Pesky Parasites

Without careful management, parasites can be costly.

by ***Shane Gadberry*** *and* ***Jeremy Powell***

The need to control internal parasites will exist as long as cattle are grazing pastures. However, parasite levels are not the same on all pastures or in all cattle. Pastures that are heavily stocked generally have a higher parasite burden than lightly stocked ones. Cattle in a drylot are less likely to have heavy worm infections than those on pastures. Young cattle will typically have more internal parasites than older cattle.

Therefore, the methods of controlling internal parasites should be developed to fit individual production situations. Strategic deworming starts with understanding the life cycle of problem parasites, identifying seasonal changes in parasite burdens and implementing cost-effective control. A successful deworming program, along with good overall herd management, will increase milk production in cows and, thereby, increase weaning weights of calves.

Effects of internal parasites

The effects of internal parasites on cattle will vary with the severity of infection as well as age and stress level of the animal. In general, younger animals and animals under stress are most likely to show signs of parasitism. Mature cows acquire a degree of immunity to parasites that reside in the lower gastrointestinal tract. However, the brown stomach worm (*Ostertagia ostertagi*) has evolved to evade the animals' immune systems. In addition, parasite burdens are most detrimental in mature cows near parturition because immunity is suppressed. Cows, especially dairy, in early lactation are often in a negative energy balance due to the stress of lactation. These cattle are affected more than cows in later lactation, when smaller levels of milk are being produced. Bulls are typically more susceptible to internal parasites than cows.

The effects of parasitism can be separated into two types — subclinical and clinical. Losses in animal productivity (milk production, weight gain, altered carcass composition, conception rate, etc.) are all subclinical effects; whereas, visible, disease-like symptoms (roughness of coat, anemia, edema, diarrhea) are clinical effects. The subclinical effects are of major economic importance to the producer.

Parasites of concern

Cattle can be infected by roundworms (nematodes), tapeworms (cestodes) and flukes (trematodes). Protozoans such as coccida are another type of internal parasite; however, the helminths (worms) will be the focus of this discussion.

Roundworms are considered the most economically devastating internal parasites of livestock in Arkansas. The

medium or brown stomach worm and the *Cooperia* species are the most common roundworms. Although cattle can be infected with tapeworms, their effect on animal performance is minimal compared to the roundworms.

Problems with flukes arise in conditions that promote snail populations — poorly drained pastures and stagnant pools of water (ponds, ditches, etc.) in the pasture area. Snails are needed in the fluke life cycle.

Life cycle of the nematode

Figure 1 shows the life cycle of the nematode. In the host animal, adult nematodes produce eggs. The egg is expelled from the host with the feces, contaminating the pasture. A first-stage larva hatches from the egg. The larva will molt two times before it becomes a third-stage larva. Once the larva is in its third stage, it is capable of migrating from dung pats and soil onto moist grass. Larvae can survive up to a year on pasture.

Infection occurs when the third-stage larva is consumed with the grass. The larva completes its life cycle in the gastrointestinal tract of its host. Once the adult stage is reached, copulation occurs and the life cycle starts over.

Unlike other nematodes, the medium stomach worm can spend part of its parasitic life cycle in hypobiosis, a condition similar to hibernation. Hypobiosis usually begins in the spring. The "hibernating" larvae do not emerge until summer.

Life cycle of the fluke

The fluke's life cycle requires two hosts — cattle and snails. The adult flukes are found in the bile ducts of cattle. The eggs are laid in the ducts and expelled with the feces. A larval stage hatches from the egg and infects the snail, where it reproduces asexually. Specific stages of the juvenile fluke leave the snail and encyst on aquatic vegetation. Cattle eat the vegetation and become infected. The fluke migrates to the liver, infects the bile ducts and matures into an adult.

Seasonal parasite pressure

The amount of parasite pressure in a pasture varies with season and management. Parasite burden peaks during the spring and is lowest during the hot, dry summer months (Figure 2). Cattle in drylot systems typically have fewer worms and less seasonal variation. Parasite pressure will be less under good management conditions as well. Good herd management includes a good nutrition and health program.

Parasite infection diagnosis

Parasite infection is diagnosed by either a fecal-egg count or postmortem exam in the event of death. The postmortem examination is the most accurate method of determining parasitism. A postmortem exam shows the types of worms present and the damage to the animal.

