PROCEEDINGS 1966 CORNELL NUTRITION
CONFERENCE FOR FEED MANUFACTURERS

Proceedings

1989 CORNELL NUTRITION CONFERENCE for Feed Manufacturers

October 24—26, 1989
Syracuse Marriott
East Syracuse, N.Y.

Departments of
ANIMAL SCIENCE AND POULTRY AND AVIAN SCIENCES
of the
NEW YORK STATE COLLEGE OF
AGRICULTURE AND LIFE SCIENCES
(A Statutory College of the State University of New York)

CORNELL UNIVERSITY, ITHACA, N.Y.

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A report of research of the Cornell University Agricultural Experiment Station
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TUESDAY, OCTOBER 24, 1989

7:00- 9:00 p.m. Registration

WEDNESDAY, OCTOBER 25, 1989

8:00 a.m. Registration

MORNING SESSION - D. G. Fox, Presiding

8:25- 8:30 a.m. Welcome.....D. G. Fox

8:30- 9:00 a.m. Some thoughts on the animal rights issue.....R. G. Warner

9:00- 9:40 a.m. Acidosis: A continual problem in cattle fed high grain diets.....R. Britton

9:430-10:00 a.m. Ruminal ionophores: Manipulating fermentation and control of acidosis.....H. J. Strobel

10:00-10:20 a.m. BREAK

10:20-10:40 a.m. What is tricarballylic acid.....J. B. Russell

10:40-11:00 a.m. Monovalent minerals in the nutrition of salmonid fishes.....R. E. Austic

11:00-11:40 a.m. Mycotoxins and how to live with them.....P. B. Hamilton

12:00- 1:20 p.m. BUFFET LUNCHEON

AFTERNOON SESSION - D. E. Bauman, Presiding

1:20- 2:00 p.m. Effects of selenium and vitamins E and C on glutathione and glutathione S-transferase in the chick.....G. F. Combs, Jr.

2:00- 2:40 p.m. Use of body reserves and fat metabolism in early lactation.....A. W. Bell

2:40- 3:20 p.m. Protein metabolism relationships with body reserves.....J. C. MacRae

3:20- 3:40 p.m. BREAK

3:40- 4:20 p.m. Interrelationships between energy balance and postpartum reproduction....W. R. Butler

4:20- 5:00 p.m. Managing body condition in dairy cows .....J. D. Ferguson

5:00- 5:15 p.m. Summary.....D. E. Bauman

5:45- 6:45 p.m. RECEPTION

6:45- 8:00 p.m. DINNER

8:00-10:00 p.m. EVENING SESSION

The animal husbandman's obligation in light of the animal rights movement.
In charge: R. G. Warner

Speaker and Discussion Leader - Anne Banville
Public Relations and Media Consultant
Washington, D.C.

HURSDAY, OCTOBER 26, 1989

MORNING SESSION - C. C. McCormick, Presiding

8:30- 8:50 a.m. Effect of Revalor, a new cattle implant, on the performance and carcass quality of Holstein and beef breed steers.D. G. Fox

8:50- 9:10 a.m. Relationship between amino acid intake and lean tissue accretion in swine receiving somatotropin.....R. D. Boyd

9:10- 9:30 a.m. Acid-base balance and egg shell quality: The influence of sodium aluminosilicate and Oyster Shell.....K. Keshavarz

9:30- 9:50 a.m. A rational approach to selenium supplementation in cattle....R. J. Van Saun

9:50- 10:30 a.m. Yeast in dairy cattle feeding programs .....L. E. Chase

0:50-11:10 a.m. On the digestibiltiy of bound N in distillers grains: A reanalysis.....P. J. Van Soest

1:10-11:30 a.m. Studies on the threonine requirement of broiler chicks.....R. E. Austic

1:30-11:50 a.m. Digestibility of various sources of fat by horses.....H. F. Hintz

CONFERENCE STAFF

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B. F. Chabot.....Director of Research
R. A. Plane.....Director, Experiment Station, Geneva
G. J. Conneman.....Director of Instruction
L. A. Noble.....Director of Extension
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J. B. Russell.....Animal Science
H. J. Strobel.....Animal Science
R. J. Van Saun.....Animal Science
P. J. Van Soest.....Animal Science
R. G. Warner.....Animal Science

GUEST SPEAKERS

A. Banville.....Washington, DC
R. A. Britton.....University of Nebraska
P. B. Hamilton.....North Carolina State University
J. C. MacRae.....Rowett Research Institute, Scotland
J. E. Pettigrew.....University of Minnesota

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SOME THOUGHTS ON THE ANIMALS RIGHTS ISSUE

R. G. Warner
Department of Animal Science
Cornell University

The term to husband means to cultivate, to till, to manage with frugality, to use to good purpose. Synonyms include cultivate, manage, economize, conserve, save. In short, a good husbandman is a good and purposeful caretaker of whatever is his/her lot, be it animal, plant or water.

