CATTLE FEEDING—MOLASSES—UREA, PHOSPHORIC ACID

By J. F. KENNY
Mossman Central Mill Co. Ltd., Mossman

The usage of molasses for cattle feeding, particularly with additives such as urea and phosphoric acid (Alexander, 1966) is increasing at a very rapid rate in some areas and it seems appropriate to give some information on our own local experience at Mossman.

In making calculations the production figure has been shown as 420,000 tons per annum for Queensland mills; this is in addition to that used for fermentation molasses. The future of fermentation molasses is uncertain, with the increasing use of alcohol from petro-chemicals.

The Government Statistician has advised that as at 31st March 1969, the cattle population of Queensland was 7,668,000 head, so allowing a ration of 1 lb per beast per day, which is the recommended quantity, then 6.2 beasts will eat one ton of molasses in one year. This means that the cattle population in Queensland is capable of eating, on this ration, three times as much molasses as we produce, or alternatively, if we could feed this ration to one third of the cattle population in Queensland, there would be no need to export any of our molasses overseas.

Molasses

While molasses is an excellent source of carbohydrate, it has practically no protein content. It is used not only as a cattle feed in its own right but more particularly as a vehicle for conveying urea, phosphoric acid, trace elements and antibiotics to the beast (Alexander, 1966). Apart from the fact that molasses improves the appetite and energy of a beast it has some further advantages, especially on station properties, where experience has shown that, by providing molasses, mustering costs have been greatly reduced because it attracts cattle to a central molasses feeding post. In this way many hundreds of “scrubbers” have come out of the bush and joined the herd again in search of molasses.

Many attempts have been made in the past to solidify molasses but this can be done only at great cost, and has apparently not been found to be economically successful in any part of the world. We know also that molasses is being mixed with bagasse; however, the handling characteristics of straight molasses are so good that, from a cost point of view, it seems preferable to leave it in the liquid form.

Urea

The purpose of adding urea to molasses is to provide the beast with a source of nitrogen, so that the bacterial population in the rumen of the animal may remain high, and the ruminant be able to make excellent protein out of any old roughage. This process occurs only in ruminants (Morrison, 1959). However horses on station properties do lick molasses, as do wild pigs, but the evidence we have to date indicates that horses will not eat sufficient to incur toxicity.
The recommended dosage limit of urea per day for cattle is 3 oz per head (D.P.I. Leaflet 330, 1961) and it is therefore necessary to provide some means of limiting the intake to approximate this amount as nearly as possible. There are three generally accepted methods, the first being by the addition of a percentage of salt so that when the beast automatically limits its intake of salt it likewise limits the intake of urea. The second method is to lot-feed, which is not practical under most conditions in Australia, and the third method, as used by ourselves, is to use the drum feeder as shown in Figure 1. This method relies on the tongue fatigue of a beast, as it endeavour to turn the drum around.

We commenced by adding only six per cent of urea, as a safe percentage with the drum feeder. However the high cost of sending molasses some 400 miles away from our mill, by road transport over difficult roads, made us consider the possibility of increasing this percentage. We have settled now on 6, 10 or 20 per cent. Although practice varies to some extent, in general the advice we give is that the user may break down the six per cent mixture to a 1:1 mixture with water, the 10 per cent mixture to a 2:1 water mixture and the 20 per cent to a 3:1 water mixture.

The mixing is a very simple procedure in the small tanker carried by a station vehicle; for example, for a 1:1 mixture the distributing tank is half filled with molasses mixture, then it is filled with water and by the time the vehicle has reached the feeding station the mixing is complete. Water is normally pumped into the drum and some mixing also takes place during this process.

**Phosphoric Acid**

For many years the recommendation regarding phosphates was to use a Christmas Island phosphate dust, avoiding Nauru phosphates because of their high fluorine content. However with the production of
phosphoric acid in Queensland the use of this latter product became more economical, and in addition does not entail minor element problems. Phosphate deficiency is very widespread in Queensland cattle and causes faulty bone structure, and botulism through attempting to obtain phosphate supplies from infected old bones; it also limits general growth. Recent surveys have shown that an adequate supply of phosphate increases calving percentages. The phosphorus requirements for cattle (Donaldson and Mawson, 1961) vary from 10 grammes of phosphorus for weaners to 20 grammes for nursing cows.

When we began to add water to the molasses mix, fermentation became a real problem and we carried out quite a number of trials both in the laboratory and outside, using the phosphoric acid as an inhibitor. It was found that a 50° Brix molasses-urea mixture commenced to ferment after five days; however a similar mixture with six per cent phosphoric acid was found to be free of live yeasts in the same period and continued without any serious deterioration for many weeks.

It was found that some mixtures gelled after six months, which made handling more difficult, but they were still usable.

Other Additives

So far we have not worried about other additives but these can be numerous and include antibiotics covering a fair range of cattle diseases, trace elements such as copper, cobalt, selenium and salt, as well as vitamins (Alexander, 1966).

Handling of Mixtures at the Mill

So far we have been mixing the materials in what was originally a mud-molasses mixing tank; however a new mixing station is now being built. It includes a 3,500 gallon squat round tank with a stirring mechanism in it, and, although molasses will mix when cold, if warm molasses is available this is preferable. The urea is lifted to the tank by an auger and the phosphoric acid is pumped in by a specially lined pump. The lining should be acid and abrasive resistant. The 3,500 gallon tank is designed for the use of 20-ton tankers. For quick loading the outlet valve should not be less than six inches in diameter.

![Fig. 2—Arrangement for handling the mixture on a cattle property.](image-url)
Handling on the Cattle Property

While we sell some of the mixture in drums to small users and as trial lots, most of it is going away in large tankers usually of 14 to 20 tons capacity. Figure 2 shows diagrammatically the set-up on a station property.

The arrangement is not expensive and all handling is by gravity, with the road tanker running up onto a rise to discharge the mix direct into a rectangular tank, which is above the loading area of the small tanker. Discharge this way is very rapid, and does not require power or pumps. Some users are using trailers drawn by 4-wheel drive vehicles and with the tank on the trailer, others are putting the tank directly in a cradle on the body of the 4-wheel drive vehicle. These tanks are usually of a capacity of approximately 150 gallons. Using tanks in a cradle on the body of a truck gives sufficient height to allow direct discharge into the drum feeder at the feeding station.

It is important that care be taken in using urea in coastal lush areas because there have been some cases, when urea was used in the mixture, where cattle have eaten anything they have found including such plants as poison peach and other poisonous foliage. Generally on the coast, in our Mossman area, we use phosphoric acid but not urea in mixtures.

Conclusions

1. One-third of the cattle population of Queensland eating 1 lb of molasses per day would require all of the molasses produced in Queensland without any surplus for export or fermentation.
2. The provision of additives such as urea and phosphoric acid with the molasses is proving a great service to cattle men, and in the last 12 months the increase in requirements has been outstanding and is expected to double in the next 12 months.
3. The major factor in costs is transport and therefore all efforts should be made to minimize delays and to endeavour to use as high a concentration of additives as possible.
4. Cattle country is adjacent to every mill in Queensland.

Acknowledgment

I wish to thank the management and staff of Mossman Central Mill for their co-operation and permission to publish this paper.

REFERENCES