



# Internal and External Parasite Control

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## Lesson 2

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### Introduction

Parasites, if uncontrolled, can produce significant losses in production and efficiency in cattle of all ages, and in extreme cases, can cause death. Typically, mosquitoes' impact on cattle production is considered trivial, as each blood meal is approximately 0.0039ml. However, in cases of large swarms, mosquitoes have been known to kill cattle overnight.

Some parasites suck blood, and will increase the host's requirement of energy and protein for maintenance. Some parasites are simply so irritating that cattle would rather huddle up in the heat of the day, to try to rid themselves of the pests, rather than graze and gain. Still others exist in the animal's system, acting fairly benignly, yet robbing nutrients from the host, that could be used for maintenance and production. Elimination or control of these parasites will result in improved production in every stage of the cattle production system.

### External Parasites

Flies can transmit all manners of diseases through bites or feeding on other bodily secretions. The large flies (tabanids: horse flies, deer flies, yellow flies, etc.) can transmit many blood borne diseases (anaplasmosis, bovine leukosis virus, anthrax) as a result of their large, slicing, and painful bite and the large blood meal that they take from each host. Face flies increase the extent and severity of pinkeye in a cattle herd by sharing the bacteria from the tear secretions of an infected animal with an unaffected herdmate.

Horn flies are a constant source of irritation for cattle during the warmer months of the year. Typically, cattle dealing with a horn fly vexation will have lower gains and lower milk production than those cattle that are protected with some form of insecticide.

Heel flies are rather large and resemble a bumblebee, and they are fairly innocuous; the only harm that they cause is that of frightening cattle when they attempt to land to lay their eggs. However, their larva (cattle grubs) can be a bit of a problem. The migration of the larva from the heel of the cow all the way up to the top of her back, can result in damage to the hide. Also, in a rare occasion, these grubs can migrate to the wrong location, such as the spinal cord, and cause paralysis, and eventual death, in the unfortunate animal.

Mechanical methods of fly control have been experimented as well. Horsefly traps, deer fly traps, and horn fly traps have all been designed and their effectiveness tested. Most of these traps require active use by the cattle and/or the producer. They are not as effective as insecticides applied to cattle, but may be used in some situations, to alleviate the total fly burden in the environment. Detailed descriptions of these traps may be found online at various extension websites.

Biting and sucking lice can drive cattle to madness, and treatment in the face of an infestation is a must, else the cattle mutilate themselves in an attempt to relieve the irritation. Two treatments, 14 days apart, is usually required for elimination of a louse infestation, unless the product used for treatment has sufficient duration of activity to eliminate the first generation of lice that hatches after treatment is instituted. Usually infestations are manifested most often in late winter and early spring. Refer to the product label for information relating to the duration of activity against the parasite you are attempting to control.

Chorioptic mange mites can cause similar problems as lice, however, the areas of scratching and hair loss tend to be centered around the rear end of the beast (tailhead, escutcheon, inside rear legs). Psoroptic mange and Sarcoptic mange are reportable parasites in some states. In other words, positive identification of mange in cattle caused by these species of mites, should be reported to the state board of animal health and the United States Department of Agriculture. These species of mites can cause serious disease in other host species, and therefore, control is important in minimizing spread to those hosts.

Ticks also transmit bacterial infections from feeding on an infected host in an immature form, and subsequently feeding on an uninfected host in the next stage of its life cycle. The most widely known and highly publicized of these transmissions is that of *Borrelia burgdorferi*, the causative agent of Lyme Disease. Ticks have also been implicated in the transmission of Rocky Mountain Spotted Fever, Q Fever, babesiosis, and tularemia, to name a few. These parasites are also rarely host specific, meaning that they will feed on nearly anything that passes by, thereby making tick control rather challenging.

## Internal Parasites

**Protozoans.** The trematodes (flukes), cestodes (tapeworms), and nematodes (round worms) are usually the creepy crawlies that come to mind when a discussion of internal parasites arises. However, one must not forget about the protozoal parasites (coccidians, *Neospora*).

In cattle nationwide, infection by protozoal parasites results in major economic losses due to neonatal calf scours. Coccidiosis will typically affect calves at 21 days of age or older (even though infection occurred at birth), and can also be seen in feedlot cattle. Due to the nature of the life cycle of this bug, coccidiosis will cause sloughing of the lining of the gut, and blood will be noted in the scours.

After a time, the calf's immune system will learn to keep the parasite under control, but will never clear the infection. At times of increased stress, the adult host immune system will experience some level of suppression, as a result of the stress, and will increase shedding of the coccidians in their feces. Thus, the level of contamination in the environment is increased. This is how transmission is able to occur efficiently from cow to calf.

Coccidiosis can be treated with amprolium, monensin, and will also respond to oral administration of sulfa drugs.