This presentation will be divided into two parts: 1. an exploration of the interface between humans and food-producing animals, and 2. veal production, an example of good animal husbandry.

HUMANS AND FOOD-PRODUCING ANIMALS

In my judgement several basic premises exist that govern our thinking about our relationship with food-producing animals.

Premise No. 1. Mankind has the right to manage its environment judiciously for its own betterment. The key word in this phrase is judicious. It is a fact that all plants and animals operate by this premise. If you don't believe it, thrust your finger into a hornets' nest and note who is in charge of that environment, or try to take the feed away from your neighbor's St. Bernard and check his mood or investigate a bear with a pair of cubs and see how uncomfortable she will make it for you to remain. Even the old oak tree casts its shade which suppresses the undergrowth, thus conserving nutrients and moisture for its own growth.

Premise No. 2. Humans are omnivorous, that is they consume both animals and plants for food. Mankind has always been a hunter and a gatherer, killing animals and gathering plants for food. In ancient times, those living in northern climates relied entirely on animals, for example the reindeer, for winter sustenance. Our dentition readily reveals our omnivorous nature, molars for grinding fibrous material and canines and incisors for grasping and tearing animal food. An examination of the teeth of a dog, a carnivore (animal eater) shows only teeth for grasping animal tissue. On the other hand, the sheep, an obligate herbivore (plant eater) has molars for grinding fibrous plant material, but no canine teeth. It has incisors on the lower jaw with a hard palate above in order to snip off growing plants. There is thus no a priori reason why human beings should be only carnivorous or only herbivorous. Historically we are both, or omnivorous.

Premise No. 3. Domestication of wild animals has led to a rich variety of animals useful for our needs. Selection of species, and individuals within species, has been occurring for 12,000 years. Each new selection has resulted in animals more capable of living within the confines mankind has developed. It is no accident that we have domesticated dogs, cats, swine, sheep, cattle, poultry and horses. They lend themselves to a working relationship with humans, and they have in fact have inadvertently benefitted by the relationship. On the other hand, it is difficult to imagine domesticating the bald eagle or the coyote or the timber

wolf or the rattlesnake. Their strong tendencies for the wild state minimize any reasonable chance for a meaningful human-animal interaction.

The results of domestication have been astounding. The Chihuahua makes a good lap dog but a poor guard dog for a junk yard; a Doberman on the other hand is an excellent guard dog but a poor lap dog. Cattle that produced 2 lb of milk per day years ago now yield 120 lb. This process of domestication has also resulted in animals which live productively in an environment dramatically different from the wild state - in fact so different that it would be cruel to force domestic animals to survive the wild.

A personal example will clarify. As a college student working on an angus beef farm, my first job was to move groups of 5 or 6 young females from a pen of 150 to a small corral, and then drive them down a chute to be examined by a veterinarian for tuberculosis. This process proceeded effectively until only three of the 150 were left. They were the wild ones which had always slipped by me. When I confronted them, one put down her head and charged. I leaped over the fence to prevent being mauled. That female would not be saved for breeding; she resisted even mild confinement and contributed little to herd tranquility. Similar selections have occurred over time, which gives us species and strains of species that perform maximally under rather strict confinement systems.

Premise No. 4. Acclimatization - animals do it well. All animals (including us) are creatures of habit but will rapidly adjust to a new environment. Grandmas are familiar with the cuddly response of a 2-month-old grandchild. They go back home for 6 months and then return to find their 8-month-old grandchild terror-stricken by the "stranger". However, with kindness and patience, their grandchild quickly returns to the accepting, cuddly state.

Farm animals are no different. Introduce a new animal to a group and an adjustment time is required. Calves used to being fed individually need care and persuasion to find the water and feed when assembled as groups. A new caretaker can disrupt the sensitivities of laying hens but they quickly adjust to the stranger.

Animals can adjust to change. Those that don't are doomed not to reproduce their kind and are "selected out".

