Matching Cattle to Markets II: A Natural Approach

Animal Health Mandates of a "Naturally Raised" Program

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Calf health is crucial to a "naturally raised" program

A. Treating a calf with antibiotics is costly:
   1. Salvage value of the calf. The calf needs to be "salvaged" in the sense that a "natural" calf for which a premium was paid now becomes a conventional" calf that is sold on the open market.
   2. Lost opportunity cost. Now that the calf has been treated, can it fit into another, conventionally managed group? There is a cost to the opportunity the calf would have had, had it been conventionally managed from the start.
   3. Lost performance. The calf did not perform at a conventional level while it was being managed "naturally."
   4. Cost of treatment and labor. The actual cost of the antibiotics and other treatments is probably lower than the other items listed above.

B. If calves need antibiotics, they must be treated and removed from the program. Acknowledging the costs of a treated calf in a natural program should underscore the need for preventive medicine, not the need to avoid antibiotic treatments of sick calves at all costs. This is important not only from an economic standpoint, but also from an animal welfare standpoint.

Definitions

"Natural Program." In its simplest sense, a program in which cattle are not given antibiotics (whether given in the feed, water, or via injection), hormones, ionophores, or coccidiostats. Each natural program will have its own specific requirements and exclusions. It is crucial that each producer fully understands what is and what is not acceptable for use in managing "naturally raised" cattle.

Antibiotic. A chemical substance that has been produced by a microorganism, that has the capacity to inhibit the growth of or to kill other microorganisms. Examples include penicillin, long-acting tetracyclines, sulfonamides, etc. Antibiotics are generally excluded from "naturally raised" programs

Antiparasitic. A chemical substance that kills or inhibits the growth of parasites. Most natural programs will allow the use of external and internal parasite compounds. The compounds in this class will include pour-ons and sprays for flies, lice, and grubs; and treatments for internal parasites such as stomach worms and tapeworms. In general, this class of compounds does not include treatments or preventatives for

coccidiosis. The compounds that control coccidiosis are classified as antibiotics or ionophores.

Coccidiostat. A chemical substance that inhibits the growth of coccidia, which is a protozoal agent that damages the intestine. Examples of these compounds are Deccox ® (decoquinate) and Corid ® (amprolium). This class of compounds are not typically allowed in natural programs, since they technically are antibiotics.

Probiotics. Live microbial cultures fed to animals to alter the balance of intestinal organisms in a beneficial way. Examples are *Lactobacillus* spp. and *Enterococcus* spp. These organisms are thought to competitively inhibit the growth of pathogenic or less beneficial organisms.

Ionophore. A chemical that increases the permeability of cell membranes to a specific ion. Examples of these compounds are Rumensin® (monensin), Bovatec® (lasalocid), and Cattlyst® (salinomycin). These substances have many effects on cattle performance through their action on rumen microbes, and (except for Cattlyst) have anti-coccidial properties.

Not Allowed in Natural Programs (typically):

- Antibiotics (feed, water, injectable)
- Hormones (implants, MGA)
- Coccidiostats (Deccox®, Corid®)
- Ionophores (Rumensin®, Bovatec®)

Allowed in Natural Programs (typically):

- Vaccines
- Internal and External Parasite Control
- Colostrum, Colostrum Supplements, and Colostrum Replacers
- Antibody preparations. Example: Clostridium perfringens antitoxin; antibodies against scours pathogens such as First Defense®.
- Anti-inflammatories Examples: Banamine® (flunixin), aspirin.
- Probiotics.
- Bloat preventives and treatments. Examples: Therabloat® (poloxalene), Carmilax (magnesium oxide).
- Buffers, such as sodium bicarbonate.

Potential health problems associated with natural programs

A. Calf Scours
    1. Causes are often multiple organisms:
        a) Viral: Rotavirus, Coronavirus
        b) Bacterial: E. coli, Clostridium perfringens, Salmonella
        c) Protozoal: Cryptosporidia, Coccidia
    2. Antibiotics are not useful for uncomplicated viral scours or cryptosporidiosis.

3. Prevention of calf scours is of great importance, provides benefits beyond simply avoidance of antibiotic treatments
    a) Colostrum
        i) Adequate colostrum intake protects calves from infection with scours organisms in the environment; has health benefits throughout life.
        ii) Optimal colostrum quality results from:
            1. Cows in proper body condition
            2. Pre-calving vaccination programs ("scour shots")
            3. Delivery to the calf before gut closure (24 hrs. following birth)
    b) Management of calving area
        i) Contamination increases chance of exposure; pathogens build up over time
        ii) Move pregnant cows periodically during calving so they calve on clean ground (Sandhills system)
    c) Use antibody preparations to enhance colostral immunity when indicated
        i) Clostridial antitoxin
        ii) Scours antibody preparations (Ecolizer®, First Defense®)

