

Oklahoma Agricultural Experiment Station.

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COMMON PARASITES  
OF DOMESTIC ANIMALS.

L. L. LEWIS.

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## COMMON PARASITES OF DOMESTIC ANIMALS.

L. L. LEWIS.

### INTRODUCTION.

The general prevalence of parasites affecting all species of domestic animals makes it possible, by observing and experimenting with a limited number of animals, to obtain information that is of general and practical use. The presence of any great number of parasites, whether internal or external, is injurious to any animal, and their effect is soon noticeable. This is especially true of external parasites where the presence of any considerable number is indicated by a tendency of the animal to rub or gnaw the skin until in nearly all cases the result is a loss of hair, a general unthrifty condition and a tendency of the tissues to degenerate into the formation of sores and ulcers.

Very few of the domestic animals are affected with parasites to such an extent as to cause death, but this may frequently be the case. Probably this is the reason that under ordinary circumstances so little attention is paid to the presence of parasites except in special cases where certain quarantine regulations prohibit the movement of infected animals. The direct injury caused by many parasites, as the scab and mange mites, and the power of others, as the cattle tick, to carry disease, necessitate measures that will prevent their spread as well as the use of some means of ridding the animals of the parasites. The numerous other forms of parasites, while not so destructive as the forms mentioned, should receive attention as they live at the expense of the animals and impoverish them in proportion to their numbers. No perceptible injury can be seen on account of the small amount of blood taken by a few lice or flies but when this small amount is multiplied by the thousands that may infest a single ani-

mal it is sufficient to cause a noticeable loss. This loss however may be less than that caused by the tissues breaking down in such diseases as scab and mange. Such a condition of the skin as seen in the above diseases causes a heavy drain on the vitality of the animal, not only through the loss of tissue which the animal economy is continually trying to repair but also through the lack of normal function of the skin and the continual irritation caused by this condition. In the majority of cases the animal is poor in flesh, not because, as many suppose, the parasites attack by choice the poor animals, but because the presence of large numbers of parasites will soon reduce the animal to this condition.

In recent years much work has been done in studying every possible means by which diseases may be communicated from sick to healthy animals. As such investigations are completed it is found that a great number of contagious and infectious diseases may be spread through the agency of parasitic or semi-parasitic insects. This is not only true of the ability of insects to spread disease among domestic animals but they may be the means of infecting man with some of the diseases of the lower animals. The most familiar example of the power of a parasite to carry disease is that of the cattle tick to carry Texas fever. This will be dealt with more fully in the consideration of that particular parasite. Flies are known to be the means of spreading anthrax and it is very probable that they are the means in many cases of carrying blackleg infection from carcasses to healthy animals. The piercing mouth parts of the fly become infected with the germ and when they pierce the skin of healthy animals they may inoculate them directly with the disease.

No systematic classification of the parasites will be given in this bulletin, but rather the occurrence of parasites as external or internal will be considered on account of the similarity of treatment used for external forms and the general application of the same remedies for the internal parasites. Most of the external parasites belong to the group commonly called insects (flies, lice, mosquitoes, etc.) while such forms as ticks, scab and mange mites, though commonly classed as insects, belong to the group Arachnida.

Many of the insects are semi-parasitic in their habits. This is especially true of the larval forms of the flies as in the case of the bot-fly where the larva or grub lives in various regions of the body depending on the species of animal attacked. It is found under the skin of the back in cattle, in the head of the sheep, in the stomach of the horse, and some of the flies attack the smaller animals as squirrels, etc. The injury done by bot-flies is while they are in the larval form as they are then present in the body of some animal. The lice are parasitic during their entire life history. The eggs, commonly called nits, are attached to the hairs and after hatching, the young do not as a rule leave the host animal. One very interesting feature in regard to lice is that the same species of lice do not infect different species of animals. The hog louse will not be found on cattle or horses, and cattle lice are never found on hogs although the animals may be kept in the same enclosure. Very little is known of the rate of increase of the lice but it is probably very rapid. Examination of an animal may show only a few parasites and within a few weeks the animal may be so badly infested that they will interfere seriously with its thrift.

The life histories of all of the scab, mange and itch mites are very similar. They live either in or on the skin of the host animal and have no independent life history. The ticks pass a part of their life history apart from the host animal. The eggs are deposited on the ground and the young ticks may live for some time before becoming attached to the host animal.

