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J. T. E. Dinwoodie

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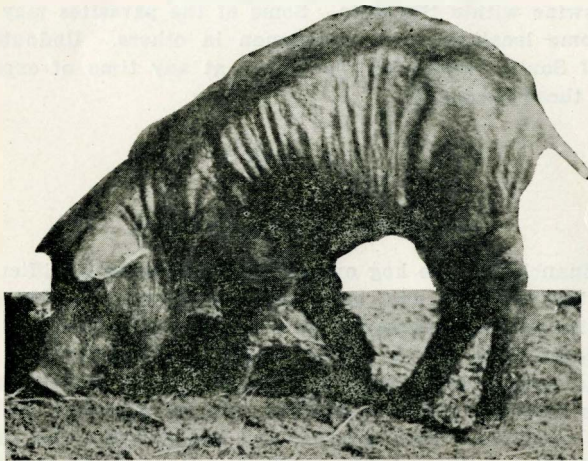
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COMMON PARASITES OF SWINE

DR. J. T. E. DINWOODIE

Extension Specialist In Animal Disease Prevention



Pig affected with internal and external parasites, showing general unthriftiness as a result of the severe infestation. (Photo by Dinwoodie)

EXTENSION DIVISION
SOUTH DAKOTA STATE COLLEGE
AGRICULTURE AND MECHANIC ARTS
C. LARSEN, DIRECTOR

Cooperative Extension Work in Agriculture
and Home Economics, South Dakota State
College and U. S. Department of Agriculture
Cooperating.

BROOKINGS

THE COMMON PARASITES OF SWINE

The publication of this bulletin is designed to convey to hog raisers of this state information regarding some of the common parasites of swine. All of the parasites described herein have been found infesting swine within the state. Some of the parasites may be common in some localities, and uncommon in others. Undoubtedly all sections of South Dakota are in danger at any time of experiencing loss from these parasites.

ECONOMIC CONSIDERATION

The financial loss to hog owners from parasites is difficult to determine. The loss that does occur is not a direct one. Hogs harboring parasites do not necessarily have to die to occasion loss. Loss usually occurs from the thriftless condition of the infested animals, the thriftlessness being caused by irritability and restlessness if the parasite is external (lice and mange) and by digestive disturbances if internal (worms). Both external and internal parasites reduce the natural vitality of the animals, rendering them more susceptible to disease (hog cholera, pneumonia, etc.) Parasitized animals do not produce as profitable gain from food consumed as they would if free. Young pigs may die as a direct result of parasitism. The amount of loss in an infested herd or individual animal depends upon the extent of the infestation. The loss in poor returns for feed consumed amounts to thousands of dollars yearly. In 1917 the loss, direct and indirect, from parasites in hogs exceeded the loss from hog cholera in South Dakota.

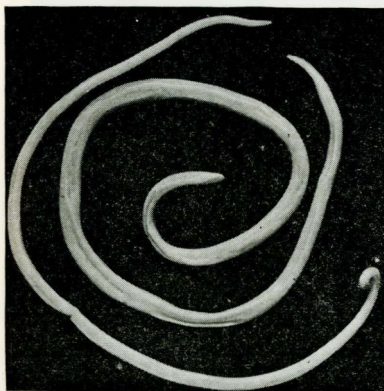
COMMON NAMES OF PARASITES

The internal parasites commonly found infesting swine in South Dakota are the "common round worm," "lung worm," "whip worm" and "thornhead worm". Their prevalence is about in the order named. The common external parasites are lice and the mange mite, lice being much more prevalent than mites.

INTERNAL PARASITES

Intestinal Tract

COMMON ROUND WORM—(*Ascaris Suis*)



Common round worm, one-third natural size. (Photo by Hutton, Station Staff)

