

# Facts on alternative fibre sources

**Nutritional values of high fibre by-products are particularly variable. Crunch the numbers before you buy using feed analysis results.**

When pasture is limited and supplies of fodder are reduced, you may be forced to consider using alternative fibre options which you may not have used before. Many alternative fibre sources are suitable for feeding to dairy stock provided they are supplemented with high energy feeds and protein sources as part of a balanced diet. They vary widely in nutritive value, digestibility, effective fibre value, and may present risks such as ruminal acidosis, mycotoxins and chemical residues. So you need to be careful.

Alternative fibre sources which may be available depending on seasonal circumstances and location include almond hulls, palm kernel meal, cereal straw (barley, oats, triticale, wheat and rice straws) sugar cane and grape marc. As the chart below shows, the nutritional specifications of each of these products are unique, and differ greatly from those of conventional fibre sources such as hay, and grains such as wheat.

## Facts about fibre

Fibre is an essential ingredient in the diets of ruminant animals such as dairy cattle. It supplies energy, maintains normal, healthy rumen function, and in cows is utilised to produce milk fat.

The most commonly used chemical measure of the fibre content of a feed or a diet is Neutral Detergent Fibre (NDF).

The 'physically effective fibre value' of a feed or a diet is also critical. It refers to the ability of a feed to stimulate rumen contractions, stimulate chewing activity and production of saliva, which contains buffers which maintain the cow's ruminal pH in the optimal range (6.2–6.6) for growth of rumen microbes.

NDF intake should ideally be about 28 to 35% of the total diet to maximize daily dry matter intake, however they can eat up to levels of 35% of the diet with minimal impact on intake. Above 35% NDF dry matter intake will decline especially if the diet is forage based. 25% of the fibre in the diet should have a fibre length of approximately 2.5 cm. Diets containing rapidly digested starch sources such as wheat should have higher levels of NDF (min 34%).

A rule of thumb for NDF intake is 1% of bodyweight as forage NDF or 1.2% of bodyweight for total NDF intake e.g. a 600kg cow can eat 6 kg DM of NDF per day from forage or 7.2 kg DM of NDF/day in the total diet.

If there is not enough long or 'effective' fibre, there will not be enough chewing during eating and ruminating, and therefore not enough saliva produced, leading to a drop in ruminal pH and increased risk of ruminal acidosis.

Cattle can suffer from two forms of ruminal acidosis:

- > 'Sub-acute ruminal acidosis' (SARA), where the ruminal pH is in the range 5.5–6. (Cows may not appear sick, but some will be off feed, have mild milk fat depression and be scouring).
- > 'Lactic acidosis' where the ruminal pH is below 5.5 – cows will be noticeably sick. (Many cows will be off their feed, down in their milk, lame and scouring. This may then progress to 'downer cow' syndrome and death).

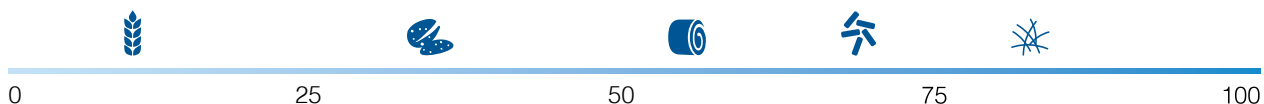
### Metabolisable energy (MJ ME/kg dry matter)