Premise No. 5. The quality of animal care is measurable. Given a specific situation, how do I know that, that food-producing animal(s) is the product of good animal husbandry and receiving good animal care?

I have two ways, ask my neighbor or ask the animal. If you ask your neighbor and he/she has had experience with the species in question, he/she can give you a valuable report just by examining the animal. If your neighbor has had no animal experience, the response is likely to be governed by an anthropomorphic attitude. "If I were that animal, would I like to be managed in that fashion?" Such an approach is invalid and can lead to an emotional response, often totally unrelated to reality.

If we ask the animal, what questions do we pose? Examples include: How well are they producing, (rate of gain, pigs weaned, pounds of milk, number of eggs etc.)? What is the mortality? What is the incidence of disease? Can you detect any gross behavioral problems? These are measurable entities and undue stress can dramatically modify these values when compared to normal or maximal values. Examples of stress include: having an animal become chilled; removing one critical nutrient from the diet; having the water supply defective.

Premise No. 6. Rearing animals in confinement has its precedents, its problems and its opportunities. My grandmother went to a one-room schoolhouse, all 12 grades, 8 students and a teacher who had just graduated from high school. As the sophistication in education improved and populations expanded, consolidation of our educational system has occurred and the quality of teaching has improved. But - and it is a big but - educational scientists have learned that there is a class size of about 25 to 28 students per teacher above which learning deteriorates. The same is true with animals. Make confinement too severe and production declines. There are, however, opportunities in both the classroom and the animal house, for example, more efficient use of resources (sand tables, microscopes, feed-handling equipment) better trained personnel (teachers, caretakers). Confining children or animals is not necessarily an impediment to progress.

Premise No. 7. Current animal husbandry practices did not evolve by accident. They have been generated by significant inputs from agricultural colleges in all 50 states, federal research stations throughout the country, industrial research laboratories, world-wide research stations and an extension service that effectively disseminates new information to the farm population. Last but by no means least, our innovative and progressive farmers have utilized this information, discarded that which didn't work on their farm and tried new ideas of their own with the result that we have the most efficient agriculture in the world. Today 2 to 3 farmers produce enough to feed 100 persons, whereas it took 30 several decades ago. We pay only 12% of our disposable income for food today, in 1929 it was 22%.

To achieve these efficient production levels, have animals been exploited? Stressed, abused animals do not produce well and will not return a profit. The farmer has to be a careful animal husbandman or his business will fail. Thus it is in his/her best interest to be a proponent of good animal care.

Profit is not a four-letter word. All at this conference are here because someone made a profit, somewhere. There is nothing inherently wrong with innovation, modernization and consolidation to make a profit.

Premise No. 8. Can we improve? Of course. Not all animal producers do it well, but not all lawyers or reporters or professors are excellent either. Nothing is ever perfect. Change is the direct result of trying to improve. Forty years ago the animal behavioral sciences were rudimentary. Today they are beginning to flourish. Tomorrow, data will no doubt be available to suggest ways to modify animal husbandry. Today unless there is ample evidence that new technology is a step forward, there is no

justification to abolish current practices.

SPECIAL-FED VEAL PRODUCTION - AN EXAMPLE OF GOOD ANIMAL HUSBANDRY

The veal industry today is made up of about 1200-1500 family farmers from coast to coast. It is often a business in which the husband, his wife and available children cooperate in managing the calves. It is estimated that about one million calves are reared yearly resulting in a billion-dollar industry nationwide. It produces a wholesome food and utilizes both "unwanted" bulls and "surplus" milk products. The demand of the veal industry for calves also improves the value of the male calves thus benefitting all of the dairy industry.

Historical - Milk-fed veal is not a modern invention. In all probability, the "fatted calf" of biblical times was a calf nursing its dam and consuming only milk. Before about 1960 in the U.S., veal was the result of calves being suckled by a cow, consuming all they could eat and being sold at about 200 lbs of live weight. They had pink meat. They were pink because cow's milk is naturally deficient in iron and the calves full-fed on milk had lower than usual hemoglobin levels. With the increased availability of high-quality milk by-products it became possible to manufacture milk replacers which could be fed in place of whole milk. The calf could then be marketed at 350-400 lb. The term "special-fed" has been applied to calves receiving milk replacers. They are not truly "milk-fed" but the replacers are largely of milk origin.

Since most people are unfamiliar with veal production, the following step-by-step outline will help describe the system.

