

Liver Flukes:

The cost of this parasite shows up in lost performance and reduced carcass weight.

Story by
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"You don't know you have a problem until it's too late to do anything about it," says Joe Eisenmenger, recounting his experience with a cattle parasite of which many cattlemen know very little. Eisenmenger, owner-manager of a 4,500-head-capacity feedlot located near Humphrey, Neb., has learned more than he ever wanted to know about liver flukes, the damage they do to infected animals, and the damage they cause to a cattle feeder's bottom line.

"The costs show up in feedlot closeouts and at the packinghouse," Eisenmenger adds, citing reduced rate of gain, reduced feed efficiency and reduced market value as factors that contribute to the economic burden. Reduced performance in the live animal means lower carcass weights at harvest.

Eisenmenger's experience with liver flukes began with a set of Montana cattle. He frequently sources the Northwest for feeder cattle of similar kind and quality, but this particular set of calves did not perform as expected.

"We take (individual) incoming weights and periodically weigh cattle again when they are reimplanted," Eisenmenger explains. "On these animals, we saw rates of gain fall off late in the feeding period. We've since learned that liver fluke damage to the liver most often affects performance during that period when cattle are on a high-concentrate diet."

Eisenmenger also has learned that, in general, the cost of liver fluke damage can be measured in terms of a 0.25-pound (lb.) reduction in average daily gain

(ADG) and 0.3-0.4 lb. of additional feed to achieve each pound of gain. In a business like cattle feeding, where margins are sometimes slim, such losses in performance and efficiency are significant — and so is the estimated 40-lb.-per-carcass reduction in weight.

Eisenmenger found that the fluke-infected cattle had been handled differently than previous shipments from that same region. Either they hadn't been treated for liver flukes, or they hadn't been treated at the right time. It does make a difference, and the proper timing of treatment varies by geographic area.

Life cycle

The cattle liver fluke (*Fasciola hepatica*) is found worldwide. In the United States, it is considered enzootic (ever present) in northwestern, southern and southeastern states, particularly along the Gulf Coast. However, liver flukes may be present in the intermediate region when conditions are favorable to the parasites' complicated life cycle. Those conditions include adequate moisture, wet meadows or poorly drained pastures, and the presence of certain species of snails, which serve as the fluke's intermediate host.

Effective control of liver flukes requires an understanding of their life cycle. Adults, which are 1.2 inches (in.) long, 0.48 in. wide and leaf-shaped, live in the bile ducts of infected cattle. Their eggs are passed from the body through manure and hatch in water. The hatched miracidia infect snails and undergo multiplication and several stages of development. A single miracidium may develop into several hundred cercariae, or larval worms, which,



Immature flukes wander within the liver, destroying tissue and causing hemorrhage until they enter bile ducts to mature and produce eggs. (PHOTOS COURTESY OF DEE GRIFFIN, UNIVERSITY OF NEBRASKA GREAT PLAINS EDUCATIONAL CENTER)

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under wet conditions, emerge from snails and attach to vegetation. Cattle ingest vegetation bearing encysted cercariae. The juvenile flukes are released in the new host's small intestine, penetrate the intestinal wall, migrate through the abdominal lining and penetrate the liver.

Immature flukes wander within the liver, destroying tissue and causing hemorrhage until they enter bile ducts to mature and produce eggs. Completion of the entire life cycle, from the time eggs are shed until a newly infected animal sheds the next generation of eggs, requires 18-24 weeks.

An extremely high liver fluke burden may cause acute reactions with symptoms including weight loss, anemia, general depression and, occasionally, death. More often, however, clinical signs are vague and the most typical symptom — reduced productivity — may easily be attributed to other causes.

According to James Hawkins, associate director of veterinary professional services for Merial, the parasitic activity of liver flukes destroys liver cells, which are not replaced. In a majority of cases, liver function is slowly but progressively diminished.

"The effects show up in the feedlot because the liver has to work harder when cattle are on a high-concentrate diet. Cattle don't convert feed as well, and gains suffer," Hawkins notes. "Somewhere between 7% and 12% reduction in average daily gain seems to be fairly common."

Hawkins says liver flukes hinder cow herd productivity, too. Evidence suggests that fluke-burdened cows exhibit reduced pregnancy rates and depressed milk production. The weaning weights of their calves may also be lowered. In the long run, liver flukes may contribute to increased culling and lower sale weights of cull cows.

In a report published by Veterinary Therapeutics (Winter

2001), University of Georgia Parasitologist Ray Kaplan noted evidence that liver flukes may have an effect on sex hormone balance and metabolism. In one study, fluke-infected heifers experienced a 39-day delay in the onset of puberty. Heifers experimentally infected with liver flukes showed significantly higher levels of estrogen and significantly lower levels of progesterone than did uninfected heifers. However, how the parasite may cause the imbalance of hormones remains unclear.

According to Hawkins, researchers suspect that flukes may have a negative effect on bull fertility. While their suspicions are not yet proven, preliminary cross-breed studies suggest that a young, fluke-infected bull may be twice as likely to fail a breeding soundness examination (often referred to as a BSE).

