility. Not ideal for wet feeding systems. White seeds contain little tannin and are an ideal feed, although they can have a constipating effect. NB. It is essential that the type of Sorghum is known to determine the true nutritional value.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	5	**Creep**	0	**Chick**	0
Dairy	10	**Weaner**	0	**Broiler**	0
Beef	10	**Grower**	5	**Breeder**	5
Lamb	5	**Finisher**	5	**Layer**	5
Ewe	10	**Sow**	6		

Storage/Processing

The whole grain should be processed for most ruminants except sheep (grain coat reduces digestion otherwise). Processing removes the seed coat, which improves digestion. It should not be over processed, ie. too finely ground, or intake will be reduced.

Alternative Names

Milo

Bulk Density

Seeds 500 - 565 Kg/m^3 Meal 475 - 500 Kg/m^3

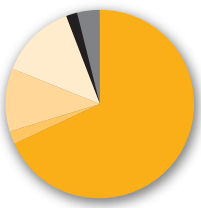
Typical Analysis

Dry Matter	85.0	NCDG	93.0	DUP (@ 5)	6.3	Avail Lysine	0.15
Crude Protein	10.9	NDF	13.1	DUP (@ 8)	6.5	Methionine	0.2
DCP	7.3	ADF	5.4	Salt	0.15	Meth & Cysteine	0.4
MER	13.5	Starch	68.3	Ca	0.05	Tryptophan	0.1
MEP	15.6	Sugar	2.0	Total Phos	0.5	Threonine	0.4
DE	16.0	Starch + Sugars	82.5	Av Phos	0.15	Arginine	0.4
Crude Fibre	3.0	FME	12.6	Magnesium	0.2	PDIA	6.5
Oil (EE)	3.5	ERDP (@ 2)	4.4	Potassium	0.4	PDIN	8.7
Oil (AH)	3.7	ERDP (@ 5)	3.1	Sodium	0.3	PDIE	14.0
EFA	1.7	ERDP (@ 8)	2.8	Chloride	0.1	Met DI	-
Ash	2.0	DUP (@ 2)	5.5	Total Lysine	0.25	Lys DI	-

Starch 68.3% NDF 13.1% Other 0%

Sugars 2% Ash 2%

Protein 10.9% Oil 3.7%



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Soya (Full Fat)

Oilseeds and By-Products

Introduction

Soya Beans Glycine max. L. Merr. subjected to an appropriate heat treatment.

Soya is the most important protein source in the world. The soya seeds are de-hulled and heat treated either by steam followed, potentially, by extrusion, toasting, micronising or jet sploding to produce a high oil, high protein product. Used commonly in young animal rations, its usage depends on the combined cost of soya meal and soya bean oil. The heat from processing reduces the levels of anti-nutritional factors (ANFs) which would otherwise reduce protein digestion. It also breaks down the plant cell wall, making it more easily digested.

Origin/Place of Manufacture

UK, worldwide.

Palatability

Excellent.

Nutritional Benefit

Ideal for all rations, especially young animals due to palatability, high energy and protein (40%) level. It is high in essential fatty acids, making it ideal for pig and poultry feed. The oil present may have some degree of rumen protection and could, therefore, enhance milk yield and modify quality. The heat during manufacture increases the level of undegradable protein.

Colour/Texture

Pale golden yellow.

Palatability

Excellent.

Limits to Usage (Anti-Nutritional Factors)

ANFs, eg. Trypsin and haemagluttin inhibitors, are removed by heating/cooking.
Finishing beef animals should not be fed high levels or soft fat will result.
It may also increase butterfat levels in milk.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	10	**Creep**	20	**Chick**	20
Dairy	15	**Weaner**	20	**Broiler**	25
Beef	15	**Grower**	15	**Breeder**	20
Lamb	10	**Finisher**	10	**Layer**	20
Ewe	15	**Sow**	10		

Storage/Processing

Higher oil content will increase risk of rancidity if it is stored for long periods.

