37 Internal Parasite Control

Justin Talley

Objectives

- **Realize potential negative impacts of internal parasites.**
- **Understand the biology of internal parasites.**
- **Present types of medications used to control internal parasites.**
- **Develop an understanding of the goals of a strategic deworming program.**
- **Concepts to consider when developing deworming programs for cattle.**

Veterinarians and producers realize the potential negative impact internal parasites can have on cattle performance, health, well-being and economic return. Parasitism can have subclinical effects such as suppression of the immune system, reduced weight gain, reduced conception rate and reduced milk production along with clinical effects such as anemia, diarrhea, rough hair coat and death.

Basic background information will be provided in this chapter to assist ranchers in understanding the biology of internal parasites. This information is a must before one can begin to develop a strategic deworming program. There are many different species of parasites and they vary considerably in their economic importance and life cycle. The focus will be primarily on gastrointestinal (GI) parasites (commonly referred to as stomach worms, intestinal worms or gut worms) involving the abomasum and the small and large intestines, liver flukes and the components to develop a strategic deworming program.

Internal Parasite Life Cycle

There are several stages in the life cycle of gastrointestinal worms (Figure 37.1). Part of the parasite's life is spent living inside the host animal and part in the environment outside the host. The life cycle can be grouped or divided into general stages:

- Developmental/free living stage.

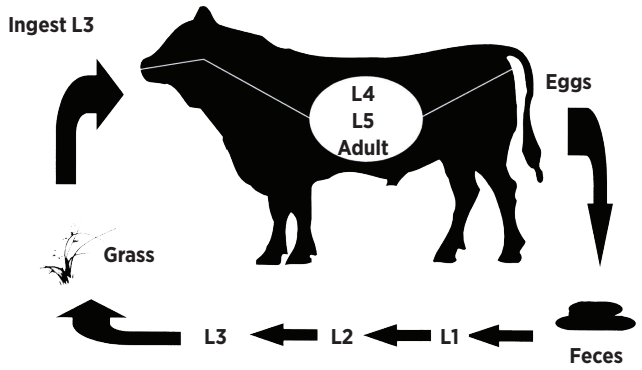

Figure 37.1. Life cycle of gastrointestinal worms.

  1. Outside the host and includes the egg and three larval stages (L1, L2 and L3).
  2. Significant portion of the parasite population in this stage.
- Prepatent stage/pre-adult.
  1. Inside the host and includes the ingested infective larval (L3) stage and the (L4) and (L5) stages.
  2. L4 can go into hypobiosis or arrested stage if outside environmental conditions are unfavorable for continuation of the life cycle (lengthening the period from ingestion to adult).
- Patent (adult) stage.
  1. Inside the host and has male and female worms that mate and produce eggs.
  2. Adults have a finite life span.
- Duration of prepatent period—ingestion of infective L3 → production of eggs.
  1. Duration of three weeks to four weeks in young cattle: ingest (L3) to produce eggs without hypobiosis.
  2. Duration of four weeks to six weeks in adult cattle: ingest (L3) to produce eggs without hypobiosis.

It is important to understand how these stages of the parasite interact with the environment, which stages can cause damage in the animal and the length of time the parasite spends in certain stages of its cycle.

There are gender distinctions in the adult stage of gastrointestinal worms: male and female. The adults

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have a finite life span and spend their entire adult life in the digestive tract of the animal. After the female worm matures, she mates with the male to produce fertilized eggs (ova). A fertilized egg is passed into the environment from the animal through the manure. The developmental stage of the parasite's life cycle begins once the egg exits the animal and is deposited in the environment.

Once in the environment, the egg develops into the larval stage. The manure pat provides the necessary nutrients and a suitable environment for its development. The three larval stages of the parasite during the developmental period in the environment are designated as L1, L2 and L3, which correspond respectively to the 1st stage larvae, 2nd stage larvae and 3rd stage larvae. The L1 and L2 larvae are not infective to the animal. The L3 larvae can infect cattle and frequently are referred to as the infective larval stage, or infective L3. Larvae can accumulate in the environment to a large infective dose or challenge for the animal.

