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Ohio State University Fact Sheet

Veterinary Preventive Medicine

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Deworming of Exhibition Swine to Prevent Liver Condemnations

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Swine liver condemnations because of parasite-induced scars continue to be a problem for the swine industry. In fact, the packing company that processed more than 900 market barrows from the 1999 Ohio State Fair reported that approximately 70% of the livers from these hogs were condemned because of parasite lesions; this compares to a 10 to 15% liver-condemnation rate for commercial hogs. The unexpectedly high liver-condemnation rate for exhibition hogs represents reduced potential income for the packers. This experience also may be reflected as lower bids on future purchases of exhibition hogs, or even a refusal by some packers to participate in bidding. While this report is only for 1999 Ohio State Fair hogs, there is no reason to believe that these findings differ significantly from those of other recent years or from those of market hogs exhibited at county fairs.

The parasite lesions referred to by the packer are the whitish liver scars or "milk spots" produced when roundworm (ascarid) larvae migrate through the liver as part of their normal life cycle. Roundworms are the most common intestinal parasite of swine and are found in 50 to 75% of the growing pigs. Livers showing numerous scars are generally condemned, but those with only a few lesions can be salvaged by trimming out the scars, if the packer wishes to do so.

An adult female roundworm in the intestine of a pig can lay a million or more eggs per day. These eggs are passed in the feces and contaminate the area in which the hogs are raised. The microscopic eggs have a sticky coating, making it very difficult to remove them from the surfaces of the pens. Even after a thorough cleaning, some eggs usually remain in cracks and crevices. With pastures, lots, and pens having dirt floors, it is impossible to remove the eggs without carefully removing the entire top layer of soil. Because roundworm eggs can remain viable for seven years or more, the contaminated area can be a source of infection for hogs raised there in the next several years.

Hogs that are raised in a contaminated environment will come into contact with the eggs and will swallow some. The larvae hatch out of the eggs in the intestinal tract and begin their migration toward the liver in a matter of hours. Once in the liver, the larvae damage the tissue as they burrow through it. From the liver, the larvae move on to the lungs before returning to the intestinal tract where they develop into adults. The adult female starts laying eggs about six weeks after the egg from which it grew was originally swallowed by the pig.

The scars or "milk spots" develop in response to tissue damage; this occurs a few days following the migration of the roundworm larvae through the liver. These scars will resolve in 25 to 35 days. This means the scars responsible for the liver condemnation occurred as the result of roundworm larvae migration during the period of one to five weeks before slaughter.

Liver condemnations in market hogs can be avoided by either preventing exposure of the hogs to infective roundworm eggs or, if there is exposure, by using a medication that will prevent roundworm larvae from migrating out of the intestinal tract to the liver. Only in special situations can we be reasonably assured that the pen is free of eggs and that the pig is entirely free of all stages of the parasite. While preventing all exposure is an admirable goal, the more practical approach to avoiding liver scars is to assume exposure to roundworm eggs and medicate accordingly. A medication that will prevent the migration of the larvae out of the intestinal tract and through the liver is needed. In a contaminated environment, the pigs are constantly ingesting the roundworm eggs as they root, explore their environment, and eat.

Use of deworming agents every three to four weeks will kill the adult worms, prevent the laying of more eggs, and kill some of the migrating larvae. However, these agents do not prevent the migration of the larvae for the entire period between actual treatments. Therefore, some of the larvae do reach the liver between treatments and cause damage that will be seen as milk spots if the pig is slaughtered in the following two to four weeks.

As the exposure to eggs is continuous, a deworming agent that has uninterrupted action against the larvae is also needed. Pyrantel tartrate, when present in the intestinal tract of the pig, does kill the larval and adult stages there. This deworming agent is approved as a feed additive and can be fed continuously to growing pigs to prevent the migration of larvae and the establishment of roundworm (and nodular worm) infections.

While roundworms are the most common intestinal parasite of growing pigs, they are not the only parasite of concern to the general health and well-being of swine. In fact, surveys have shown that when one type of intestinal parasite is present in a swine herd, it is more likely that at least one other type of intestinal parasite will also be found in that herd. Therefore, other parasites should also be addressed in the routine deworming program.

