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FEEDLOTS

High-energy feed alternatives for the feedlot industry

A range of high-energy feed alternatives is available which will allow feedlot operators to lower the cost of rations while maintaining feed quality.

Feedlot operators can use these products to reduce their reliance on feedgrains as the major contributor to the energy component of rations, particularly in times of drought when grain prices are high.

By using Table 1, which shows comparative energy values, producers can assess the available products as alternatives to grain on a cost per unit of energy basis.

Recent studies addressed and identified a likely increase in the real cost of high-energy feedstuffs. Feedgrains are currently the principal source of nutrient metabolisable energy (ME) for feedlot rations, and their variable availability and price is seen as a core problem affecting the long-term prosperity of the Australian feedlot industry. The cost of high-energy feedstuffs used by the feedlot industry will increasingly be determined by global feedgrain supply and demand interactions.

Research background

An extensive review of potential feedstuffs was made and a short list of crops, products and by-products was prepared for more detailed assessment.

Two criteria were used as the basis for this assessment; the feedstuff must have a ME equal to or greater than 10 MJ/kg, and the anticipated cost must be comparable with those energy sources currently used by the Australian feedlot industry (see Table 1).

The studies reviewed and collated past and current research and commercial experience, in the production and feeding of the identified products.

These studies examined the potential for existing crops, new purpose-grown crops, or the improved and expanded use of existing high-energy-dense by-products.

Key benefits

- Alternative high-energy feedstuffs allow lot feeders to maintain ration quality while reducing reliance on grain.
- During times of drought, alternative feeds can protect producers against escalating grain prices. This however, requires an ongoing commitment to use forward contracts to secure supply at a known fixed price.
- High-energy feed alternatives offer an opportunity to increase industry efficiency.

Suitable high energy alternatives

Three producer-funded studies examined the opportunities to expand the use of the following products as alternatives to grain:

- sugarcane by-products
- high ME silages
- alternative energy-dense feedstuffs

There appears to be no new product or by-product that would significantly protect the Australian feedlot industry against future feedstuff cost fluctuations. The studies identified several products that are currently under-used by the industry, and offer opportunities to increase industry efficiency and provide a potential buffer against future grain price increases.

These include:

- molasses
- maize silage
- grain and forage sorghum silages
- fats and oils

- whole cottonseed
- cassava
- commercial food wastes

Sugarcane by-products

Molasses is recognised as a valuable cost-effective and convenient source of metabolisable energy (11.0 MJ/kg DM) and minerals. Conventional ration inclusion rates are in the range of 3-8%.

Research and industry experience indicates that molasses can be beneficially incorporated in balanced production rations at rates much higher than that generally practised in Australia. When costed, on a cost per unit of metabolisable energy basis, a 15% inclusion rate is feasible and there are indications that rates of 25% or higher are possible and practical.

High-energy silage

Research has shown that a range of high-energy silages (ME > 9.5 MJ/kg DM) can sustain cattle liveweight gains in the range of 0.9–1.1 kg/day, and can be increased to 1.3kg/day with the addition of grain and protein supplements in the ration, with no adverse effects to carcase quality. Such high-energy silages include maize, subclover, grain sorghum, lucerne and oat/vetch silage.

Crop selection, stage of harvest and effective silage management are the three key factors that determine cattle growth rates per tonne of silage. Detailed information is available to producers for maize silage, with further research required to assist in the production of other high quality, high-energy varieties of silage suitable for the feedlot industry.

Fats and oils

Fats and oils are high-energy feedstuffs (35 MJ/kg DM) whose cost frequently makes them an attractive ration component as a source of ME. Their inclusion enhances average daily gains, increases feed use efficiency, and improves carcase characteristics. Other associated benefits that improve general overall operation efficiency means that their use in Australian feedlot rations can almost certainly be extended when competitively costed.

Fats and oils included in feedlot rations at 2% to 6% of ration DM have been shown to enhance ration quality and livestock performance. At inclusion rates above this, there is a decline in the marginal feeding value of supplemental fats and oils.

The optimal ration inclusion levels for maximum performance are influenced by a number of factors: total dietary fat intake; the interactions of fat with other ingredients; dietary nutrients, and/or environment. Further, the basic quality characteristics of commercially available fats and oils vary considerably.

It is possible that feedlot producers do not currently make full use of fats and oils because of an underestimation of their nutritional quality and comparative value, and an uncertainty as to maximum inclusion rates.

In addition to the nutrient energy they can contribute to feedlot rations, supplemental fats and oils may also assist efficiency through their impact on dust control, palatability, lubrication and formula density.

