



Australian lupins

for dairy cattle

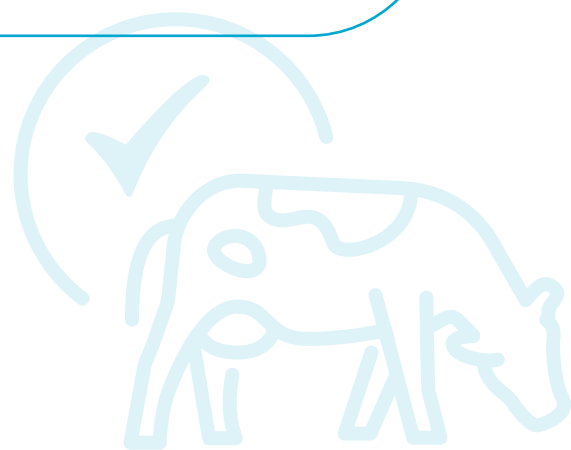
Australian lupins are a proven, reliable, high-quality feed grain. Australian lupins are two feeds in one: high in both protein and energy.



Key benefits of Australian lupins for dairy cattle

- ✓ Australian lupins can increase the energy and protein inputs of cows on low quality forages.
- ✓ Lupins are great as an alternative protein source for cows.
- ✓ They can be used as a safe, low starch alternative energy source for cows.

Most research studies comparing dairy cows fed with lupins versus grains have found that lupins tend to produce more milk fat and protein.



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Production and export

Australia produces about **730,000** million metric tonnes (mmt) of lupins per year (ABARES 5-year average, 2018–2019), which is **80–85%** of the world's lupins. About **80%** are grown in Western Australia.

About 30% are used within Australia, while about **70% are exported** to Asia, North Africa and the Middle East for animal feed.

About **40% of exported lupins are fed to dairy and beef cattle**, 40% to pigs and 20% to poultry, sheep and goats.

Australia has had a very active breeding program since the 1960s, which has led to the development of many varieties of *Lupinus angustifolius* (commonly called Australian sweet lupin) and *Lupinus albus* (commonly called Australian white lupin) to suit different soil types and climatic conditions.



Storage and processing

Lupins are easy to handle and store due to their low moisture level and robust seed coat which is impervious to insects.

For feeding lupins to cattle, only coarse rolling to reduce particle size to 2–4mm is required. Lupins require more energy than other grains to mill due to their harder seed coat. Heat treatment of lupins is not necessary.



Nutrition

Dairy cows require nutrients, not specific ingredients. Dairy cows are remarkably flexible animals, able to thrive on a wide variety of forages and feeds. Rather than specific feeds, dairy cows have daily requirements for nutrients, i.e. water, carbohydrates (sugars, starches, fibre), fats, protein, minerals and some vitamins.

The objective is to meet the nutrient needs of cows without excesses and within their intake limit, with good feed efficiency and optimal diet cost.



Australian lupins are an exceptional feed ingredient. Lupins are really two feeds in one, as they are high in both protein and energy.

The metabolisable energy value is higher than that of cereal grains and they are a very good source of rumen degradable protein (RDP) for synthesis of microbial protein.

Compared with other grains, lupins are low in starch and moderately high in NDF, so they don't depress fibre digestion or voluntary feed intake. Australian sweet lupins are about 6% oil, and Australian white lupins are about 10% oil. 75% of the oil comprises unsaturated fatty acids. Lupins are a good source of minerals, especially P, Mg and S and have a relatively low DCAD value.

A feature of Australian lupins is their very low levels of anti-nutritional factors, which therefore do not limit the daily feeding rate of lupins to dairy cattle.