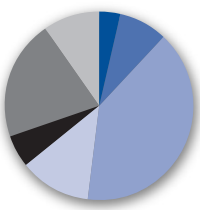
Alternative Names

Bulk Density

Typical Analysis

Dry Matter	89.0	NCDG	8.9	DUP (@ 5)	6.6	Avail Lysine	2.4
Crude Protein	40.0	NDF	12.3	DUP (@ 8)	8.9	Methionine	0.6
DCP	38.0	ADF	8.2	Salt	0.1	Meth & Cysteine	1.1
MER	16.1	Starch	3.7	Ca	0.3	Tryptophan	0.6
MEP	16.9	Sugar	8.3	Total Phos	0.5	Threonine	1.5
DE	19.3	Starch + Sugars	12.0	Av Phos	0.25	Arginine	0.5
Crude Fibre	6.0	FME	8.5	Magnesium	0.25	PDIA	18.4
Oil (EE)	20.5	ERDP (@ 2)	32.0	Potassium	1.7	PDIN	27.8
Oil (AH)	20.7	ERDP (@ 5)	27.9	Sodium	0.02	PDIE	21.2
EFA	10.9	ERDP (@ 8)	26.0	Chloride	0.05	Met DI	0.4
Ash	5.5	DUP (@ 2)	3.4	Total Lysine	2.8	Lys DI	1.1

Starch 3.7%
Sugars 8.3%
Protein 40%
NDF 12.3%
Ash 5.5%
Oil 20.7%
Other 9.5%



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Straw (Nutritionally Improved) NIS

Forages and Stock Feeds

Introduction

Wheat or barley straw is first ground, hammer milled and then treated with sodium hydroxide (caustic soda) or ammonia to make the carbohydrates more available.

Origin/Place of Manufacture

UK.

Nutritional Benefit

A good source of digestible fibre but very low in protein and other nutrients. Ideal to extend forage or complement starch source. Mineral and vitamin levels are extremely low except for sodium which is supplied when caustic treated. Ammonia treatment raises the protein level to 7% by supplying non-protein nitrogen.

Colour/Texture

Yellow/brown pellets.

Palatability

Good.

Limits to Usage (Anti-Nutritional Factors)

Sodium content means adequate water should be made available. Avoid high intakes for prolonged periods as this can lead to alkalosis.

Foarge Inclusion % per species

	Inc %		Inc %		Inc %
Calf	5	**Creep**	0	**Chick**	0
Dairy	15	**Weaner**	0	**Broiler**	0
Beef	15	**Grower**	0	**Breeder**	0
Lamb	5	**Finisher**	0	**Layer**	0
Ewe	10	**Sow**	5		

Storage/Processing

Stores well.

Alternative Names

Caustic Straw.

Bulk Density

Straw - Caustic treated

Typical Analysis

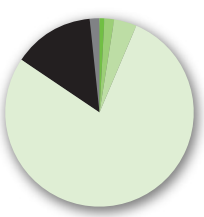
Dry Matter	86.0	NDF	78.0	DUP (@ 8)	1.0	Methionine	0.02
Crude Protein	4.0	ADF	45.0	Salt	0.5	Meth & Cysteine	0.07
DCP	1.0	Starch	1.0	Ca	0.3	Tryptophan	0.1
MER	7.5	Sugar	1.5	Total Phos	0.15	Threonine	0.3
MEP	-	Starch + Sugars	2.5	Av Phos	-	Arginine	-
DE	4.0	FME	7.1	Magnesium	0.1	PDIA	1.7
Fibre	45.0	ERDP (@ 2)	5.0	Potassium	1.0	PDIN	4.0
Oil (EE)	1.3	ERDP (@ 5)	4.5	Sodium	0.05	PDIE	6.0
Oil (AH)	1.5	ERDP (@ 8)	4.1	Chlorine	0.65	Met DI	-
Ash	14.0	DUP (@ 2)	0.05	Total Lysine	0.1	Lys DI	-
NCDG	45.0	DUP (@ 5)	0.5	Avail Lysine	-		

Ammonia Treated

Typical Analysis

Dry Matter	87.0	NCGD	-	DUP (@ 5)	-	Avail Lysine	-
Crude Protein	7.0	NDF	78.2	DUP (@ 8)	-	Methionine	-
DCP	-	ADF	48.3	Salt	0.25	Meth & Cysteine	-
MER	7.8	Starch	1.0	Ca	0.4	Tryptophan	-
MEP	-	Sugar	2.0	Total Phos	0.1	Threonine	-
DE	-	Starch + Sugars	3.0	Av Phos	-	Arginine	-
Fibre	42.0	FME	6.8	Magnesium	0.85	PDIA	-
Oil (EE)	2.0	ERDP (@ 2)	-	Potassium	-	PDIN	-
Oil (AH)	2.4	ERDP (@ 5)	-	Sodium	0.1	PDIE	-
EFA	-	ERDP (@ 8)	-	Chloride	-	Met DI	-
Ash	5.5	DUP (@ 2)	-	Total Lysine	-	Lys DI	-

Starch 1%
Sugars 1.5%
Protein 4%
NDF 78%
Ash 14%
Oil 1.5%
Other 0%



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Urea (Feed Grade)

Miscellaneous

Introduction

Cattle and sheep have the ability through their rumen to utilize urea/non protein nitrogen (NPN) to manufacture microbial protein. Only feed grade urea should be used as fertilizer grade may contain heavy metals.