Suggested Deworming Program for Project Pigs

Five to ten days before project pigs are placed in a clean pen, they should be treated with a dewormer. The broad-spectrum dewormers such as fenbendazole (*Safe-Guard*, Hoechst- Roussel), ivermectin (*Ivomec*, Merial), and doramectin (*Dectomax*, Pfizer) can be used. These agents are considered effective and safe for removing most of the common types of intestinal parasites. This initial treatment is to eliminate the shedding of worm eggs in the pig's feces which would contaminate the pen where they are going to be raised. Depending on the product and the route of administration, a second treatment two to four weeks later is sometimes recommended. Consult the label of the product you are considering for specific directions and limitations. Remember to fill out the treatment record with all the details of the

treatment.

Safe-Guard is available in 10-pound buckets. Each pound will treat 20 100-pound hogs at a total dose of 4 mgm/pound body weight spread over three to four days. (The content of each bucket is sufficient to treat pigs with a combined body weight of 20,000 pounds.) The price for a 10-pound bucket of "Safe-Guard EZ Scoop Sow Dewormer" is about $100. This would be enough to worm 267 pigs weighing 75 pounds each for a cost of approximately 40 cents per head. This dewormer can be measured out with a small measuring cup and put on the feed over a three- to four-day period of time. No withdrawal time is required.

Using *Ivomec 1%* (Merial) or *Dectomax* (Pfizer) for the initial deworming has the convenience of a single injection. Both products also are effective against the external parasites, lice and mange. However, neither product is effective against whipworms.

Ivomec1% is available in 50 ml bottles at a cost of less than $50. At 1 ml per 75 pounds body weight, each bottle will treat 50 75-pound hogs at a cost of less than $1 each. The product is available in larger bottles. Ivomec is available also as a 0.27% injectable solution for use in smaller pigs. Withdrawal time is 18 days.

Dectomax is available in 100 ml bottles at a cost of less than $100. At 1 ml per 75 pounds body weight, each bottle will treat 100 75-pound hogs at a cost of less than $1 each. The product is also available in larger bottles. Withdrawal time is 24 days.

With any of these products, the unit of purchase (50 and 100 ml bottles, 10 pound buckets) is much more than will be needed by most individual exhibitors. Consider arranging for a group to go together to buy and share the contents, or contact your veterinarian. Many veterinarians will dispense individual doses from their inventory.

To address the problem of liver scars specifically, the deworming agent pyrantel tartrate (*Banminth*, Pfizer) can be used to kill roundworm larvae before they can migrate out of the intestinal tract. But the agent has to be present in the lumen of the gut when the larvae are there. The easiest way to have this dewormer continually present in the intestine is to mix it in the feed. Hence, we recommend including pyrantel tartrate (*Banminth*, Pfizer) in the feed and feeding it continuously for the last eight weeks (minimum of six weeks) before marketing. It is important that the pigs continue to receive the agent up until a few days before marketing as new liver scars can develop in as little as a week after withdrawal of the pyrantel tartrate if the environment is contaminated. Liver scars that occurred before the six weeks' medication was started will have had time to heal so that the liver will not have to be trimmed or condemned. Once again, remember to annotate your treatment record with the details of this treatment.

Pyrantel tartrate is approved by the FDA as a swine feed additive at 96 grams/ton of feed. It is to be fed continuously as the sole ration in a complete feed. The withdrawal time is 24 hours. Pyrantel tartrate can be used along with carbadox, lincomycin, or tylosin in medicated feeds. When used in combination with lincomycin or carbadox, a longer withdrawal time is required. There is no approval to use pyrantel tartrate concurrently with ractopamine (*Paylean*, Elanco)

The cost of adding 96 grams of pyrantel tartrate to a ton of feed is approximately $15. This translates into an additional feed cost of about $7 per market hog, if the medicated ration was used for the entire feeding period (50 pounds to 250 pounds).

In return for the investment in dewormer, the exhibitor can increase the customer's satisfaction in the

product, improve rate of gain and feed conversion, and decrease disease problems such as pneumonia and enteritis. When used in commercial swine production systems, most strategic parasite control programs will return approximately $4 for every $1 invested.

