



Internal Parasite Control in Cattle

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In the United States, veterinarians, producers and economists estimate annual parasite-related losses to the livestock industry at more than \$100 million. Most parasite losses are subclinical, and losses go unnoticed, are not measurable and probably far exceed the estimates.

University trials have shown paybacks from internal parasite control of \$25 to \$200 per head, which should make effective control one of the first goals of today's cattle producer.

A parasitic relationship exists when one organism (the parasite) profits at the expense of the other (the host). The parasite may harm the host enough to kill it if not controlled. This would end the relationship, so the parasite prefers that the host survive with decreased efficiency.

Parasites are normally host-specific, and cattle serve as hosts for a variety of parasites. The major threat to cattle health and performance comes from internal parasitic nematodes (worms), especially those found in the stomach and intestines (gastrointestinal parasites). Today's cattle production is concentrated on heavily populated, permanent pastures where gastrointestinal parasites are abundant. This increases the probability that every worm will successfully reproduce.

Most of the internal parasites of cattle are in the abomasum (true stomach) or small intestine (see Table 1). *Ostertagia* are the most common internal parasites of cattle, causing severe symptoms and the highest economic loss. The stomach and intestinal linings, or mucosae, are damaged by irritation and inflammation. Therefore, cattle don't get the proper nutrients, due to the decreased digestive and absorptive ability of the mucosal surface.

The life cycles of the more common cattle internal parasites are direct. Infected cattle pass eggs in the manure, and with favorable weather conditions, the eggs hatch and develop into third-stage, infective larvae in about 14 days. These larvae move from the protective manure up moist grass blades and are eaten as the cattle graze. They then penetrate the gut lining, and mature into egg-laying adults two to four weeks after they're eaten.

The fourth stage in the life cycle of *Ostertagia* is different. Fourth-stage larvae are able to stay in the stomach glands for up to six months. These are called inhibited or arrested larvae. The ability to inhibit and then leave the stomach glands seems to be triggered by weather or nutritional factors.

This complex life cycle of *Ostertagia* has been divided into three types: Type 1 is when large numbers of infective larvae are eaten over a short time and quickly complete their life cycle to become adults.

A Pre-Type 2 stage happens when the fourth-stage larvae burrow deep into the stomach lining and are inhibited. There may be as many as 100,000 of the inhibited larvae in the stomach wall. When favorable weather occurs, larvae will leave the stomach lining and become adults — this is the fifth stage.

Type 2 *Ostertagia* infection occurs when the larvae leave the stomach lining. A few at a time may not cause many problems; however, when large numbers of larvae mature and leave at the same time, severe symptoms will develop.

Symptoms

Type 1 *Ostertagia* clinical disease is characterized by severe greenish diarrhea, swelling under the jaw (bottle jaw) and rapid weight loss. Young animals show the most severe symptoms, which will continue until the calves die or are treated. All age animals may show symptoms, especially weight loss.

Pre-Type 2 *Ostertagia* infection doesn't normally produce any damage or symptoms when the larvae enter the stomach glands. They're arrested or inhibited until weather changes trigger their release.

Type 2 *Ostertagia* infection is caused by adults suddenly leaving the stomach glands. Their leaving may be gradual or in a sudden burst. With gradual releasing of the adults, the symptoms are similar to those exhibited in Type 1. But a sudden weather change may trigger the release of all inhibited worms and cause acute symptoms with high death loss.

The other internal parasites are normally a mixed infection with *Ostertagia* and cause similar symptoms.

With *Haemonchus*, both the larvae and adults feed on the blood in the stomach. Small numbers can cause acute symptoms with blood and protein loss. Severe anemia or sudden death will be a noticeable symptom.

Diagnosis

Clinical signs, grazing history and season may give a presumptuous diagnosis of internal parasite infection in cattle. The diagnosis may be confirmed by finding worm eggs on a fecal exam.

Eggs per gram (EPG) of manure is the numerical value used in egg counts. The EPG count is mainly made up of the *Haemonchus*, *Ostertagia* and *Trichostrongylus* complex (HOT complex). The numbers are not given but are rated low, moderate or high, depending on the EPG.

