DS 79

UNIVERSITY OF FLORIDA
IFAS EXTENSION

Parasite Problems of Dairy Replacements[1]

B. Harris, Jr. and J. K. Shearer[2]

Cattle are affected by a variety of internal and external parasites. Internal parasites include protozoans, nematodes or worms, liver flukes and tapeworms. External parasites include lice and flies.

PROTOZOAL PARASITE OF CATTLE

Protozoans attack the lining of a calf's intestinal tract, weakening it through malnutrition and weight loss. The two common protozoans involved are coccidiosis and cryptosporidiosis

Coccioliosis

The acute form of coccidiosis, caused by a protozoan, is characterized by bloody diarrhea and anemia. Calves 3 weeks to 6 months old are most susceptible to infection. The disease usually strikes at weaning time when calves are moved to overcrowded, dirty and wet pens. Feeding hay fed from the ground or grain from low troughs which are easily contaminated by fecal material increases the likelihood of infection.

Once ingested, coccidia invade and destroy the epithelial cells lining the intestine. Diarrhea, sometimes bloody, and anemia are often observed in clinically affected calves. Calves that survive coccidiosis develop longlasting immunity. Pens should be maintained in dry areas with a sufficient drainage system. Overcrowding should be avoided and waterers and feeders should be constructed or located so that fecal contamination can be averted. Medicating feed and water supplies usually controls the disease without interfering with the development of immunity.

Cryptosporidiosis

These organisms are protozoans like coccidia, and are capable of infecting a variety of animals, including man. The disease is reported to be common in calves up to one month old; however, in Florida, it most frequently is observed around 7 to 10 days of age. Recent surveys on several Florida dairies have found a high incidence of cryptosporidial infection in calves between 5 and 15 days of age.

Cryptosporidia damage epithelial cells of the small intestine. This decreases the absorptive ability and surface area of the gastrointestinal tract and causes watery diarrhea. Because the infected calf cannot digest and absorb nutrients, it loses weight.

1. This document is DS 79, one of a series of the Animal Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date September 1992. Reviewed June 2003. Visit the EDIS Web Site at http://edis.ifas.ufl.edu.
2. Professor, Dairy Science Department; Associate Professor, College of Veterinary Medicine; Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville.

The importance of cryptosporidia as a cause of calf diarrhea is unclear; however, it has increasingly been reported as a finding in calves with diarrheal disease. Less severe experimental infections often clear up in 1 to 2 weeks, whereas naturally acquired infections are often complicated by *E. coli* or rotavirus and may lead to death. Like aforementioned pathogens, cryptosporidia are found in the gut of healthy calves. One study showed that neonatal calves deficient in colostral antibody are at increased risk of developing cryptosporidial-associated diarrhea. The best current treatment is good nursing care. The best prevention is to feed calves colostrum at birth. Continued feeding of colostrum through the first week of life may provide additional protection against cryptosporidia as well as other pathogens likely to infect calves during this period.

NEMATODE PARASITES OF CATTLE

Nematode or worm infections in cattle usually begin with first exposure to grass. Most young animals have only a limited immunity to parasites, and will develop overwhelming infections if not carefully monitored. However, calves who recover from these infections develop a long-lasting immunity that protects them into adulthood. In the southeast, low immunity is often a result of malnutrition or conditions conducive to extreme parasite exposure.

General Life Cycle of Nematodes

The life cycles of gastrointestinal parasites are similar in that none needs an intermediate host. Mature worms produce eggs that are passed in the feces. After variable lengths of time these eggs hatch, liberating the first of two free-living larval stages, commonly known as L(1) larvae. These larvae grow and molt twice, giving rise to third stage "infective" larvae (L(3)). This infective L(3) remains in the manure pat until it moves onto surrounding vegetation following periods of rainfall or heavy dew. Cattle become infected while grazing infected pasture and ingesting infective L(3). In general, survivability of the infective L(3) is most favorable during cooler seasons in Florida, whereas survival is less certain during the hotter and dryer times of the year. In the gut, L(3) undergo further development to an L(4), L(5), and an adult stage. Once mature, they reproduce and the cycle repeats itself.

