ACIDOSIS IN FEEDLOT CATTLE: PRACTICAL OBSERVATIONS

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SUMMARY

Acidosis in cattle is caused by excessive ingestion of feeds which are rich in readily available carbohydrates. Thus, factors which contribute to excessive ingestion of high energy diets are predisposing to acidosis. Many of the conditions which prevail in cattle feedlots contribute to variable feed intake by cattle and subsequently to acidosis.

A multitude of management factors are involved in successfully feeding large numbers of cattle under typical feedlot conditions. Management is most critical during the following periods: 1) starting cattle on feed, 2) graduating cattle to higher concentrate rations, 3) during changes in weather, 4) during long periods on a finishing diet, and 5) when cattle are extremely hungry due to feeding problems or errors.

There appear to be some breed differences in the development of acidosis.

(Key Words: Acidosis, Cattle, Feedlot Cattle.)

INTRODUCTION

In recent years it has become a routine practice in feedlots to rapidly increase the concentrate portion of the diet being fed to cattle in order to have them on a high-concentrate or even an all-concentrate diet as soon as possible. In general, the economics involved have usually favored this practice when finishing cattle for market. This system of feeding cattle has resulted in the frequent occurrence of a problem commonly called “acidosis”. Acidosis refers to the syndrome in ruminants which is brought about by excessive ingestion of feeds which are rich in readily available carbohydrates, such as starch and sugar.

Since it had been shown that there is a buildup of D-lactic acid in the rumen and blood of animals during acidosis, Dunlop and Hammond (1965) suggested the name D-lactic acidosis for this malady. It is commonly shortened to acidosis. Some other common names for the same condition are: overeating, acute impaction, grain engorgement, founder, and overloading. Of course, some of these common names do not accurately reflect the problem of acidosis.

Signs of Acidosis. Following the ingestion of an excessive amount of readily available carbohydrate feeds, some of the outward signs of acidosis are anorexia, diarrhea, mucous in feces, dehydration, incoordination and, sometimes, death.

When acidosis develops in the animal the following physiological changes have been observed:

1. Increased level of lactic acid in the rumen and blood.
2. Reduction in rumen pH and blood pH.
3. Increased osmotic pressure in the rumen.
4. Destruction of gram negative bacteria and proliferation of gram positive bacteria in the rumen.
5. Reduction in rumen protozoal count.
6. Rumenitis and sloughing of rumen epithelium.
7. Rumen stasis.
8. Reduced urine pH.

Experimental Acidosis. Acidosis has been produced experimentally by manually engorging rumen-fistulated animals with grain or by voluntary engorgement of “starved” animals.

Uhart and Carroll (1967) were able to produce acidosis in steers by immediately changing them from a ration of alfalfa hay to one containing 90% grain. Steers reportedly went “off-feed” within 2 to 3 days. Other changes they noted included a marked increase in rumen lactic acid level and decreases in rumen pH and urine pH.
Changes to the rumen epithelium were reported by Ahrens (1967). These changes included the loss of keratin and vacuolation of cytoplasm, rupture of cells, microvesicle formation, and neutrophilic infiltration. The association of lactic acidosis with rumenitis was shown by the fact that epithelial changes were observed upon the addition of isotonic lactic acid solution to the rumen.

Predisposing Feedlot Factors. Our firm is retained by cattle feeding operations in just about all areas of the U.S. and several foreign countries. As a result, we have the opportunity to frequently observe cattle being fed a wide variety of feeds and under a wide range of conditions. In this presentation it is my purpose to point out some of the observations which have been made by people in the cattle feeding industry with regard to lactic acidosis in cattle. Naturally, these observations or associations have not been made under controlled conditions, but, on the other hand, have been seen often enough to justify pointing out as practical considerations.

Cattle feeders are in business with the objective of making a profit and as a result usually "push" cattle to gain at their maximum potential rate. This usually involves getting cattle onto full-feed of a high-concentrate diet very rapidly. In addition, the commercial cattle feeding business is such that volume is helpful in order to be efficient and competitive and, therefore, individual feedlots often contain 10,000 to 40,000 head of cattle, and some even more.

Economics also favor processing the grain portion of the ration by one of several methods available which will increase the starch availability. These processes, e.g., steam flaking, exploding, etc., usually result in increased availability of starch (Trei et al., 1970) and thus increase its rate of degradation in the rumen. Thus, the stage is set for acidosis.

There are many barriers that can interfere with the proper feeding of large numbers of cattle concentrated in pens within a feedlot. Naturally, the larger the feedlot the more people and machinery necessary to conduct the job of feeding. It takes several capable people with good supervision to operate the feed trucks and do a good job of feeding the cattle in a large feedlot. Frequently, one feeder might be responsible for feeding 8,000 to 10,000 head of cattle.

Cattle may be penned in pens of various sizes and shapes. Pen capacities commonly range from 50 to 300 head. Some feedlots also have larger pens that may hold up to 1,000 head. Often pens of the same size may not contain the same number of cattle. Larger pens will often have cattle added periodically for a week or more before the number remains relatively constant for the major portion of the feeding period. Likewise, cattle are often sold and shipped out in a similar manner so that the cattle in a pen are shipped at intervals, and the pen count will be reduced several times before the pen is finally empty. All of these factors increase the difficulty of properly feeding cattle.

