

Controlling Internal Parasites in Swine ¹

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Swine internal parasites (worms) cost the U.S. swine industry millions of dollars annually, but are generally not considered to be lethal. Internal parasites devitalize pigs by robbing them of essential nutrients and injuring vital organs. Pigs heavily parasitized are more susceptible to diseases such as scours and pneumonia. The resulting diseases and unthriftiness are a major cause of economic loss. Swine producers should be aware of the common internal parasites of swine and methods of prevention and control.

Common Internal Parasites

Roundworms (*Ascarids*). An adult female ascarid produces thousands of eggs daily. These pass out in the feces and, under favorable conditions of adequate moisture and warm temperature, become infective in 3 to 4 weeks or more. A protective shell resists adverse environmental conditions, enabling the eggs to remain alive for years. Consequently, infective eggs are abundant on hog lots, pastures and other places contaminated by droppings of infected hogs. When pigs swallow infective eggs, the larvae (young worms) emerge from the eggs in the intestinal tract and migrate through the liver, lungs and other tissues. Migration of roundworm larvae through the lungs may lead to pneumonia and coughing. These larvae eventually return to the intestine where they mature and become prolific egg layers.

Roundworm infestation results in decreased feed efficiency, lowered growth rates and condemnation of livers.



Figure 1. Pigs raised on pasture or in dirt lots where reinfection is inevitable will need a more rigorous control program than pigs raised on slotted floors.
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Nodular worms (*Oesophagostomum*). Nodular worms also inhabit the intestinal tract causing intestinal damage and unthriftiness in pigs. Eggs pass out in the feces and hatch on the ground. The larvae develop over an extended period and are ingested by the pig. They burrow into the intestinal wall and develop within nodules in the wall of the intestine before re-entering the intestinal tract where they mature.

Intestinal threadworms (*Strongyloides*). Threadworms are another inhabitant of the intestinal tract. Their eggs pass out in the feces and hatch within a few hours under favorable conditions. This parasite can also multiply outside the animal host, can be transmitted from the sow to the pig before birth (prenatal infection), can be transmitted through the colostrum and is capable of penetrating unbroken skin. As a result, mature threadworms have been detected in baby pigs as early as 4 days old. The resulting yellowish diarrhea and possible death loss in baby pigs can be a difficult problem. In fact, numerous deaths of baby pigs in Florida have been caused by this internal parasite.

Whipworms (*Trichuris*). Whipworms are common internal parasites of swine. Eggs passed with the feces develop into infective larvae in the environment in about a month. The larvae are ingested and penetrate the intestinal wall, damaging tissue, robbing the pig of essential nutrients, and causing diarrhea. Pigs infected with whipworms are also prone to other intestinal infections such as salmonellosis and swine dysentery. Whipworm infestations can be particularly devastating in young pigs (3 months old or less).

Kidney worms (*Stephanurus dentatus*). The kidney worm is one of the most damaging parasites. The mature kidney worm is about 1 inch long and can be found in or around the kidney or along the tubes leading from the kidney to the bladder. The adult female produces eggs that are passed through the urine. Swine are infected by ingestion of the eggs. The young larvae will migrate into the liver and cause considerable damage before migrating on to the kidney where the larvae will mature. Unlike other parasites, the life cycle of this parasite is quite long, a total of 15 months. The kidney worm is a problem primarily in the southeastern USA.

Lungworms (*Metastrongylus*). The adult lungworm produces eggs in the lungs which are coughed up, swallowed and pass out in the feces. Earth worms ingest the eggs and become infected. Pigs may root up and swallow earth worms containing the infective stage of the parasite. Lung infection then occurs and considerable lung damage and pneumonia can result.

Other internal parasites. Several other parasites are also of importance in swine. These include coccidia, thorny-headed worms, stomach worms and trichina (from raw or improperly cooked garbage).

Treatment and Control

Control is aimed at reducing infection and minimizing their detrimental effects. Although several chemical deworming agents are available, cleanliness and general good management must be practiced to minimize losses. A combination of good management and sanitation plus proper use of deworming agents will most effectively control internal parasites of swine.

Sanitation and Management Recommendations

Management. Management should be aimed at breaking the cycle of the parasite. Most parasite eggs and larvae persist and thrive in warm weather with plentiful moisture. They are destroyed by direct sunlight and drying. However, pastures and lots can remain infective for years because parasite eggs are protected by layers of soil and manure. Mud holes and shade encourages parasite survival, thus, land and lot rotation is of some value in parasite control. Confinement rearing on slatted floors or concrete is also of practical value, especially if good sanitation is practiced.

Sanitation. Sanitation is of definite value in controlling parasites, as well as to prevent other diseases of swine. Thorough cleaning that removes the parasite eggs from the environment plus disinfection of pens between use is of real value. Various disinfectant products are available from farm supply stores. Disinfectants are more effective if preceded by mechanical cleaning with the use of a detergent solution or steam cleaner.

The following sanitation and management practices are recommended:

1. Wash sows with a mild soap solution and rinse with a mild antiseptic solution immediately before placing them in the farrowing house. Give special attention to the udder and feet.
2. Keep farrowing pens clean and free of manure to prevent exposure of baby pigs to large numbers of worm eggs and parasite larvae.