Internal parasite infection levels can be estimated in live cattle by counting the eggs shed with the feces. The eggs are quantified as eggs per gram (EPG) of feces by a trained individual. An EPG is only an estimate of parasite populations. Results from this test may be misleading. Variations in egg counts can arise from the ratio of immature to mature worm populations, worm species, degree of inhibition, consistency of the manure, etc. Realistically, a herd should be sampled on multiple occasions to determine worm prevalence.

Pasture practices for educing parasitism

Pasture management and anthelmintics (dewormers) are two methods now used to control internal parasites. Pasture management practices may reduce the parasite burden in cattle; however, this method alone will not guarantee parasite eradication.

As discussed earlier, part of the nematode life cycle is on pasture. Pasture management methods designed to reduce third-stage larva populations include the following:

- Move more susceptible younger cattle to a safe pasture. Safe pastures include pastures that were not grazed during the last 12 months as well as small grain pastures developed from a prepared seedbed. When a pasture lies untilled and is plowed, contamination can drop quickly. Always deworm cattle prior to placement on a safe pasture; otherwise, the pasture can immediately become contaminated.
- Place less susceptible, mature cattle on the more contaminated pastures. Mature cows under a good nutrition program develop some acquired immunity to parasites and are affected less by their presence than young cattle and calves.
- Do not overgraze pastures. Animals on overgrazed pastures graze closer to the ground and pick up more larvae. Rotational grazing systems are unlikely to provide enough rest to paddocks to reduce possible contamination. Some studies have shown that rotational grazing can increase infection compared to continuous stocking. This increased infection is likely since rotational grazing allows higher stocking rates. However, rotational grazing combined with a strategic deworming program can still provide more production per acre than conventional grazing. If flukes are a problem, identify ways to increase pasture drainage and fence off problem areas such as ponds.
- Consider miscellaneous practices such as dragging manure pats in dry weather and cutting the forage for haylage.

Anthelmintic control of parasites

Anthelmintics provide an excellent tool for controlling parasites. Application of dewormers should not be aimed at treating infected cattle showing signs of parasitism. Instead, apply dewormers in a timely manner to reduce infection before symptoms of disease occur. Treatment should also be aimed at interrupting the life cycle of the parasite in an effort to minimize pasture contamination. Unfortunately, instead of implementing a deworming program, producers typically deworm their cattle

continued on page 54...

Figure 1: Basic life cycle of common gastrointestinal nematodes of cattle

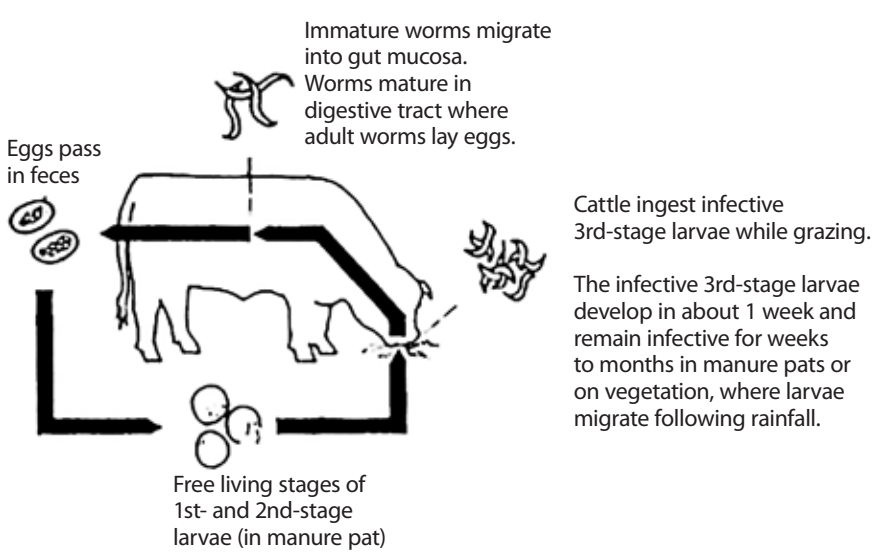
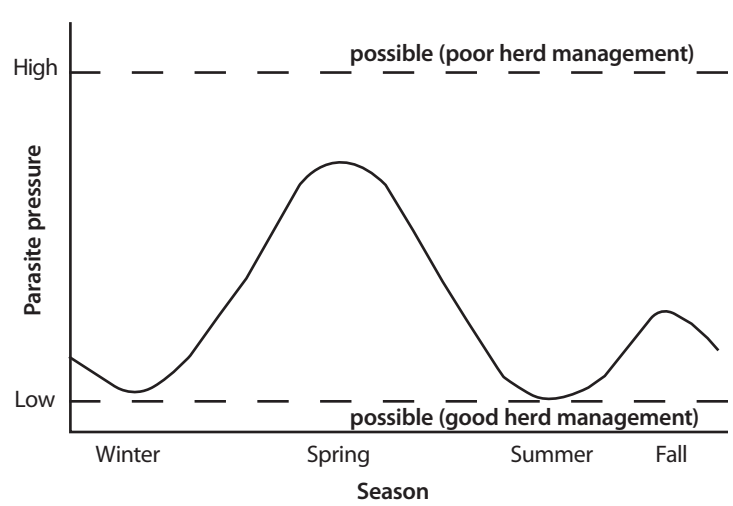


