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## External Parasite Control

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External parasitism is a continuing problem for pork producers. Estimates of annual losses to lice and mange infestations range from \$30 million to \$200 million. Lice and mange mites can also mechanically transmit diseases such as swine pox. The major problems are caused by hog lice, *Haemotopinus suis*, and mange mites, *Sarcoptes scabiei* and *Demodex phylloides*.

### Life Cycle of Hog Lice

Hog lice (Figs. 1 and 2) are bloodsucking parasites that feed exclusively on swine. They are small (1/4 in. long) insects that cling to the hair of the neck, behind the ears, and in the folds of the skin. They can survive for up to 2-3 days off the pig in warm bedding, but they will not generally live on other animals. The life cycle of lice takes about 25-30 days to complete development from adult-egg-adult. The adult life span is about 35 days. An adult female will lay 3 or 4 eggs daily for approximately 25 days. These eggs are attached to the hair shaft and hatch as nymphs (immature forms) in 7-20 days. Nymphs are similar in structure but smaller than the adult. The nymphs will go through three nymphal stages before reaching adulthood. During development, lice may feed in clumps, generally on the more tender areas of the skin. Lice infestations start around the ear, expand to the lower body, and then to soft-skinned abdominal areas. Lice do not burrow into the skin at any stage of their life cycle.

### Symptoms

Mild lice infestations may cause no clinical problems. In more extensive infestations, the pests can be seen as dark bluish-black discolorations on the skin. The continuous sucking of blood and lymph causes irritation to the skin, leading to some itching. Damage from lice is primarily irritation, making the hogs restless and decreasing feed intake and growth rate in growing-finishing pigs. In addition, anemia may occur in young pigs because of the blood loss. Also, lice can carry swine pox virus and other diseases to susceptible pigs.

### Life Cycle of Mange Mites

Two types of mange mites affect swine. *Sarcoptes scabiei* var. *suis*, the most common, burrow into the epidermis. Their life cycle takes 8-25 days to complete. New females, as they mature, mate close to the skin surface and then begin new tunnels for their young (Fig. 3). This is the only external exposure mites have during the life cycle. The adult female lays 1 to 5 eggs daily for about 14 days. In 3-20 days, these eggs hatch in tunnels, maturing to adults in 5 days. The female dies about 30 days after reaching maturity.

Most often, an infestation begins on the inner side of the ear and spreads over the head, along the neck and across the body. The affected skin has small raised areas covered with brownish scabs. This is followed by hyperkeratosis-thickened, rough skin (Fig. 4). An intense itching may accompany the infestation, although in mild infestations itching may be negligible. Mite activity increases as skin is warmed by fever or high environmental temperature. This increases the irritation and feeding rates and may intensify the itching in affected pigs. Mites can be found on pigs year round, but during the winter when treatment is often difficult producers recognize a mange problem in their herds. Winter adds an additional stress to animals and, in many cases, pigs are in close contact, allowing the mites to spread throughout the herd. In summer, pigs are less likely to sleep close together, and mite transmission is slowed due to lack of pig to pig contact. Treatment is also easier in summer when concerns of animal stress due to spraying and handling are less.

Infestations by *Demodex phylloides* are uncommon in swine. These mites live in the hair follicles and produce a pimple-like lesion. The complete life cycle is not known, but the mites require about 3 weeks to develop through three larval stages to the adult. Adults will live for 1-2 months. Usually, an infestation begins around the nose and eyelids, then moves to the abdomen and inner thigh areas. No serious pruritus (itching) or other clinical problem is involved with this parasite. Occasionally, the pimples become infected and an abscess develops.

## Transmission

Species of mange mites and hog lice described above infest only swine. These pests are not carried on other animals, so pig-to-pig contact is the major means of transmission. Hog lice and sarcoptic mites can live in warm bedding for 1-2 days under ideal conditions before attaching to a new host. Occasionally, this will result in uninfested animals being infected without direct animal contact. However, primary transmission is by direct contact with infested pigs. Demodectic mites are very susceptible to drying and low temperatures and will live only a day or two away from the host.