During the period outside the host, warm moist environmental conditions favor development of the larval stages. Larval stages are vulnerable to desiccation (drying out). Survival of the larvae is dependent on moisture, as is its ability to migrate onto forage to be consumed by a grazing animal. The moisture is most commonly in the form of rain or dewdrops. In the continental U.S., spring and fall generally equate to warm, moist conditions. Thus, the spring and fall seasons favor development of the parasite. The optimal temperature range for development of the parasite is 45 F to 85 F.

Parasites have adapted unique characteristics, allowing them to take advantage of the environment and cattle behavior during the developmental/free living stage. These unique characteristics equip the parasite to survive and complete its life cycle by infecting animals. One of the parasite's unique characteristics takes advantage of the grazing behavior of cattle and involves the movement of the larvae away from the manure pat. Cattle normally do not graze adjacent to a fresh pile of manure. It can be reasoned that the fresh odor might be offensive to the animal's sense of smell. As the natural decay and breakdown of the manure pat occurs, nutrients are dispersed into the soil. The plants adjacent to the manure pat take up the nutrients and with adequate moisture, become more succulent and nutritious for the grazing animal to consume. The plants are more appealing to cattle and the cattle begin to graze closer to the manure pat. In the L3 stage, the parasite can migrate away from its original location in the manure pat onto a blade of grass, increasing its chance to be consumed by a grazing animal. The transmission of the L3 larvae normally does not occur in dry lot production situations.

Another adaptive characteristic parasites have developed is the ability of the larval stage to survive on pasture grass and overwinter until the following spring. The larvae can survive for long periods of time in the fecal pat or the vegetative mat of the pasture. The third stage larvae/L3 larvae can survive freezing conditions and some species are resistant to hot, dry summers.

When springtime arrives, the infective larvae that have survived the winter are available for consumption by cattle along with the larval forms developed from eggs laid by infected cattle. This increase in the number of infective L3 on the pasture increases the likelihood of infecting grazing animals.

Once consumed by the grazing animal, the infective larvae (L3) are transported to an area of the digestive tract where further growth and development of the parasite occurs. Every species of internal parasite has a particular area of the digestive tract that is most ideal for its survival and further development. This area in the digestive tract is known as the predilection site. Upon arrival to the parasite's predilection site, larval development continues into a fourth stage or L4 larvae. At this stage, the larvae can follow one of two different paths of development.

When environmental conditions outside the host are NOT conducive for continuation of the parasite life cycle, for example extreme cold (fall/winter in northern latitudes) or extreme hot weather (late spring/summer in southern latitudes)—further development of the L4 larvae inside the host GI tract is inhibited. This inhibition of further development also may be affected by day length. This inhibition of development is termed hypobiosis. If the larvae become inhibited or arrested in their development, they are said to be in a hypobiotic or arrested or inhibited state. Some species (brown stomach worm, *Ostertagia ostertagi*) may enter the stomach or intestinal wall and become encysted within the glands of the digestive tract wall. Further development and maturation is halted until the environmental conditions outside the host are favorable. Once conditions become more conducive and the parasite's offspring have a better chance of reaching maturity, development continues and the encysted larvae reenter the gastrointestinal tract. The hypobiotic larvae then mature into a L5 or young adult. Damage to the animal's digestive tract may occur when parasites emerge from infected tissue.

This damage may be permanent and affect future production. The decrease in production is generally caused by local irritation of the stomach or intestinal tract or to hypersensitivity (allergic) reactions with continued exposure to the internal parasites. This often occurs when large numbers of encysted larvae reenter the gastrointestinal tract through a short period of time. The season for this arrested development of L4 varies in the continental U.S. and is dependent on where the cattle are raised.

In southern U.S. climates, parasites often enter hypobiosis in the summer with a subsequent increase in maturation of parasites and subsequent increase in pasture contamination in the fall. Summer in the southern areas of the U.S. is a harsh season with very hot temperatures, very dry to drought conditions and minimal lush forage growth. Thus, L4 potentially will arrest its development in cattle during the summer season in the south. If cattle are raised in middle latitudes of the U.S., hypobiosis can occur in either the summer or the winter season, depending on the environmental conditions.