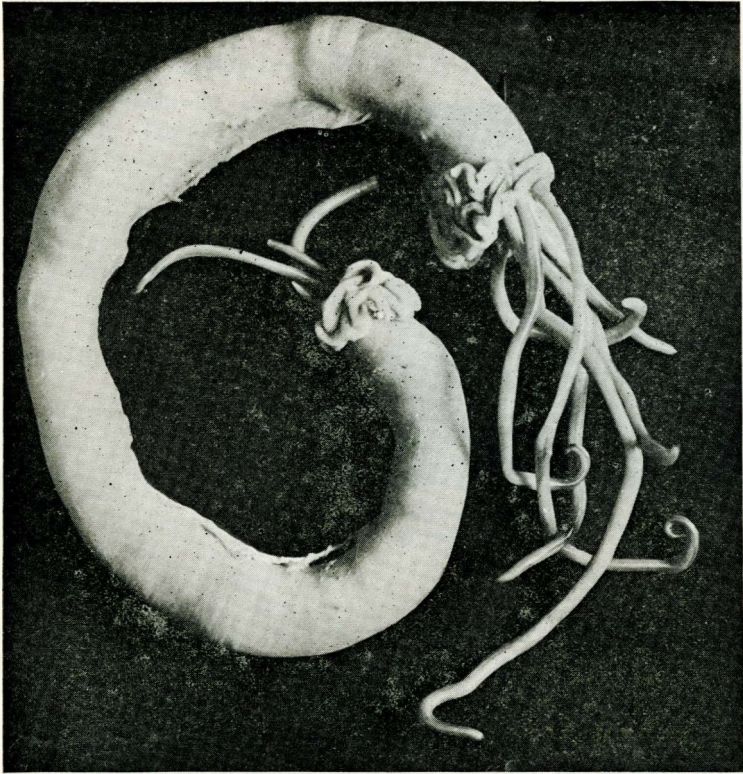
This is decidedly the most common intestinal parasite of swine in South Dakota. Its distribution is universal. The *Ascaris Suis* is of a milky white, or pinkish color. The male is 6 to 10 inches long and female 10 to 12 inches, either seldom exceed $\frac{1}{4}$ inch in diameter. The body is firm and elastic, cylindrical and pointed at both ends.

Location.—The common seat for this worm is in the small intestines, two or three feet from the stomach. However, it may be found anywhere in the small intestines and in some instances may invade the stomach, gall duct, gall bladder and liver.

How Spread.—The female deposits eggs which pass out with the manure. The eggs or ova are very small and can be seen only with a microscope. The eggs upon reaching the ground become mixed with earth, water, food or the usual hog lot debris. The passing of the egg from one animal to another is a matter of chance. But if food and water are allowed to become contaminated with the manure of an infested animal, the chance of spread becomes almost a certainty. Upon being swallowed, the digestive juices liberate the young parasite from the shell, which then passes into the small intestines where it rapidly develops into a full sized parasite. Young pigs and shoats are more susceptible to the round worm than are more mature animals.

Unthrifty pigs, from any cause, are much more liable to infestation than are more healthy individuals.

Injury. The round worm causes damage to its host in a variety of ways. The most serious is by its mechanical presence. When we recall that a worm is often a quarter of an inch in diameter, it is easy to conclude that the presence of five or six in one portion of the small intestine will greatly impede the free passage of ingesta, resulting in severe digestive disturbances. Their presence also causes inflammation. In badly infested animals it is not uncommon for the worms to push their way up the gall duct into the gall bladder and they may even penetrate the substance of the liver, causing functional derangement of the organs involved. The common round worms are



Portion of small intestine occluded by common round worms. One-half natural size. This is one method by which the worm causes harm.
(Photo by Hutton, Station Staff)

not blood suckers, consequently they do not attach themselves to the inner coat of the intestine. They gain their nourishment principally by absorption from the food taken in by the animal. The worm-infested pig does not even get a chance to assimilate and use its own feed, but must share it with the worms. As the worms carry on their life processes, they throw off from their bodies waste material. This toxic material, if absorbed by the host, acts upon the nervous system. Hence, it is not uncommon for badly infested hogs to show cerebral disturbances. In other words, they act "crazy" and are prone to have "fits."

Symptoms. The number of worms present and the age of the animal greatly influence the symptoms presented. A slight diarrhea, disturbed appetite and restlessness are indications. Severe infestation may cause continuous diarrhea, colicky pains, restlessness, loss of appetite, unthriftiness in hair and skin, loss in weight and strength, unnatural standing positions and sometimes "fits."

THORN HEADED WORM—(*Echinorhynchus Gigas*)

This parasite is not as common in South Dakota as the round worm. Its presence has been reported from packing plants and it is occasionally met with in field post mortems. This particular worm is often confused with the common round worm, many hog owners reporting thornheaded worms when the common round worm was the invader. The thorn headed worm is so named on account of the fact that its head is armed with five or six spine-like horns by which the worm attaches itself to the lining wall of the intestine.

Description. The *Echinorhynchus Gigas* is a large worm. The female is much the larger, being from 8 to 12 inches long, the male 3 to 4 inches. The worm near the head end may reach a diameter of a lead pencil, the body tapering posteriorally. The female tapers more than the male. The male has a blunt tail, while the female has a thin, long tail of about the same diameter as the lead in an ordinary pencil. Both sexes abruptly taper to form the head. This worm is milky white in color.