A certain amount of knowledge of the habits and manner of development of parasites is necessary before any very successful means can be adopted to rid animals of them. Remedies that will be effective in one case will be of no use when applied to some other parasite. The habit of the parasite, whether completely parasitic or not, will make a difference in the remedy and the way it is applied. It is practically impossible to disinfect hog pens, cattle stalls, etc., but very few of the external parasites, with the exception of the fleas, leave the body of the animal to an extent that would make such a procedure necessary.

## BOT-FLY OF THE HORSE.

The horse probably harbors no parasite about which there is so much discussion as there is about the bot-fly; some contending that the presence of a few bots in the stomach cannot possibly be injurious while others regard them as being very dangerous and refer all digestive troubles to their presence. Every one who handles horses is familiar with the small yellow "nit" or egg found attached to the hair in the region of the leg, shoulder or jaw. The eggs are deposited by the bot-fly, or as more commonly called, the nit fly, on regions of the body where the horse can by biting and licking the skin convey them either as eggs or larvae into the mouth and stomach. Figure

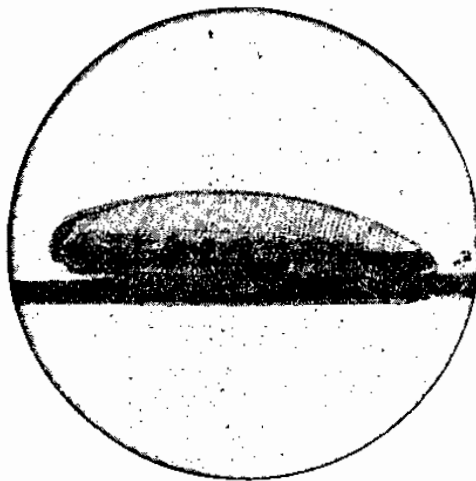


FIG. 1. (*GASTROPHILUS EQUI*)—Photomicrograph of egg of the bot-fly of the horse.

one is a photomicrograph of an egg showing a larva inside. It is probable that the animals in licking themselves open the greater number of eggs by removing the cap, as shown in the figure, and the larvae are then carried to the mouth by the tongue. They pass from the mouth to the stomach where they attach themselves to the walls of this organ and when seen in this position are familiarly known as bots.

Almost every animal that runs in pastures, and the greater number of driving horses are infected each season with the bots. In some cases where postmortems gave opportunities for examination only a few larvae were found but occasionally cases were seen where the greater portion of the walls of the stomach were covered with the larvae. Where they are present in such large numbers they necessarily interfere with the normal function of the stomach. The very nature of the case prevents any absolute determination as to whether they are injurious or not. The possibilities of injuring the horse are by interfering with the digestive function of the stomach, by the irri-

tation caused by the presence of the bots or, when present in such large numbers, they may obstruct the passage from the stomach. In any case the possibility of injury would depend on the number of bots present, it being very probable that the presence of only a few bots is without any injury whatever. After the larvae are developed they are passed from the body after which they bury themselves in the dirt where they continue their development and finally emerge as the fully developed bot-fly.

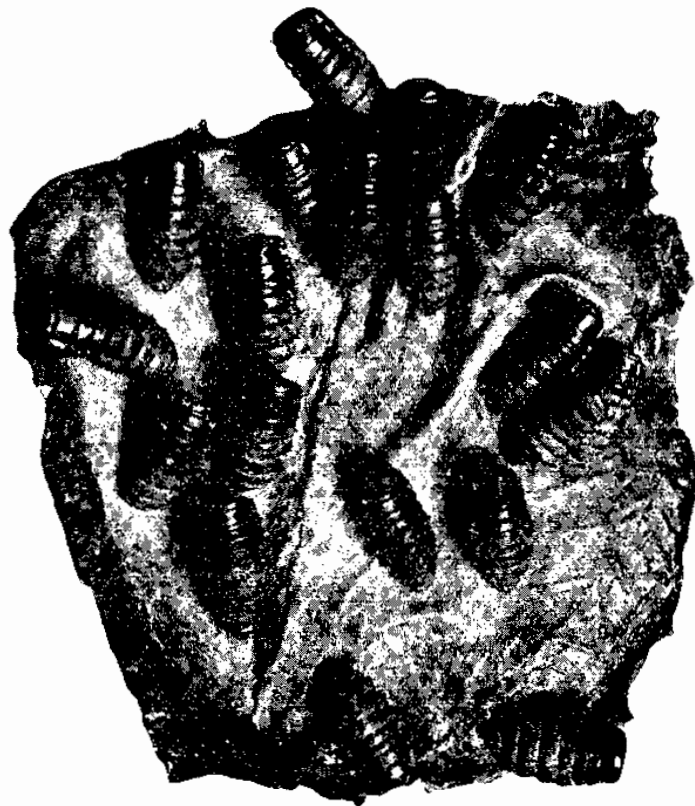


FIG. 2 Photograph of Bots attached to the walls of a horse's stomach.