In northern U.S. climates, parasites often enter hypobiosis in the fall with a subsequent increase in maturation of parasites and subsequent increase in pasture contamination in the spring. Winter in the northern

latitudes of the continental U.S. is a harsh season with cold temperatures and no lush growth of forages. This type of environment is not conducive to survival of the internal parasite. Therefore, L4 potentially will go into a hypobiotic state during the winter season in northern climates.

When the environmental conditions are conducive for the parasite's life cycle to continue, hypobiosis often does not occur and the parasite's life cycle continues from the ingested L3 to L4, then L5 or young adult stage. The young adults mature into adult parasites capable of producing fertile eggs. Male and female adults mate and produce fertile, potentially viable eggs. Thus, the cycle continues.

The period of development from ingestion of infective L3 until the adult parasites mature and are able to produce viable eggs is referred to as the prepatent period. It is extremely important for anyone involved in developing a strategic deworming program to understand the length of time for this period in the development of the parasite. It is the prepatent period, along with the mechanism or mode of action of dewormer medications that determine the appropriate time to deworm cattle. The length of time the parasite spends in the prepatent period is dependent upon the species of parasite, age of the host animal and outside environmental conditions, which might affect hypobiosis. For young cattle, the prepatent period of most of these parasites is generally three weeks to four weeks. For adult cattle, the prepatent period is generally four weeks to six weeks. The reason for a shorter duration to maturity for the parasite in younger animals is because the younger stock have not been exposed to the parasites to the extent of adult cattle in normal field conditions and thus, have not developed any appreciable degree of immunity.

Cattle Immunity and Preventive Health Programs

Although immunity to internal parasites develops with time in most cattle, adult cattle still harbor internal parasite infections. Veterinarians have done an excellent job communicating to producers the importance of a protective immune response in farm animals. Thus, most producers understand the importance of animals developing an adequate immune response to certain disease causing agents known as pathogens. Vaccines are administered prior to exposure to these agents, so animals can develop a memory immune response.

As discussed earlier, internal parasites have adapted unique characteristics to survive harsh conditions and allow them to perpetuate their species. With normal conditions as an animal grows and matures, it is continually exposed to a certain level of parasitism. This continual exposure to the parasite causes an immune response in a normal individual animal with a competent immune system. The type of immunity that develops will not necessarily eliminate the worms from the animal's digestive tract, but will suppress the reproductive capability of the internal parasite and reduce the infectability of newly acquired parasites. The adult animal can still have internal parasite infections, just fewer of them. The internal parasites can still reproduce; however, they will generally produce fewer eggs than parasites that infect younger nonimmune cattle. Therefore, adult cattle can still be a major source of pasture contamination for younger animals. Most parasitologists and veterinarians consider young cattle to be less than two years of age and adult cattle to be more than two years of age.

Classes of Dewormers

In the U.S., dewormer medications can be grouped into one of four primary classes of compounds, depending upon their mode or mechanism of action. The four classes of dewormers include the benzimidazoles, the imidazothiazoles, the macrocyclic lactones (MCL) and the tetrahydropyrimidines. Examples of the active ingredients in each class of compounds are provided in Table 37.1. Within each class of drugs, there are several different active ingredients (or individual chemicals). In general, the different active ingredients may possess unique characteristics compared to other actives within each class of compound. But within a class of drugs, the modes or mechanisms of action will be the same.

One of the distinguishing characteristics between the different active ingredients that is important when developing a deworming program is the residual killing activity. The residual killing activity refers to the period of time after a product has been administered that it will still kill the parasite if infective larvae are ingested. The residual killing activity may or may not be beneficial in all management situations. The time period can vary slightly between different species of internal parasites. Producers must work closely with their veterinarians to develop a preventive health program that meets their individual needs (Williams). Follow label recommendations for storage of deworming medications. Avoid excessive heat, cold and exposure to light to maintain effectiveness of medications.