1. A dairy cow must give birth to a calf in order to produce milk (like all mammals).

2. On the average 50% of the calves will be females (heifers) and 50% males (bulls)

3. The heifers can:
   a. Be raised, be bred, and two years later will calve and enter the herd as a milking cow or
   b. Be slaughtered when less than 3 weeks of age as a bob-calf and sold as veal for food.

4. The bulls can be:
   a. Slaughtered as bob-veal like the heifers; (3b above).
   b. Raised on milk or milk replacer for 4 to 6 weeks, fed on forage and grain and slaughtered as beef at about 1200 lb live weight or about 1 to 1 1/2 years of age.
   c. Raised as a special-fed veal calf for 16 weeks and sold as veal.

5. The practice of separating the calf from the cow at 1 to 3 days of age has existed for many decades. It has the advantage of:
   a. Permitting more of the cow's milk to be sold.
   b. Removing the calf from the cow barn to a special barn or stall where it can be fed and watched as an individual.

6. Male, 3 to 7 day old calves are collected from a number of local dairy farms by a cattle buyer and transported to a

nearby auction barn where they are sold.

7. About one third of these calves will be big enough and vigorous enough to be desirable for the special-fed veal buyer who buys them and trucks them to a veal producer.

8. The veal barn is equipped with special stalls in rows and will hold from 25 to 250 calves. The barn is environmentally controlled to provide adequate ventilation and temperature control.

9. The stalls are at a minimum 22" wide by 64" long. They are made of oak and have slotted sides to permit some calf contact and good ventilation. They have wooden slotted floors or expanded metal covered with plastic to permit excreta to fall through to a concrete slab which is flushed regularly. The calf is tethered to the feeding end by an adjustable chain. It permits the calf to stand and lie in a normal position, to reach around and groom itself. It cannot turn around completely, which prevents the excreta from contaminating the feeding area. Calves have reasonable contact with their neighbors and see other calves across the aisle.

10. Individual stalls make observing and treating health problems easier. Calves having come from many farms and having been to an auction, have been exposed to many disease viruses and bacteria. Their immunity level is high on arrival at the barn (if they received a timely feeding of good quality colostrum at the time of birth). It drops down gradually until their own immune system can begin to function effectively usually at about 6 to 8 weeks. Thus the period 1 to 6 to 8 weeks is critical for the calf's health. Individual attention, judicious use of FDA - approved antibiotics and careful adjustment of the amount of feed are important for keeping the calf healthy and growing.

11. The calves are fed a milk replacer reconstituted with warm water which contains all the 40 nutrients that the calf needs. The milk replacer ingredients are by-product feeds such as dried skimmilk, dried whey, whey protein concentrate, fats, such as lard, tallow and coconut oil, and vitamins and minerals. They are fed as much as they can consume without being overfed.

12. They are fed no hay or grain because: (a) if they get as much milk replacer as they want, they will eat very little hay or grain; (b) gains are more rapid and efficient with milk replacer alone; (c) carcasses will be red at slaughter which brings a lower price. This latter fact leads us to discuss the iron in the diet.

13. The gourmet (largely restaurant) and ethnic market which consumes special-fed veal <u>demands</u> a pink meat. This is a historical tradition and a demand which the special-fed veal industry is filling. A veal producer cannot make a profit if his carcasses are red.

14. Iron is the crux of the pink vs. red carcass discussion. Iron is a part of the red pigment hemoglobin found in the red blood cells which carry oxygen from the lungs to the tissues.

Myoglobin is a red pigment of muscle which performs a similar function and gives the red color to meat. The veal producer in order to meet the consumer demand for a pink meat (low myoglobin) and a healthy calf (adequate hemoglobin) must be very careful about the dietary iron levels used. If the hemoglobin is too low (anemic calves) the calf will not eat or grow well. The feeder obviously does not <u>want</u> anemic calves. Today feeders carefully monitor the blood hemoglobin by periodic blood sampling in order to maintain a level which will maintain a healthy calf and not produce a red carcass (about 7-8 gm hemoglobin per 100 ml of blood). They provide additional iron to the calf as needed.

15. Calf barns are well lighted to allow careful observation of each calf by the feeders. Lights may be dimmed to conserve energy at night.

16. The calf is removed from the barn at about 16 weeks, at a weight of 350 to 400 lb and trucked to the slaughterhouse.

17. No antibiotics are fed after specified times before slaughter to permit tissues to become free of any residues at slaughter.

