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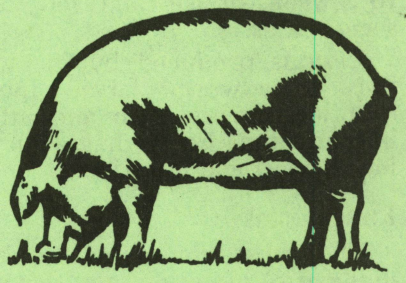

Internal Parasites of Swine

Diseases of pigs associated with infestation by internal parasites are among the most common problems affecting swine production today. Economic losses to the swine industry from internal parasitic diseases are estimated at several million dollars annually. The losses range from unthriftiness and poor weight gain to death resulting directly from the parasitic infestation or from secondary infection. Frequently the effects of a preexisting disease are worsened because of a concomitant internal parasitic disease. For example, the severity of swine influenza and mycoplasmal pneumonia is often increased when second stage roundworm (ascarid) larvae are migrating through the lungs.

The species of internal parasites and the incidence of internal parasitic disease affecting swine depend on several factors including herd management and geographical location. This publication discusses the more common internal parasites.

Roundworms-Ascarids

One of the most common intestinal parasites is *Ascaris suum*, also called roundworms and ascarids. Pigs are the natural host although the parasite has also been found abnormally in apes, cattle, sheep and squirrels. A species of roundworm in man is very similar to that found in pigs.

The adult ascarids are normally found in the small intestine. They appear cream-colored and may reach 8 to 12 inches in length. Adult female worms lay up to 200,000 embryonated eggs per day which pass out in the feces and contaminate the feed, water and environment. The eggs then hatch into infective larvae which are ingested and pass into the intestinal tract of exposed pigs. The remainder of the life cycle includes migration of second stage larvae through the intestinal wall, liver and lung, and development of adult worms in the small intestine. The entire life cycle requires up to 50 or 60 days.

The first clinical sign in affected young pigs is a transient moist cough that occurs about 1 week after exposure. The coughing coincides with migration of the second stage larvae through the lungs. Clinical signs in more advanced cases include failure to gain weight, loss of appetite and an unthrifty runty appearance.

The most common lesion of ascarid infestation is the presence of white "milk spots" or pearl-like nodules in the liver. Lesions are seen in the small intestine only when the adult parasites are so numerous that they cause a partial or complete blockage and prevent the normal passage of food material. Occasionally, individual pigs will have a large number of adult worms in the small intestine but no evidence of liver lesions. Lung lesions are nonspecific but may include scattered hemorrhages. Migration of ascarid larvae through the lungs seldom causes pneumonia nor has it been shown that larvae are capable of migrating through the uterine wall of the dam and into the unborn fetuses.

Nodular Worms

Several subspecies of nodular worms may affect the large intestine of pigs. The most common species of *Oesophagostomum dentatum*. Adult nodular worms are slender, white or gray and are 1/2 to 3/4 inches in length. The life cycle of the nodular worm and roundworm are similar except that after ingestion, the infective nodular worm larvae burrow into the wall of the large intestine and cause thickening and nodule formation. No evidence suggests that the nodule formation causes serious damage to the intestinal wall nor do the adult worms accumulate in large enough numbers to block the intestinal tract.

Threadworms

Intestinal threadworms, *Strongyloides ransomi*, are normally found in the small intestine and are believed to affect only swine. The adult parasites are very small and difficult to see with the unaided eye. The adult female worms burrow and lay eggs in the wall of the intestine. The eggs emerge and pass out in the feces where they hatch under optimum conditions into infective larvae or into free-living forms. The free-living forms become free-living adult worms which can be ingested and infect susceptible pigs directly. Infective larvae can either be ingested from contaminated feces, feed or water or can penetrate the intact skin of susceptible pigs. Infective larvae that gain entrance through the skin are carried to the lungs via the bloodstream and then are coughed up, swallowed and finally develop into adult worms in the small intestine. The complete life cycle requires 8 to 10 days.

Migrating infective larvae can cross the placental barrier and infect developing fetuses. Further, these larvae are often found in the fatty tissues of the mammary glands of the sow and contaminate the colostrum. Most of the infective larvae are passed in the colostrum in the first 12 to 18 hours after farrowing. Thus, newborn piglets may be infected by ingestion of contaminated colostrum, feces and feed and by the free-living larvae that penetrate through the skin.