As a means of prevention there is no surer remedy than thoroughly to rub the body occasionally with a brush or rag wet with kerosene. The oil will prevent the eggs from hatching and it soon evaporates leaving the skin free from grease. It is difficult to remove bots from the stomach as they withstand severe remedies. Good results have followed the use of full doses of anaesthetics, as chloroform or ether. Carbon bisulphide is probably the best remedy that can be given. This drug is very volatile and is best given in large gelatin capsules or it may be given in ice water. First fast the animal for a day then give four

drachms of the carbon bisulphide every two hours until you have given three doses. This treatment should be followed with a physic of oil or salts.

#### STOMACH WORMS OF CATTLE AND SHEEP.

This parasite belongs to the round worms and varies in length from one inch for the females to about half that size for the males. The color varies from dark to light red depending on the amount of blood it contains as it takes its food from the membrane lining the stomach. When present in large numbers the parasites are apt to cause serious trouble and in many cases death results from their presence. They multiply rapidly, the eggs passing out with the excrement and when washed into pools they soon hatch and gain entrance to the alimentary canal with the drinking water.

Dr. Stiles of the Bureau of animal industry recommends the use of a one per cent solution of coal tar creosote for the destruction of this parasite. Sheep may be given as much as six ounces, young cattle ten ounces and adult cattle one quart of the one per cent solution. If necessary the treatment may be repeated in a few days.

#### ROUND WORM OF THE HOG.

This is the common round worm of the hog and is usually found in the small intestine. The worm is never attached and it occasionally moves forward into the stomach. The males are from four to seven inches long, the females being usually twice as long. When present in small numbers it is not likely that these worms cause any serious disturbance but as they are often seen in sufficient numbers to almost completely fill the small intestine they necessarily interfere with digestion and consequently with the growth and development of the animal.

#### THORN HEADED WORM.

This is a very common parasite and can be easily distinguished from the preceding one by its size, as it is much smaller than the round worm, and also by the spiny growth at the head by which the worm attaches itself to the walls of the intestine. The place where the worm is attached can be seen from the outside of the intestine as a yellowish nodule. On opening the intestine small ulcers are seen at the point of attachment and at other places in the intestine showing that the worm frequently moves from one place to another. The worm is milky white in color and measures from seven to ten inches in length for the females and four to six inches for the males. The



body shows a number of constrictions in the region of the head and tapers gradually from this region back. The effect of the worm in the intestine does not differ greatly from that of the other worm except in the local inflammation where the worm is attached.

*Treatment:* The same remedies may be used against both parasites. If hogs are allowed free access to a mixture of salt, wood ashes and sulphur they are not apt to be troubled with worms. Such a mixture is inexpensive and should be kept in the pens at all times. Turpentine or oil of worm seed (chenopodium) in thirty drop doses in a small amount of feed three times daily will soon relieve hogs of any intestinal worms that may be present.

#### REMEDIES AGAINST INTERNAL PARASITES.

There is little practical value in dividing remedies against worms into vermicides, those that kill, and vermifuges, those that expel worms. It is of more importance to know that certain drugs have a selective action for certain species of worms. In considering remedies against intestinal worms remedies against bots have been included although they belong to the group of insects, being a larval form of the bot-fly.

A number of the remedies are likely to produce symptoms of poisoning if administered in too large doses, many are irritating to the alimentary canal and may cause excessive purgation, some, as pumpkin seed and quassia, are not injurious to the animal when used in large quantities. In giving drugs some account must be taken of the age and size of the animal. The following list contains the drugs usually administered for the different intestinal parasites. The difference in the size of the dose necessary for young and adult animals is indicated. Where no dose is given the drug is not suitable for that species of animal.