B. Bovine Respiratory Disease Complex (BRDC)
    1. Proper pre-conditioning is critical to success of natural calves:
        a) Immune system: Vaccinate pre-weaning and booster at weaning with 4-way virals and Mannheimia/Pasteurella
        b) Creep feeding and breaking to bunks to pre-condition rumen health
    2. Nutrition plays a role in BRDC control and prevention
        a) Higher concentrate levels in receiving rations may be increase BRDC risk
        b) Higher protein levels in receiving rations may increase BRDC risk
        c) Supplemental Vitamin E may aid in BRDC prevention
    3. Control of stress in weaned calves is crucial also.
        a) Test incoming animals for BVD-PI; ensure that naturally raised cattle are not exposed to BVD-PI calves
        b) Consider fenceline weaning strategies
        c) Minimize co-mingling and mixing as much as possible

C. Coccidiosis
    1. Protozoal organism that has a complex life cycle.
        a) Eggs (oocysts) shed into the environment become infective in 1-7 days.
        b) Oocysts "sporulate," enter cells in intestinal tract lining
        c) Organisms use these cells to reproduce (1 or more rounds of asexual reproduction, followed by a round of sexual reproduction), create more oocysts, which leave the body through the feces.
    2. Result of intestinal damage is diarrhea, commonly bloody or mucoid.
    3. Whole cycle takes about 28 days. So calves not clinically affected until 28 days of age, minimum
    4. Ionophores and coccidiostats are used for control & prevention
        a) Ionophores (Rumensin® and Bovatec®) effective against two of the stages occurring after the asexual division

b) Deccox® effective against the early infective stage. Will kill the organism in this stage or put it in a "holding pattern" within the intestinal cells

c) Corid® and sulfa drugs effective in the asexual dividing phase of the organism

5. Risk factors for coccidiosis:

a) Cool, moist weather: helps survival and activation of eggs that have been shed into the environment

b) Stress: weather conditions, weaning, co-mingling, immunosuppression by BVD

6. Prevention without antibiotics and ionophores involves managing exposure through sanitation and minimizing stress to the animals

D. Digestive Problems

- Rumen bacteria and protozoa play a large role not only in digestion, but also in the development of certain digestive problems
  - Rumen fluid contains 20-25 billion bacteria; 200,000 to 2 million protozoa, and variable numbers of fungi in one ml (cc) of fluid!
  - Rumen "bugs" break feedstuffs into: volatile fatty acids (VFA's, which the calf absorbs and uses as an energy source); ammonia; methane; carbon dioxide; plant cell material, and heat. The bacteria and protozoa themselves then become a source of protein (nitrogen) for the animal

1. Acidosis

a) Lactic acid is the root cause of rumen acidosis. It is an intermediate product in the fermentation of carbohydrates to volatile fatty acids.

b) Starches and sugars are more rapidly fermented in the rumen compared to other feedstuffs. This contributes to a drop in rumen pH (becomes more acidic).

c) Effects of lower rumen pH:

- Detrimental effect on bacterial species that convert lactic acid to volatile fatty acids.
- No effect on bacteria that produce lactic acid
- Favors growth of Gram-positive bacteria, which produce lactic acid.

d) Lactic acid:

- Is a stronger acid than the VFA's; so its production results in ever-decreasing rumen pH, and exacerbation of the situation.
- Is more slowly absorbed from the rumen than are VFA's, which prolongs low rumen pH conditions.

e) Rumen acidosis can be either acute, or chronic.

- "Sub-acute ruminal acidosis (SARA)" = continual, lower-level rumen acidosis

f) Acute acidosis

- Occurs after an uncommonly large ingestion of carbohydrates in a short period of time.
- Symptoms may range from mild to extremely severe, and sudden death can be experienced.

- Common signs include cattle off feed, diarrhea, rapid or difficult breathing, abdominal pain, rumen stasis, and, in the most severe form, recumbency and death.

g) Chronic or subacute acidosis
- Occurs after longer periods of relatively high carbohydrate intake.
- Symptoms include: decreased feed consumption, diarrhea, weight loss, and laminitis (founder).

f) Conventionally, ionophores have been used in feedlot rations to decrease the incidence of acidosis.
- Act on certain species of rumen microbes, altering the overall population within the rumen to change fermentation patterns.
- Net result = ↑proprionic acid production, ↓ lactic acid production.
- Ionophores also cause a moderation in feed intake, affecting incidence of acidosis.
- Use of ionophores in natural programs is <u>not</u> normally permitted

g) Nutritional management becomes important
- Total mixed rations should be utilized and steps taken to ensure proper mixing.
- Proper pre-conditioning of pre-weaned and weaned calves will ensure that calves make an even transition onto higher concentrate rations
- Institute ration changes gradually so that rumen microbes are able to adapt to the new conditions.