An understanding of this basic life cycle is fundamental to the development of rational control strategies. The most effective control schemes are based upon appropriate use of anthelmintics in a deworming program designed to prevent contamination of pastures with infective stages of parasites. This can be accomplished by deworming immediately prior to movement to new grazing areas and again three to four weeks later.

In the sections that follow are descriptions of the disease syndromes resulting from common nematode infections in cattle. These descriptions are organized under general headings according to the organ or organ system in which they occur.

Stomach (Abomasum) Worms

The stomach worms of major significance in cattle, *Ostertagia ostertagi*, *Trichostrongylus axei*, and *Haemonchus* spp., tend to be the most pathogenic of the gastrointestinal parasites and consequently the most important economically.

Ostertagia, known as the brown stomach worm, is capable of entering an arrested state of development for as long as six months. Because of this unique ability, two types (Type I and Type II) of ostertagia infection are recognized. Type I ostertagiasis is most typically seen in the southeast during the winter and spring in heifers during their first season at grass. The clinical syndrome is characterized by diarrhea, weight loss, decreased appetite, and hypoproteinemia (low blood protein) exhibited as submandibular edema (bottle jaw). Damage to abomasal digestive glands in the stomach is caused by both the larvae and adult worms during their development, but in particular, by emergence of the adult L(5) from the glands.

Type II ostertagiasis occurs in young stock (yearlings and first and second calf heifers) that have had at least one grazing season. In the southeast it is most commonly observed in late summer and early fall. The clinical signs are similar to those described above, but usually more severe. Also, it differs from

Type I in that the occurrence is more sporadic with smaller numbers of animals in a herd affected. Type II disease is caused by the accumulation of arrested larvae acquired during the late spring of the previous grazing season. Signs of disease are evident in the fall as the adults emerge from the glands as described earlier for Type I. An early summer deworming with an anthelmintic capable of eliminating those arrested larval forms can prevent Type II ostertagiasis.

Trichostrongylus axei and Haemonchus spp. induce a clinical syndrome similar to that of Ostertagia with a few minor exceptions. In sufficient numbers, *Trichostrongylus axei* is a serious parasite that causes diarrhea, weight loss, mild anemia, and rough hair coats. Heavy infections with haemonchus, in both larval and adult stages, can result in profound anemia as both larval and adult stages are blood suckers. Haemonchus, unlike ostertagia, causes infection during warm, wet weather and may be troublesome during the summer months in Florida.

Intestinal Worms

Worms found in the intestinal tract include: *Cooperia* spp., *Strongyloides papillosus, Trichostrongylus colubriformis, Nematodirus helvetianus, Bunoostomum phlebotomum, Oesophagostomum radiatum* and *Trichuris discolor*. Heavy infections with these worms result in poor digestion, weight loss, diarrhea, stunted growth and occasionally, coughing and dermatitis. Some of these worms penetrate the skin and migrate to the lungs and other tissues. Others are blood suckers and all damage the intestinal tract to varying degrees. These worms, however, are not generally as damaging as the stomach worms described previously.

Lungworms

Dictyocaulus viviparous is the lungworm of cattle. It is a major cause of respiratory disease in cattle in the southeast as well as in the more temperate climates. Infections typically occur in young stock (less than one year old) grazing on pasture. Climatic factors have a major influence on the incidence of this disease with most outbreaks occurring during the warm, wet spring and summer months. Affected animals show only a slight cough in the early course of the disease. Later on the coughing becomes severe and breathing becomes difficult. Animals may be seen stretching their heads and necks to facilitate breathing. When the disease reaches this stage (usually 3 to 6 weeks following from onset), death loss may be high. Animals that survive the acute infection will develop a variable degree of immunity; however, many will not be productive due to permanent lung damage.