The parasite that causes coccidiosis is rather specie-specific, in other words, only cattle will get sick from cattle coccidian. However, the parasite that causes cryptosporidiosis is highly infective for human beings. This is very important to note for anyone that is treating sick calves. Those individuals who have compromised immune systems should use caution when handling calves infected with *Cryptosporidium*, as infection may result in life-threatening diarrhea in the unfortunate individual. Immune system suppression may be caused by a variety of factors (organ transplant, cancer therapy, HIV/AIDS, treatment for autoimmune diseases such as rheumatoid arthritis, etc) and care should be taken to avoid exposure.

Cryptosporidiosis is fairly punctual in regard to expression of clinical disease. Typically calves will begin to scour at 8 to 16 days of age, and, if the first calf starts at 11 days of age, the rest of the calves will likely start scouring at the same age.

There is no approved treatment for cryptosporidiosis, however, there are benefits to treating scouring calves with sulfa drugs.

The most important way to help a scouring calf is not through the use of anti-infectives, but through supportive therapy. In the case of any calf scours, first and foremost, hydration status needs to be corrected. Dehydration is the cause of death, not the parasite. A 100 pound calf that is 10% dehydrated will require replacement of 11 liters of water in one day!

The next important step in supportive therapy is to correct the acid state of the calf's body. This can be accomplished with commercially prepared electrolyte solutions or by simply adding baking soda to the drenching bag when replacement fluids are administered.

The third most important step in supportive therapy is to provide some type of energy source for the calf, so that it can make steps toward recovery. This may include milking the dam of the calf and tube feeding it (if the cow is agreeable), or inclusion of milk replacer in the therapeutic plan. Consult with your herd veterinarian on the best management practices for dealing with calf scours in your production system.

*Neospora* is a protozoal parasite for which there is no treatment. Cattle that are infected with this parasite, will have reproductive problems, which are transmitted from dam to calf, in utero, with extreme efficiency.

Initial exposure of the parasite occurs from inadvertent consumption of contaminated fecal matter from canids (dogs, coyotes, wolves, or fox) by the cow. The parasite has strong affinity for the uterus, and will take up residence there; causing abortion of the fetus, or various birth defects in the subsequent calf that is born. After initial exposure, the cow is unable to clear the infection in her uterus, and has a 25% chance of aborting her next pregnancy. If she does calve normally, her calf will also be infected, and if it is a female calf, that calf, as an adult, will have a 25% chance of aborting if she becomes pregnant, and she will also pass the parasite to her calves during gestation.

Control measures for *Neospora* should be instituted if infection is suspected or has been positively diagnosed. The best control for this parasite is culling the infected cows and minimizing exposure to contaminated feedstuffs. This requires proper disposal of all aborted materials, so that the infected tissue is not scavenged by canids, wild or domestic, and thus decreasing the environmental load of *Neospora*. Minimizing canid access to stored feed is also very important, though difficult to accomplish.

**Trematodes.** Trematodes, or flukes, can be acquired by ingestion or skin penetration (swimmer's itch). Flukes that affect cattle are acquired by ingestion of vegetation or insects that carry the immature form of the fluke. Flukes of greatest economic concern for the beef industry in the United States are the liver flukes. One fluke in a liver results in the condemnation of that liver in any U.S.D.A. inspected processing facility. According to the National Beef Quality Audit of 2000, 30.3% of livers were condemned, and 21.7% of those condemnations were due to the presence of liver flukes.

Migration of many immature flukes through the liver can cause "Black Disease", which can kill the host very quickly. In more chronic cases, migration of liver flukes damage the liver enough that it is unable to perform its functions normally, and cattle will become weak, emaciated, anemic, and can die.

The intermediate hosts for liver flukes are snails, and often effective control of liver flukes in cattle is to decrease the cattle exposure to the snail infested areas. Usually these are ponds, swamps, and other wet areas where the snail can thrive, thereby increasing the concentration of the immature flukes. By fencing cattle away from these wet areas, or providing adequate drainage, one can decrease the total fluke burden that the cattle may be exposed to during grazing.

There are currently only two approved drugs for the treatment of liver flukes in cattle (albendazole, clorsulon). However, results can be less than satisfactory without thorough investigation and planning of a treatment strategy. Also, these drugs have been shown to be reasonably effective in treating deer flukes in their normal host, the white-tailed deer. However, because cattle are not the normal host for deer flukes, it is important to eliminate ALL of the immature deer flukes that may be present in the

bovine liver. The two flukicides mentioned previously have not been shown to meet this need at their current label doses. If you deal with liver flukes, consult with your herd veterinarian on the best approach to dealing with your liver fluke problem.