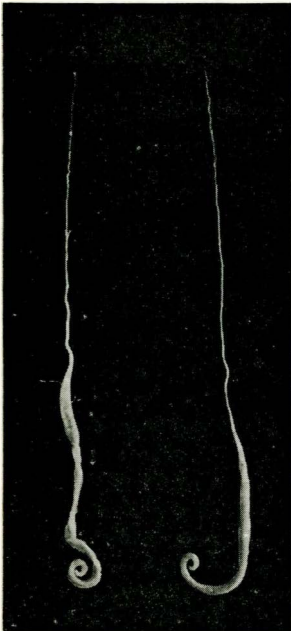
The mode of infestation with this worm differs from the common round worm. The eggs deposited by the mature female pass out with the manure. Unlike the common round worm, the eggs will not grow into a worm if taken up at this stage by another hog. They must gain further maturity in the body of the common white grub worm which is the larvae form of the May beetle or May bug. Upon reaching the ground, the eggs are eaten by the white grub worm. Upon being liberated from its shell in the intestines of the grub worm the little parasite works its way thru the intestinal walls and encysts in the body of the white grub worm. When the pig or hog eats, infected white grub worms, the encysted larval thornheaded worm is freed by digestive action in the hog's stomach. The small worm passes back to the large intestine and attaches itself to the lining wall by means of the spines on its head. Here it grows to maturity in a few weeks and is ready to commence over again its life cycle.

Injury. The thornhead worm does not remain permanently attached at one spot, but may move, reattaching at another place. In this manner it may set up several points of inflammation. The thorn head of the worm penetrates so deeply into the wall of the intestine that the inflammation may extend to the outer layer of the intestinal wall, causing peritonitis and death. Abandoned points of attachment may give rise to ulcer formation. This parasite absorbs its food from the contents of the digestive tract, and it may also gain some nourishment by sucking blood. This worm, like the round worm, also liberates a toxic material which has a deleterous effect on the nervous system.

Symptoms. Positive evidence of the presence of worms can only

be determined by finding the eggs or worms in the feces from the hog or the worms in the intestines upon post mortem examination. The thornhead worm is not usually found in large numbers. A very few worms can give rise to symptoms that may suggest their presence. Pigs become thin, lose their appetite, and have alternating periods of constipation and diarrhea. As a result of continued digestive disturbances and the absorption of toxic material liberated by the parasite, nervous derangements are quite common. Involvement of the nervous system is manifest by restlessness, irritability and twitching of muscles. Oftentimes the animal shows extreme convulsive movements, producing a rigidity of the body. Death frequently occurs in animals that present these symptoms.

WHIP WORM—(*Trechocephalus Crenatus*)



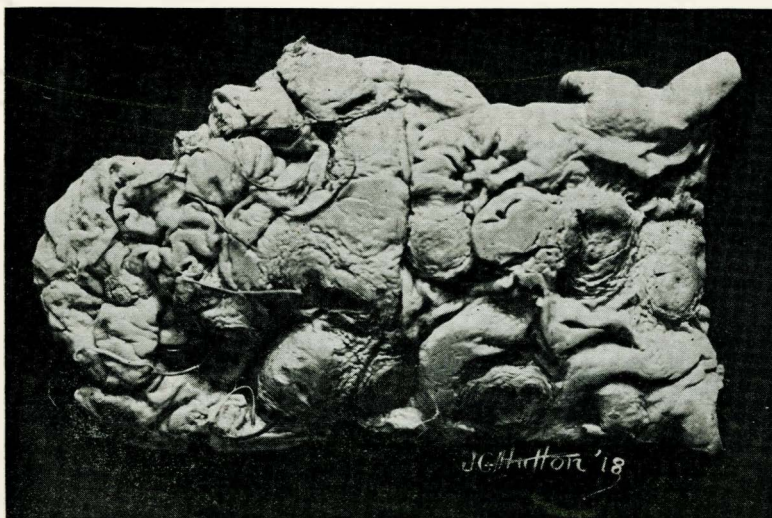
Whip worm, three times natural size, showing thread-like anterior end and larger posterior extremity. (Photo by Hut-ton, Station Staff)

The whip worm is much less common than the round worm.

Description. It is from $1\frac{1}{2}$ to 2 inches long. The small head end is about as large as an ordinary hair. The posterior end is much larger, giving the parasite the appearance of a blacksnake whip. The thin portion of the male is coiled and in the female straight, or slightly curved. Both sexes are of a cream or pinkish color.