h) Other products that may be utilized include probiotics and buffers

2. Bloat

a) Two types of bloat in cattle are recognized:

i) <u>Free gas bloat</u>
- a large gas bubble in the rumen that cannot be eructated (belched out)
- usual cause = physical or functional obstruction of the rumen or esophagus
- Can be treated successfully by decompression with a stomach tube
- Not as prone to reoccurrence.

ii) <u>Frothy, or foamy bloat</u>
- <u>The most common type of bloat encountered in feedlot cattle.</u>
- Occurs when the rumen contents become so thick and viscous that gas bubbles trapped within the fluid cannot coalesce and be belched out.
- Two root causes of frothy bloat:

A. <u>Microbe-based frothy bloat</u>
- Occurs when compounds in the <u>rumen bacteria</u> (polysaccharides) cause the rumen contents to become viscous.
- When fluctuations in rumen environment occur, a higher proportion of those bacteria rupture and release the polysaccharide into the rumen

- The higher viscosity rumen fluid is more apt to trap gas within it, causing froth instead of free gas.

B. Plant-based frothy bloat

- Occurs when compounds within the diet cause the rumen contents to become viscous.
- Common causes: legume pastures, barley, wheat, and soybeans.
- Particle size of the feed may affect its occurrence, as may the rate of change of the diet.
- It is thought that more gradual changes may actually increase the incidence of bloat by allowing rumen microbes to adapt to the change.

b). Prevention and treatment.

- Conventionally, ionophores have been used for bloat prevention.
  - Alter microbial activity such that lesser amounts of foaming agents are produced.
  - Typically, ionophores are not allowed in natural feeding programs.
- Surfactants, such as Therabloat® (poloxalene) and mineral oil have been used.
  - Blocks containing poloxalene are available
  - Generally regarded as useful only for pasture (plant-based) frothy bloat prevention.
- Nutritional management becomes important in managing bloat
  - Inclusion of higher amounts of long-stemmed grass hay

3. Liver Abscesses

- Sequelae to rumen acidosis.
- The bacteria that start liver abscesses, *Fusobacterium necrophorum* thrives in environments containing high levels of lactic acid.
- Acidosis also causes the inner wall of the rumen to become more permeable to the bacteria, which then enter the portal circulation, which runs from the digestive tract to the liver.
- The bacteria then colonize the liver and cause abscesses.
- Effects of liver abscesses include:
  - Decreases in carcass yield, fat thickness, and yield grade.
  - In rare cases, they may rupture and cause peritonitis (infection of the lining of the abdomen).
- Prevention strategies:
  - In conventionally fed animals, includes feeding Tylan, which of course is not permitted with natural feeding programs.
  - Other control measures are based on the control of rumen acidosis, as outlined previously.
  - A vaccine is available that has been shown to reduce the incidence of liver abscesses in cattle being fed high-concentrate diets.

Summary Points:

1. Animal health is crucial to the success of a "naturally raised" feeding program
2. Vaccines are not excluded from natural programs and are a key component of preventive medicine in these groups of cattle.
3. Prevention is key when dealing with calf scours, BRDC, and coccidiosis. Limiting exposure to these agents is the most effective means of prevention.
4. Immunosuppression must be controlled in natural cattle. The foremost cause of immunosuppression in cattle is stress, due to weather, weaning, processing, and co-mingling. Other significant causes are parasitism, and exposure to persistently infected BVD calves.

Naturally-Raised Cattle Health Program: from before birth to slaughter: (**Always coordinate your specific program with your veterinarian!!**)

1. Pre-calving scours vaccination for dams to increase colostral antibodies delivered to the calf
2. Calve cows on clean ground.
3. Assure passive transfer of antibodies to newborn calves; use colostrum supplements or replacers, or antibody products if needed.
4. Use antitoxin products (Clostridial) if conditions require.
5. Consider Vitamin E or B12 injections to weaker baby calves.
6. Pre-turnout (branding) vaccines as conditions require:
    a. 7-way Clostridial (blackleg)
    b. +/- Pinkeye vaccine
    c. +/- 4-way viral vaccine
    d. +/- Mannheimia (Pasteurella) vaccine
7. Pre-weaning vaccines 2-4 weeks prior to weaning:
    a. 7-way clostridial (blackleg)
    b. 4-way viral vaccine
    c. Mannheimia hemolytica vaccine
8. Booster vaccines at weaning time:
    a. 4-way viral vaccine
    b. Consider liver abscess vaccine
9. Consider fenceline weaning as a means to reduce stress.
10. Manage ration changes carefully to reduce incidence of acidosis, bloat, and liver abscesses.

Additional step for purchased cattle:

1. Test incoming calves for BVD persistent infection by taking an ear-notch sample.

Note: Product brand names, when included, are presented solely for clarification, and do not represent in any way an endorsement of those products.