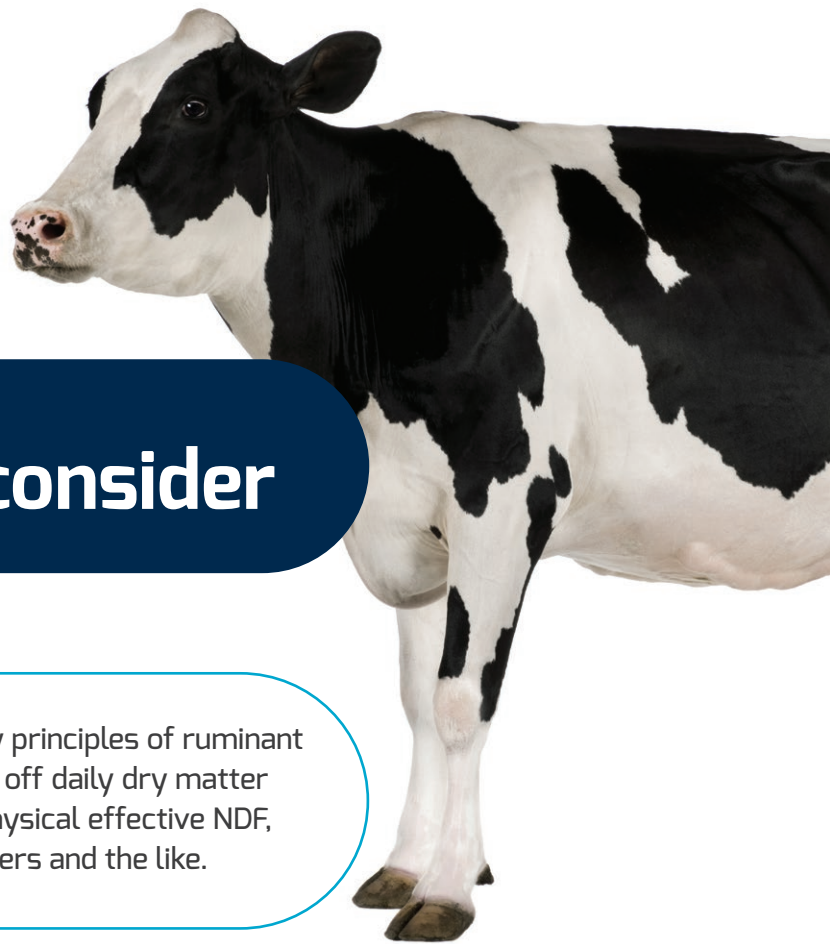




Opportunities to use lupins in Asian dairy cattle diets

- ✓ Use lupins as a safe, easy-to-use feed ingredient to increase the energy and protein inputs of cows and young stock fed diets based on low quality forages. By using lupins in diets based on low quality forages, the following can be achieved:
 - a. Increased metabolisable energy density of diet
 - b. Increased dietary protein supply
 - c. Synthesis of more microbial protein in the rumen
 - d. Increased daily milk yield / growth
 - e. Increased daily milk income minus feed cost through dilution of maintenance feed costs.
- ✓ Some or all of the soybean meal / other protein sources in a diet may be replaced with lupins. However, the bypass protein (UDP) characteristics of canola meal fit very well the rumen degradable (RDP) aspect of lupins. If the diet is well balanced, dietary protein supply should be maintained while the diet's metabolisable energy density is increased, thereby sustaining current milk production. The cost/benefit of this will depend on the relative costs of the currently used protein source relative to lupins.
- ✓ In circumstances in which cows are at moderate-to-high risk of ruminal acidosis due to herd factors, feed factors or feeding management factors, replacing some of the starch-dense energy sources in a diet such as corn or cassava/tapioca with lupins (which are low in starch but still high in energy) may be beneficial. This may also enable inputs of costly protein sources in the diet to be reduced.





Things to consider

When considering dairy cow diets, key principles of ruminant nutrition must be applied, referencing off daily dry matter intake and regulating levels of NDF, physical effective NDF, starch, sugars, protein, minerals, buffers and the like.

Table 1: Typical nutrient specifications of lupins vs. other dairy feed ingredients

| Feed | Crude protein (% DM) | Starch (% DM) | NDF (% DM) | Metabolisable Energy (MJ ME/kg DM) |
|---------------|----------------------|---------------|------------|------------------------------------|
| Lupins | 34.5 | 3.1 | 25.9 | 13.8 |
| Barley | 12.2 | 56.8 | 20.0 | 12.8 |
| Wheat | 12.9 | 66.9 | 13.1 | 13.3 |
| Corn | 9.3 | 72.5 | 10.7 | 13.5 |
| Dried tapioca | 3.0 | 73.0 | 11.8 | 12.3 |
| Soybean meal | 48.0 | 2.7 | 13.4 | 12.1 |



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AEGIC is an initiative of the Western Australian State Government and Australia's Grains Research and Development Corporation

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