18. The carcasses are inspected by inspectors from the USDA, one a veterinarian who examines for evidence of any disease in the carcass. Another monitors the carcasses for evidence of any residues, taking samples for laboratory analysis as indicated. Rabbis kill and inspect carcasses destined for the Kosher trade.

19. Producers whose carcasses show illegal residues are subject to punitive action.

20. Veal is a safe food. The U.S. has the safest food supply in the world. There are few countries in the world where you can travel the highways and byways, eating any food and drinking the water in any establishment without fear of illness. Veal is a part of that food supply.

21. Many carcasses in some regions are shipped with the hide on in order to prevent drying. Others may be shipped with the hide off and wrapped in plastic. At slaughter houses or markets they are cut into wholesale and retail cuts. All shipping is via refrigerated trucks to preserve quality.

22. Do the calves receive quality animal care? Yes!! How do we measure that? We ask the calf! Performance, health, behavior.

    a. <u>Performance</u> - Calves gain at a rate of 2.5 lb per day which is as rapid as they are genetically capable. Even though hemoglobin is controlled by limiting iron intake, growth is at the maximum.
    b. <u>Health</u> - Mortality is often less than 5% which is equal to or better than on most dairy farms. They are not disease-free, but by treating the calves as individuals the diseases are quickly controlled.

    c. <u>Behavior</u> - Calves remain bright-eyed throughout the feeding period. They are eager to eat. They spend about 70% of their time lying down. If one gets loose it takes

a run, kicks up its heels and very often jumps back into a stall, its own empty one or one already occupied. The stall is its security blanket.

23. Other management options open to the veal producer:
    a. Produce red veal?
        1. If the consumer demanded it, it could be done tomorrow. Without the consumer demand there is little incentive or in fact profit.
    b. Group housing with a mechanical nursing machine?
        1. Individual attention to health needs is difficult.
        2. Vices such as navel-, ear- and tail-sucking are problems. Urine-drinking also develops.
        3. Big calves prevent smaller calves from eating their share, resulting in a non-uniform group. The smaller ones (really badly stressed because of inadequate feed) must be kept longer.

24. Current research is underway to examine other housing techniques. In some areas red veal is being tested in the market place. This is all a plus.

VEAL INDUSTRY ACTIVITIES

In the last couple of years the veal industry has developed programs to educate their producers and the public about the veal industry. The American Veal Association and the American Veterinary Medical Association have published guidelines for the care of veal calves. The Veal Committee of the Beef Industry Council of the National Livestock and Meat Board has published a position paper "Modern Veal Production: An Industry Perspective" which describes and gives the scientific basic for current veal production practices. They also have videos entitled "Modern Veal Production" and "Managing Perceptions: A Proactive Stance for the Veal Industry" which help to explain the issues of veal production. A consumer bulletin "The Truth about Veal" has also been released.

Currently the American Veal Association together with the Food Safety Inspection Service (FSIS) and the United States Department of Agriculture (USDA) have embarked on a self-regulating Quality Assurance Program to guarantee the safety of veal meat in the market place.

Further information can be obtained from:
Veal Committee of the Beef Industry Council
National Livestock and Meat Board
444 N. Michigan Ave.
Chicago, IL 60611

or

American Veal Assn.
#1 Naperville Plaza Suite 241
Naperville, IL 60563

SUMMARY

Animal Husbandry has a good story to tell. The challenge is to provide the true story to the public who are not familiar with animal agriculture.

ACIDOSIS: A CONTINUAL PROBLEM IN CATTLE FED HIGH GRAIN DIETS

R. Britton and R. Stock
Animal Science Department
University of Nebraska

INTRODUCTION

The cattle feedlot industry in the United States evolved to be an intensive management system using grains as the primary source of energy. Feeding grains as the energy source came about primarily because of the economics of greater energy density in the grains as well as ease of storage, handling and mixing of diets. As with all feedstuffs consumed by ruminants, these grains are subject to microbial fermentation in the rumino-reticulum part of the stomach complex. The microbial fermentation of the starches contained in those grains can proceed too rapidly causing the rumen to become acidotic. The severity of the acidosis ranges from mild to life threatening.

A recent definition of acidosis is: an array of biochemical and physiological stresses caused by rapid production and absorption of ruminal organic acids and endotoxins from excessive ruminal fermentation of carbohydrates (1). This definition encompasses many problems that are related to low ruminal pH, but is not necessarily classical acidosis. The term organic acid rather than just lactic acid production was chosen because the problem of acidosis is a result of overproduction of organic acids produced in the rumen and not just lactic acid and certainly not just the D isomer of lactic acid.