There is a storage management responsibility for the effective use of fats and oils as a nutrient source. It is important that antioxidants, of which there are a number commercially available, be used to safeguard fat quality.

As with any feedstuff, fats and oils may become contaminated. It is the responsibility of the supplier to certify the quality of the product to ensure that it is contaminant free.

A specific purpose infrastructure will be required to handle fat and oil feedstuffs delivered in bulk. This infrastructure should be robust and simple with prime consideration given to preserving quality. A range of design and construction considerations is available and the manufacture and installation of such equipment is within the capabilities of many light industrial manufacturing businesses throughout rural Australia.

To use fats and oils lot feeders need a reliable, quality source, the infrastructure to handle them in bulk, and a quality control program to prevent possible rancidity and contamination.

Whole cottonseed

Whole cottonseed (WCS) is a palatable high-energy feed (14.5 MJ/kg DM) with high protein levels (23% CP). It is widely available in eastern Australia at ME costs comparable to currently used ration components including cereal grains such as barley, wheat and sorghum.

The feedlot industry uses 80,000-100,000 tonnes of WCS annually. The constraints to broader use within the industry include the perception that it can affect carcase quality (hard fat), and that the maximum advisable ration inclusion rates are in the order of 8-12%. Research indicates there is potential to include WCS at levels up to 20%.

There is also the consideration that the product may be chemically contaminated. To date, extensive testing carried out by WCS suppliers has shown it to be free of chemical contaminants. Producers are encouraged to ensure that suppliers of any feedstuff, including WCS, guarantee that product is free of any contamination before purchase (a good way to do this is to use Commodity Vendor Declaration forms).

Table 1. Comparative energy values of commonly used feed grains and potential feed alternatives

Feedstuff	Metabolisable energy (MJ)/kg on DM basis	Dry matter %	Cost range ($/tonne as purchased) Low	Med	High	Cost range of ME ($/100MJ of ME Low	Med	High
Barley (grain)	13.0	88	100	150	200	0.87	1.31	1.75
Cassava (pellet)	14.2	88	160	200	240	1.28	1.60	1.92
Fats and oils	35.5	99	250	450	600	0.71	1.28	1.71
Maize (grain)	13.7	88	125	200	275	1.04	1.66	2.28
Maize (silage)	10.3	37	35	45	55	0.92	1.18	1.45
Molasses	11.0	77	60	90	120	0.71	1.07	1.43
Sorghum (grain)	12.0	88	100	150	200	0.95	1.42	1.89
Wheat (grain)	13.3	88	125	200	275	1.07	1.71	2.35
Whole cottonseed	14.5	92	120	160	200	0.89	1.19	1.50

Sample calculation for maize silage:
To determine the cost per MJ of ME of maize silage
Price as purchased = $45/tonne

Price per tonne of dry matter = $\frac{\$45/\text{tonne}}{0.37\text{tonneDM}}$

= $121.62/tDM or 12.16c/kgDM

Cost per MJ of ME = $\frac{\$121.62/\text{tDM}}{10.3\text{MJ/kg} \times 1000}$ or $\frac{12.16\text{c/kgDM}}{10.3\text{MJ/kg}}$

= $0.0118/MJ = 1.18c/MJ

Cost per 100MJ of ME = $1.18

Cassava

Cassava is a potentially useful source of ME (12.7 MJ/kg DM) in feedlot rations as a part ration component, able to replace up to 30% of DM in growing and finishing rations. The economics of cassava as a grain substitute depend upon the cost of additional protein. Cassava is low in protein (3.1% CP), which is something that needs to be taken into consideration when formulating rations.

A protocol for the import of cassava from Thailand has only recently been established. To date this has been of little consequence to the Australian feedlot industry, as there have been no imports. In the future, the South Pacific nations appear to offer better prospects for production.

Studies have shown there is potential to establish a commercial cassava production and processing industry in the Northern Territory.

Commercial food wastes

While there appears to be a large proportion of food wastes suitable for inclusion in cattle fattening rations, there is in reality no knowledge of what, where, when and how much is available, or of its nature, supply and consistency pattern.

The majority of these wastes are currently discarded at a cost. The exceptions are possibly brewers' grains used in dairy and minor cattle feedlot operations, cannery and vegetable processing wastes, and some confectionery wastes used in pig production units.

Potential exists to identify the available food industry wastes resources, which may support in part a strategically located and localised industry. The high moisture content of many of the processing wastes makes transport expensive.

The bottom line

A range of alternative energy sources is available to feedlot producers. These feedstuffs could reduce industry reliance on grain as the major energy source of feedlot rations, and are capable of contributing to increased efficiency in the feedlot industry.

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