The EPG is not always an accurate indication of the number of adult worms present. EPG counts may be negative or low in the presence of large numbers of immature worms, and even when many adult worms are present the count may be low. An immunity produced by the cow or previous worm treatment at low dosage may lower egg production.

With the development of safe, effective de-wormers, diagnostic drenching should be used where EPGs are absent or low and symptoms and history may suggest infection. Response after deworming would confirm the diagnosis.

Postmortem examinations of dead animals should always be done when the cause of death is not known.

Some larger worms, such as *Haemonchus*, may be easily seen, but *Ostertagia* or *Trichostrongylus* are hard to see unless they're alive and swimming in the stomach fluid. Stomach and intestinal contents can be scraped and washed to identify specific types of worms and get accurate counts.

Where internal parasites are severe enough to be the cause of death, postmortems by a veterinarian are invaluable in treatment and control methods.

Other diseases and conditions may complicate the case, and a postmortem will be the only way to determine the primary cause. Other diseases such as shipping fever, digestive disturbances, salmonella infection and viral diarrhea will show similar symptoms as internal parasite infection.

Cattle dying with Type 2 *Ostertagia* infection will show Moroccan leather appearance in the lining of the stomach. The stomach fluid will have a high pH, and a blood test may help make the diagnosis. Type 2 *Ostertagia* infection needs to be determined, because not all dewormers are effective in treating this type of internal parasite infection.

Control

To be effective, a parasite control program must kill the worms in all cattle and control the numbers of worms on the pasture.

Pasture Control

Pasture control must be directed at controlling the free-living stage of internal parasites in cattle. To do this, keep large numbers of infective larvae from accumulating by reducing contamination of pastures at critical times during the grazing season. By predicting these times during which large numbers normally occur, you can reduce intake of large numbers of infective larvae by removing susceptible cattle and not placing them on highly contaminated pastures.

Clean and safe pastures are terms used to designate pastures with few or no free-living larvae. Examples of clean pastures would be those permanent pastures not grazed for a long time. In our area, larvae may live in the soil for extended periods in winter and summer if the weather is favorable. Temporary grazing, both summer and winter, where extensive tillage is carried out would be classified as clean pastures.

Safe pastures are described as those with low enough infective worm larvae numbers to cause a low adult worm load. Permanent pastures that have been used for hay should be safe pastures.

Permanent pastures with high contamination in the spring may become safe in hot, dry weather.

Management practices used to break up and scatter manure piles will allow worm larvae and eggs to be exposed to heat and dry conditions, thus reducing contamination. However, this practice may increase the numbers in early spring or fall when conditions are more favorable for the free-living larvae to survive and infect susceptible cattle.

Our long grazing seasons and year-round larvae survival make pasture control more complex. The critical periods are after hot, dry summers when existing adults and also inhibited *Ostertagia* mature and produce large numbers of eggs.

If older cattle are not dewormed at this time, a dangerous build-up takes place and will continue during autumn and winter.

Young, susceptible cattle may need additional treatment to prevent infections that carry over into spring. Most calves are weaned or marketed at this time of year and the responsibility of control changes.

In Type 2 *Ostertagia* infections triggered by better larvae-surviving weather, treat cattle before this condition occurs. Not only does this prevent damage to the stomach of the yearling cattle, but it also helps prevent pasture larvae build-up.

Feedlot Control

There has been some controversy about the incidence of internal parasites in feedlot cattle. According to the life cycle where infective larvae are being picked up on blades of grass in moisture drops, infection should be impossible. If infected cattle are not treated before being placed in feed lots infection should not increase. The performance of these cattle can still be reduced and they should be treated on entry.

Inhibited *Ostertagia* sometimes show severe symptoms in the feedlot and should be treated with an effective dewormer. The dry lot can be very effective immediately after treatment to prevent recontamination before placing treated cattle on clean or safe pastures.

Animal Control

Control of internal parasites in cattle must kill all stages in the animal and help control the number of larvae and eggs on pastures.

Adult cattle have more resistance to internal parasites than younger cattle. But deworming older cattle will help keep down pasture contamination. Strategic parasite control has been recommended by parasitologists and dewormer manufacturers. One recommendation suggests deworming in January, April and July.