Location. In the large intestines, the caecium (blind gut) is its favorite habitat. Unlike the round worm the whip worm attaches itself firmly to the lining membrane of the bowel and derives its nourishment by sucking blood. The worms are seldom present in sufficient numbers to cause severe harm. Injury results from irritation of the large intestine producing a diarrhea. The mature female lays eggs, which pass out with the manure.

Animals become infested by swallowing food or water contaminated with egg-laden manure from an infested animal. In the stomach of the hog these eggs rapidly hatch. The embryo passes back to the large intestines where it attaches itself and grows to maturity.



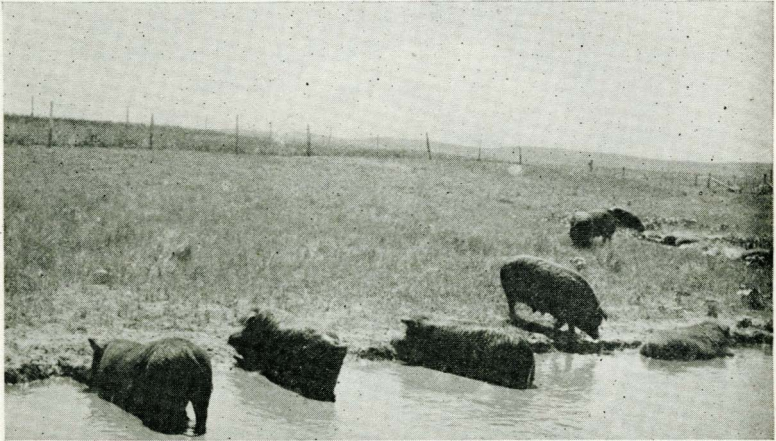
Portion of "blind gut," one-half natural size, showing whip worms attached to inner lining. (Photo by Hutton, Station Staff)

Treatment of Internal Parasites of the Intestinal Tract

Treatment may be classified under two heads, **preventive** and **medicinal**. Either method if practiced alone will not bring the desired results. Preventive measures cannot be bought in containers, neither will medicinal treatment of infected hogs rid the premises of eggs. Both measures must be in force at the same time successfully to free a herd of intestinal parasites. One treatment does not have precedence over the other; both are necessary.

Preventive Treatment. All intestinal worms lay eggs which pass out with the feces. These must come to the outside world to undergo a stage of development and to gain entrance to other hogs. Upon this point hinges successful preventive measures. Destroy the eggs before they can regain the body of another animal. A large number of eggs perish in this transfer, but this loss is made up by the large number of eggs deposited. Many more eggs will perish if conditions that prolong their survival are removed. Damp, moist, or shaded areas favor their longevity. Bodies of stagnant water, mud-holes, as found in the usual hog pen and yards, together with wallows around stock watering troughs usually serve as media to keep the eggs alive. Such areas should be drained or filled. Eggs do not live more than a few weeks under dry conditions, but may live a year or more under more suitable conditions, thus allowing their accumulation in enormous numbers.

Hogs kept in barns and small lots should be regularly cleaned and the pens disinfected.



Mud wallow. Such places afford favorable conditions for the survival of parasite eggs. Drainage is the remedy. (Photo by Dinwoodie)

Provide feeding facilities that will keep the food clean. A feeding floor of concrete is recommended.

Pastures and lots may become so extensively infested that the ordinary preventive measures are fruitless; under such condition the hogs, after medicinal treatment, should be removed to new lots and the old lots put under cultivation.

With the thornheaded worm it is necessary for the hog to eat the grubworm, harboring the larval worm to become infested. Grubworms are particularly common in the old manure piles, old straw stack bottoms, and in wooded areas. The removal of manure piles and old straw bottoms will assist in reducing the number of grubworms. Wooded areas, especially if damp, can be fenced off.

Medicinal Treatment. The usual manner of administering drugs to hogs is with the food. The medicine is usually mixed with slop and fed to hogs in groups, each group containing about ten hogs of equal weight. This method of treatment is open to much criticism. At the best, it is a hit-and-miss proposition. Even if we equalize the pigs as regards to size and strength, there are always a few that will get less feed and drug than intended. Also the mixture of drugs with slop or other liquids may change the chemical properties of the drug. All drugs used to expel or kill worms are more effective when administered on an empty stomach. The advantage of giving drugs with feed lies in the ease of administration. **More effective treatment consists in giving each animal a measured dose in pill or capsule form.** Veterinarians keep on hand drugs prepared in such form together with the instruments necessary for their administration.

