Epidemiological Evaluation of Coccidiosis in a Cow-calf Herd

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Summary

Analyzing a disease process using an epidemiological approach may help us reduce costs for the producer and increase wholesomeness of our food animal protein. Coccidiosis is a parasitic disease that requires a good understanding of its occurrence to be efficiently controlled. Frequently, producers and veterinarians rely on medicating the clinically sick animals and preventive treatments of the entire group of cattle for control. This can be expensive and unrewarding if other management practices are not considered. Removing animals from exposure to high concentrations of the parasites may be the most practical management of the problem.

Introduction

Schillhorn van Veen[1] explained there are at least 12 different species of coccidia, a parasite that causes coccidiosis and affects cattle. Feedlot operators especially dread the disease. The most common clinical sign is frank blood in the fecal material of cattle. Coccidiosis can cause death of the host or set up an ideal environment for secondary invaders. Coccidiosis is a problem of increasing importance in our beef industry in the U.S. On a national basis, coccidiosis is thought to be the 5th greatest problem facing the cattle industry today.

Palvasek et al.[4] claimed the extent of infections is much higher than that described two decades ago. This has resulted both from the intensification of husbandry and the resistance of the coccidia to current forms of therapy. Infection does not always lead to the disease.

Review of Literature

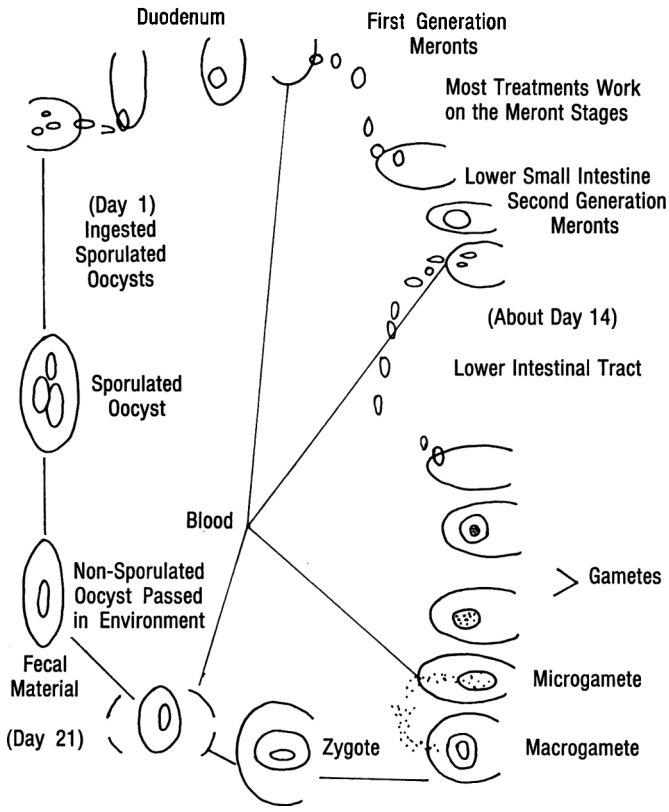
James E. Fox[2] indicated coccidiosis at weaning time or times of stress in the feedlot is a common problem. He stated many feedlot veterinarians have been recommending producers using coccidiostats such as decoquinate (Rhone-Poulenc) in the starter ration for a 28 day feeding program. This is to help prevent a feedlock wreck. When the cattle are in the 600 lb. range, an ionophore has been thought to be helpful in coccidia control. An ionophore is a drug used to increase feed efficiency and has not been approved as a coccidiostat in cattle. A dosage for coccidia control or prevention has not been established.

W.S. Bailey[7] stated coccidiosis is a parasitic disease of cattle of all ages. The author noted most literature relates to feedlot coccidia or confined dairy calves. A difficult time to treat coccidiosis is when the calf is still on the cow. This requires a total herd roundup for a number of days in a row. Death loss from secondary infection is not uncommon. The producer may not observe the young calves daily, and secondary infection may go unnoticed.

Life Cycle of Eimeria spp.