## Treatment

Treatment of swine for sarcoptic mange based upon products currently available for use in the U.S. will fall into one of two categories: sprays or dips and injectable. While the specifics of a mange control program will differ based upon the product chosen, there are some fundamental steps that should be taken with any mange control program.

Mange is a problem that recirculates throughout the breeding herd. Mange is introduced onto a farm by introduction of pigs, feeder pigs or breeding animals. Any mange program should start with good biosecurity. Producers should put in mange free stock when possible and all animals should be isolated in a separate building until they can be treated for internal and external parasites as well as other disease problems.

Sows and herd-boars should be the focal point for a herd control program. Sows should be treated prior to farrowing so that when the piglets are nursing, the fewest (hopefully none) mites will be transmitted to them. Boars are exposed to all females in the herd and therefore should be treated 4-6 times a year. Animals should be examined closely 30 days after treatment and any animals that appear to still have mange retreated. These animals should be checked again in 30 days and, if they still appear to have mange, should be culled from the herd as they are carriers and will continually spread mange through the herd. One sow that is a carrier will transmit mites to her pigs. When these pigs are weaned and mixed with other litters in the nursery, the whole pen will have mange. In the final move of the pigs from the nursery to the finishing floor, the pigs are mixed again and mange will have moved through a large part of the herd from a single sow.

To start a mange control program on a farm, all pigs should be treated according to the label of the product chosen. In most cases, a second treatment 5-21 days following the first treatment will be recommended. All sows should be treated prior to farrowing and pigs can be treated at weaning or after the nursery if needed. In most cases, if a good job of mange control is done on the sows, piglets should not need to be treated.

Choosing a mange control product is important, and you should choose one that has an application method that fits into your production system. Sprays and dips will need to be applied to ensure 100% coverage of

the animals. Injectable ivermectin must be applied at the correct rate and in the correct manner.

**Weather Influences.** During severely cold weather, injectables, pour-on treatments or dust applications can be used for lice and mange control. Small portable, low-volume misting applicators also may be used for lice and mange control. Insecticides are prepared in an oil or water base and a small quantity (4-6oz.) is applied to each animal. Because of the smaller volume, fewer problems of chilling are encountered during cold weather application. Conventional spray applications alternatively for mange or lice control can be made during winter months by selecting sunny, calm days when temperatures are above freezing.

Table 1 lists currently labeled products found successful in external parasite control. Approved products and their use concentrations may change periodically. Always read and follow the product container label to ensure safe and effective treatment.

Withdrawal periods must be carefully observed because of the residue-producing potentials of these chemicals. Read the label for information on withdrawal times, proper product usage, and application rates. Do not overtreat animals with any insecticides.

### Total Control with Ivermectin

The approval of injectable ivermectin for use in swine facilitates external parasite control. Spraying or dipping swine in an insecticide solution is no longer required to kill external parasites. At the 300mcg/kg body weight dosage level, extended (6 months) sarcoptic mange mite control has been demonstrated. At lower levels much shorter control periods have been achieved. The product maintains activity for 8-10 days after injection and may be effective in killing emerging immature forms. Persistence of effective ivermectin blood levels has encouraged veterinarians to adopt a control program for mange and lice. Mange mites can be controlled under specific conditions. Because of the high treatment expense and the difficulty in completely breaking the mite's life cycle, development of a comprehensive control program should follow veterinary consultation. Meticulous implementation of the program is required because leaving a single pig untreated at any stage of this plan can cause the control effort to fail. Steps to consider include:

1. Reduce the breeding herd numbers through a rigorous culling program prior to total control initiation.
2. Attempt only in the summer months.
3. Remove all bedding and spray the premises with an approved spray from Table 1 at the time all animals are injected.
4. Inject all pigs on the farm within a 1- to 2-day period with 300mcg/kg body weight of ivermectin. All pigs must be treated including lactating sows and breeding boars. Suckling pigs should be treated 2 or more days before placement in the nursery. Inject all replacement stock during the isolation period with 300mcg/kg body weight of ivermectin and leave in isolation for 7 days before adding to the herd.