	HORSES	CATTLE	SHEEP	PIGS	DOGS
Aloes .....	$\frac{3}{4}$ to 1 oz.	1 to 2 oz.			20 to 30 gr.
Arecá nut.....			1 to 4 dr.		15 to 20 gr.
Turpentine.....	2 ounces	2 to 3 oz.	2 to 4 dr.	2 to 1 dr.	1 to 3 dr.
Santonin .....	$\frac{1}{2}$ to 1 oz.	1 to 2 oz.	1 to 2 dr.		10 to 30 gr.
Oleorsin of male fern.....	1 to 2 ozs.		1 to 3 dr.		1 to 2 dr.
Chloroform.....	1 to 4 dr.		1 to 2 dr.		
Kousso.....			2 to 4 dr.	3 to 6 dr.	1 to 2 dr.
Pomegranate .....			2 to 4 dr.		1 to 2 dr.
Carbon bisulphide .....	$\frac{1}{3}$ to 1 oz.				
Pumpkin seed..			4 to 6 oz.		2 to 4 oz.

Before giving any remedy to expel or destroy worms the animal should be fasted for at least thirty-six hours in order to have the alimentary canal partially empty. When this is done the action of the drug is not interfered with by large quantities of partially digested food. In many cases it is better to give a physic of either salts or oil to free the alimentary canal of material and then give the remedy intended to act on the worms, this may be given alone or with a small dose of physic. Where the remedy itself is a physic, as calomel or aloes, this is not necessary. With most of the remedies it is necessary to give some physic to remove the parasites from the alimentary canal. This should always be done when preparations of santonin, areca nut, male fern, kousoo or pomegranate are used.

Many of the remedies have a specific action on certain worms as shown in the following list: Remedies against tape worms; areca nut, kousoo, pumpkin seed, male fern and pomegranate. Remedies against round worms; areca nut, santonin, aloes, turpentine and calomel.

Any of the tonics are very beneficial in ridding an animal of parasites. Such remedies as iron, arsenic, gentian or nux vomica when continued for some time will give good results. The following preparation will be found very beneficial as a tonic after the use of any of the remedies indicated in the above list.

Sulphate of iron, six ounces.

Pulverized nux vomica, four ounces.

Common salt, one pound.

Linseed meal or bran, one gallon.

Mix the material dry. For horses and cattle give an ounce of the mixture in feed twice daily. For smaller animals as sheep, use one-fourth to one-half as much.

Remedies against the small thread-like worms that are found in the rectum must be applied directly to the parasite in the form of an injection. The presence of this worm is indicated when the animal is continually rubbing the tail, although they may do this when irritated by lice or mange mites. Of the various preparations that have been tried against these worms turpentine and quassia have given the best results. Turpentine may be used as an emulsion with milk or soap suds in the proportion of one part of turpentine to ten of the other liquid. To prepare the quassia for injection take one ounce of

quassia chips and place in a half gallon of warm water and allow them to remain there for an hour. The chips are then removed and the fluid diluted to make one gallon. This diluted fluid is then used as an injection. The injection should be repeated in from three to five days.

#### CATTLE LICE.

There are two species of suctorial lice found on cattle. These lice are provided with mouth parts capable of piercing the skin of the host animal and obtaining blood for their nourishment. Cattle are more frequently troubled with lice than they are supposed to be and it is a very rare thing for the stockman to undertake anything to relieve them of the parasites. During the winter and early spring months cattle are continually rubbing and showing in other ways that the skin is irritated and an examination will show the presence of lice. The eggs, commonly called nits, are attached near the roots of the hairs by some glue-like substance and are usually more easily found than the lice.

#### SHORT NOSED OX LOUSE.

This species is generally found on the neck and shoulders and animals frequently rub these parts bare in their efforts to rid themselves of the parasites. This louse is larger than the one known as the long nosed ox louse and is one of the most difficult of the external parasites to destroy when it is once thoroughly established. The average size of the parasite is one-eighth to one-seventh of an inch in length with the body about one-half that in width. This parasite, so far as observations have been made here, is comparatively rare.

#### LONG NOSED OX LOUSE.

This species is often confused with the preceding one as they are frequently found occurring together. In length they are about one-eighth of an inch and one-third of that in breadth, the entire body having a slender appearance as compared with the preceding parasite. The color of both species is the same, being described as blue or slate colored.

The egg, as shown in the figure, is an elongated oval body firmly attached near the root of the hair with some glue-like substance

which is deposited with the egg. The specimen from which the



FIG. 3. Egg of the long nosed ox louse. (*Haematopinus vituli* Linn.)