3. Avoid using permanent pastures or dirt lots. If temporary pastures are not available, rotate permanent pastures yearly or renovate pastures periodically.
4. Use well-drained areas for lots and pastures. Avoid formation of mud holes. Avoid overstocking lots and pastures.
5. Provide adequate nutrition to minimize the effect of parasitism and to reduce the tendency of pigs to search and root for food.
6. Pigs raised on concrete have some advantage over those raised on dirt particularly if regular cleaning and sanitation practices are followed.
7. Do not feed raw or improperly cooked garbage or table scraps to swine (to prevent trichinosis).

Diagnosis of Internal Parasites

Internal parasites can be diagnosed by clinical signs, necropsy and examination of feces for eggs. Clinical signs include poor feed efficiency, unthrifty appearance, coughing, pneumonia, diarrhea and death. However, many hogs may be heavily parasite-infected and appear normal.

Depending on the parasite species, adult parasites can be observed in the intestinal tract, lungs or kidneys post-mortem. Migrating larvae of roundworms (*Ascarids*) and kidney worms cause scars or white spots on the liver. These can be observed during necropsy of young pigs or at the time market hogs are slaughtered.

Deworming and Control Recommendations

For practically all swine producers in Florida, regular deworming of pigs and sows is needed to control common internal parasites of swine. Roundworms, nodular worms, strongyloides (threadworms), whipworms, lungworms and kidney worms cause problems in Florida swine. Several good deworming agents are available but vary in their effectiveness against specific parasites. No individual dewormer is effective against all species of parasites. Some dewormers, however, are fairly effective against many species and these are often referred to as broad spectrum dewormers. Deworming agents and their effectiveness are described in Table 1.

Piperazine is inexpensive, effective against adult roundworms and moderately effective against nodular worms.

It is administered in feed and water. Hygromycin B has value as an aid in control of whipworms, nodular worms and roundworms and is used as a feed additive to be fed continuously. Dichlorvos (Atgard) is effective against roundworms, nodular worms and whipworms and is a good dewormer to use in sows 1 and 2 weeks before placing them in the farrowing house. It is used only in feed. Levamisole (Tramisol) is effective against kidney worms, lungworms, roundworms and nodular worms. This dewormer is administered in feed or water. Pyrantel (Banminth) is effective against roundworms and nodular worms and is used only in feed either as a one-time dewormer or it can be fed continuously. Thiabendazole (TBZ) paste is the dewormer approved for use against threadworms (*Strongyloides*) in baby pigs. Fenbendazole (Safe-guard) is effective against roundworms, nodular worms, stomach worms, whipworms, kidney worms and lungworms. This dewormer is mixed with feed and fed for three consecutive days. Ivermectin (Ivomec) and Doramectin (Dectomax) are unique in that these dewormers are injected. They are rather expensive but are also effective against lice and mange. These dewormers are particularly useful in deworming sows.

Parasite Control Program

Parasite control programs vary with the individual farm. In general, farms can be separated into confinement or pasture (dirt lot) operations. Pigs raised on pasture or in dirt lots where reinfection is inevitable will need a more rigorous control program than pigs raised on slotted floors. Confinement systems with dirty solid concrete floors are no different from a pasture lot and should be considered contaminated with worm eggs.

In a parasite control program, sows and gilts should be dewormed with dichlorvos, fenbendazole, ivermectin, doramectin or levamisole 1 to 2 weeks before entering the farrowing house. Sows and gilts should also be washed prior to entering the farrowing house to get rid of worm eggs on their bodies. If threadworms (*Strongyloides*) are a problem in small pigs, thiabendazole paste should be used at 5 days of age and repeated at 10 days of age. When pigs reach 6 to 8 weeks of age, they should be dewormed with dichlorvos, levamisole, fenbendazole or pyrantel. Deworming again in 30 days using a different dewormer is advantageous in particular if pigs are raised on dirt. Please follow the manufacturer's directions regarding the use of deworming agents.

Monitoring of the internal parasite problem in the herd is recommended. Fecal samples can be collected and

examined by a veterinarian or diagnostic laboratory at regular intervals. Discussion of the problem with a veterinarian or extension livestock specialist is desirable to adopt the most effective program for the herd. Management practices to prevent parasite infections and sound nutrition programs are important control measures in addition to use of chemical deworming agents.

Table 1. Effectiveness of deworming agents in removing common swine internal parasites.

Deworming Agent	Roundworms	Nodular Worms	Whipworms	Lungworms	Threadworms	Kidney Worms
Piperazine ¹	75-100%	50%	0%	0%	0%	0%
Hygromycin B ²	95-100%	95-100%	85-100%	0%	0%	0%
Dichlorvos ³	99-100%	95-100%	90-100%	0%	60-80%	0%
Levamisole ⁴	99-100%	80-100%	60-80%	90-100%	80-95%	80-100%
Pyrantel ⁵	96-100%	88-100%	0%	0%	0%	0%
Thiabendazole ⁶	0%	0%	0%	0%	100%	0%
Fenbendazole ⁷	92-100%	99-100%	94-100%	97-99%	variable	100%
Ivermectin ⁸	90-100%	86-100%	variable	99-100%	99-100%	100%
Doramectin ⁹	90-100%	0%	0%	100%	100%	100%

¹ Tradename – Wazine, Fleming Labs

² Tradename – Hygromix⁸, Elanco Animal Health Co.

³ Tradename - Atgard, Boehringer Ingelheim

⁴ Tradename - Tramisol, Wyeth

⁵ Tradename - Banminth, Phibro Animal Health Corporation

⁶ Tradename - TBZ, Merial Ltd.

⁷ Tradename - Safe-guard, Merck Animal Health

⁸ Tradename - Ivomec, Merial Ltd.

⁹ Tradename – Dectomax, Zoetis