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FEEDLOTS

Expanded use of molasses for intensive beef cattle feeding

Molasses production

Australia has an expanding sugarcane industry located principally in coastal Queensland, but also in northern NSW and northern Western Australia. The principal by-product of interest is molasses. Australian cane blackstrap molasses is used as a raw material in the fermentation (ethyl alcohol, rum, yeast, lysine and monosodium glutamate) and stock feed industries supplying the domestic and export markets.

Some 670,000 tonnes, or 56% of Australian molasses production, was exported in 1996 at prices less than those achieved selling into the domestic market. The greatest exported surplus came from Queensland, in particular from the northern, Herbert-Burdekin and central regions.

Cost of molasses compared with conventional feed grains

The use of molasses by the intensive cattle feeding industries depends on availability and relative cost compared with the alternative feedstuffs available.

Transport is a significant factor in determining the overall on-site molasses cost for much of the established feedlot industry. Molasses has the advantage of requiring very little further processing, as is the case for many of the competing feedstuffs.

Table 1 illustrates that molasses at $90/tonne in the ration, equates to (processed) barley at $122/tonne in the ration as a source of metabolisable energy (ME), and provides a cost advantage when barley exceeds $122/tonne or whole cottonseed (WCS) exceeds $143. Similarly, when molasses is costed at $120/tonne, it provides a cheaper source of ME than (processed) barley above $163/tonne or WCS above $190/tonne.

A full appreciation of the feedstuff nutrient profile and cost will determine the most cost effective inclusion rate in a well formulated ration, acknowledging the animal performance expected.

Key benefits

- Molasses is recognised as a valuable and convenient source of metabolisable energy (11 MJ/kg DM) and minerals for much of the Australian intensive cattle feeding industries.
- Molasses is attractive to most livestock promoting appetite by its flavour and smell, which can mask unpalatable feed elements. Its physical properties enable it to improve ration composition by minimising fines, dustiness and ingredient separation.
- Even when competitively costed, molasses has been under utilised with conventional inclusion rates in the range of 3-8%. Research has shown that when favourably costed, inclusion rates of 15-25% are feasible and practical.
- The use of surfactants will improve the efficiency of molasses handling, aiding producers to increase inclusion rates above current convention.

Table 1 : Breakeven feedstuff costs for ME when molasses costs $60, $90, $120 and $150 /tonne 'as fed'

Feedstuff	Metabolisable energy (MJ/kg DM)	Dry matter %	Breakeven feedstuff cost supplying ME at the same cost ($/tonne 'as is')			
Barley	13.0	88.0	82	122	163	204
Maize	13.7	88.0	86	129	172	215
Molasses	**11.0**	**76.5**	**60**	**90**	**120**	**150**
Sorghum	12.0	88.0	75	113	151	188
Wheat	13.3	88.0	83	125	167	209
Whole cottonseed	14.5	92.0	95	143	190	238

Molasses composition

Typically, Australian molasses is 76.5% DM, has an ME value of 11.0MJ/kg, crude protein of 5.0% and is high in some minerals. Sugars contribute approximately 65% of the solids of which sucrose accounts for some 70%.

Molasses is attractive to most livestock promoting appetite by its flavour and smell, which can mask unpalatable feed elements. In addition, its physical properties enable it to improve ration composition by minimising fines, dustiness and ingredient separation.

Molasses is a valuable and convenient feedstuff source of ME and potassium for much of the Australian intensive cattle feeding industries. It is also commonly the basis of commercial liquid supplements carrying micro components for balanced rations.

Inclusion rates

Molasses is recognised as a valuable source of metabolisable energy (ME) and minerals and conventional ration inclusion rates are in the range 3% to 8%. At these rates it is considered that molasses is generally under utilised.

Research and industry experience indicates that molasses can be beneficially incorporated at higher inclusion rates in balanced production rations.

When favourably costed, a 15% to 25% inclusion rate in balanced production rations has been shown to maintain average daily weight gains and feed use efficiency in feedlot cattle. It is therefore feasible and practical to increase inclusion rates above normal convention.

Higher inclusion rates of molasses into rations may assist significant sectors of the feedlot industry financially, aiding long-term prosperity, and possibly underpinning an expanded industry.

Surfacants

The principal reasons for the relatively low inclusion rates in the Australian industry, other than when cost considerations exist, are the handling and feed distribution challenges that molasses presents due to its physical characteristics. Molasses has a high viscosity and resistance to flow, which makes it difficult to pump or disperse in the feed.

Winter handling of molasses presents even greater challenges. Temperature has a dramatic effect on the viscosity, of molasses – for every 5°C drop in temperature the molasses doubles in viscosity. This is obviously a critical factor during early morning start-ups, and throughout the winter, when storing molasses in outside tanks.

An option to overcome the handling problems is the use of surfactants to reduce the viscosity of molasses. When added to molasses the surfactants act by reducing surface tension and interfacial tension, effectively reducing viscosity. This not only makes the molasses easier to pump, it also improves the penetration of the molasses into the feed for more uniform dispersion, distribution and mixing.

In industry trials, the use of a surfactant additive to molasses has been shown to have significant benefits.

The surfactant was added to the molasses in the tanker on arrival at the feedlot. The unloading process was sufficient to get the required mixing of the surfactant with the molasses. Benefits derived include:

- reduced load on the pump and faster unloading for the tanker operator
- reduced load and less problems with circuit breakers ‘dropping out’ on the molasses pump
- faster loading times for molasses into the mixer
- reduced load and less problems with shear pins breaking on the mixer
- reduced load on the tractor driving the mixer
- improved distribution of molasses through the feed mix with balling of ingredients virtually eliminated

Surfactant manufacturers claim that its use will also reduce molasses build up in augers and mixing equipment, therefore making cleaning of equipment easier.

There are a number of commercially available surfactants that can be used for this application. Molasses suppliers should be able to assist operators to identify and source the required product. Addition rates for two known products Easy-Flow® and KEM WET® WS, are 125-250mL per tonne of molasses. The surfactant should be mixed with a small quantity of water (1-4L per tonne of molasses) prior to addition to the molasses. The lower rates appear to be effective for most applications at a cost of $1.50 -$2.00 per tonne depending on the quantity of product purchased.

Surfactants may well offer feedlot operators another option for improving the handling of molasses during the cooler winter months.

The bottom line

Molasses is a high-energy feed alternative that is currently under utilised. By increasing inclusion rates, when favourably costed, it will allow feedlot operators to reduce their reliance on feed grains as the major contributor to the energy component of rations, thus lowering the cost of rations whilst maintaining feed quality.

Further information

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MEAT & LIVESTOCK AUSTRALIA

Level 1, 165 Walker Street
North Sydney NSW 2060
Ph: 02 9463 9333
Fax: 02 9463 9393
www.mla.com.au

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