Clinical signs of threadworm infestation are most often seen in young piglets and include vomiting, loss of appetite, runting, uneven growth within a litter, rough hair coat and a persistent diarrhea that does not respond in the usual manner to treatment with antibiotics. The death loss in piglets up to 2 weeks of age can reach 75% in severe cases.

Lesions produced by the infective threadworm larvae include eruptions of the skin and inflammation and hemorrhages in the lungs, heart and intestine.

Lungworms

The most common species of lungworm affecting pigs is *Metastrongylus elongatus*. The small, white adult parasites are 1/4 to 3/8 inch in length and inhabit the medium to small air passages of the lungs. The adult female parasites lay eggs which are coughed up, swallowed and pass out in the feces. A necessary phase in the life cycle of lungworms is ingestion of the eggs from the contaminated soil by earthworms. The eggs hatch within the earthworms and develop to infective larvae. Pigs will then eat the infected earthworms, the larvae emerge and are carried to the lungs via the bloodstream where they develop into adults.

Clinical signs in pigs with moderate to severe lungworm infestation are not diagnostic, but do include severe coughing, labored breathing and loss of appetite. Milk infestations are often characterized by the absence of clinical signs.

Lesions in the lungs caused by lungworms include wedge-shaped areas of trapped gas (emphysema), formation of firm gray nodules and inflammatory changes in the air passages.

DIAGNOSIS

Diagnosis of internal parasites in swine is based upon observing clinical signs, identifying parasite eggs in the feces by laboratory analysis and finding the adult worms in the respective target organs by postmortem examination. Clinical signs alone often only suggest an infestation. Although parasite eggs in the feces are a positive sign of infestation with a particular parasite(s), the finding does not necessarily indicate whether the infestation is light, medium or heavy. For example, whipworms and others lay eggs only during certain times of the adult life cycle. Pigs may be negative for eggs in the feces and yet may be infested with migrating infective larvae.

Finding the adult parasites on postmortem examination seems the most dependable method to diagnose and assess the severity of the infestation. This is difficult, however, when the adult parasites are so small that they are not easily detected. Producers should also be aware that internal parasitic diseases can precede and accompany other infectious diseases. Concomitant internal parasitic diseases may also weaken an animal further and contribute to the severity of other disease problems. Always, consult your veterinarian concerning diagnosis and severity of internal parasitic diseases in a herd.

TREATMENT, PREVENTION

Preventing or permanently eradicating internal parasitic diseases of swine is often difficult with ordinary management systems. Freedom from these diseases is further complicated by the nondiscriminate eating habits of pigs and the natural resistance of the intermediate forms of some of the internal parasites even to extremes in environmental conditions. Nonetheless, internal parasitic diseases can be controlled by carefully selecting proper treatment preparation (anthelmintics) and paying strict attention to herd treatment schedules and sanitation procedures during all phases of the production cycle.

A number of anthelmintics can be used to treat swine for internal parasites. As Table 1 shows, certain of these are more effective than others against particular parasites. Further, some anthelmintics have a narrow range of effectiveness where others are effective against a wide variety of parasite species. Anthelmintics for swine are either placed in the drinking water or given in the feed as a premix.

In all cases, producers should comply with the advice of the local veterinarian regarding treatment recommendations and must follow the exact instructions on the product label. Producers must also be aware of any side effects resulting from the use of certain products and comply with the required withdrawal period between administration and slaughter where it applies.

Table 1. Effectiveness of selected anthelmintis in removing certain internal parasites of swine.

	Internal parasites and effectiveness of removal (%)				
Anthelmintic	Roundworm	Nodularworm	Whipworm	Lungworm	Threadworm
Piperazine	75-100	50	0	0	0
Dichlorvos	99-100	95-100	90-100	0	60-80
Levamisole HCL	99-100	80-100	70-85	90-100	80-95
Thiabendazole	0	0	0	0	99-100
Pyrantel tartrate	96-100	99-100	0	0	0
Hygromycin B	95-100	95-100	85-100	0	0

Successful internal parasite control programs include the following:

1. Identifying the species and severity of the parasite infestation.
2. Select the most effective anthelmintic to use depending on the species of parasite(s) present.
3. Treat the following groups of animals with anthelmintic:
   a. All newly purchased stock during the quarantine period after arrival.
   b. All boars before breeding and bred sows before farrowing.
   c. All weaned pigs.
4. Thoroughly clean and sanitize the farrowing and rearing facilities before introduction of animals.
5. If possible, maintain animals on cement slabs or slatted floors to help reduce contamination with parasite eggs and infective larvae.

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