Although following a comprehensive program as outlined above may result in controlling mange within a herd, no guarantees can be given. An additional degree of effectiveness may be provided by retreating all pigs on the farm 10-14 days after the initial injections. Although it doubles the expense and labor, retreatment will provide longer therapeutic levels and a great margin of safety.

Because external parasites are so difficult to control, eradication of mange may not be possible under some farm conditions. Therefore, total control of swine mange should be attempted only after a careful cost-benefit evaluation has been completed with a veterinarian or extension entomologist.

Compound	Usage instructions	Sarcoptes	Lice	Withdrawal times (days)	Special Instructions
amitraz Taktic	Mix 1 qt./50 gal. water	x	x	1	
coumaphos Co-Ral 25% w.p. Co-Ral 11.6% e.c. Co-Ral 1% dust	Mix 1 lb./50 gal. water Mix 1 qt./50 gal. water 1 oz./head		x x -	0 0 0	Do not treat pigs less than 3 months old.
2-fenthion Tiguvon 3% pour-on	1/2 fl. oz./100 lb. body weight		x	1	May be used on gestating and lactating sows.
fenvalerate Ectrin 10% w.d.l.	Mix 1 gal./50 gal. water	x	x	1	Repeat in 14 days.
lindane 20% e.c.-	Mix 1 pt./50 gal. water	x	x	30	Restricted use. Do not treat pigs less than 3 mo. old. Do not treat gestating & lactating sows.
lindane 12.4% e.c.-	Mix 1 1/2 pt./50 gal. water	x			
malathion 4-5% dust	1/4-1/2 tbsp./head	partial	x	0	
malathion 57% e.c.	Mix 2 qt./50 gal. water	x	x	0	Do not treat pigs less than 1 month old.
methoxychlor 23.8% e.c.	Mix 1 gal./50 gal. water		x	0	Repeat in 14-21 days.
methoxychlor 50% w.p.	Mix 4 lb./50 gal. water	x	0		
permethrin Atroban 11% e.c. Ectiban 5.7% e.c. Expar 11% e.c. Insectrin 5.7% e.c. Permaban 11% e.c. Permethrin 10% e.c.	Mix 1 pt./25 gal. water Mix 1 qt./25 gal. water Mix 1 pt./25 gal. water Mix 1 qt./25 gal. water Mix 1 pt./25 gal. water Mix 1 pt./50 gal. water	x (all)	x (all)	5 (all)	Repeat in 14 days. (all)
phosmet Prolate 11.6% e.c. Prolate 1% dust	Mix 2 qt./50 gal. water 1/2-1 oz./head	x (both)	x (both)	1 (both)	Do not treat pigs less than 3 months old.
stirofos -Rabon 50% w.p. -Rabon 3% dust	Mix 4 lb./50 gal. water 3-4 oz./head	x (both)	x (both)	0 (both)	Repeat in 14 days.
ivermectin 1% Ivomec	300 mcg/kg (1cc/75 lb.)	x	*	18	

**Table 1. External parasite control products. There are no known treatments available for Demodex infections in swine.**

This table represents general usage and withdrawal information as presented on current labels. Label changes can occur at any time. Before using any pesticide, read and follow label directions. Specific formulations may have longer withdrawal times.

The amended Federal Insecticide, Fungicide and Rodenticide Act of 1974 requires that all pesticides be classified for general or restricted use. Producers purchasing or using restricted-use pesticides after October 21, 1977, must become certified or additional state regulations may limit use of certain pesticides. Check with your state Extension specialists for certification or use requirements and for the specific latest control recommendations.

Lindane is a restricted-use pesticide. Do not use benzene hexachloride (BHC) in making this formulation. Run-off of excess material from lindane-based sprays may create an environmental hazard.

w.p. = wettable powder; e.c. = emulsifiable concentrate; w.d.l. = water dispersable liquid.

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