January or midwinter treatment is given because cattle are stressed by weather and possibly by poorer nutrition, pregnancy or nursing a young calf. These conditions may reduce the brood cow's resistance to internal parasites. This treatment will also reduce pasture contamination, and calves should be exposed to fewer infective larvae.

Early spring (mid-April) treatment is recommended because adult worm populations peak at this time. As weather conditions get warmer and dryer, infective larvae are less likely to complete their life cycle and many will be killed. This decrease in pasture contamination helps make a safe pasture.

The midsummer treatment given in mid-July should be the most effective. Life cycle activity of the larvae on pasture is very low; cows and calves are dewormed; and pastures should remain safe until cooler, wet weather. This is also the best time to treat for inhibited (Pre-Type 2) *Ostertagia*. Grub treatment can also be given at this time.

Another type of strategic deworming program used mainly in young cattle is deworming two to four times every three to five weeks, depending on which dewormer is used.

Normally, controlling parasites in cattle is done at the convenience of the producer. We talk about the cost of the dewormer, but most cattle aren't dewormed because of the trouble of penning and working, which is a big part of the cost. The producer who has adequate, convenient

facilities does a better job of internal parasite control in cattle. Combining the deworming with other health and management practices will make it all more cost effective, as long as cattle are not overly stressed.

In cow/calf operations, calving season will determine when cattle are worked, and deworming treatment should be an important part of the process.

Other recommendations are to deworm calves at 200 to 250 pounds and three to four months of age. This would fit the early spring schedule with fall calving or midsummer with spring calving.

Deworm calves again at weaning and repeat in three to five weeks, depending on the type of dewormer used and whether calves are placed on a safe pasture.

Deworm stocker cattle at turnout with a dewormer effective against Pre-Type 2 *Ostertagia* and repeat in three to five weeks if the cattle are not placed on a safe or clean pasture.

Dairy calves raised in dry-lot conditions, having not been exposed to infective larvae, should be almost free of internal parasites. Not being exposed, they would have no immunity and, therefore, no resistance. A negative fecal check may show that calves are free and, if placed on clean pasture, may not need deworming. If there is any question, deworm calves three weeks after turnout and, if the pasture is not safe, again in three to five weeks.

Dewormers

Many effective dewormers are approved and available for treating internal parasites in cattle (see Table 2). They vary as to their effectiveness against adult and immature stages. Methods of dosing vary, and this gives the cattleman a choice as to how he may treat the cattle.

For convenience, several products are available where working and handling the cattle are not required. These dewormers, in blocks, cubes, pellets and mineral mixtures, are economical and easy to use, especially in adult cows.

For these products to be effective when cattle are not being fed, the cattle need to be conditioned to the feeds carrying the dewormer. This allows the cows to adjust so their consumption will be even and adequate. This is especially true where the dewormer is given in a single dose. Some of the products are given over three days and chances of adequate dosing is better.

When cattle are dewormed individually, accurate weight determinations are critical to proper dosage. It is not necessary to weigh every animal, but spot weighing takes the guesswork away. If weight estimates are being used, be sure to use the heaviest weight if there is not a big difference in the weight of the cows.

Equipment to administer the individual dewormers should be accurate and in good working order. Care-fully check settings and calibrations before starting and periodically check while treating the cattle.

Most injectable dewormers are given subcutaneously (S/Q). Use a short needle, 3/4 inch long or shorter, no more than 16 gauge. Check these needles every few animals for burrs or dullness, which may cause abscesses. Changing needles often will help prevent this and also lessen the chance of passing infections between animals. Early local reactions may occur, but most are temporary.

Most producers use the loose skin along the neck for injection site. Behind and above the elbow is another good site for subcutaneous injection of dewormers, and reactions are not as bad or noticeable.

Boluses or pills have been used for some dewormers. Don't use these in calves since choking or lodging in the oral cavity may occur.

Dewormers in paste or jell form are very handy and easy to use, especially where small numbers of cattle are being dewormed. Place the product well into the mouth on the base of the tongue. Don't force the dewormer into the mouth because it might physically damage the upper throat or be forced into the lungs.