Origin/Place of Manufacture

Widely manufactured in Europe, USA and S. America.

Nutritional Benefit

Urea is approximately 50% nitrogen and is the most concentrated source available. As protein is N x 6.25, urea is equivalent to 295% Crude Protein. Care should be taken to supply urea in a safe form as it is toxic in large amounts and can produce ammonia toxicity. Urea must be fed with a readily available energy source to ensure rumen capture.

Urea for Grain Treatment: Feed grade urea can be used to preserve moist grain (20-30% moisture). Moisture below 20% will result in inadequate preservation as there is insufficient moisture to hydrolize the urea fully.

Grain Moisture	kg/Urea/tonne Grain
20 - 22	25
23 - 25	30
26 - 28	35
> 28	40

The grain should be well mixed with the urea and an addition at 20-40 kg of water added in the mixture. When mixed, it should be stored in a clean area covered with a plastic sheet, to retain ammonia vapour released by the process at a height of 1 metre, to prevent overheating.

Colour/Texture

White/grey granules.

Palatability

Poor.

Limits to Usage

Typical feed rates for milking cows range from 50-150 grams per head per day in a well balanced complete diet. Care must be taken on overall levels of non-protein nitrogen fed to ruminants as ammonia toxicity can easily result.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	0	**Creep**	0	**Chick**	0
Dairy	0.015	**Weaner**	0	**Broiler**	0
Beef	0.015	**Grower**	0	**Breeder**	0
Lamb	0	**Finisher**	0	**Layer**	0
Ewe	0.01	**Sow**	0		

Storage/Processing

Alternative Names

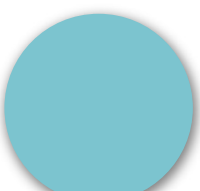
Bulk Density

550 - 600 Kg/m³

Typical Analysis

Dry Matter	99.5	NCDG	0	DUP (@ 8)	0	Meth & Cysteine	0
Crude Protein	280.0	NDF	0	Salt	0	Tryptophan	0
DCP	236.0	ADF	0	Ca	0	Threonine	0
MER	0	Starch	0	Total Phos	0	Arginine	0
MEP	0	Sugar	0	Av Phos	0	PDIA	0
DE	0	Starch + Sugars	0	Magnesium	0	PDIN	68.0
Crude Fibre	0	FME	0	Potassium	0	PDIE	0
Oil (EE)	0	ERDP (@ 2)	230.0	Sodium	0	Met DI	0
Oil (AH)	0	ERDP (@ 5)	230.0	Chloride	0	Lys DI	0
EFA	0	ERDP (@ 8)	230.0	Total Lysine	0		
Linoleic	0	DUP (@ 2)	0	Avail Lysine	0		
Ash	1.0	DUP (@ 5)	0	Methionine	0		

Starch -
Sugars -
Protein 280%
NDF -
Ash -
Oil -
Other -



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Cereals and By-Products

Introduction

Grains of Triticum aestivum L., Tritcum durum Desf. and other cultivars of wheat.

Wheat is classified into three types - hard, soft, durum. It is used in bread, pasta, brewing and starch manufacture, with soft varieties generally used as animal feed. The naked grain has a prominent crease and is oval in shape. Wheat can now be fed at higher levels in compound feeds due to the inclusion of enzymes which reduce stickiness. Feed wheat in the UK has been grown for bread or biscuit making qualities but failed to attain the grade, hence unavailability for feed. The most common use of wheat is to make bread which requires hard wheats, with high proteins, high Hagberg falling numbers so it can make a stiff dough.

Origin/Manufacture

The most common cereal in Europe and other temperate countries.

Nutritional Benefit

Very high in energy with average protein (13%). High in starch (64%), low in fibre (3% as a naked grain), but tends to be low in vitamins especially biotin. Vitamin E is reduced when grain is stored moist with preservatives. It is useful for increasing milk protein yields and for the promotion of growth. Approximately 10% of the starch is rumen unfermented.