The life cycle of lungworms is different from that described earlier for stomach and intestinal worms. In the lungworm cycle, cattle ingest infective L(3) while grazing. These larvae penetrate the gut wall and enter the blood stream where they are carried to the lungs. They undergo further development in the bronchi and bronchioles of the lung to the adult stage. Here they lay eggs which are coughed up and swallowed. The eggs hatch larvae in the intestinal tract to L(1) larvae which are passed in the feces. They develop to the L(3) larval stage in manure pat and soil. The L(3) larvae can remain infective for months in the manure pat or on vegetation where the larvae migrate following rainfall.

There are several products available for treatment of lungworms. Other important considerations for control should include efforts to reduce exposure of young cattle to infective larvae. Young, susceptible animals should not be grazed on pastures contaminated by older animals especially during the spring and summer months. Deworming of yearlings should be accomplished so that pasture contamination can be avoided.

TREMATODE AND CESTODE PARASITES OF CATTLE

Liver flukes (Trematodes) and tapeworms (Cestodes), unlike the nematode parasites described above, depend on an intermediate host for completion of their life cycle.

Liver Fluke Infection (Fascioliasis)

Liver flukes are common in the southeast, particularly along the Gulf Coast and central and south Florida. They are often responsible for significant economic losses in beef cattle from reduced production efficiency and liver condemnation at slaughter. In dairy replacements,

primary losses result from occasional deaths, depressed growth, poor feed conversion, and impaired reproduction. While liver fluke infection may cause acute disease in cattle, it is often chronic and asymptomatic (showing no symptoms).

Completion of the life cycle of the liver fluke requires the presence of a lymnaeid snail which serves as the intermediate host. In Florida, only two species of snails, *Lymnaea cubensis* and *Pseudosuccinea columnella*, are capable of fluke transmission. These snails are not found in or near large bodies of permanent water or on dry land. They prefer soils with a neutral pH and thus are not commonly found in cypress heads where soils are too acid. Ideal habitat for these snails is water-saturated soil in poorly drained pastures, irrigation ditches, and around springs.

Adult flukes living in the bile ducts of the liver lay eggs that eventually enter the gastrointestinal tract with the bile. These eggs are passed in the manure and hatch, releasing free-living miracidia. The miracidium infects a lymnaeid snail, develops into a cercaria which leaves the snail to encyst on vegetation as a metacercaria. This is the stage infective for cattle, which ingest metacercariae while grazing. Following ingestion, metacercariae invade the wall of the gastrointestinal tract and migrate to the liver. During migration, they continue to develop into immature flukes. Upon reaching the liver they invade and continue their migration through the liver tissue and eventually enter the bile ducts where they develop to adults, feed on blood, and begin to lay eggs.

A two-pronged approach is necessary to control liver flukes: snail population control, and the use of anthelmintics to reduce pasture contamination. Controlling snail populations may not be practical under certain conditions, but improving pasture drainage, repairing leaky water pumps and irrigation lines, and fencing off localized areas prone to heavy contamination with metacercariae will help in reducing potential exposure.

Strategic anthelmintic treatment regimes are currently being studied in Florida. Present recommendations suggest treatment in the fall (September through December) and again in late spring, prior to the summer rainy season (Table 1). Curatrem (clorsulon) is the only treatment presently available for liver flukes.

Tapeworms

Tapeworm infection is common in young replacement heifers during their first grazing season. Tapeworms rarely cause serious disease, but in extremely heavy infections may be responsible for depressed growth rates.

Like the liver fluke, the tapeworm requires an intermediate host to complete its life cycle. Free-living mites feed on the egg-bearing segments of the adult tapeworm that are passed in manure. Tapeworm infection develops when infective mites are eaten during grazing. Adult tapeworms attach themselves to the mucosal wall of the small intestine. Tapeworms grow in segments as they absorb nutrients from ingesta in the small intestine.