Dewormers in drench form are probably the least expensive. Where larger numbers are dewormed, automatic drench guns are used. A curved hook is available and it is not necessary to grab the mouth as in the case with straight dose syringes, balling guns or paste guns. Use care in giving the drench dewormer to prevent spitting out or injury as with the paste dewormers. The drench gun should be adjusted and calibrated when beginning and checked periodically for dose accuracy.

Some drenches must be mixed before using; follow directions closely. Periodic shaking or agitating will guarantee a consistent mixture.

Overdosing is not necessary. Today's dewormers have a good safety margin, but overdosing will only add to the expense of the deworming treatment.

Adequate care and storage of dewormers should receive close attention. Some dewormers must be refrigerated, others kept out of sunlight. All dewormers have an expiration date — check this when buying the product and when using it.

Overbuying by volume pressure may mean less per-dose cost, but if you buy too much, and the date expires, it will be wasted. Plan ahead and buy what is needed.

Resistance of internal parasites of cattle to some dewormers does not seem to be a problem. Failure of dewormers is normally caused by underdosing or using out-of-date or improperly stored dewormers.

Facilities

When individual deworming treatment is used to rid cattle of internal parasites, good facilities are a must. Working cattle on a scheduled basis, as needed, is determined by the adequacy and convenience of the working facilities.

Working facilities should be in a convenient area where cattle are pastured or kept. For convenience, facilities should be in the center of the area using lanes or traps so cattle can be easily penned.

Pens and handling areas should be large enough to hold the herd, both in size and strength of structure. Pens should be laid out where sorting and movement can be done with the least stress on animals and men, including shade or covering.

Crowding pens and chutes should be adequate to handle all size cattle with minimum turning around and piling on. Small crowding pens, with short lanes leading to the chute or head catch, work best. Head catches are necessary for accurate and safe dosing when boluses, drenches or injections are used. Open areas along the neck or low shoulder make subcutan-eous injections easier and safer. Arms can be injured when injecting between boards or bars.

When pour-on dewormers are used, cattle don't need to be restrained in a head catch but should be run in a chute where accurate dosage can be poured on the back.

Coccidiosis

Coccidiosis is a disease affecting the intestinal tract of cattle. It is caused by a tiny, one-celled organism and is a very serious parasitic problem in cattle under one year old, with an estimated cost to the U.S. cattle producer of \$50 million. The parasites can damage tissue, thereby causing blood and tissue loss and reducing food absorption and the ability to resist other infections. It can cause death in young cattle.

Life Cycle

The life cycle of the parasite is very complex, short and fast-spreading. Coccidia produce eggs (oocysts) in very large numbers, and the complete life cycle takes only 21 days.

The important things to know regarding the life cycle of coccidia are:

1. Calves ingest coccidial "eggs" (called oocysts).
2. The eggs hatch inside the animal and the coccidia develop through several life stages during which they damage the digestive tract.
3. Mature coccidia produce eggs which continue the life cycle.

By the time symptoms are noticed in calves, the disease is already widespread. Unlike other internal parasites, eggs may be picked up by cattle in contaminated forage, water or by licking themselves or other cattle soiled with contaminated manure.

Eggs are very hardy and will contaminate premises for a long time. Coccidiosis may strike any time of year, but most severe outbreaks occur in stressful weather, especially cool, wet months of fall, winter and early spring.

Symptoms

Clinical signs of coccidiosis include diarrhea tinged with blood and mucus. As the condition progresses, dehydration, anemia and general loss of condition becomes evident. With continued diarrhea, soiled hindquarters are evident. The calves may continue straining to have bowel movements. Weakened calves are very susceptible to pneumonia, and death will follow.

Diagnosis

Young cattle under stress conditions, in feed lots or close confinement or during cold, wet weather with bloody diarrhea should be considered infected with coccidia. Check stool samples for eggs (oocysts). The number of eggs is influenced by eggs ingested, stage of infection, age and condition of the animal and consistency of the fecal sample. Dead animals will show intestinal lesions and possibly eggs on scrapings.