Resistance to Dewormers

Documented resistance or tolerance to dewormer medications among the GI parasites of cattle is a concern for producers and veterinarians. Resistant parasites are not killed by dewormer medications at the rate of non-resistant parasites and this resistance can be passed or inherited from one generation of parasites to the next.

Table 37.1. Examples of active ingredients in the different classes of dewormer medications.

Benzimidazoles:	**Imidazothiazoles:**
Albendazole	Levamisole
Fenbendazole	
Oxfendazole	
Macrocylic Lactones:	**Tetrahydropyrimidines:**
Doramectin	Morantel
Eprinomectin	
Ivermectin	
Moxidectin	

Veterinarians and veterinary parasitologists are shifting their views on parasite control from one of parasite elimination to one of parasite management. Discuss the implications of any parasite control program with your veterinarian before implementation. Recommendations/ approaches to reduce parasite resistance may focus on:

- All treated animals must receive the calculated therapeutic dose (underdosing cattle may select for resistance).
  1. Weighing the animals allows for the calculation of the recommended dose of deworming medication or treatment.
  2. Though easier to administer the drug, absorption of topical/pour-on dewormers is quite variable, therefore other modes of administration such as injectable and oral routes are preferred or recommended (Leathwick).
- Monitor effectiveness of dewormers using fecal egg count reduction tests (FECRT) to determine if treatments achieved the expected efficacy.
- Consider selective treatment of different classes/ages of animals and not blanket treatment at a location.
- Consider NOT using different classes of dewormer on commingled cattle at intervals of less than two months.
- Consider leaving a portion of cattle untreated.
- Consider thoughtfully timed alternating classes of dewormers.
- Consider simultaneous use of multiple classes of anthelmintics versus single class anthelmintics or dewormers (Yazwinski et al. and Gasbarre).

Internal Parasite Control

Controlling internal parasites is a difficult balancing act between practical management and reducing anthelmintic resistance for cattle. Some considerations for developing a well-rounded internal parasite program should include the following:

1. Understand the three categories of how internal parasites impact cattle which are a) infection, b) economic and c) clinical (Craig)

   Infection: Certain cattle will always have a level of parasitism present but are not affected by those internal parasites usually due to immunity. This is known as infection. However, these animals can contribute to sustained parasite deposition onto pastures, so deworming these animals does little benefit to these individual animals but are beneficial to more susceptible stock such as calves and yearlings.

   Economic: There are several benefits of maximizing production efficiency in animals that are affected by parasites due to the economic impact the parasites are causing on the cattle operation. At certain times of the year, the benefit of deworming is to maximize efficiency by reducing the economic impact the parasites might cause within the production system. Usually, when the economic impact of parasites is considered, then the deworming program occurs with a specific management practice of scheduled deworming that either occurs once a year in the spring or twice a year with an anthelmintic application in spring and again in the fall.

   Clinical: The impact of having cattle exhibiting clinical signs of parasitism is the economic impact has already occurred and these animals are contributing to pasture contamination. So treating these animals is primarily to recover them without the benefits of increased performance or reduced pasture contamination.
2. While most deworming programs aim to reduce pasture contamination and increase the performance of the animals, there is increasing evidence that demonstrates deworming programs should be designed in a manner to reduce anthelmintic resistance.
3. Designing a deworming program that takes into consideration the benefits of reduced pasture contamination, increased performance and managing anthelmintic resistance can be as simple as knowing the chemical class the dewormer belongs to and not overusing products in one particular chemical class. For example, using white oral dewormers (benzimidazoles) continuously without utilizing products from the macrocyclic lactones can lead to parasite benzimidazole resistance and reduced performance due to the resistant worms.
4. Another consideration for managing anthelmintic resistance is utilizing the concept of refugia which can be impractical but obtainable when implementing deworming programs. Refugia is defined as proportion of the parasite population that is not exposed to a particular anthelmintic, which then allows those worms to escape selection pressure for resistance (Van Wyk). The impractical aspect is not deworming a certain number of animals and the obtainable aspect is some animals are not affected by certain parasites due to immunity. Consider animals that are not consistently co-mingled with high risk stock (calves, yearlings, replacement heifers) and reduce the number of animals receiving a dewormer.