If one decides to give the medicine in feed, the hogs should be sorted into sizes. Strength of the individual should also be considered. A pig may be as heavy as his pen mates, but if suffering from worm infestation, it may not be strong enough to secure its just share of feed and quantity of worm medicine. Starve the animals for one meal. Provide sufficient trough room. Select pens that have a solid impervious floor, so that the manure passing from the animal can be easily collected.

The Veterinary Division of the Iowa State College recommends the following treatment for intestinal worms:

Santonin, 8 grs.
Areca nut, 2 drams.
Calomel, 2 grs.
Sodium Bicarbonate, 1 dram.

This is a dose for a 100 pound hog. The dose given to a herd can be determined by using the above for each 100 pounds live weight.

The U. S. Department of Agriculture recommends the following: 45 drops of oil of chenopodium to one ounce of castor oil for each shoat weighing 60 to 100 pounds. The Department recommends that each hog be treated separately.

Objection to either of the foregoing treatments is raised by some on account of the cost of the drugs, and other cheaper drugs are often used, principally turpentine and copperas. While either will expel some worms, neither is very efficacious.

Turpentine is given in doses of one teaspoonful for 100 pounds, live weight, fed in milk or slop for three consecutive meals. This is followed at the fourth feeding period with a physic of one pound of Epsom salts to 1,000 pounds live weight.

Copperas is given in teaspoonful doses, dissolved in warm water and mixed with the milk or slop, following the same course of treatment as outlined for turpentine.

After the worm remedy and physic have worked on the treated animals, all the manure that the animals have passed must be collected and removed. This manure contains the eggs and dead worms that may also be full of eggs which, if left within reach of the hogs, will soon destroy all benefit of the treatment. The manure can be mixed with quick-lime or scattered on a cultivated field to which the hogs do not have access.

Attempts have been made to supply a medicinal treatment that will prevent worms from gaining lodgment in hogs. This is a fine theory, but not logical. The best preventive treatment for swine is good feeding and proper housing, resulting in good health which will tend to prevent parasitic infestation. However, the following mixtures are used to prevent worm infestation:

Pulverized charcoal	2 parts or 10 lbs.
Air slaked lime	2 parts or 10 lbs.
Hardwood ashes	2 parts or 10 lbs.
Common salt	1 part or 5 lbs.
Sulphur	1 part or 5 lbs.
Pulverized sulphate or iron	1 pound

Mix very thoroughly and put in a dry place where pigs or hogs may get at it at will.

The following mixture has been recommended for preventing or eliminating intestinal worms in swine.

	Pounds
Pulverized wood charcoal	1
Pulverized sulphur	1
Pulverized sodium sulphate	1
Pulverized antimony sulphide	1
Pulverized sodium chloride	2
Pulverized sodium bicarbonate	2
Pulverized sodium hyposulphate	2

Mix thoroughly and give a tablespoonful in ground feed once a day to hogs weighing 200 pounds and to others in proportion to their weight.

INTERNAL PARASITES

Respiratory Tract

LUNG WORM—(*Strongylus Paradoxus*)

This is the only worm worthy of note that inhabits the respiratory tract of swine. It is quite common in South Dakota.

Description. Lung worms vary in length from $\frac{3}{4}$ to $1\frac{1}{2}$ inches, and are thread-like in appearance. The male is smaller than the female. They are white or brownish white in color.

Location. In the air passages of the lungs.

How Spread. The mature female lays eggs that are expelled through the nose, during seizures of coughing, or instead of escaping through the nose, the egg-bearing mucus may be swallowed and pass out through the intestines with the manure. In either case the eggs eventually reach the ground. Upon reaching the ground the eggs hatch, producing a very small worm or larva. Moisture greatly facilitates the hatching. These larvae gain entrance to the lungs by being taken in with inspired air. Upon reaching the air passages they quickly mature.

Symptoms. A few lung worms apparently cause but little trouble that is noticeable. Young pigs are more susceptible to infestation from this worm than older hogs. Even in pigs the symptoms are often quite unnoticeable. The main symptom is usually a cough. Coughing is more noticeable when the animal gets up and moves

about. At this time the cough may last for a few minutes. Pigs seldom show loss of appetite, loss of weight or marked unthriftiness. Occasionally, infested pigs will have a frothy discharge from the nose. At times, mature worms may be found, upon close examination, in the coughed up material. Eggs, which can only be seen with a microscope, are present in this same material.