Consideration of associated feedlot problems related to acidosis suggest these economic losses from acidosis are large. Brent (2) detailed founder, polioencephalomalacia and ruminitis as problems related to acidosis. Recently, Britton and Stock (1) added sudden death syndrome, reduced feed intake, malabsorption, liver abscesses, and clostridial infections to this list. There are probably other disorders that are related that we have not included or are unaware of at this time.

ACUTE ACIDOSIS

Acidosis is not one disease, but rather a continuum of degrees of ruminal acidity. Acidosis has been simplistically characterized into acute and subacute based on overt clinical symptoms. The actual ruminal pH where subacute becomes acute is difficult to determine and probably not very important. In acute acidosis, the animal may be sick to the point of death or may have impaired some physiological functions, like absorption, which can reduce performance for a period of time. Acute acidosis can be minimized with proper management.

Acute acidosis has been reviewed (3,4,5,6) and the classical aspects will not be dealt with in this article. However, many of these reviews use the term D(-)lactic acidosis to characterize the heart of the disturbance because it accumulated in ruminal fluid. D(-)lactic acid was also thought to be a particularly difficult acid for the animal to metabolize (7,8). Ruminal epithelial metabolism of D(-)lactate was reported to be slow (9). Prins et al. (10) found significant rates of both L and D-lactate oxidation

in ruminal epithelial tissue slices, but the D isomer was metabolized at about one-third the rate of the L isomer.

Giesecke and Stangassinger (11) infused U^{14}-C D(-)lactate intravenously in sheep and goats and found that oxidation and gluconeogenesis accounted for 50 to 60% of the total plasma D(-)lactate removal. Similar studies in heifers (12) indicated that only a small amount (3%) of radioactivity was excreted in 48 hours of urine collection after intravenous infusion of U-^{14}C-D(-)lactate. Most of the dose (over 70 %) was collected as expired $^{14}CO_2$ or isolated as ^{14}C-glucose.

Metabolic capacity of cattle to handle the lactate isomers was measured by estimating oxidation and gluconeogenesis from D(-) and L(+) lactate (13). Rates of metabolism of D(-)lactate were similar to L(+)lactate metabolism at substrate levels of 0.1-1.0 mM in kidney and liver slices in vitro, but declined as concentrations exceeded 1 mM. From these estimates of oxidation and gluconeogenesis, the total potential utilization of D(-)lactate in a 450 kg steer at either 1 mM or 10 mM concentrations of D(-)lactate in the plasma was calculated to be 8.5 and 46 millimoles per hour, respectively.

Harmon et al. (14) measured lactate absorption of steers that had acute acidosis. Net portal absorption was 164.4 mmol/h for L(+)lactate and 71.8 mmol/h for D(-)lactate. Total elimination of D(-)lactate from these acutely acidotic cattle was about 75 mmol/h at a plasma concentration of about 5 mM. These acutely acidotic cattle removed blood D(-)lactate faster than the compound was being absorbed from the rumen. Average ruminal concentrations of L(+) and D(-) lactate were 53 and 30 mM, respectively. It should be pointed out that these cattle did not suffer severe blood acid-base disturbances and were in no danger of dying. These studies demonstrate that ruminants have the capacity to metabolize D(-)lactate efficiently. The term D(-)lactic acidosis is too confining to describe acidosis and is a misnomer. The problems associated with acidosis are due to the cumulative effects of all organic acids produced in the rumen.

SUBACUTE ACIDOSIS AND INTAKE

Many feedlot managers associate acidosis with only acute acidosis because the symptoms are observable while the major manifestation of subacute acidosis is reduced intake. The magnitude of the economic loss from subacute acidosis is difficult to estimate. Nevertheless, we have tried to estimate the effect of subacute acidosis in cattle fed wheat diets containing either 0 or 10% roughage. Wheat starch is rapidly fermented in the rumen and may cause acidosis easily. Addition of roughage reduces the acidosis caused by the wheat. This comparison gauged the effect of acidosis to be a $10 loss per animal per feeding period. The performance obtained from cattle fed the wheat and no roughage was very acceptable and higher than that predicted by NRC, which emphasizes the point that subacute acidosis is an insidious problem that is difficult to detect. Considering the number of cattle fed in the United States the cost is substantial. Most of the management recommendations that feedlot nutritionists make today are to avoid subacute acidosis. Therefore, we feel that acidosis is the most important feeding and health problem the feedlot industry faces daily.