Managing Acidosis in Feedlot Cattle

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Introduction

The cattle feeding business in the United States has evolved to an intensively managed system using grains as the primary source of energy. Grain feeding is common throughout the cattle feeding regions of the United States because the cost per unit of energy is often cheaper with grain compared with other feedstuffs available for beef cattle. In addition, grains are easier to store, handle, process, mix and deliver in rations compared with bulky, lower energy forage type feedstuffs. Consumers also prefer the taste and flavor of grain-fed beef compared with other alternatives.

Acidosis is one of the most important nutritional disorders in feedlot cattle today and is caused by a rapid production and absorption of organic acids and endotoxins from the rumen when cattle over consume grain (starch) or sugar in a short period of time. Acidosis is an array of stresses and is not confined to a single symptom such as ruminal pH. The previous definition is a collective term for several associated facets and includes the effects of organic acid production, ruminal pH, salivary flow, rate of passage, starch fermentation, feed intake and others. Ruminal acidosis often leads to metabolic acidosis in feedlot cattle. Acidosis is difficult to measure and diagnose in feedlot cattle. Even in metabolism studies designed to measure the effects of acidosis, it is difficult to research because as ruminal pH declines, cattle adjust by decreasing feed intake and altering their consumption patterns to help diminish the deleterious effects of acidosis.

Acidosis is not one disorder, but a continuum of degrees. Effects of acidosis can be slight as a .25 lb/day decrease in feed intake, or as severe as the death of an animal. Brent[2] attributed founder, polioencephalomalcia (PEM) and ruminitis to acidosis in feedlot cattle. Sudden death syndrome, reduced feed intake, reduced absorption, liver abscesses, grain bloat and clostridial infections have been added to the list of acidosis related problems. Acidosis is not the only nutritional disorder that can occur in beef cattle fed high-grain diets, but may be a contributing factor to many of the diagnosed nutritional disorders that are currently observed in feedlot cattle. Many of the management recommendations that feedlot nutritionists make on a daily basis are to reduce the incidence and severity of acidosis. Because acidosis is not simply one disorder, we generally separate acidosis into acute or subacute situations. The actual ruminal pH where subacute acidosis becomes acute is difficult to define and probably not very important. Additionally, the actual ruminal pH where an individual animal experiences subacute acidosis may be equally less important because of animal-to-animal variation.

Acute acidosis

Feedyard managers, nutritionists, and veterinarians readily recognize the effects of acute acidosis. Many cattle diagnosed as sudden death syndrome may have died from acute acidosis. Diagnosis of acute acidosis is often difficult due to the time lag between death and necropsy. Following death, ruminal microbes continue to ferment feed resulting in very low ruminal pH and sloughing of the ruminal lining prior to necropsy. Other cattle that appear to wandering aimlessly in the pen or cannot stand or appear to have brain damage may be suffering from acute acidosis. A thiamine injection often results in a quick recovery for these cattle. During acute acidosis, thiamine production by ruminal microbes may be impaired or the thiamine produced is destroyed. Field observations suggest the relationship between thiamine metabolism and acidosis occurs during transition rations, and is not normally observed after cattle are consuming diets containing 80% or more grain.

Acute acidosis can have other effects that are less obvious. During acute acidosis, ruminal pH drops to levels below 5 to 5.3, and in most cases rumen pH remains at this level for several hours. During this time, the lining of the rumen wall becomes damaged, and the intestinal linings are severely inflamed. Destruction of the rumen wall (rumen papille) results in reduced absorption of nutrients, resulting in reduced gains and efficiencies. These cattle are often those that are considered "poor doers". Additionally, foundered cattle are an indication acute acidosis occurred 40 to 60 days previously in the feeding period.

