

Nutritional Characteristics of Feed Ingredients for Ruminants



This short guide summarizes the nutritional value of forages, concentrate ingredients and byproduct feeds commonly used in ruminant diets in Ireland. Feeds are evaluated on a dry matter (DM) basis. Feed energy content is measured as **UFL** (UFLV for intensive beef diets). Protein value is expressed as **PDI** (grams of absorbed protein); this is a more appropriate measure than crude protein (CP). Fibre content of feeds is expressed as neutral detergent fibre (**NDF**). Meeting diet NDF requirements is essential to ensuring good rumen function and health; can be achieved by having adequate forage in the diet.

Forages, Roots and Wet By-Product Feeds	Ingredient (Values on DM basis)	Energy UFL (UFLV) (per kg DM)	Protein CP% (PDI) (g/kg DM)	Fibre NDF%	Comments (Feed value will vary depending on sward and crop management - test forage quality)
	Grazed grass (good quality)	1.03 (1.01)	18 (103)	35	High energy and protein content; feed value dictated by growth stage at grazing. Adequate diet NDF at 3-leaf stage. Increased stem content significantly reduces UFL and protein. Low-cost feed per UFL and PDI.
	Grass-white clover	1.05	19 (105)	32	Increased intake per kg liveweight and improved animal performance compared to grass-only swards, due in part to lower NDF content. Manage bloat risk at key times by grazing management or adding fibre or oil to diet.
	Good Grass Silage (74 DMD+)	0.86 (0.83)	14 (77)	45	The cornerstone of winter diets for growing, finishing and milking animals. High DMD silage reduces cost of purchased energy and protein supplementation while delivering good animal performance.
	Average Grass Silage (66-68 DMD)	0.76 (0.71)	12 (66)	50	Low DMD (<68) suitable for dry dairy and suckler cows in good body condition. Extra concentrate needed for growing cattle, poor economic returns when fed to milking cows.
	Maize Silage	0.88 (0.82)	8 (70)	41	High-quality where cob development is good and starch content is high (>30%). Increases feed intake when fed at 30-50% of forage in grass silage diets. Balance for protein and minerals.
	Red Clover Silage	0.85 (0.81)	15 (82)	40	Good quality red clover silage increases forage intake and offers potential for better animal performance and/or reduced concentrate feeding. Quality depends on NDF and protein levels. Improves milk yield and weight gain.
	Fermented Whole Crop Wheat Silage	0.80 (0.75)	9 (76)	55	Winter wheat crop harvested at soft cheddar cheese grain stage and some green left in stem, with overall dry matter of 35-40%. Can improve forage intake when fed as a complement to grass silage for milking cows.
	Hay (good quality)	0.68 (0.60)	10 (75)	66	Good fibre source but low in energy and protein, moderate intake potential. Supplement the overall diet based on type of stock being fed. Adequate clean water supply essential.
	Barley Straw	0.45 (0.35)	4 (46)	80	Reliable fibre source to meet minimum diet NDF. Very low energy and protein, requires balancing with adequate energy and protein from other ingredients, plus minerals.
	Brewers Grains	0.92 (0.84)	25 (189)	53	Moderate energy, good protein, high fibre. Increases overall intake on silage diets. Value per tonne as fed depends on DM content. Storage losses and risk of spoilage must be carefully managed.
	Fodder Beet	1.12 (1.14)	8 (88)	15	High energy, low protein and low DM crop. Excellent feed for high performing animals, fibre source needed to balance diets for rumen health. Balance minerals and protein, particularly Ca and P.
	Potatoes	1.20 (1.22)	11 (103)	16	High energy feed suitable as an alternative to cereals for finishing cattle and milking cows. Must be processed/crushed to avoid choke risk, High starch and low NDF must be balanced in the overall diet.

	Ingredient <i>(Values on DM basis)</i>	Energy UFL (UFV) <i>(per kg DM)</i>	Protein CP% (PDI) <i>(g/kg DM)</i>	Fibre NDF%	Comments <i>(Composition of by-product feeds may vary more than cereal ingredients)</i>
Concentrate Ingredients	Barley	1.16 (1.15)	11 (103)	17	Benchmark feed for energy quality. Excellent option for finishing diets, growing stock and milking cows. High starch and low NDF limits overall inclusion in dairy rations to meet diet targets for rumen health.
	Feed Wheat	1.16 (1.15)	11 (107)	9	High energy feed similar in value to barley. Rapid starch breakdown and low NDF content increases risk of rumen pH issues at high feeding rates, inclusion rates limited in the overall diet.
	Feed Oats	1.03 (1.15)	11 (85)	34	Good energy, higher fibre content relative to barley. Performs well in cattle diets as an alternative cereal. Lower starch content but high degradability. Can be used in stretcher diets at moderate inclusion rates.
	Cereal Rye	1.02	11 (101)	14	Cereal grain similar in energy content to barley. Low in NDF and high in starch.
	Field Beans	1.18 (1.18)	28 (102)	20	High energy, starch and crude protein. Limited bypass protein content and low NDF content. Peas have similar feed value characteristics. Inclusion rates depend on diet cereal content and total diet NDF.
	Maize Meal	1.22 (1.21)	10 (120)	13	High energy feed. Relatively slow starch breakdown reduces rumen health risk at high feeding rates. Excellent for finishing bulls and high productions dairy cows as a complementary cereal source.
	Soybean Meal	1.18 (1.17)	55 (270)	6	Benchmark feed for protein content and quality. High energy. Stock fed low-quality forage benefit from soybean meal inclusion. Improves colostrum quality in ewes and cows where forage quality is poor.
	Rapeseed Meal	1.05 (0.98)	39 (151)	38	By-product of the food oil industry, high energy and moderate to high protein ingredient. Used to add protein to rations.
	Distillers' Grains	1.16 (1.13)	29 (134)	34	By-product of the drinks/ethanol industry, high energy and moderate to high protein ingredient.
	Maize Gluten	1.04 (0.98)	23 (125)	47	By-product of starch or ethanol production. Moderate feed energy and moderate to high protein; variable feed composition. Good intermediate ingredient for rations.
	Beet Pulp	1.14 (1.04)	10 (110)	55	Good energy with high levels of digestible NDF. Excellent complement to grazed grass. Works well as a fodder stretcher or to balance cereals in rations.
	Soya Hulls	1.05 (1.01)	11 (105)	70	Moderate to good energy with very high levels of digestible NDF and low protein. Can be fed as a fodder stretcher, protein balance needed depending on stock being fed.
	Palm Kernel	0.95 (0.85)	16 (140)	80	By-product feed with very high NDF. Moderate energy and protein, variable quality. Can be offered free choice as fodder stretcher; poor palatability tends to limit intake. Poor mineral profile for close-up dry cows.
	Wheat-Feed (pollard)	0.87 (0.80)	18 (90)	43	By-product of milling industry. High NDF and lower starch compared cereal results in relatively lower energy content. Moderate protein content. Generally used as a blended feed ingredient.

Balancing diets for cost and quality: Grazed forages continue to offer the best combination of high energy and protein at lowest cost per unit of nutrient. High-quality conserved forages (silages) offer good potential to drive performance when grazed pasture is limited or unavailable. Concentrates and/or by-products can then be used to balance total energy and protein requirements depending on forage intake and quality, and class of stock to be fed. In all situations home grown forages should be maximised in the diet first and then if required other feeds should be offered based on nutritional characteristics, fibre content and cost. Where possible and feasible home-grown feed ingredients should be sourced.