Figure 1 illustrates the normal life cycle of *Eimeria* spp. Schillhorn van Veen[1] explained the calf ingests the sporulated

Figure 1: Life Cycle of Coccidiosis



oocysts from the environment. The sporocysts are released in the duodenum. The small intestinal epithelium is then entered by sporozoites released from the sporocysts. Meronts are formed from the sporozoites. The meronts split into hundreds of merozoites. These break out of the cells and travel to the lower small intestine. These usually form second-generation merozoites. The sexual cycle known as gamogony may start at this stage. The merozoites turn into female macrogametes or male microgametes. The macrogametes enter cells in the lower intestinal tract and are fertilized by the microgametes. This zygote develops and is released in the fecal material as the non-sporulated oocyst. The sporulated oocyst develops in nature with the help of proper temperature and oxygen.

Figure 1 shows the host cell has ruptured when the first and second generation meronts are released. Cells became damaged during the reproductive stage of the parasite. This cellular damage helped explain why clinical signs may be observed and no oocyst are found in the fecal material. Fox[2] explained when large numbers of oocysts appear in the feces, the disease has gone full cycle. If the animal does not ingest more oocysts, the disease process is probably over. Schillhorn van Veen[1] told how meronts can be found in other cells such as subepithelial cells, lamina propria, and Peyer's patches. He felt this might account for some recurrence of the clinical signs at a later date. The parasite might avoid the chemotherapy and local immunity and resurface in their absence.

Diagnosis of Coccidiosis in Cattle

Bailey[7] stated coccidiosis is diagnosed by clinical signs and using a fecal flotation technique. The non-sporulated oocysts are identified in fecal material of animals with clinical signs. Bloody diarrhea usually is associated with coccidiosis, however, this is not always the case. The mere presence of oocysts in the feces is not diagnostic, for many animals are carriers without clinical disease. Schillhorn van Veen[1] claimed nearly all ruminants are infected with coccidia and only a small number have the clinical disease.

Immunity to Coccidiosis in Cattle

Tizard[8] indicated cell-mediated immunity must be involved with bovine coccidiosis. After infection, an animal usually forms immunity. Schillhorn van Veen[1] stated this immunity is species specific. With 12 species, the animal could become infected and form clinical signs with all 12 species. Conlogue[3] found that premunization could not prevent coccidiosis when animals were exposed to large numbers of oocycts. Research on the immunity of coccidiosis in cattle needs attention.

Treatment of Coccidiosis in Cattle

McDougold[5] related that continuous feeding of a drug as a part of a complete feed ration is an effective way to administer anti-coccidial drugs. Prophylactic use of anti-coccidial drugs in cow-calf operations is not generally practiced. The young calves in these herds frequently are at great risk. Fox[2] stated amprolium, decoquinate, and sulfas are used to treat clinical coccidiosis. Amprolium and decoquinate are the only drugs approved for the prevention of coccidiosis. A study conducted by McDougold[5] indicated ionophores aid in the control of coccidiosis. According to the literature, most treatments can be helpful, but they are only partially effective against coccidia. Greve[9] stated all of the drugs mentioned are coccidiostats. They affect the meronts early in the cycle. For this reason, sometimes they will continue to bleed for days after treatment, for the gametes will continue to develop and the non-sporulated oocyst will be eliminated.

Kester[6] described the use of ionophores in free-choice feeding programs. This has been tried by producers to control coccidiosis in the cow-calf herd. the problems of safety and adequate consumption for prevention of coccidiosis still needs attention.

Schillhorn van Veen[10] demonstrated that after chemotherapy, color and consistency may change rapidly. However, the gut may take weeks to get back to normal. It may take weeks for the animal to regain the weight lost during infection.

Epidemiology Considerations of Coccidiosis in Cattle

Pavlasek[4] demonstrated the importance of reducing the concentration of animals in an area for preventing the spread of coccidia. The animal may become infected from a severely contaminated environment. The severity of infection depends on the number of oocysts ingested. Greve[9] felt in cow herds, the replacement heifers are the most apt to shed large numbers of oocysts. If a producer is having problems with calves showing clinical signs on the cow, a primary source of oocysts may be from the replacement heifers. Treating replacement heifers for 28 days before adding them to the herd may help lower the number of oocysts in the calves' environment.