Subacute acidosis

Subacute acidosis occurs more frequently in the feeding period, but is much more difficult to recognize. The major response observed from animals experiencing subacute acidosis is reduced feed intake and erratic feed intake patterns. This reduction in feed intake translates into reduced daily gain and feed efficiency. Optimum feed intake is very important because daily gain, and subsequently feed efficiency, are based on the amount of energy consumed in excess of maintenance needs. Identifying all cases of subacute acidosis in feedlot cattle is difficult. Cattle are normally fed in large groups, pens sizes of 100 head or more. Identification of individuals who are experiencing subacute acidosis, as measured by reduced feed intake, is almost impossible because other animals will often compensate for a small percentage of the animals which have reduced their feed intake. Only when pen closeouts are evaluated and feed intake patterns and/or total feed intake are available can the effects of subacute acidosis be realized. Daily observation of feed intake fluctuation of cattle that are "on-feed" is essential in managing subacute acidosis. Some animal signs typically associated with subacute acidosis are panting, excessive salivation, kicking at the belly, eating dirt, and diarrhea.

Individual animal data collected at Nebraska suggests that most animals will experience some degree of acidosis while in the feedlot.[6] This actually may be an important step in the transition from forage based to grain based diets. Additionally, any management or environmental changes that take place while cattle are on-feed can cause acidosis. The goal of all those involved at the feedlot must be to minimize the degree of acidosis that occurs. We have learned from numerous metabolism and performance studies at Nebraska that we cannot prevent some degree of acidosis during the feeding period, but rather we must manage to prevent cattle from developing the more severe acidosis challenges.

Acidosis management

Because more severe cases of acidosis are readily recognized by feedyard personnel, nutritionists and veterinarians, the main focus of this paper will concentrate on less severe (subacute) acidosis management. Additionally, the effects of subacute or less severe cases of acidosis often result in the greatest economic losses because the effects are not easily noticed in our daily observation of feedlot cattle. Subacute acidosis is influenced by many nutritional and management factors. The type and amount of grain, grain processing, feed additives, roughage level and type and bunk management strategy are a few of those nutritional and management factors. Figure 1 depicts the relative rate of digestion in the rumen for grains commonly fed in the United States. Wheat and barley have the fastest rate of ruminal starch digestion, whereas, whole corn and dry-rolled grain sorghum are generally slowest. This figure is only a relative ranking. Variation within grains due to genetics, environment and degree of processing can greatly influence the relative rate of ruminal starch digestion. In general, the grains or grain types having the fastest rate of ruminal starch digestion have the greatest extent of ruminal digestion. Conversely, the digestion of starch often occurs further down the digestive tract (small and large intestine) for those grains having a slower rate of ruminal starch digestion. Therefore, the rate, site, extent and amount of feed grains that are digested in the rumen contribute to ruminal acidosis. Changes in rate, extent and site of starch digestion should have an impact on acidosis.

Stock *et al*[24] fed finishing steers mixtures of fast (ground high-moisture corn) and slow (dry-rolled grain sorghum) fermenting grains to test the hypothesis of altering rate and extent of ruminal starch digestion. The effect of grain mixture could be detected in animal performance as early as 28 days on feed (Table 1). The inclusion of 25% dry-rolled sorghum appeared to diminish the deleterious effects of acidosis when a highly fermentable grain source like ground high-moisture corn was fed as the major component of the diet. These associative effects on daily gain and feed efficiency are common throughout the literature with regard to feeding grain mixtures (Table 2).

Fast ↑	**Wheat**
	Barley
	High moisture corn (bunker storage; ground or rolled)
	Steam flaked corn, HMC (stored whole)
	Steam flaked grain sorghum
Slow ↓	**Dry rolled corn**
	Dry whole corn
	Dry rolled grain sorghum

Figure 1. Grains ranked by rate of ruminal starch digestion.

Feed grains are normally processed to some degree in finishing diets. More intensive processing methods, like steam-flaking, have a profound effect on the rate and extent of ruminal starch digestion. Numerous experiments have demonstrated the influence of flake density on animal performance; however, few have offered acidosis metabolism studies conducted concurrently. Reinhardt *et al*[20] evaluated three flake densities of grain sorghum (22, 25, or 28 lb/bushel) in finishing steers (Table 3). Steers fed sorghum grain flaked to 28 lb/bushel consumed more feed, gained faster and had similar feed efficiencies compared with more intensively processed sorghum grain. Additionally, feeding grain sorghum processed to a 28 lb flake resulted in reduced susceptibility to acidosis compared with the more in-

Table 1. Effect of feeding mixtures of high-moisture corn and dry-rolled grain sorghum on performance of finishing cattle – three trial summary.