Control methods

In the past, fluke-control practices have included measures aimed at reducing the intermediate host snail populations in infected pastures. Several molluscicide chemicals are effective against snails, but they may be toxic to grazing animals and/or fish and humans. For environmental reasons, molluscicide use is restricted and may be prohibited in some areas.

Most experts agree that treatment of cattle with flukicide drugs can be justified in areas where flukes are enzootic. The flukicides currently available in the United States include clorsulon and albendazole. Used orally as a drench, clorsulon is effective against flukes

According to veterinarian Dee Griffin, University of Nebraska Great Plains Educational Center, this map indicates the relative distribution of fluke infestation by region. Black, medium gray and light gray shaded areas represent regions that are heavily, moderately or lightly affected, respectively. However, there are not sufficient data to accurately report levels of fluke infestation at various locations. The lines are not clear-cut.

"There will be grazing areas within parts of the U.S. identified as 'heavily affected' that will not present a fluke infestation risk, and likewise there will be grazing areas within parts of the United States identified as 'lightly affected' that will present a tremendous fluke infestation risk," Griffin explains, noting that the risk can be high wherever conditions are right. Infestations will be highest when water is retained (marshes, bogs, etc.) and there exists a species of snail that can serve as the intermediate host.

"Ranchers should evaluate the fluke infestation potential of the different grazing areas on their land and, if possible, monitor the fluke levels found in animals they sell to slaughter, including cull cattle, and cattle they sell to feedlots," Griffin recommends.



Table 1: Approximate costs of flukicide products

Product	Dosage per cwt.	Price per quantity	Relative cost per 600 lb. body wt.
Clorsulon (drench)	3.25 mL	\$200 per gal.	\$1.00
Ivermectin + Clorsulon (inject)	0.91 mL	\$250 per 500 mL	\$2.75
Albendazole (drench)	4 mL	\$250 per 5 L	\$1.20

only. Clorsulon also is available in combination with ivermectin, administered by subcutaneous (sub-Q) injection, which provides broad-spectrum treatment for nematodes and external parasites, as well as flukes.

Albendazole, used as a drench, also offers broad-spectrum control. Cow-calf producers should be aware, however, that albendazole is not approved for treatment of pregnant females during their first 45 days of gestation.

All of these products will kill adult liver flukes, but only clorsulon administered orally is effective against immature flukes 8 to 12 weeks old. None of the drugs will control migrating juvenile flukes, which makes it important to time treatments strategically to achieve optimum benefit.

Since transmission occurs during the wet season, treating cattle just prior to that period will accomplish two goals. First, adult flukes will be removed from cattle, thus improving animal performance. Second, the shedding of large numbers of eggs onto pastures will be prevented, reducing opportunities for cattle to become reinfected during the wet season. In some cases follow-up treatments are recommended.

Kaplan says current recommendations for fluke control on the Gulf Coast call for treatment once annually, in late summer or autumn, when virtually all flukes will be mature adults and susceptible to flukicides. In Florida, treatment is best given during September, while October through November is the optimal treatment period for other Gulf states. Producers with particularly severe fluke problems sometimes repeat the treatment in the spring.

In the cool, temperate northwestern United States, most fluke transmission occurs from late spring through early fall and ceases by December, when cold temperatures prevent parasite development. The optimal period for annual treatment is late winter or early spring (March-May), before spring turnout to pasture. Eliminating adult flukes at this time will prevent fluke contamination of pastures when cattle go back to spring/summer grass and snail populations return. In northwestern states, autumn treatments have little effect since fluke populations are immature and not susceptible to flukicides.

At the University of Nebraska Great Plains Veterinary Educational Center, Parasitologist Rick McKown suspects that Eisenmenger's experience is similar to that of other cattle feeders who procure cattle from areas where flukes may be a problem. Eisenmenger is different than many of them, because he now is aware of the problem and the solution.

"And [Eisenmenger's] cattle did not have huge fluke burdens. When we looked at the livers, I think the most we found in any one animal was 16 flukes, while some had as few as four or five. But even a few flukes per animal can nickel-and-dime you to death," McKown says.

The ideal situation would involve treating cattle on the ranch, to have them clean before they come into the feedlot. Unfortunately, it may be difficult for feedlot operators to know if the job was done, and done right.

"I think feedlot managers will find it to their advantage to routinely treat cattle from high fluke-risk areas when they arrive at the feedlot. The benefits

outweigh the costs," McKown states. "A second treatment, eight to 12 weeks later, will get the flukes that were too immature to be killed by the first treatment."

Eisenmenger now treats all cattle coming to his feedlot from areas known to be fluke-infected. Upon arrival, cattle receive a dose of the injectable, broad-spectrum combination of clorsulon and ivermectin. For the follow-up treatment,

Eisenmenger uses a clorsulon drench.

"I'm sure we end up treating some animals that were already clean when they got here, but I don't want to take a chance," Eisenmenger says. "The cost of flukicide is not prohibitive, and through improved performance, we believe we can recover the cost in about 30 days."