Perhaps more serious are the personnel problems which seem to be common in the feedlot industry. Relatively rapid turnover of cowboys and feed truck drives is commonly experienced and makes it very difficult to keep trained people on these important jobs. The damage resulting to a pen of cattle that is fed by error a finishing diet when they should have been fed a starting diet can be difficult to overcome. Newly arrived cattle can sometimes develop acidosis from eating a hot ration left in the bunk from previous cattle. Contributing to this type of problem are the days off and holidays that are allowed. It is common practice for "skelton crews" to operate on Sundays and holidays and cattle are often fed heavily the day before so that only a small amount of feeding will be necessary by this crew. Usually, there are more pens out of feed on Monday morning than any other day of the week.

Critical Periods. Numerous factors are predisposing to animals consuming an excessive quantity of high-energy feeds. From a practical standpoint in the feedlot, acidosis problems are usually encountered: 1) when starting cattle on feed, 2) when graduating cattle to higher concentrate rations, 3) while feeding cattle on a high-energy finishing diet for long periods, 4) after weather changes, and 5) after periods in which some problem, such as a mill breakdown, has resulted in the cattle being out of feed and hungry. Management practices are very critical during these periods.

Starting Cattle in the Feedlot. In order to start cattle on feed without causing rumen damage due to acidosis, it is helpful to know the previous history or background of the cattle. That is, the usual problem with new cattle that haven't received mixed feed before is one of getting them to eat enough feed rather
than eating too much feed. On the other hand, cattle that have previously had mixed feed or that have eaten out of feed bunks usually start on feed rapidly and will sometimes eat too heavily and bring about digestive disturbances even when fed relatively low-concentrate rations. Thus, for starting hungry cattle that are known to have been fed mixed feed previously it is important that they be fed a low-concentrate, high-roughage level for several days before they are graduated to higher levels of concentrate.

A program often suggested for starting cattle on feed involves feeding a starting diet made up of 40 to 60% roughage, containing approximately 40 Mcal NEg, plus feeding long hay ad libitum for the first few days. Once cattle are filled and are eating the diet, the hay is discontinued. The starting diet is then continued until most of the cattle appear to be eating to near capacity before a ration change is made.

Changing Diets. When raising the caloric density of the diet, or when increasing the concentrate portion of the diet, it is important to make increases gradually. A safe rule is to increase the level of net energy about 10% at a time. For example, if cattle are started on a diet containing 40 Mcal NEg per 45.5 kg, they are then moved up to 44 Mcal and then on to a 48 Mcal diet, et cetera.

Another precaution is never to make a diet change when cattle are hungry due to lack of feed. In addition, if cattle fed a finishing diet have been out of feed for a sufficient time to become extremely hungry, they should be fed one feeding of a lower energy diet in order to fill them before resuming the finishing diet. The objective is to feed cattle a low energy diet at a time when they are likely to eat a large amount. Then return them to the regular diet at the next feeding, when they are less hungry.

Feeding High-Energy Diets. In general, high-energy diets are synonymous with high concentrate diets which in turn contain high levels of grain and low levels of roughage. It is difficult to feed a diet containing a high level of grain and low roughage without eventually experiencing some acidosis, founder or bloat. Naturally, the longer cattle are fed this type of diet the greater the chance for acidosis to occur.

If some of the grain in a high-energy diet is replaced isocalorically with roughage and fat there is usually less acidosis experienced. In addition replacement of grain with other high energy ingredients, such as molasses dried beet pulp, will tend to reduce acidosis problems.

While high-grain diets are predisposing to acidosis, some grains are worse than others. Wheat is generally considered the worst grain as far as development of acidosis is concerned. Milo and corn diets are also highly conducive to the occurrence of acidosis, while barley is observed to be the least predisposing to acidosis.

Weather and Seasonal Factors. The highest incidence of acidosis and similar problems is observed in feedlots during the warmer seasons and is especially high during the summer months. The reason for this is unknown, but is probably related to fluctuations in feed intake.

Livestock and other animals are known to be sensitive to changes in barometric pressure and have been observed to reflect weather changes with marked changes in their eating and other behavioral patterns. Acidosis in feedlot cattle is often associated with weather changes and the resultant disruption of feed consumption patterns. In addition, when rain is involved and feed becomes wet and possibly even moldy, feed intake usually drops. When fresh dry feed is offered again there can be a marked increase in feed intake which results in some cattle developing acidosis.

Breed Differences. Some breed differences appear to exist regarding the development of acidosis. Brahman cattle are observed in feedlots to develop founder more frequently than cattle of the English beef breeds. Research results in Florida (Hentges, 1970) confirmed this observation and revealed that following engorgement with a high concentrate diet blood lactate levels increased more rapidly in Brahmans than in Herefords or Angus. Holsteins appear to be more resistant to acidosis, and founder is uncommon in Holsteins that are finished for beef.

LITERATURE CITED


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