Treatment. Preventive treatment is much more important than medicinal. Preventive measures consist in draining or filling in all low, wet places. Plow up and rotate the hog pastures. Clean out old winter quarters, and leave them uninhabited during the summer. Animals may grow up and reach a mature age with a chronic infestation. Such animals are common sources of infestation for the yearly crop of pigs.

Rarely does it become necessary to dispose of all swine. Occasionally it is necessary, in which case the infested stock is replaced with clean, mature animals. The newly purchased are placed in pens and lots freed from eggs. No medicinal treatment is practical. Nutritious food, clean pens and proper feeding quarters will be found to produce beneficial results, and all that is necessary, in a majority of cases.

EXTERNAL PARASITES

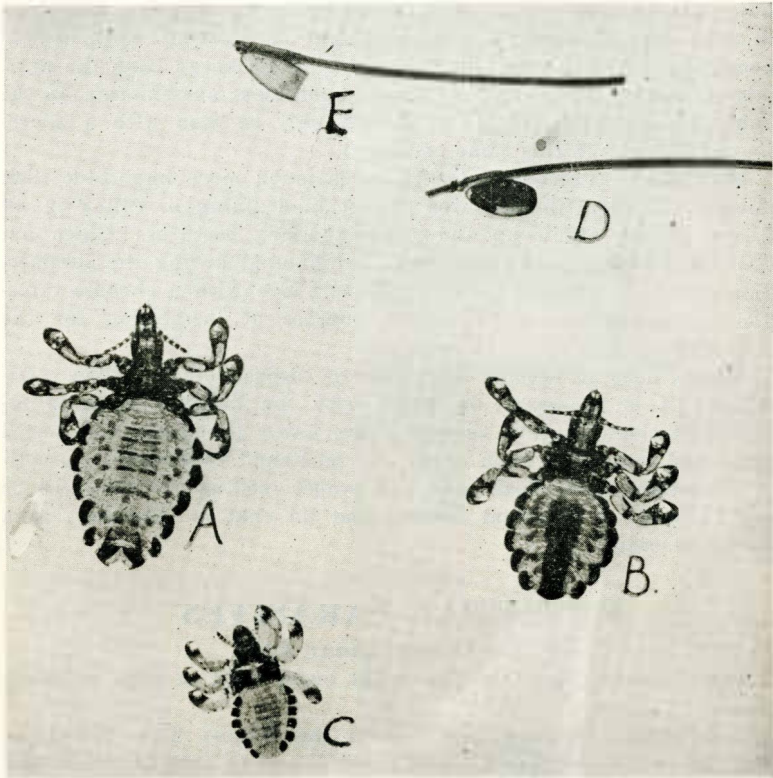
LICE—(*Hematopinus Suis*)

These lice are found in practically every herd of hogs in South Dakota.

Description. *Hematopinus Suis* is the largest louse found on any of our domestic animals. It is about 1-5 of an inch in length and 1-10 of an inch in width, of a gray color, the edges of the body being darker in color, the younger immature lice being of a lighter shade. Lice multiply by laying eggs. The mature female cements the eggs or nits on the hair. The eggs are quite small, but can be seen with the unaided eye.

Location. The lice may be found anywhere on the surface of the animal's body, but are usually more numerous in the grooves and depressions back of the ears and the inner side of the hind legs. In these localities the nits or eggs are more numerous also. The reason the lice choose these localities is that the skin here is thin, making it easy for the larvae to pierce thru and obtain the blood upon which it lives.

An individual louse does not necessarily spend its entire life on one animal. It spreads from one animal to another in sleeping quarters, or when it finds an unsuitable host, it drops off and gains a more desirable victim. Many lice are brushed off by the rubbing of hogs against fences, posts, etc., and transferred to the body of another animal that chances to come in contact with such objects.



A—Common hog louse, male. B—Female, C—Young louse, D—Nit or egg attached to bristle, unhatched, E—Hatched. Ten times natural size. (Photo by Hutton, Mount by Severin, Station Staff)

Symptoms. Affected animals will rub and scratch against posts, fences, etc. As a result of the irritation and biting of the lice affected animals are restless and do not sleep or rest well. It is not difficult to find lice on hogs if they are present. The thin hair on the hog does not afford a hiding place for them. The eggs may be noticeable also as small whitish specks attached to the hair.

Injury. Results from restlessness due to irritation and biting of the lice. Young animals have thinner skins than older animals, thus affording a better feeding ground. It is not uncommon for pigs to show symptoms of marked unthriftiness, even becoming stunted and runty. Unthrifty animals are usually more lousy than animals in better condition. The constant biting of this parasite causes a slow inflammation of the skin which adds to the pig's discomfort.