	High-moisture corn:dry rolled grain sorghum			
Item	100:0	75:25	50:50	0:100
First 28 days on feed				
Daily DM intake[a], lb/d	20.68	20.13	20.57	20.72
Daily gain, lb	3.23	3.37	3.32	3.10
Feed efficiency[a]	6.33	5.88	6.10	6.49
Entire feeding period				
Daily DM intake[ab], lb/d	20.50	20.48	20.97	22.15
Daily gain[c], lb	2.90	2.99	2.99	2.84
Feed efficiency[ab]	7.04	6.71	6.99	7.75

[a]Quadratic effect (P < .05).
[b]Linear effect (P < .05).
[c]Quadratic effect (P < .10).
Adapted from Stock *et al* [23, 24]

Table 2. Summary of published grain mixture trials with finishing cattle.

	Percent improvement above expected performance		
Source	Daily gain	Feed efficiency	Grain sources[a]
Stock *et al*[23]	-4.0	-6.3	HMC:DWC
Stock *et al*[23]	8.8	17.9	HMC:DWC
Stock *et al*[23]	3.5	1.5	HMC:DRC
Stock *et al*[24]	4.0	7.4	HMC:DRGS
Axe *et al*[1]	4.7	4.7	DRW:HMS
Kreikemeier *et al*[16]	9.2	6.7	DRW:DRC
Stock *et al*	4.6	6.0	DRW:DRC
Brandt *et al*	5.1	0	SRW:SFGS
Lee *et al*[18]	5.7	2.2	SFC:DRW
Kreikemeier *et al*	6.0	2.8	SFC:SFGS
Bock *et al*[3]	4.4	5.2	HMC:SFW

[a]Grain sources: HMC= high-moisture corn; DWC= dry whole corn; DRW= dry-rolled wheat; DRC= dry-rolled corn; DRGS= dry-rolled grain sorghum; HMS= high-moisture grain sorghum; SRW= steam-rolled wheat; SFGS= steam-flaked grain sorghum; SFC= steam-flaked corn; SFW= steam-flaked wheat.

tensively processed grain (Table 3). Over processing of feed grains may reduce the potential benefit to more intensive and expensive processing techniques due to erratic and low feed intake and subsequently reduced performance. Most recommendations today are to

Table 3. Effect of flake density on performance, ruminal metabolism and mill production efficiency in feedlot cattle fed steam-flaked grain sorghum

	Grain sorghum flake density, lb/bushel		
Item	22	25	28
Feedlot performance			
Daily DM intake[a], lb	18.43	18.85	19.00
Daily gain[a], lb	3.00	3.09	3.22
Feed efficiency[b]	6.13	6.10	5.92
Ruminal metabolism			
pH hours below 5.5[a]	20.8	25.2	18.2
pH hours below 5.0[a]	9.6	7.3	3.9
Feed mill efficiency			
Production rate[a], t/hr	1.05	1.38	1.75
Energy costs[a], $/t	4.17	3.16	2.49
Starch Gelatinization[a], %	85.7	74.3	58.7

[a]Linear effect of flake density (P < .05).
[b]Linear trend of flake density (P < .15).
Adapted from Reinhardt *et al*[20]

steam-flake corn grain at 28 to 30 lb/bushel. Considering all aspects of an intensive grain processing method, like steam-flaking, over processing can reduce profits from animal performance losses and unnecessary processing costs.