Schillhorn van Veen[1] explained that oocysts develop and survive well in moist, shaded areas. This would include around haystacks, in water puddles, and in wet bedding. The cow's dirty teat would be one avenue of infection for the calf. On pastures, it is usually seen in dry years when cattle may use contaminated water and may be stressed more.

Bailey[7] indicated once the oocysts are removed and the meronts mature to gametes the clinical disease should be controlled. Allowing an uncontaminated environment is essential for breaking the cycle of disease.

It is epidemiologically important to remember that when the immune system is suppressed, the clinical disease may surface. Fox[2] explained that stress may reduce the

immunity. Any immunosuppressive action would allow for recurrence of the disease. The author has observed coccidiosis with respiratory problems. Weather, feed changes, weaning, certain vaccinations, application of certain chemicals, and other stress-related activities can depress the immune system.

Case History

A case history demonstrating some of the complexities of coccidiosis in the cow-calf herd will be reviewed. A producer started experiencing coccidiosis three years ago in calves about 6 weeks old. From a herd of 60 cows, he treated approximately 50% to 75% of the calves showing a bloody diarrhea with Corid drench (Merck) which contains amprollium and 5 cc/100 lbs. of LA200 (Pfizer). The calves responded well.

Before the next calving season, the cow herd was placed on Corid crumbles. The barn and lots were scraped and limed. the weather during calving was ideal, dry and warm, and 12 of the 60 calves were treated. Bovatec (Hoffmann-LaRouche), an ionophore containing lasalocid, was placed in the cattle mineral and salt the next summer. The calves creep was medicated with Deccox (Rhone-Poulenc) that contains 6% decoquinate. About one month after all cattle were weaned, 33% were dehorned, and all but four were poured with an organophosphate Warbex (Cyanamid) for lice and grub control. In 72 to 96 hours, a profuse bloody diarrhea was observed. About 50% of all the calves had a watery bloody diarrhea. It appeared to be a severe coccidiosis outbreak. All calves were drenched with Corid (Merck) for three days and given 5 mg/100 lbs. of LA200 (Merck). By the third day of treatment, the stools looked normal. Fecals from two different days were negative for oocysts.

Results and Discussion

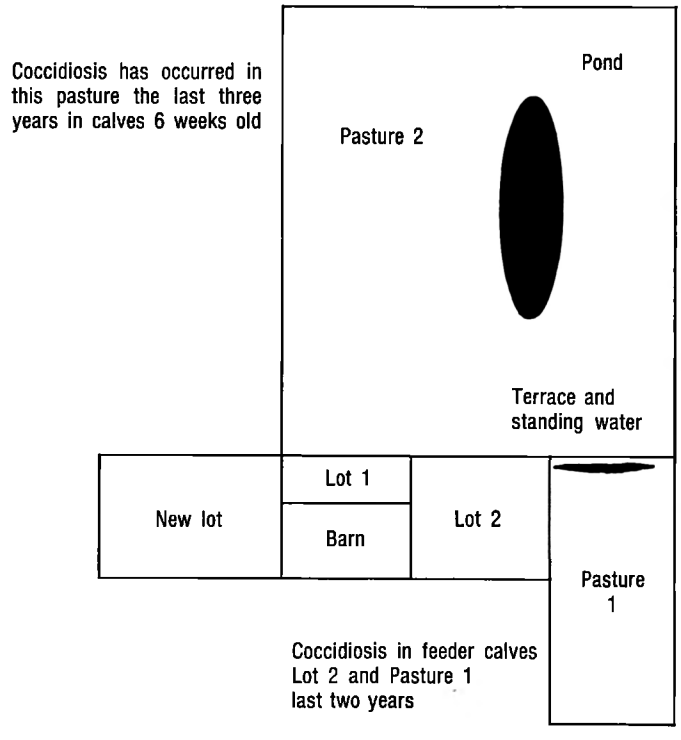
The possibility of the immune system being depressed by the Warbex and the contaminated lots providing a massive amount of ooxysts lead to the diagnosis of coccidiosis. If the bloody diarrhea was from the first generation meronts, this would explain the absence of oocysts. Since the Corid affects the first generation meronts and individual drenching was implemented at the first signs of blood, it may have stopped the disease before it progressed to the gamete stage. This, along with the fact that the animals had some immunity from previous exposure, may have lended itself to a quick rcovery time.