MANGE—(*Sarcoptic-flesh eaters*)

Mange is uncommon in South Dakota.

Description. The mange mite is very small, and can only be seen with the naked eye under very favorable circumstances. It is more easily detected with a high power reading glass or a microscope. To facilitate finding the mite, deep skin scrapings are placed on black paper; the mite may be seen as a small white object moving away from the skin debris.

The mite burrows into the skin, forming galleries where it lives and lays its eggs.

Injury. The mites cause irritation by piercing the skin to secure tissue fluid. This with the burrowing cause intense itching. During violent rubbing, the hogs break off and pull out hair, and otherwise injure the skin, adding to the animal discomfort.

Symptoms. The mite usually attacks the regions around the eyes and ears and in the flanks. The effected parts become scaly, the skin thickened and corrugated and the hair drops out, giving a rather characteristic picture.

Treatment of External Parasites

Successful treatment for lice consists in treating both the affected animals and the premises harboring the animals. The parasite exists on the animal in two forms, the living louse and the eggs or nits.

Animals may be freed from lice and nits in a variety of ways and with a variety of compounds. The method and compound used depending usually on the size of the herd and the facilities for administration.

Commercial Dips. There are a large number of commercial dips which are quite effective. Any of the common ordinary coal tar preparations, usually termed sheep dips, give pleasing results. The dip is prepared according to directions on the label. The coal tar preparations will destroy the lice, but will not destroy all the nits, making it necessary to kill all young lice before they reach a breeding age and deposit more eggs.

Home-made Dips. Of the many home made preparations used against lice or mites, kerosene emulsion heads the list. Another one in common use is lime and sulphur.

Kerosene emulsion is a milk-like preparation made by combination of ordinary kerosene, soap and water.

A stock solution is made by cutting up $\frac{1}{2}$ pound of soap and dissolving it in 1 gallon of water, which is brought to a boil, then it is mixed while hot with 2 gallons of kerosene.

The dip is prepared by mixing 1 gallon of the stock solution with 9 gallons of water.

Kerosene emulsion is more destructive to nits than common sheep dip, and is quite effective in killing the live lice.

Kerosene emulsion should not be used during the day, unless the dipped animals can be kept under roof. Direct sunshine on newly dipped animals may cause quite a severe inflammation of the skin. Kerosene emulsion can be safely used in late afternoon or evening.

Bulletin No. 155 of the Alabama Experiment Station gives the following directions for preparing lime and sulphur dip:

"Take 8 pounds of unslaked lime and 24 pounds of sulphur. Put into large kettle, cover with 20 gallons of water and boil for not less than 2 hours. Add a little hot water occasionally while boiling to take the place of the water that evaporates while boiling. Take off the fire and let the sediment settle and strain through a fine sieve and cloth; then add sufficient warm water to make the whole measure 100 gallons."

Lime and sulphur dip may be bought in concentrated form from commercial houses. In ordering be sure and specify dip for animal use.

Dips may be applied as a spray or wash, but best results are obtained by use of a dipping vat. A dipping vat 4 feet long at the bottom, 9 feet at the top, 12 inches wide at the bottom and flaring to 20 inches at the top with a depth of 4 feet is quite satisfactory for hogs. Concrete is the best material for vat construction, being decidedly the most durable material to use. Vats of plank, although quite satisfactory, are not long-lived. Metal tanks may be obtained from dealers or they can be built by the local tinsmith. Vats may be built on the plunge or incline style. The plunge vat is inclined only at one end, the receiving end being perpendicular. Incline vats are sloping at both ends, the exit end being more inclined than the receiving. The incline style has the most advocates. Injury is likely to result in the 4 feet drop which the animal must take in the plunge style.

Vats may also be built of variable length, the length depending on the number of minutes the hog should be kept in the dip. Long vats are of such a length that it will take a given time for an animal to wallow to the incline end. Short vats are usually equipped with a sliding drop gate in the vat at the lower end of the incline to hold the animal in the dip the proper length of time.

Small pigs and light shoats can be hand dipped. The dip is placed in a candy pail, wash boiler, tub, or half barrel and the animals picked up by hand and held under the dip the proper length of time.

Dips can be applied by spray pump or sprinkling can. The animals should be very thoroughly soaked, wet all over. Particular attention being paid to those areas that commonly harbor lice. While this method is not as effective as the dipping vat, good results can be obtained by doing careful work. It has the advantage over dipping

in being less expensive where only a few hogs are to be treated. This method on large herds is wasteful with the dip, adding to cost, besides not being as effective.