Traditionally roughages added to finishing diets were used as a means of controlling acidosis and adjusting cattle to high-grain diets. Numerous management challenges exists with roughages in feedyards (i.e. shrink, mixing problems, inventory control, reduced feeding efficiency, etc.). Most feedlots would like to eliminate most or all the roughage from the diet for these reasons as well as performance. If acidosis is not a problem, adding roughage to the diet increases feed intake, does not affect daily gain, reduces feed efficiency, increases cost of gain and increases the amount of manure to be removed from the pen. More often than not, some roughage is needed in the diet to help control acidosis. An example of the roughage dilemma is summarized in Table 4. Stock *et al*[25] fed dry-rolled corn and wheat based finishing diets containing 0 or 7.5% roughage as alfalfa hay (5% of diet DM) and corn silage (5% of diet DM; corn silage=50% grain, DM basis). The dry-rolled corn-based diet could be fed without roughage to improve feed efficiency and cost of gain. Conversely, including 7.5% roughage in the wheat-based diet improved daily gain, feed efficiency and cost of gain. This is typical of subacute acidosis where feed intake is re-

Table 4. Effect of grain type and roughage level on performance and cost of gain in finishing cattle.

	Dry-rolled corn		Dry-rolled wheat	
Item	0% roughage	7.5% roughage	0% roughage	7.5% roughage
Daily DM intake, lb				
Complete diet	22.88	26.25	21.21	22.46
Concentrate portion[a]	21.56	23.50	20.04	20.13
Daily gain, lb	4.00	4.20	3.43	3.76
Feed efficiency	5.71	6.22	6.22	6.01
Cost of gain[b], $/cwt	41.10	43.15	45.50	43.16

[a]Includes dry matter contributed from grain, molasses, dry supplement and corn silage (multiplied by .5).
[b]Ration cost = $5.00/cwt; yardage, interest, health costs = $.50/day.

duced, subsequently reducing daily gain. The trend is to continue to feed lower roughage diets due to the difficulties of managing roughage sources at the feedyard and in the ration. However, controlled feeding experiments (Table 5) continue to support the use of 6 to 10% roughage (DM basis) across grain sources of whole corn,[19] high-moisture corn and dry-rolled grain sorghum,[26] dry-rolled corn[27] and steam-flaked corn.[28] Milton *et al*[19] calculated cost of gain and profit (loss) when 0, 4 of 8% alfalfa was fed in whole corn-based diets. The addition of alfalfa reduced feed efficiency and increased the cost of gain. However, because of more weight sold from the 8% roughage treatment, net returns were greater. Therefore, it is important to remember that reducing cost of gain by removing roughage from the diet does not always translate into increased profitability. This data provides a good example of the effects of acidosis on profitability. When acidosis reduces feed intake, as would have been the case when whole corn was fed without alfalfa hay, daily gain will decrease even though feed efficiency may remain the same. Other considerations such as ionophore level and the use of byproducts deserve attention in determining the appropriate roughage level needed to facilitate the management of acidosis.

Monensin is commonly fed to finishing cattle for improvements in feed efficiency. Recent experiments have also demonstrated positive effects of monensin on feeding behavior and ruminal fermentation patterns of cattle fed high-grain diets.[5,10] In these two studies, feeding monensin increased the number of meals consumed each day and reduced average meal size, but did reduce total feed intake (Table 6). Ruminal pH variance and ruminal pH area below 5.6 (indicator of subacute acidosis) were reduced in steers fed monensin compared with diets containing no monensin (Table 6).

Numerous byproducts are available for incorporation into finishing diets for feedlot cattle. Byproducts can normally be purchased cheaper than corn or other feed grains, and thus, attractive for cattle feeders to use. However, keep in mind the importance of consistency in controlling acidosis in feedlot cattle. The use of wet corn gluten feed and wet distillers grains from the corn milling industry have been extensively researched at the University of Nebraska, but many others are available to feeders. Typically, byproducts are generated as a result of removing starch from the native grain during the milling process (i.e. wheat midds, gluten feed, distillers grains, etc). This appears to be the key to the success of byproducts in controlling acidosis.