Recommendations:

1. Work with your veterinarian to develop a comprehensive deworming program.
2. Understand the different classes of dewormers available in the cattle sector.
3. Consult with your veterinarian to conduct a Fecal Egg Count Reduction Test (FECRT) to determine how well your current dewormer is performing .
4. If the FECRT demonstrates low efficacy of a product then do not use the same product year after year as this will lead to resistance.
5. Consider utilizing injectable or oral applications when available.
6. Understand when new animals are brought into your herd, new parasites come with those animals.
7. Consider submitting fecal samples to your veterinarian from at least 10 animals in each herd so they can give you a description of the parasite burden within your herds.

Adult Cattle Deworming Recommendations

The recommendations for adult cattle more than 2 years of age, including breeding or herd bulls, assumes the purpose of the adult cattle in a herd is to produce offspring for replacements and/or marketing beef and the production of the offspring should be as efficient as possible. Controlled studies documenting a direct performance benefit of deworming adult cattle have produced inconsistent and varied results. With normal conditions, it is difficult to justify the practice of deworming adult cattle strictly from a performance benefit to the individual animal. However, pasture contamination should be of prime concern. Even though adult cattle develop a degree of immunity, they can be a significant source of pasture contamination for young stock. A non-treated cow and her non-treated calf may deposit millions of eggs onto a pasture in a grazing season. Even if only a small percentage of eggs hatch and the larvae survive, infective L3 larvae on the pasture are able to re-infect the donor or other animals in the pasture.

When adult and young cattle graze pastures simultaneously, producers should consider deworming the adult animals prior to turnout, minimizing pasture contamination with parasite eggs. If the adult cattle were dewormed the previous year in late fall or winter and the likelihood of acquiring an infection is minimal, the adult cattle should contribute very little to the initial contamination of the pasture at spring turnout. The pasture however, would still have some L3 infective larvae that would have survived through winter. Therefore, the adult cattle would acquire L3 larvae when they start to graze. As the prepatent period for the adult animals is four weeks to six weeks, the adult cattle would then start to contribute to pasture contamination after four weeks to six weeks from turn out. In situations where adult and young cattle graze together, the adult cattle should be dewormed at four weeks to six weeks after turnout to decrease the level of pasture contamination. If the medication has no residual killing activity, it will be another four weeks to six weeks (prepatent period is four weeks to six weeks) until cattle will start to shed fertile eggs and contribute to pasture contamination. Using the time interval of six weeks, plus another six weeks will be approximately 90 days of allowing the younger stock to graze parasite-safe pastures. If the dewormer medication has a longer residual killing activity such as two weeks to four weeks, then it would be eight weeks to 10 weeks after the administration before the adult animals would start to contaminate the pastures and the younger stock would be allowed parasite-safe grazing.

If the deworming history of adult cattle is unknown or they were not dewormed after summer/fall grazing, then they would be considered infected and could contribute to early pasture contamination. In this instance, producers should administer a deworming medication prior to turn out for spring grazing to eliminate the adult population as a source of early pasture contamination. If the dewormer medication did not have any residual killing activity, then the adults would start to contribute to pasture contamination four weeks to six weeks after turn out. If the dewormer medication has a longer residual killing activity, the amount of time would be added to the period after turn out to determine when the adult animals would start to contribute to pasture contamination.

Another situation indicating the need for deworming adult cattle occurs during the winter season, after the period of summer/fall grazing. During the winter in most of the continental U.S., adult cattle are provided hay and possibly a supplement. Feed expense generally accounts for the largest percent in the cost of raising or maintaining cattle, thus producers want the most benefit possible from the feedstuffs. Therefore, it is frequently recommended to administer a dewormer to the adult herd after the fall grazing period. This also will allow the adult animals to be considered fairly free of internal parasites at spring turnout onto summer grazing pastures.

