



**Dairy
Australia**

Your Levy at Work

Facts on alternative fibre sources

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.

Ruminal acidosis:

- ✓ **Do you really understand fibre?
Not sure? Ask your adviser.**

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

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 6 to 5.5. (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, 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).

NDF intake should ideally be about 35 to 40% of total daily dry matter intake, with 75% of the fibre sources in the diet having a fibre length greater than 1.5 cm.

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Alternative fibre sources which are widely available include almond hulls, palm kernel meal, and cereal straw (barley, oats, triticale, wheat and rice straws). 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.

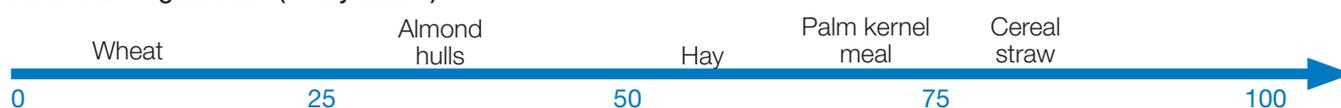
Metabolisable Energy (MJ ME / kg dry matter)



Crude Protein (% dry matter)



Neutral Detergent Fibre (% dry matter)



Effective fibre value (Low / Medium / High)



Almond hulls

- A good forage extender, with medium effective fibre value when fed whole.
- Reasonable energy source with very good palatability.
- Low in protein.
- Available whole and milled. Whole almond hulls have a higher effective fibre value but a lower bulk density

Keep in mind

Highly palatable. If offered ad-lib, cows may consume 6+ kg/cow/day.

Sugar level is > 20%

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.

Can be challenging to regulate daily feed intakes and avoid excess competition and wastage.

Ad-lib almond hulls will not provide the daily nutrient requirements of dry cows or young stock.

Prone to mould growth if allowed to get wet, increasing the risk of mycotoxins (fungal toxins).

Potential chemical residue risk.

Management tip

Limit daily consumption of almond hulls to 3–4 kg/cow/day. Always feed almond hulls with a palatable, good quality straw/hay.

Introduce gradually to cows' diets

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.

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.

Supplement with grain / concentrates, including protein supplements.

Store under cover, ideally on a dry concrete floor. Consider including a reputable mycotoxin binder product in feed.

Limit daily consumption to 30% of dry matter intake. Purchase almond hulls with a vendor commodity declaration.

Facts on alternative fibre sources

Palm kernel meal

- A forage extender, not a grain replacer.
- Medium digestibility, but low effective fibre level due to small particle size.
- Low in starch and sugars.
- Oil content: 8–10%.

Keep in mind

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.

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.

Stimulates high water intakes by cattle.

Ad-lib palm kernel meal /straw diet will not provide the daily nutrient requirements of springers or dry cows.

Prone to mould growth if allowed to get wet, increasing the risk of mycotoxins (fungal toxins).

Potential chemical residue and aflatoxin risks.

Management tip

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.

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.

Always provide plenty of access to water. 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.

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.

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 30% of dry matter intake. Purchase palm kernel meal with a vendor commodity declaration.

Cereal straw (barley, oat, triticale, wheat)

- A poor nutritional quality forage, but high effective fibre value.
- Its sole purpose in the diet is to help stimulate chewing and saliva production, and maintain a fibre mat in the rumen.
- Low in energy and protein.

Keep in mind

Not very palatable. Cattle may reject if other forage choices available.

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).

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.

Potential chemical residue risk

Management tip

Mix cereal straw with other higher quality feeds in a mixer wagon if possible.

Check product before you buy, and as you feed out.

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.

Limit daily consumption of cereal straw to 30% of dry matter intake. Purchase cereal straw with a vendor commodity declaration.

Rice straw

- A poor nutritional quality forage, but high effective fibre value.
- Its sole purpose in the diet is to help stimulate chewing and saliva production, and maintain a fibre mat in the rumen.
- Low in energy and protein.
- High in silica and low in lignin compared to other straws.
- Beware palatability and intake issues.

Keep in mind

Not very palatable. Cattle may reject if other forage choices available

Conservation methods vary (variable DM, time of baling after rice harvest, storage), so products may be prone to mould growth, increasing the risk of mycotoxins (fungal toxins).

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.

Prolonged feeding may result in urinary stones

Potential chemical residue risk

Management tip

Mix rice straw with other higher quality feeds in a mixer wagon if possible. If not, provide rice straw as the sole forage source, rather than giving animals a choice between rice straw and another straw or hay.

Check product before you buy, and as you feed out.

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.

Limit daily consumption of rice straw to 10% of dry matter intake.

Purchase rice straw with a vendor commodity declaration.

Expected nutrient values of alternative fibre sources

- Nutritional values of high fibre by-products are particularly variable.
- Get to know the variation in key nutrients for a range of feed types.
- Crunch the numbers before you buy using feed lab analysis results.

Simple rule of thumb:

1 kg Cereal straw +
1 kg Palm kernel meal + 1 kg Almond hulls
=
3 kgs cereal hay

Always double check that diets including alternative fibre sources provide animals with adequate:

- ✓ Effective fibre
- ✓ Energy
- ✓ Protein

The table below lists typical values for some alternative fibre sources (to give an indication of how variable the feeds can be. It is important to keep this in mind when planning your feeding). Ranges have been included in brackets.

Table 1. Nutrient values of some alternative fibre sources.

Feed	Dry Matter* (%)	Metab. Energy* (MJ/kg DM)	Crude Protein* (% DM)	NDF* (% DM)	Digestibility	Effective fibre value
Almond hulls (whole)	90 (88–92)	10 (8.5–10.5)	5 (4–6)	35 (30–45)	Medium	Medium
Almond hulls (milled)	90 (88–92)	10 (8.5–10.5)	5 (4–6)	35 (30–45)	Medium	Low
Barley straw	89 (74–93)	6.5 (2.2–8.5)	2.8 (0.2–28.8)	77 (55–87)	Low	High
Oat straw	89 (73–93)	6.2 (4.3–10)	2.8 (0.1–11.9)	73 (55–79)	Low	High
Palm kernel meal	94 (91–96)	11.1 (9.3–12.4)	15.7 (14.8–16.3)	65 (55–74)	Medium	Low
Rice straw	85 (52–94)	6.7 (5.3–8.9)	4.0 (1.9–5)	63 (54–69)	Low	High
Wheat straw	92 (65–96)	5.1 (3.8–9.3)	2.8 (0.2–8.8)	73 (54–86)	Low	High

* Nutrient values of feeds can be highly variable and there is no substitute for actual sampling and testing of the feed in question.

Considerations:

- **Dry Matter**
 - The proportion of the feed that is not water.
- **Metabolisable Energy**
 - Decide where each feed fits in with other feeds you are offering.
 - Determine how many megajoules (MJ) of ME per kilogram you need to achieve your target milk production and cow body condition.
- **Crude Protein**
 - Cow requirements for CP vary according to stage of lactation and range from 16–18% in early lactation, dropping to 11–12% during the dry period.
- **NDF**
 - The suggested dietary NDF level for a high-production milker diet is 30–35% of total DM.
 - A dietary NDF level less than 30% is high risk for ruminal acidosis.
- **Effective fibre value**
 - This refers to the ability of a feed to stimulate chewing activity and the production of saliva. Each feed is rated high, medium or low.