Table 1. Commonly Used Swine Deworming Agents.

Product: Active Ingredient	Trade Name	Generally considered effective against these swine parasites	Required pre-slaughter withdrawal time	Route of administration
Dichlorvos	Atgard	Round, Nodular, Whip	Zero days	Medicated feed
Doramectin	Dectomax	Round, Nodular, Lung, Stomach, Lice/mange	24 days	IM injection
Fenbendazole	Safe-Guard	Round, Nodular, Whip, Lung, Stomach	Zero days	Medicated feed
Ivermectin	Ivomec	Round, Nodular, Lung, Stomach, Lice/Mange	18 days	SQ injection*
Levamisole	Tramisol	Round, Nodular, Lung	3 days	Drinking water
Piperazine		Round, Nodular	Zero days	Drinking water
Pyrantel Tartrate	Banminth	Round, Nodular	24 hours	Medicated feed

* Available also as a feed additive

Summary

De-worm all new project pigs, using a broad-spectrum product, when they are acquired or at the start of the project. Note this treatment on the treatment record.

Move the pigs to a clean permanent pen five to 10 days after deworming.

Feed a medicated feed containing pyrantel tartrate (96 grams/ton) for at least the last six weeks before marketing. To avoid changing feed, the medicated feed can be used continuously for the entire growing period. Note this treatment on the treatment record.

When the hog is taken to the fair, switch to a ration that requires no withdrawal time.

In completing the Drug Use Notification Form (DUNF) on your arrival at the fair, list the medicated feed on the form if it has been less than 24 hours since the hog last ate feed containing pyrantel tartrate. (This is a completely legal use of a product and does not affect the showing and sale of the hog if the withdrawal time has elapsed by the time the hog is sold.)

Without prior request, feed medicated with pyrantel tartrate probably will not be immediately available, especially in 50-pound bags. Likewise, the feed manufacturer is not likely to mix less than 500 pounds of medicated feed at a time. Please contact your feed manufacturer/distributor in advance, indicating your intentions to purchase feed containing pyrantel tartrate at the concentration of 96 grams/ton. Feed suppliers will be more likely to have the feed on hand if they know many exhibitors will be requesting it.

Questions and Answers

Q: Why won't the use of one of the broad-spectrum dewormers prevent liver scars?

A: The common dewormers, other than pyrantel tartrate, are used periodically rather than continuously. In a roundworm-contaminated environment, the pig will be ingesting infective eggs every day. Unless the dewormer is present every day to kill larvae, the liver will be damaged, and scars will form. Of the dewormers generally available and effective against migrating larvae, only pyrantel tartrate is approved for continuous use.

Q: No parasite eggs were found on microscopic examination of my pig's feces. Does this mean I don't have to use a dewormer on my pig?

A: Not necessarily! If your pig is in a contaminated environment, it takes about 42 days from the time an infective egg is ingested until that larva becomes an adult capable of laying eggs. The damage to the liver occurs more than 30 days before we see the eggs produced by that parasite.

Q: What is the best dewormer for me to use?

A: It depends on what is to be accomplished, the type of husbandry practices used, and the swine parasites on the farm. Fenbendazole, ivermectin, and doramectin are safe, broad-spectrum agents. Pyrantel tartrate has a very narrow spectrum and is **not** a good general-purpose dewormer in that it is only effective against roundworms and nodular worms. But it is the best agent for preventing roundworm liver scars when fed continuously. Fenbendazole (*Safe-Guard*, Hoechst-Roussel) is effective against most of the common internal parasites but has no effect on external parasites such as lice and mange; a separate louse/mange medication can be used in conjunction with the fenbendazole. Ivermectin (Ivomec, Merial) and doramectin (*Dectomax*, Pfizer) are not very effective against whipworms but are effective against lice and mange. Other products such as dichlorvos (*Atgard*, Boeringer Ingleheim) and levamisole hyrodchloride (*Tramisol* and *Levasole*, Mallinckrodt) are also available and effective; they may be recommended in certain situations.

NOTE: *References to products in this fact sheet are provided as examples of available medications and are not intended as an endorsement to the exclusion of others that may be similar.*

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