Figure 2 demonstrates the lot structure of the farm and *Table 1* explains the uses of the holding areas. The calves were weaned in the same lots used for calving. Lot 2 and the barn were used to house the gestating cows and the cow-calf pairs for the first week after calving. The overuse of this lot was brought about by the desire to calf during cold weather. Intensive husbandry practices like this lead to increased oocyst concentrations in the environment.

Table 1: Possible Sources of Calf Exposure.

Holding Area	Livestock Held
Barn	Alll calves in barn after birth and weaning
Lot 1	All cows pre- and post-calving and calves at weaning.
Lot 2	All cows held from start to finish of calving season. All cattle weaned and held in this lot. Post-calving pairs may spend time in this lot.
Pasture 1	Used to pasture calves 1 month post-weaning.
Pasture 2	All cow-calf pairs are held here for 3 to 4 months.

Figure 2: Cattle Holding Areas



The new lot has been formed and used to hold cows during calving. All replacement heifers are treated for a 28 day period with Corid prior to adding to the new lot. This removes the calves from contact with high concentrations of oocysts. Lowering the concentration of livestock in all portions of the farm should be considered.

In conclusion, a full understanding of the life cycle of coccidiosis is essential in making a diagnosis and effectively treating the condition. Removing the animals from the

source of infection may be the most labor saving, cost effective, and permanent control of coccidiosis in a cattle operation.

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Commissioner's Special Citation Presented to Dr. Morse

Dr. Jack W. Morse of the Lander Veterinary Clinic in Turlock, California was presented with the FDA Commissioner's Special Citation on October 13, 1988. Mr. James S. Benson, Deputy Commissioner of Food and Drugs, presented the award at the meeting of the American Veterinary Medical Association (AVMA) Council on Biologic and Therapeutic Agents (COBTA) in Washington, D.C.

The Citation was presented to Dr. Morse, who is a member of COBTA, in recognition of his leadership and commitment in the development and adoption of the "AVMA Guidelines for Supervising Use and Distribution of Veterinary Prescription Drugs." This very innovative document provides guidelines and standards for proper use and/or dispensing and prescribing of animal drugs by veterinarians. Adoption of these Guidelines by the AVMA represents a highly significant step by the veterinary profession, evidencing the profession's commitment to the proper and responsible use of drugs, particularly in food animals. Dr. Morse's contribution will have a significant effect on preventing drug residues in meat, milk, and eggs and will enhance animal welfare by providing for more responsible use of drugs in animals.

In presenting the Citation, Mr. Benson expressed FAD's gratitude for Dr. Morse's personal leadership and selfless dedication in developing and implementing the Guidelines. In addition to serving as the primary author, Dr. Morse was responsible for shepherding the Guidelines through the various stages of review, revision and approval. FDA and CVM are very grateful to Dr. Morse for his efforts in providing these landmark Guidelines.

Sulfamethazine in Feed

FDA To Begin Sampling

FDA plans to evaluate finishing feeds for dairy and swine for sulfamethazine (SMZ) residues to determine the significance of contaminated feed as a source of SMZ residues. FDA also hopes to show whether this contamination is occurring in the commercial feed mill or on the farm.

State feed control officials in states having inspection contracts with FDA will be asked to conduct the sampling. States with no contracts will use FDA personnel to obtain the samples. Samples will be analyzed for SMZ and other sulfa drugs using thin layer chromatography. Samples will be taken at the farm level and identified as from a commercial feed operation or handled by the producer.

Samples for the study will be collected at random in large target areas. The final results are likely to indicate whether SMZ contamination is a regional or case-specific problem. FDA does not plan to announce the program's implementation in an effort to avoid biasing the results. The results of the project will be available upon its completion.

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