Table 1. Liver fluke control recommendations for Florida using Curatrem.*

Yearly weather	**Severity of flukes on dairy**		
Pattern	**Low**	**Moderate**	**Severe**
Average rainfall	autumn only (reduced dose)**	autumn only (full dose)***	autumn & spring (full dose)
Dry spring/dry autumn	autumn only (reduced dose or none)	autumn only (reduced dose possible)	autumn & spring (full dose)
Wet spring/dry autumn	autumn only (reduced dose possible)	autumn & spring (full dose)	autumn & spring (full dose)
Dry spring/wet autumn	autumn only (full dose)	autumn only (full dose)	autumn & spring (full dose)
Wet spring/wet autumn	autumn & spring (full dose)	autumn & spring (full dose)	autumn & spring (full dose)

Table 1. Liver fluke control recommendations for Florida using Curatrem.*

Yearly weather	Severity of flukes on dairy		
Pattern	Low	Moderate	Severe

*Curatrem -- Merck, Sharp and Dhome.
**Reduced dose: 1/4 oz. (7 1/2 ml) per 400 lbs body weight.
***Full dose: 1/4 oz. (7 1/2 ml) per 100 lbs body weight.

Infections in older cattle are usually of minimal consequence. There is no effective treatment.

EXTERNAL PARASITES

Lice and flies are the major external parasites affecting cattle. They are commonplace and require constant control.

Lice

Cattle in the United States are troubled by four species of sucking lice and one species of biting lice. Lice can cause death in heavily infested calves, but often only slow weight gain and reduce feed conversion efficiency. Heavy infestations of sucking lice often cause a blood loss sufficient enough to result in serious anemia. Anemic calves become weak, and are increasingly susceptible to other diseases which may lead to death. Biting lice feed on skin and cause the animal to develop a scruffy appearance with hair loss and raw, reddened skin. Infected animals lose hair when they rub, scratch, lick, and bite the irritated skin.

In Florida, probably the most important louse is the tail louse, (*Haematopinus quadripertusis*), a sucking louse found only in the Gulf Coast states and Puerto Rico. These lice inhabit the brush or switch of the tail; immature forms may be found near the eyes and eyelids and in the ears.

Cattle lice control methods include pour-on insecticides, dust bags, sprays, and backrubbers.

Flies

Flies of major importance in livestock in Florida are horn flies, house flies, and stable flies. Nationwide losses to these pests are estimated to be in excess of $400 million annually through decreased weight gain, lower milk production and control costs. Because of their rapid reproductive rate, flies quickly develop resistance to insecticides, making them one of the most difficult parasites to control.

Grazing heifers are likely to suffer from horn flies. The flies' mouthparts pierce skin and suck blood from the animal's back and shoulders. In this location they are less accessible to switching tails. Self-application devices, such as dust bags and back-rubbers, provide daily fly control to pastured cattle. Calves in isolated pens should be sprayed or dusted individually.

Confined cattle are more vulnerable to stable flies and house flies. Similar to the horn fly, the stable fly is a voracious pest. They cause blood loss poor feed conversion, annoyance and irritation. Swarms of flies can cause pastured or drylot cattle to bunch together. This, during the summer months, increases heat stress.

The house fly is the vector of numerous animal and human diseases. One of the more important of these diseases in heifers is pinkeye. In northeastern states, the face fly transmits pinkeye. The face fly does not presently occur in Florida, but its role in spreading pinkeye has been assumed by the house fly. Both species feed on secretions of the eyes, muzzle, and other mucus membranes. As cattle bunch together, the disease spreads rapidly throughout the herd. Pinkeye vaccination continues to grow in popularity as a means to reduce the incidence of pinkeye in herds.

Control methods for stable flies and house flies consists primarily of insecticide self-application devices or regular spraying or dusting. Problems with fly populations resistant to the insecticides used in eartags have made these of limited value in fly control.