Table 7 summarizes feedlot feeding trials evaluating the use of wet corn gluten feed and wet distillers grains from experiments conducted at the University of Nebraska between 1992 and 1999.[10,12,13,15,17,21,22] The largest percentage of these trials has been conducted with wet corn gluten feed allowing for a range in response to be evaluated. When wet corn gluten feed replaced corn grain in these feeding trials, performance remained similar to the corn control diets or was improved. Replacing corn grain with wet corn gluten feed in finishing diets normally increases dry matter intake by approximately 1 lb/d (range; 0 to 1.2 lb/d), increases daily gain by about 6% (range; 0 to .4 lb/d) and improves feed efficiency approximately 3% (range; 0 to .3 lb of feed/lb of gain) compared with dry-rolled corn control diets. Improvements in daily gain and feed efficiency tend to be larger for wet distillers grains compared with wet corn gluten feed due to the higher oil (fat) concentration of wet distillers grains. Based on animal performance, the net energy for gain (NEg) value for wet corn gluten feed is 0 (similar) to 115% greater than corn grain, whereas the NEg value of wet distillers grains is 115 to 130% greater than corn grain.

These byproducts contain little or no starch, and greater concentrations of protein and minerals than corn grain. In the case of wet distillers grains, the oil content ranges from 10 to 15%. Based on their chemical composition these byproducts are commonly considered highly digestible fiber sources. The improvements in

Table 5. Effect of dietary roughage level on performance of finishing cattle fed various grain sources.

	Roughage level (alfalfa hay)			
Reference/Grain Source	0	4	8	
Milton et al[19] / Whole corn				
Dry matter intake, lb/d	18.6	19.6	20.5	
Daily gain, lb	3.12	3.13	2.24	
Feed efficiency	6.06	6.33	6.37	
Cost of gain, $/lb	.449	.464	.460	
Profit(loss), $/hd	4.28	(5.60)	20.60	
	Roughage level (50:50; alfalfa hay:corn silage)			
Stock et al [25,26] High-moisture corn and dry-rolled grain sorghum	0	3	6	9
Dry matter intake, lb/d	22.7	24.3	25.0	25.3
Daily gain, lb	3.53	3.65	3.68	3.48
Feed efficiency	6.39	6.84	6.76	7.24
	Roughage level (alfalfa hay)			
Turgeon et al [27] Dry-rolled corn	5	10	15	
Dry matter intake, lb/d	16.4	17.0	17.4	
Daily gain, lb	2.82	2.95	2.87	
Feed efficiency	5.88	5.82	6.14	
	Roughage level (cottonseed hulls)			
Xiong et al [28] Steam-flaked corn	9	18		
Dry matter intake, lb/d	19.6	21.7		
Daily gain, lb	3.32	3.42		
Feed efficiency	5.89	6.32		

feedlot performance observed when these byproducts replace corn grain demonstrates the deleterious effects of acidosis. Additionally, the range in performance improvements observed with wet corn gluten feed suggests that not all byproducts are the same.

Experiments conducted by Dalke *et al*[9] have demonstrated similar improvements in feed intake and daily gain when wheat midds replaced corn grain in finishing diets; however, these improvements were smaller than those reported with wet corn gluten and wet distillers grains diets. Wheat midds can vary in the amount of residual starch following milling. Ranges commonly reported are 5 to 25%. In one report,[9] the wheat midds contained approximately 23% finely processed starch.

There are numerous factors that can be used to help manage acidosis in feedlot cattle. However, regardless of the techniques available, management of acidosis begins with daily bunk management. The number of philosophies on bunk management probably equals the number of nutritionists. It is impossible to conclude that one system is superior to another across all feedyards and management situations. However, we have learned from experience and research that consistency is one common factor needed in successful bunk management. Experiments recently conducted by Cooper *et al*[7] have demonstrated this point (Table 8). In two finishing trials, steers were allowed *ad libitum* access to feed using a typical bunk management strategy or subjected to an imposed feed intake variation of 4 pounds/day from day 35 until the conclusion of a 140-day feeding period. This was accomplished by first decreasing the feed offered by 2 lb/head from each pen's average dry matter intake on day 36. Then, on day 37, the amount of feed offered was increased by 4 lb/head,

Table 6. Effect monensin on feeding behavior and ruminal metabolism of steers fed corn-based finishing diets.