Colour/Texture

Pale brown oval grain.

Palatability

Good.

Limits to Usage (Anti-Nutritional Factors)

Contains high levels of gluten which, if excessively ground, can result in a sticky dough, reducing digestion. The readily fermentable carbohydrate present can cause acidosis when fed at high levels to ruminants.

Concentrate Inclusion % per species

	Inc %		Inc %		Inc %
Calf	25	**Creep**	60	**Chick**	50
Dairy	40	**Weaner**	55	**Broiler**	60
Beef	40	**Grower**	50	**Breeder**	65
Lamb	25	**Finisher**	50	**Layer**	60
Ewe	35	**Sow**	50		

Storage/Processing

Can be crushed and rolled or coarsely ground (2mm for Pigs, 4mm+ for Poultry). Sheep can eat whole grains. Wheat will improve pellet quality (10% minimum).

Alternative Names

Bulk Density

700 - 770 Kg/m^3

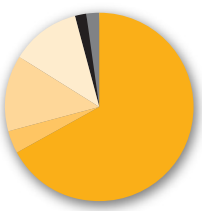
Typical Analysis

Dry Matter	86.0	NCDG	93.5	DUP (@ 5)	1.1	Avail Lysine	0.3
Crude Protein	13.0	NDF	12.0	DUP (@ 8)	1.4	Methionine	0.21
DCP	10.0	ADF	2.6	Salt	0.15	Meth & Cysteine	0.45
MER	13.8	Starch	67.0	Ca	0.06	Tryptophan	0.15
MEP	15.1	Sugar	4.0	Total Phos	0.35	Threonine	0.4
DE	16.0	Starch + Sugars	71.0	Av Phos	0.15	Arginine	0.6
Crude Fibre	3.0	FME	12.8	Magnesium	0.15	PDIA	2.7
Oil (EE)	1.8	ERDP (@ 2)	10.7	Potassium	0.5	PDIN	8.2
Oil (AH)	2.0	ERDP (@ 5)	10.3	Sodium	0.05	PDIE	10.2
EFA	1.5	ERDP (@ 8)	9.9	Chloride	0.01	Met DI	0.19
Ash	2.0	DUP (@ 2)	0.7	Total Lysine	0.35	Lys DI	0.2

Starch 67% | NDF 12% | Other 0%

Sugars 4% | Ash 2%

Protein 13% | Oil 2%



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Whey Syrup

Miscellaneous

Introduction

When milk is treated with rennet in the process of cheese making, casein is precipitated and takes with it most of the fat and almost half the calcium and phosphorus. The liquid residue is whey.

Origin/Manufacture

UK.

Nutritional Benefit

It is a poorer source of energy, fat, soluble vitamins, calcium and phosphorus than milk. It is often fed in wet feeding systems to pigs.

Colour/Texture

Yellow/white liqour.

Palatability

Good when fresh.

Limits to Usage (Anti-Nutritional Factors)

Low dry matter and high salt content.

Concentrate Inclusion % per species

	Inc%		Inc%		Inc%
Calf	5	**Creep**	0	**Chick**	0
Dairy	10	**Weaner**	10	**Broiler**	0
Beef	10	**Grower**	20	**Breeder**	0
Lamb	5	**Finisher**	20	**Layer**	0
Ewe	10	**Sow**	10		

Storage/Processing

Alternative Names

Bulk Density

Typical Analysis

Dry Matter	47.0	NCGD	0	DUP (@ 5)	-	Avail Lysine	-
Crude Protein	22.0	NDF	0	DUP (@ 8)	-	Methionine	-
DCP	17.0	ADF	0	Salt	12.0	Meth & Cysteine	-
MER	13.0	Starch	0	Ca	0.8	Tryptophan	-
MEP	-	Sugar	12.0	Total Phos	1.2	Threonine	-
DE	10.8	Starch + Sugars	12.0	Av Phos	-	Arginine	-
Crude Fibre	0	FME	-	Magnesium	0.2	PDIA	-
Oil (EE)	0	ERDP (@ 2)	-	Potassium	3.3	PDIN	-
Oil (AH)	0	ERDP (@ 5)	-	Sodium	1.3	PDIE	-
EFA	0	ERDP (@ 8)	-	Chloride	3.2	Met DI	-
Ash	10	DUP (@ 2)	-	Total Lysine	-	Lys DI	-

Starch 0%
Sugars 12%
Protein 22%
NDF 0%
Ash 10%
Oil 0%
Other 56%

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