Figure 2: Seasonal parasite trends



...Pesky Parasites continued from page 53

when the herd is being worked for another purpose. The 2007-2008 NAHMS cow/calf health survey showed that 85% of beef cattle operations in the United States deworm their herds according to a regular schedule, but 10% base treatment upon animal appearance. In the latter case, the herd has already suffered economic losses.

Many anthelmintic products are on the market. Most of the products are either avermectins/milbemycins (ivermectin, dormectin, eprinomectin and moxidectin) or benzimidazoles (oxfendazole, albendazole, fendbendazole). Avermectins/milbemycins provide an additional benefit of external parasite control plus internal parasite control, as well as persistent protection for days to weeks after treatment. When a producer is selecting a dewormer, the following should be kept in mind:

- Type of animal being treated (calf vs. cow, beef vs. dairy)
- Product efficacy
- Ease of application
- Broad spectrum of control (immature, mature, inhibited)
- Cost effectiveness
- Slaughter/milk withdrawal time

Personal safety: Always read and follow the instructions on any animal health product. Application rates were developed through extensive research to identify the best and safest level of control. Undertreatment of animals can reduce the level of control and may increase the chances of parasites developing resistance to dewormers. Applying dewormers above recommended levels increases withdrawal times, and the compounds in dewormers can become toxic to animals when applied at extremely high rates. Overdosing is costly. Over application usually provides the same amount of control as recommended levels but at a higher cost.

As with any chemical used to control parasites, the potential for parasites to develop resistance exists. No reports of extensive parasite resistance to currently used bovine anthelmintics exist in the U.S.; however, countries with livestock numbers comparable to the U.S. have reported occurrences of resistance in areas where dewormers were used extensively.

Table 1: Deworming program for beef cattle

Animal	Time of treatment
Mature cows	Near calving
Bulls	Spring and fall
Calves	3 to 4 months of age
Replacements and stockers	• Weaning/purchase and at spring/fall (minimum) • Weaning/purchase and every 3 to 4 months until yearlings • Weaning/purchase and placed on safe pasture
Yearlings	Spring and fall until mature

Deworming the beef herd

Since cows, bulls and young stock are affected differently by internal parasites, corresponding treatment programs should also differ. Table 1 gives a recommended guideline for deworming beef cattle.

Mature cows should be treated at least one time per year. The best time to treat the mature cow is near calving. The mature cow's susceptibility to parasite detriment increases during this time due to stress of production and a suppressed immune system. In situations where parasite levels may be high, such as overstocked pastures, treating twice a year may be necessary. In other situations, parasite levels may be low enough that mature cows do not need any treatment. These conditions can only be determined by treatment followed by critical observation. Bulls, unlike cows, tend to be more susceptible to parasites and should be treated twice a year, spring and fall. Since mature cows and bulls have some degree of acquired immunity to internal parasites, the older benzimidazole-type products should do a sufficient job of controlling parasites in these animals.

Treatment of calves should begin when they reach three to four months of age and again at weaning if they are kept as replacements or stockers. Yearlings can be treated on a seasonal basis, spring and fall, until they are mature cows (a mature cow is generally recognized as an animal pregnant with her second calf). If calves are backgrounded in a drylot, one initial treatment should be sufficient.