Item	No monensin	Monensin
Cooper,		
Daily[5] DM intake, lb	28.4	28.0
Number of meals/day	8.8	9.3
Average meal size, lb	3.75	3.31
Average ruminal pH[a]	5.59	5.74
Ruminal pH area below 5.6[ab]	214	96
Fanning et al 1999		
Daily DM intake, lb	27.9	27.2
Number of meals/day	5.9	6.5
Average meal size[a], lb	7.4	5.0
Average ruminal pH	5.69	5.73
Ruminal pH variance[a]	.161	.124
Ruminal pH area below 5.6[b]	104	106

[a]Means differ (P < .10).
[b]Area= magnitude of ruminal pH below 5.6 by minute.

Table 7. Improvement in feedlot performance above corn control diets when wet corn gluten and wet distillers grains replace corn grain.

Improvement[a], %	Wet corn gluten feed	Wet distillers grains
Dry matter intake	.03 – 5.4	1.8
Daily gain	.4 – 11.4	8.0
Feed efficiency	.3 – 5.1	11.5
Byproduct Net Energy Value (NEg)		
NEg[b], Mcal/cwt	70 – 80	80 – 90
Increase over corn control	0 – 15	15 – 30

[a]Improvement in performance relative to corn-based control diets.
[b]NEg= Net energy for gain calculated from feed efficiency data for controlled experiments.

followed by a 4 lb/head decrease on day 38, then a 4 lb/head increase on day 39, and so forth. In order to ensure that these cattle were offered feed *ad libitum* throughout the trial, a 1 lb/head adjustment factor was used. If feed remained in the bunk on the morning following a day when a low level of feed was offered, the feed offered was only increased by 3 lb/head. Conversely, if no feed remained in the bunk following a day when the high level of feed was offered, the feed was only decreased by 3 lb/head. Figure 2 represents the daily feed offered throughout this experiment. There were no differences in performance between steers fed using the routine bunk management strategy or the bunk management strategy imposing feed intake variation (Table 8). This does not mean that bunk management is not important, but rather the opposite. The imposed variation was consistent throughout the feeding period, suggesting that steers on this treatment adjusted their feed intake patterns to accommodate the method of feeding.

Table 8. Effect of imposed intake variation on performance of steers fed ad libitum.

	Feeding system	
Item	Ad libitum[a]	Imposed variation[b]
Finishing trial 1		
Daily DM intake[c], lb	23.81	24.47
Daily gain, lb	3.77	3.86
Feed efficiency	6.29	6.29
Finishing trial 2		
Daily DM intake, lb	24.69	24.47
Daily gain, lb	4.08	3.97
Feed efficiency	6.06	6.13

[a]Ad libitum feed offered with no imposed intake variation.
[b]Daily intake variation of 4 lb/day from day 35 through slaughter.
[c]Means differ (P < .05).
Adapted from Cooper *et al*[7]

Environmental factors play a major role in how we manage acidosis. Unfortunately we have little control over environmental challenges such as mud, heat, cold stress, storm fronts, etc. As an example, mud and heat reduce feed intake and alter feed intake patterns. Cattle tend to consume fewer and larger meals daily. Obviously if acidosis is related to over consumption of grain, the methods with which cattle are fed during these environmental challenges may often need to concentrate on acidosis management.

Bloat

Many people separate bloat from acidosis in feedlot cattle. This may be appropriate in a few cases, but not all. The cause of feedlot bloat is not well understood. Bloat can often be associated with acidosis and the over consumption of grain during a short period of time. When rumen motility decreases as a result of acidosis, accumulation of gas can occur. As rapid turnover of bacteria occurs during more acute phases of acidosis, gas is trapped in "slime" produced by the bacteria, resulting in a frothy bloat. Management techniques used to control bloat in feedlot cattle are very similar to those used to control acidosis. Therefore, this author would