Young Cattle Deworming Recommendations

Young cattle (less than 2 years of age) are the next group to consider when developing a deworming program. Milk is the primary source of nutrition for neonatal calves. The young calves learn grazing behavior from their dams starting at a few weeks of age. A rule of thumb to use regarding the time or age when young calves might benefit from the administration of a deworming medication is approximately 2 months of age or approximately 200 pounds of body weight. Studies have shown deworming the cow and her calf at this time (early grazing) provides a significant economic return. Calves less than 2 months of age or 200 pounds generally do not need to be treated for internal parasites. However, in certain conditions, such as severe drought or lack of milk production from the dam, young calves will start to graze earlier and can potentially develop internal parasite infections that affect their growth and production. In such instances, the diagnosis of parasitism must be confirmed by the veterinarian and appropriate medications administered to treat the problem. If conditions are such that a change in management would promote improved health and well-being of the animals, changes should be implemented.

If young calves are more than 2 months of age or more than 200 pounds at spring grazing turnout, one can assume they will start to acquire internal parasite infections on day one of grazing. With most production systems for fall-born calves, the chance of acquiring infective L3 during the winter months is minimal. From a practical standpoint, the calves will be weaned in early spring. A deworming program as described for weaned cattle less than 2 years of age will generally work best for those calves. They will start to contribute to pasture contamination three weeks to four weeks after turnout (prepatent period is three weeks to four weeks). The young cattle need to receive a dewormer medication at that time. If the dewormer medication does not have any residual killing activity, then the calves can start to acquire infective L3 and start to contaminate the pasture in another three weeks to four weeks. Therefore, the young calves will need to be administered another dose of dewormer medication at that time. With this dose, the calves will not contribute to the contamination for another

three weeks to four weeks. Thus, a total of nine weeks to 12 weeks (60 days to 90 days) will be allowed for the calves to graze parasite-safe pastures. If the dewormer medication has a residual killing activity of two weeks to four weeks, then the pasture contamination from these calves will be six weeks to eight weeks after their initial treatment. Consult a veterinarian and refer to product labels to determine the residual killing activity of the various products.

Weaned Cattle Deworming Recommendations

In a scientifically controlled study, beef steers were evaluated during the grazing period (118 days) through the finishing period (average 121 days) to harvest (Smith). The steers were purchased from various auction markets, grazed in southeastern Oklahoma and finished at a feedlot in Colorado. During the grazing trial, steers were grouped into a non-treated control group and a strategically dewormed group. At the conclusion of the grazing period, the strategically dewormed steers were 48 pounds heavier than the non-treated steers (Smith). With most stocker programs, deworming at turnout provides a good economic return.

During the finishing phase of production, both pasture treatment groups were randomly assigned to groups that either received a treatment of dewormer medication or were assigned to untreated control groups. The group that was dewormed during the grazing period and dewormed in the feedlot gained 103 pounds more than steers that never received a dewormer medication (Taylor). Steers that were strategically dewormed on pasture but did not receive any further treatments were 83 pounds heavier than the untreated control group (Taylor). Steers that were not administered a dewormer medication during the grazing period, but were administered a medication during the finishing phase were 63 pounds heavier than the control group (Taylor). The steers treated during the grazing and finishing phases of production produced the heaviest hot carcass weights, larger rib eye area and the highest marbling scores of the groups involved in the trial (Taylor). The internal parasite control program for weaned cattle less than 2 years of age (weaned calves, yearlings, replacement seedstock) is straightforward because the prepatent period will be the same, three weeks to four weeks, for all cattle.

Liver Flukes

Liver fluke infections can have an economically important effect on cattle production. They can impact health and productivity by reducing feed efficiency, weight gain, reproductive rates and responses to vaccinations (Zimmerman). Flukes can cause a loss of condition, anemia, bottle jaw and death. More importantly, they may be associated with liver condemnation at slaughter.