Visit with a local veterinarian about setting up a herd health program that includes a strategic deworming program. **HW**

Editor's note: *Shane Gadberry is a University of Arkansas associate professor of animal science, and Jeremy Powell is a University of Arkansas associate professor and veterinarian.*

Performance of replacement heifer calves following deworming

*by **Jeremy Powell** and **Elizabeth Backes,** University of Arkansas Extension*

Internal parasites are estimated to cost the U.S. cattle industry over $2.5 billion annually. Parasite burdens have been reported to decrease animal appetite, feed efficiency, ADG (average daily gain) and total gain performance. Parasites also have potential to negatively affect reproductive performance of cows and developing heifer calves due to the parasites' effect on gain performance. According to the United States Department of Agriculture's National Animal Health Monitoring System (NAHMS), only slightly over 40% of replacement heifers and cows are dewormed at least one time a year.

A recent study focused on how deworming affects gain in performance of replacement heifers. The study took place during the summer of 2014, with 83 head of replacement heifers located at the University of Arkansas Research Station near Fayetteville. The heifers were allocated to one of three deworming treatments based on body weight, fecal-egg counts and days of age. The three treatments were 1) negative control (no dewormer), 2) a combination of a full label dose of Cydectin pour-on and a full label dose of Synanthic drench (combo) and 3) a label dose of LongRange injectable treatment (Table 1).

Heifers grazed in multiple groups, with only one treatment represented per grazing group and had access to forage available in the assigned pasture and were fed a corn gluten supplement at 1% of body weight daily. Heifers were processed for body weights and fecal-egg counts on multiple dates throughout the study (Table 2).

Over the 84-day study, heifer body weights (Table 3) were similar on day 0, 14 and 28; however, heifer body weights were greatest for LongRange treated heifers, intermediate for combo heifers and least for the control groups. Heifer ADG overall was highest for LongRange treated heifers at 1.52 lb./day, intermediate for combo treated heifers at 1.2 lb./day and least for negative control heifers at 1 lb./day.

Fecal-egg counts were similar amongst heifers on day 0. On day 14 combo and LongRange treated heifers exhibited lower fecal-egg counts compared to control heifers. LongRange and combo heifers were similar on day 28 and again had lower fecal-egg counts compared with the control treated group. Control heifers exhibited the highest fecal-egg counts on day 84, the combo treated group was intermediate and LongRange heifers had the lowest fecal-egg counts.

In this study, treatment against gastrointestinal nematodes positively affected replacement heifer body weights, ADGs and fecal-egg counts. LongRange treated heifers reported the strongest benefit over the 84-day study period. **HW**

Table 1: Treatments

Treatment group	Number of head treated	Description
Mature cows	28	Negative control treatment
Bulls	28	Cydectin/Synantic combination
Calves	28	LongRange

Table 2: Timeline for study

Day -14 (May 19, 2014)	Fecal-egg counts and body weights
Day 0 (June 2, 2014)	Fecal-egg counts and body weights
Day 14 (June 16, 2014)	Fecal-egg counts and body weights
Day 28 (June 28, 2014)	Fecal-egg counts and body weights
Day 56 (July 30, 2014)	Fecal-egg counts and body weights
Day 84 (Aug. 25, 2014)	Fecal-egg counts and body weights

Table 3: Performance of replacement heifers

	Treatment			
Body weight (lb.)	Control	Combo	LongRange	P-value
Day 0	496	496	498	0.98
Day 14	502	502	505	0.99
Day 28	516	514	522	0.84
Day 84	578	593	622	0.06
Total ADG (lb./day)	1.0^{b}	$1.20^{a,b}$	1.52^{a}	≤0.01

a,b Means within a row without common superscript differ(P≤0.05).

Table 4: Fecal-egg counts (FEC; GM) of replacement heifers

	Treatment			
Fecal-egg counts	Control	Combo	LongRange	P-value
Day 0	35	23	23	0.70
Day 14	68^{b}	1^{a}	4^{a}	≤0.01
Day 28	144^{b}	5^{a}	8^{a}	≤0.01
Day 84	164^{c}	80^{b}	6^{a}	≤0.01

a,b,c Means within a row without common superscript differ(P≤0.05).