### Crude protein (% dry matter)




### Neutral detergent fibre (% dry matter)



### Physically effective fibre value (low/medium/high)



 Cereal straw
  Hay
  Almond hulls
  Palm kernel meal
  Wheat

**Figure 1**  
Nutritive value of feeds

Almond hulls	Keep in mind	Management tip
<ul style="list-style-type: none"> <li>&gt; A good forage extender, with medium effective fibre value when fed whole.</li> <li>&gt; Reasonable energy source with very good palatability.</li> <li>&gt; Low in protein.</li> <li>&gt; Available whole and milled. Whole almond hulls have a higher effective fibre value but a lower bulk density. Milled almond hulls provide no effective fibre.</li> </ul>	Highly palatable. If offered ad-lib, cows may consume 6+ kg/cow/day.	Limit daily consumption of almond hulls to 3–4 kg/cow/day. Always feed almond hulls with a palatable, good quality straw/hay.
	Sugar level is > 20%	Introduce gradually to cows' diets. Limit daily consumption to 70% of dry matter intake.
	If feeding out using a front end loader (FEL), you need to know how many kilograms per bucket, to ensure you don't under or over feed.	Weigh the FEL with and without the bucket full of almond hulls, or estimate using almond hulls' bulk density (kg/litre) and your bucket's volume. Check bulk density regularly.
	Can be challenging to regulate daily feed intakes and avoid excess competition and wastage.	Mix almond hulls with other higher quality feeds in a mixer wagon if possible. If offered to cattle separately, place in troughs a fair walk away from water troughs and other forage sources.
	Ad-lib almond hulls will not provide the daily nutrient requirements of dry cows or young stock.	Supplement with grain/concentrates, including protein supplements.
	Prone to mould growth if allowed to get wet, increasing the risk of mycotoxins (fungal toxins).	Store under cover, ideally on a dry concrete floor. Consider including a reputable mycotoxin binder product in feed.
	Potential chemical residue risk.	Purchase almond hulls with a vendor commodity declaration.

## Key messages



Nutritional values of high fibre by products are particularly variable



Crunch the numbers before you buy using feed lab analysis result

Palm kernel meal	Keep in mind	Management tip
<ul style="list-style-type: none"> <li>&gt; A forage extender, not a grain replacer.</li> <li>&gt; Medium digestibility, but low effective fibre level due to small particle size.</li> <li>&gt; Low in starch and sugars.</li> <li>&gt; Oil content: 8–10%.</li> <li>&gt; Medium protein 15–18%.</li> <li>&gt; High feeding levels of PKE (&gt;3–4 kg/day) will alter the ratio of fatty acids in milk fat, which can be an issue when processing certain products.</li> <li>&gt; PKE might also be a potential mycotoxin risk.</li> </ul>	If offered ad-lib, cows will consume about 6 kg/day. High feeding rates for extended periods without effective fibre sources may lead to animals suffering impacted stomachs.	Limit daily consumption of palm kernel meal to 3–4 kg/cow/day. Always feed palm kernel meal with a palatable, good quality straw/hay.
	If feeding out using a front end loader (FEL), you need to know how many kilograms per bucket, to ensure you don't under or over feed.	Weigh the FEL with and without the bucket full of palm kernel meal, or estimate using palm kernel meal's bulk density (kg/litre) and your bucket's volume.
	Stimulates high water intakes by cattle.	Always provide plenty of access to water.
	Ad-lib palm kernel meal/straw diet will not provide the daily nutrient requirements of springers or dry cows.	If palm kernel meal is offered to cattle separately, place it a fair walk away from water troughs and forage sources to help regulate their intakes and avoid excess competition.
	Prone to mould growth if allowed to get wet, increasing the risk of mycotoxins (fungal toxins).	Feed palm kernel meal and grain/concentrate 50:50 with forage sources to help ensure daily nutrient requirements are met for maintenance, growth and pregnancy.
	Potential chemical residue and aflatoxin risks.	Store under cover, ideally on a dry concrete floor. Can be stored in silo, but needs very steep cone. Bocce balls on top of the auger may help avoid bridging problems. Consider including a reputable mycotoxin binder product in feed.
		Limit daily consumption to 40% of dry matter intake. Purchase palm kernel meal with a vendor commodity declaration.

Cereal straw (barley, oat, triticale, wheat)	Keep in mind	Management tip
<ul style="list-style-type: none"> <li>&gt; A poor nutritional quality forage, but high effective fibre value.</li> <li>&gt; Its sole purpose in the diet is to help stimulate chewing and saliva production, and maintain a fibre mat in the rumen.</li> <li>&gt; Very low in energy and protein.</li> <li>&gt; If fed at substantial levels, it will reduce performance due to very low ME content and low fibre digestibility</li> </ul>	Not very palatable. Cattle may reject if other forage choices available.	Mix cereal straw with other higher quality feeds in a mixer wagon if possible.
	Conservation methods vary (variable DM, time of baling after grain harvest, storage), so products may be prone to mould growth, increasing the risk of mycotoxins (fungal toxins).	Check product before you buy, and as you feed out.
	Excess intakes by far-off dry cows and young stock may result in body condition loss/poor growth. Mycotoxins may also put pregnant cows at risk.	Not an ideal feed for far-off dry cows and young stock unless well managed. May be better to feed to milkers in small amounts, e.g. 2 kg/cow/day.
	Potential chemical residue risk	Limit daily consumption of cereal straw to 30% of dry matter intake. Purchase cereal straw with a vendor commodity declaration.