**Cestodes.** Cestodes, or tapeworms, are fairly nonpathogenic in cattle. Their life cycle includes infection of an ant with the immature form of the tapeworm, which makes the ant go crazy. Instead of doing normal ant things, when infected, the ant will crawl up a blade of grass, dangle off the end of the blade by its mandibles, and wait patiently to be ingested by the grazing ruminant. For this reason, pasture renovation will help disrupt the soil and potentially deter the ants from colonizing the pastures where cattle graze.

Because tapeworms are fairly benign, they are often treated, not because they are causing disease, but because the stockman simply will not tolerate the big, white, ugly worms, and the expense associated with deworming is not as much a concern as the presence of the parasite.

**Nematodes.** Nematodes, or round worms, consist of the largest, most diverse groupings of internal parasites. They also exist in a variety of host tissues. Some take up residence in the gut (hookworm, whipworm), some latch on to the lining of the abomasum (barber pole worm), some migrate through the lungs, causing pneumonitis (lung worm), and others even migrate through the hide and lesions can be visualized on the underside of a cow's belly (go ahead and see for yourself).

The roundworms of the most economic significance for the beef industry in North America are strongylids. These can be found in the lungs, abomasum, and small intestine. Infestation is usually the most significant for young animals early in the grazing season. The gut of a calf does not have a parasite burden at the start of its first grazing season, making it an ideal place for a strongyle to want to be. Due to the fact that there is an increased amount of shedding of parasite eggs in the spring ('spring rise'), and thus increase load on the pastures, the young stock are taking in a larger dose of the infective larva, which could result in significant loss of performance.

When cattle ingest the infective larva of nematodes, the worm can either molt and grow into an adult, or it can go into a state of arrested development as a fourth stage larva. It can exist in this state, in the gut of the cow, until some unknown stimulation causes it to resume development and grow to adulthood. Perhaps the vacancy of existing adults, due to deworming, stimulates this resumption of growth, perhaps it is due to an increase in nutrient availability in the gut due to increased quality of feed at spring turnout.

Interestingly, the older animals can actually develop a stable relationship with the parasites that take advantage of their hospitality. The presence of adult parasites will actually hinder development of any new strongyles that may seek to get a hold of some alimentary real estate. Therefore, intake of new infective larva late in the grazing season does not necessarily result in an increase parasite burden in the cow.

If the cow is effectively dewormed, and her gut cleaned out, at a time when larval burden is high, the subsequent parasitic burden may be higher than the previous load that you worked so hard to eliminate. Bearing this in mind, timing, evaluations of your grazing system, and the effect and persistence of the dewormer chosen, are integral parts of an effective deworming schedule for roundworms.

Current anecdotal recommendations are to deworm the cattle in the spring of the year, when exposure and load is high, to avoid performance losses. Also, if a fall deworming strategy is employed, it has been recommended to wait until after a hard frost, which will kill some of the infective larva, and decrease the load that the cattle will be exposed to. Again, consult with your herd veterinarian on the best timing and product usage for your production system.

## Parasite Control Products

Control measures for external parasites will vary in relation to control of internal parasites. Different classes of parasiticides used for control have varying degrees of toxicity for the host, therefore, external application of some drugs is effective for fly control, but would be lethal if an attempt was made to utilize the drug for control of internal parasites.

**Organophosphates** and **pyrethroids** are effective control for external parasites. These can be found in the form of dips, sprays (animal and premises), pour-ons, or in insecticide impregnated ear tags. These can be quite effective in controlling external parasites. Unfortunately, these compounds can be toxic to the cattle and to the applicator, so some measure of caution should be used during the application process. If sprays are utilized, respiratory and skin protection should be used. If insecticide impregnated ear tags are applied to the cattle, latex gloves should be worn to minimize skin contact with the insecticide. It is also important to remember to remove the ear tags from the cattle after the grazing season is over. Removal of the ear tags will help reduce the likelihood of the development of insecticide resistance in flies.

The **benzimidazoles**, or '-azoles' (fenbendazole, oxfendazole, albendazole, etc.) are effective compounds for internal parasite control, though with little to no persistence. These dewormers have a very short half life, and if they are utilized in a deworming program, ALL animals in the herd must be treated on the same day, and moved to clean pastures or pens immediately after treatment, or re-infestation will occur and the exercise would be a wasted effort.

The **macrolides** are the dewormers that revolutionized parasite control in cattle. The avermectins (ivermectin, doramectin, eprinomectin, moxidectin) are extremely safe dewormers that are in easy to administer preparations and have excellent persistence. They are generally employed in a deworming protocol for their excellent internal parasite control, but also have activity against some external parasites as well. However, the activity of avermectins does not extend to flukes or tapeworms; if these

are an affliction to your herd, inclusion of the ‘-azoles’ may be required to maximize your herd health status.