The liver flukes are geographically and topographically restricted in their distribution, unlike the more common internal parasites of cattle. Adult flukes reside in the bile ducts of the liver, passing eggs in the manure. The egg hatches and releases a free-swimming form that seeks out and penetrates a particular aquatic snail intermediate host. The tadpole-shaped cercariae (fluke stage) emerge from the snail and encyst on vegetation, inanimate objects, ideally in aquatic and high-humidity environments. The liver flukes are observed in areas maintaining populations of aquatic snails, as the snails are required for the life cycle and are an intermediate host for the flukes. Coastal marsh areas, irrigated pastures, streams and river valleys can support the snail intermediate hosts.

Depending on the product, both adult flukes and immature forms may be removed by treatment. Timing of administration is critical to controlling the fluke population in your herd. Proper timing of treatments varies with geographic areas. Consult a veterinarian for proper timing of administration of dewormers. Because the fluke life cycle includes snails, restricting access to snail-infested areas may be an important part of the control program.

Other Recommendations

Besides the administration of dewormer medications, other control measures have been investigated and utilized throughout the world with promising results. One method is to use rotational grazing, where cattle are rotated from one pasture to another during the period of time the animals will consume minimal numbers of parasites, hence grazing parasite-safe pastures. The use of rotational grazing also can increase the amount of forage harvested from a pasture and generally increase production efficiency. Some drawbacks to using rotational grazing systems include an increase in the amount of labor involved in moving the animals frequently, an increase in fencing costs and sometimes an increase cost of supplying water to the herd. Due to some parasites ability to survive for long periods of time, permanent pastures may have to be vacated for extended periods to prevent reinfestation. Alternatively permanent pastures can be baled for hay or tilled for wheat, etc. to reduce pasture contamination.

Another control method that has been used with beneficial results to control internal parasites is the rotation of species allowed to graze the pastures. This is effective because most parasites are species specific. For example, cattle parasites cannot survive when ingested by horses, goats or sheep. The species are rotated on a seasonal or annual basis. Small ruminants such as sheep and goats, along with horses are commonly used in a rotational sequence in this type of control system. In the U.S., most producers would not be able or willing to utilize this type of control method. However, in parts of the world where internal parasites prevent certain species from surviving on some pastures, this type of production system allows the producer to utilize available pastures.

Farmers and ranchers should consider selecting for parasite-hardy cattle. It has been found the majority of parasites are shed by only a small number of adults. Consider culling the animals that shed large numbers of parasite eggs.

Conclusion

Modern beef cattle production is considered a business. In general, optimal health is required for efficient production of cattle. Thus, recommendations about deworming programs must be justified from a cost-benefit viewpoint. Also, the development of anthelmintic resistance must be addressed by working with your veterinarian so deworming tools are not lost due to misuse or overuse of certain products.

Dewormer resistance is present but can be managed in cattle production systems. Anthelmintic resistance occurs because certain parasites have genetic features that allow them to respond to chemical attack (Kaplan). Another feature that allows resistance development is the high level of genetic diversity due to rapid development of population sizes (Kaplan). These two features not only allow parasites to survive deworming applications but also pass along those resistant genes to worms in different individual animals. Thus, it is important to manage resistance through management practices such as working with your veterinarian to determine if resistant populations are present in your herd by conducting regular fecal egg counts or fecal egg count reduction tests. Other management practices include the use of refugia (not treating certain animals), pasture management (burning, rotational grazing) and mechanical disruption of manure to reduce parasite development.

Cow-calf producers are frequently challenged to develop a parasite control program including both the adult cows and young calves. Theoretically, the cows should be dewormed based on the prepatent period of four weeks to six weeks and the calves on the prepatent period of three weeks to four weeks. However, in practice, the cows are frequently administered a dewormer medication at the same time as the calves, so pasture contamination is minimized. A significant percentage of most parasite populations is in the environment, not the final host. It is an important goal of the control program to reduce pasture contamination, reducing potential future exposure.

Because of the various factors involved in developing a practical control program, it is strongly recommended farmers and ranchers work closely with their veterinarians to develop a customized control program that will be most beneficial. A cheaper product may not necessarily equate to more profit. Select a dewormer meeting needs and backed by sound research data.

Endnote

Special thanks to Mason V Reichard, PhD, Veterinary Pathobiology, College of Veterinary Medicine, Oklahoma State University for reviewing this chapter.

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