Dips are often added to the water in concrete hog wallows, a weak solution being used.

Crude oil is an effective remedy to kill lice. It is usually applied by hog oilers, or by hand. The theory of the hog oiler is good and one may be made at home by soaking rope or other material in crude oil and wrapping it around a post to a height of about two feet. The material may be saturated with more oil from time to time. Crude oil may be applied to the backs of the pigs with a wide paint brush while they are at the feeding trough. Apply the oil from a point between the ears to the root of the tail. The oil will run down over the sides of the hog and by contact with other hogs and other objects will soon be distributed over the entire body surface. In summer time sheep dip may be added to cement wallows to make a weak solution in the water, or crude oil may be poured on the water, and each hog will get a thin coating upon entering the wallow.

Cleaning the Premises. Dipping of the hogs without a thorough cleaning of the premises, will give only temporary relief. The hog louse will live in the litter and filth of a hog pen for a considerable time. If no attempt is made to kill the "pen" lice, the hogs will soon be as badly infested as ever. If the hog lots cannot be properly freed from lice, dipped hogs should be placed on a new range and kept away from the old feed lots. The "pen" lice will die out if the hogs are kept away for several weeks.

To clean premises properly, all litter and debris should be gathered up and burned, or spread on the field. Old straw bottoms can be burned or spread. Tumble-down sheds should be removed or repaired, followed by thorough disinfection of all hog houses and grounds, using any of the dips and apply with a spray pump.

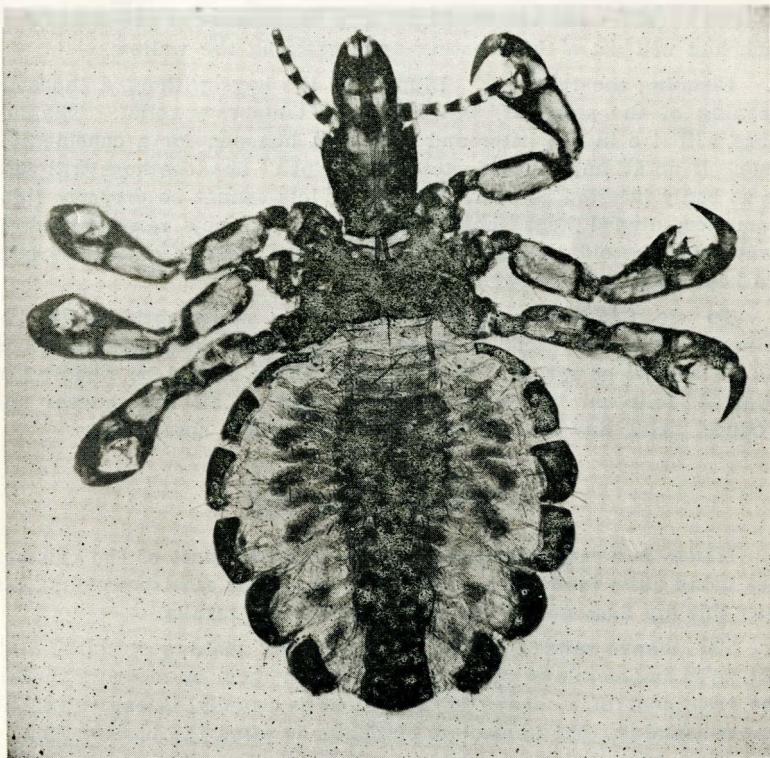
MANGE, or Hog Itch

Mange is a much harder condition to treat, most of the common dips being quite ineffective. Lime and sulphur is most promising, but even this dip does not always bring the desired results.

The mange mites burrow into the skin, making it quite difficult, even impossible in some cases, to reach them by ordinary means. The treatment of a mangy herd of hogs is usually so expensive and time-consuming, that immediate slaughter is often the best method of handling such animals. After a thorough cleaning of the entire premises the place can be restocked with animals from a non-infected herd.

WARNING

It is dangerous to drench hogs. The only safe way to give a hog medicine is by pill or capsule. If a hog must be drenched, snub it to a post, with a noose around upper jaw. Tilting a pig upright and pouring medicine into the mouth is often fatal. Every time the pig squeals, the wind-pipe is thrown open and the medicine runs down the wind-pipe into the lungs, either suffocating the animal, or causing pneumonia. In either event, death is likely to result.



This hog parasite and others are described in this bulletin. Thirty times natural size. (Photo by Hutton, Mount by Severin, Station Staff)