Over time, and with increased use, there are, invariably, cases of parasite resistance to dewormers. In theory, switching dewormers in the face of a building resistance will help minimize growth of the population of resistance parasites. For example, some veterinarians have suggested that switching drug classes every two years will help keep the incidence of resistance down (‘-azole’ to avermectin, and back to ‘-azole’). Unfortunately, there has not been an introduction of any new, novel broad spectrum dewormers to help make the transition smooth for the producer. But, hold on to your hats, folks. The pharmaceutical industry has heard your cries, has identified this as a significant problem, and is working feverishly to bring you new, efficient, and effective broad spectrum products.

## **Summary**

Internal and external parasites can rob efficiency, production, and gain from cattle in every stage of life. Effective control of these parasites can be achieved with current veterinary preparations and proper timing of the application of these products. Insecticide and parasiticide resistances in the species of parasites that we attempt to control are real issues that need to be taken into consideration when developing a parasite control program. Consult with your herd veterinarian regarding the species, timing, and product to use in your production system.

## References and Supplemental Readings

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<b>Appendix Table 1. Parasite Control Products.</b>				
<b>Drug Class</b>	<b>Drug Name</b>	<b>Susceptible Species</b>	<b>Preparation</b>	<b>Withdrawal*</b>
Organophosphates	Various	External species: flies, lice, ticks, mites	Animal Spray, pour-on, Premises spray, ear tag, dust, additive to mineral supplement (Rabon®)	Various
Pyrethroids	Various	External species: flies, lice, mites, ticks	Pour-on, ear tag, premises spray, dust	various
Benzimidazoles (‘-azoles’)	albendazole (Valbazen®)	Roundworms, tapeworms, and adult flukes	Oral drench	27 days
	fenbendazole (Safe-Guard®, Pancur®)	Round worms, tapeworms	Oral drench, oral paste, mineral supplement, mineral block, pellet	8 days
	oxfendazole (Synanthic®)	Roundworms, tapeworms	Oral drench, oral paste	7 days
Macrolides	Ivermectin (Ivomec®)	Roundworms, cattle grubs, lice, mites, horn flies	Pour-on injectable	48 days 35 days
	Ivermectin + clorsulon (Ivomec Plus®)	Roundworms, lungworms, cattle grubs, lice, mites, horn flies, and adult flukes	Injectable	49 days
	Doramectin (Dectomax®)	Roundworms, lungworms, cattle grubs, lice, mites	Pour-on injectable	45 days 35 days
	Eprinomectin (Eprinex®)	Roundworms, lungworms, cattle grubs, lice, mites	Pour-on	0 days
	Moxidectin (Cydectin®)	Roundworms, lungworms, cattle grubs, lice, mites	Pour-on injectable	0 days 21 days
Antiprotozoals	Sulfonamides (Sustain III®, Sulmet®, Albon®)	Coccidians, <i>Cryptosporidium</i>	Oral bolus, drench	12-21 days (See label)
	Amprolium (Corid®)	Coccidians	Oral drench, feed granules, water treatment	24 hours

\*Note: Always consult product label for accurate withdrawal times.

## **Notes**

## Lesson 2 Quiz

### Internal and External Parasite Control

1. List two reasons why it is important to control horse flies.
  
  
  
  
  
  
  
  
  
  
2. Two types of mites are reportable in some states. Which are they?
  
  
  
  
  
  
  
  
  
  
3. Typically, at what age is the earliest that calves will scour due to coccidiosis?
  
  
  
  
  
  
  
  
  
  
4. List the three most important components to supportive therapy for a scouring neonatal calf
  
  
  
  
  
  
  
  
  
  
5. How is *Neospora* treated?
  
  
  
  
  
  
  
  
  
  
6. Which is not an important feature of a *Neospora* control program?
  1. Sell cows that test positive for *Neospora* antibodies.
  2. Bury aborted placenta and fetus deeply into the ground or compost pile.
  3. Breed cows that aborted for fall calving.
  4. Keep coyotes from hunting for mice in the hay storage area.

7. What are the two drugs approved for treatment of liver flukes in cattle?
  
  
  
  
  
  
  
  
  
  
8. In which season is nematode load on pasture typically highest?
  
  
  
  
  
  
  
  
  
  
9. The macrolides are nearly all available in two forms of delivery. What are these forms of delivery?
  
  
  
  
  
  
  
  
  
  
10. Who should be your right-hand man/woman when planning your deworming program?
  1. Your spouse
  2. The feed store manager
  3. Your banker
  4. Your veterinarian

**PLEASE SEND QUIZ TO YOUR ASSIGNED GRADER UPON COMPLETION**

Name \_\_\_\_\_ Phone \_\_\_\_\_

Address \_\_\_\_\_

Fax (Optional) \_\_\_\_\_ Email (Optional) \_\_\_\_\_

## 2008 Minnesota Beef Home Study Course

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