Treatment

Some infections may be self-limiting and go away within a week if reinfection does not take place. Cattle should be treated early to keep contamination down and shorten the course and seriousness of the disease before secondary infections occur.

Early-treated calves have less chance of permanent damage to the intestinal tract, which can cause calves to be stunted.

Sulfonamides, Amprolium (Cordi^R) and Decoquinatate (Decox^R) are approved for treatment and prevention. In severe infections, fluids and other supportive treatment may be necessary.

Prevention

Prevention is based on controlling the intake of the eggs by young animals. Some exposure may be beneficial since the calf may develop immunity without having clinical signs of the disease. Keep young cattle in large, clean, dry areas and keep feed and water clean and free from manure contamination. Keep stress from weaning, shipping and sudden feed changes to a minimum, especially in young calves in wet, cool weather.

The products mentioned for treatment may be used at preventative levels, especially during stress times. Ionophores, Monensin (Rumensin^R) and Lasalocid (Bovatec^R) have shown to prevent coccidiosis.

Good management and prompt diagnosis and treatment will control coccidiosis.

Table 1. Common Internal Parasites of Cattle			
	Common Name	Scientific Name	Infective Stages
Stomach Worms	Brown Stomach Worms	<i>Ostertagia ostertagi</i>	Adults, Fourth Stage Larvae, Inhibited Fourth Stage Larvae
	Barberpole Worms	<i>Haemonchus contortus</i> <i>H. placei</i>	Adults, Fourth Stage Larvae
	Small Stomach Worms	<i>Trichostrongylus axei</i>	Adults, Fourth Stage Larvae
Intestinal Worms	Threadnecked Intestinal Worms	<i>Nematodirus spathiger</i> <i>N. helvetianua</i>	Adults, Fourth Stage Larvae
	Small Intestinal Worms	<i>Cooperia punctata</i> <i>C. oncophora</i>	Adults, Fourth Stage Larvae
	Hookworms	<i>Bunostomum phlebotomum</i>	Adults
	Bankrupt Worms	<i>Trichostrongylus colubriformis</i>	Adults
	Nodular Worms	<i>Oesophagostomum radiatum</i>	Adults
Lungworms		<i>Dictyocaulus viviparus</i>	Adults, Fourth Stage Larvae
Liver Flukes		<i>Fasciola hepatica</i>	Adults
Tapeworms		<i>Moniezia benedeni</i> <i>M. expansa</i>	Heads, Segments

Table 2. Approved Dewormers for Cattle							
Generic Names	Ivermectin	Levamisol	Thiabendazole	Albendazole	Fenbendazole	Morantel tartrate	Oxfendazole
Trade Names	Ivomec	Levasole Tramisol Ripercol Totalon	Omnizole TBZ Thiabendazole	Valbazen	Panacur* Safe-Guard	Rumatel, Nematal	Synanthic
Manufacturer	MSD-Agvet	Pitman Moore, American Cyanamid	MSD-Agvet	SmithKline Beechum	Hoechst Roussel	Pfizer	Syntex
Dosage Forms	Injectable pour on	Drench, bolus, paste, injectable pour-on, feed cube	Drench, bolus, paste, feed pre- mix & top dress	Drench paste	Drench paste, feed block minerals	Bolus, feed pre-mix	Drench 22.5% 0.06%
Slaughter Withdrawal	49 Days	2-9 days	3 days	27 days	13 days	14 days	7 days
Effective Stomach and Intestinal Roundworms							
Adults	ALL	ALL	ALL	ALL	ALL	ALL	ALL
Young Immature	ALL	MOST	MOST	ALL	ALL	MOST	MOST
Ostertagia Type 2	ALL	NONE	NONE	ALL	Panacur* 10 mg level	SOME	ALL
Lungworms	ALL	ALL	FEW	ALL	ALL	NONE	ALL
Tapeworms	NONE	NONE	NONE	ALL	ALL	NONE	ALL
Flukes	** NONE	NONE	NONE	ALL	NONE	NONE	NONE
Comments	Has a 2 wk. residual effect. Some external parasite control	** When combines with clorsulon will control flukes			*requires veterinarian's prescription	Approved lactating dairy cattle	22.5% prescription drench or injected into rumen

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