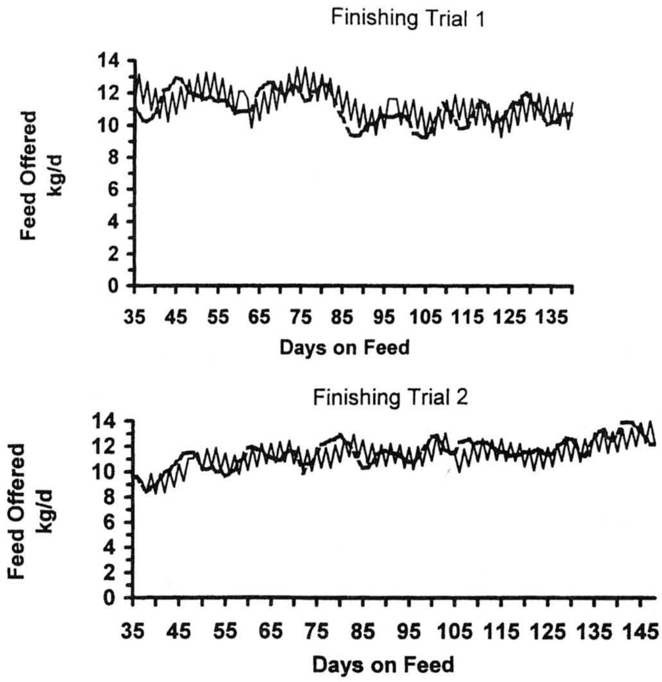

Figure 2. Daily feed offered by treatment in finishing trials 1 and 2 (Adapted from Cooper *et al*[7]).

argue that many bloat cases observed in feedlot cattle are a secondary disorder to acidosis or part of the acidosis syndrome.

Feedlots utilize several management techniques to manage or prevent bloat. Roughage quality is important to help prevent bloat. Many feedlots use alfalfa hay as their roughage source. Finely processed alfalfa is much less effective in controlling bloat compared with more coarsely processed product (4 inch chop). The particle length of the alfalfa is even more important as the particle size of the grain decreases (i.e. fine ground high-moisture corn). Many feedlots will elect to use byproducts like soybean hulls to replace a portion of the alfalfa hay in the diet. Routinely, the incidence of bloat increases when this substitution is made. Soybean hulls, as an example, have an average particle size much smaller than processed alfalfa hay.

The following are some recommendations that may help reduce the incidence and severity of bloat in feedlot cattle having problems. Increasing the dietary hay concentration to 15% of the diet dry matter increases the average particle size of the diet and also reduces the energy density (grain content) of the diet. Feeding a portion of the corn as whole corn rather than rolled or steam-flaked helps to reduce the rate of starch fermentation in the rumen. Replacing high-quality alfalfa hay with another non-legume hay source often results in the average particle size of the roughage increasing. Another common practice to prevent grain bloat is the use of ionophores, like monensin. Coe *et al*[4] reduced bloat scores in Holstein steers fed a highly fermentable diet with the incorporation of monensin. Additionally, as the dietary concentration of monensin increased, the incidence and severity of bloat decreased.

Solutions and Summary

There is not one simple solution to managing acidosis, but rather a continuum of management aspects must be considered; all factors that influence the incidence and severity of acidosis interact. Often treatment of acute acidosis is not possible because of animal death or enough damage has occurred to the digestive system of the animal that the effects are irreversible. Most cattle will recover from subacute acidosis without any medical treatment. However, it remains unknown if the effect of multiple or continual challenge of subacute acidosis following recovery from the previous challenge are additive in the reduction in animal performance. Obviously, during each incidence of subacute acidosis and reduced feed intake we would anticipate a reduction in performance.

Acidosis is the most common nutritional disorder that affects feedlot cattle. Total control of acidosis is difficult because of the complex nature of ruminal and metabolic events that occur and because acidosis is not one specific disorder, but rather a continuum of disorders. There is a fine line between maximal animal performance and acidosis, making this particular nutritional disorder an even larger challenge in feedlot cattle. The most critical aspect of controlling acidosis is the consistency of the feeding program. Diligent bunk management, ration mixing, grain processing, feed delivery and the use of non-starch highly digestible fiber-based byproducts and proven feed additives can reduce much of the risk for acidosis.

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