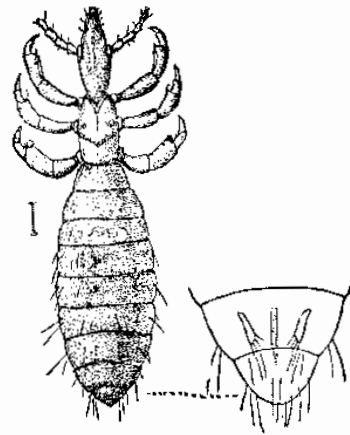


FIG. 4.

Fig. 4. Long nosed ox louse (*Haematopinus vituli*) under surface of last segment of abdomen. From Osborn, United States Department of Agriculture.

drawing was made measured .75 mm. in length and .3 mm. in width. In all of the specimens examined there was nothing but the shell of the egg found. The material examined showed no marking on the eggs as described by Osborn for the egg of the short nosed ox louse. The drawing shows several particles of foreign material that are not a part of the egg but particles left by the embryo.

#### BITING LICE OF CATTLE.

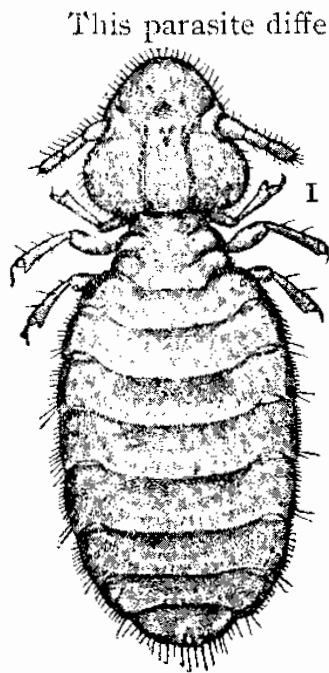


Fig. 5. Biting louse of cattle. (*Trichodectes scalaris* Nitzsch. From Osborn, U. S. Dep. of Ag.)

This parasite differs especially from the sucking lice in the manner of obtaining food, being provided with strong mouth parts its food consists principally of the scales and secretions of the skin. The biting lice are easily distinguished from the sucking lice by their color, the former being commonly spoken of as the red lice while the latter are called the blue lice. The red lice are also smaller and are the most common species found here. They may be found on any part of the body but especially on the back and sides. The biting lice do not take any food direct from the body but cause irritation by crawling over the skin.

*Treatment:* The same remedies are applicable to all species of cattle lice and are equally effective, except that the short nosed ox louse is more difficult to eradicate than the others. Fumigation and dipping are two methods that are not practicable for the farmer with a few head of stock, and in any case the use of dips and other

solutions during the winter months must be practiced with care on account of the danger of the stock contracting pneumonia and other diseases from being wet.

A remedy to be of general use must be cheap, easily prepared and easily applied. Chloro-Naphtholeum, Zenoleum and Lincoln disinfectant have been tried in solutions varying from one-half per cent to one and one-half per cent. For practical use we have found that a one per cent solution of any of the above preparations when thoroughly applied by means of a sponge or spray pump will kill cattle lice. A second application will be needed to kill the lice that will hatch from the eggs, this should be used in about ten or twelve days after the first. The seed of stavesacre or larkspur may be steeped in water and this used as a wash and is considered as very effective against any form of external parasite. Kerosene emulsion has been tried with as good results as was obtained by using any of the other remedies.

#### THE HOG LOUSE.

This parasite is probably the most generally distributed species of the louse affecting any of the domestic animals and is the only species found on hogs. It is never found on any other animal, consequently there is no necessity for any precaution so far as other animals are concerned. This parasite belongs to the group of suctorial lice and obtains its food by piercing the skin of the host animal. It is larger than any of the other species of suctorial lice, fully developed specimens measuring as much as one-fourth of an inch in length. On account of the thick covering of the body it is very difficult to kill by direct application of remedies, as dips, etc.

Since these parasites are so commonly present on hogs they are generally regarded as a necessary evil and their injury to the animal is entirely overlooked. The presence of large numbers of lice must necessarily interfere with the growth and development of the hog.

At different times during the last two years various solutions have been used both in the laboratory and on hogs in order to find some cheap and effective remedy to kill the lice. Some remedies were tried in order to test their value as insecticides that would have no value in practice. A number of coal tar dips were used and very

little difference found in their efficiency. When used in very weak solutions as recommended by their manufacturers it required such a length of time to kill the lice as to make them useless for dipping purposes.

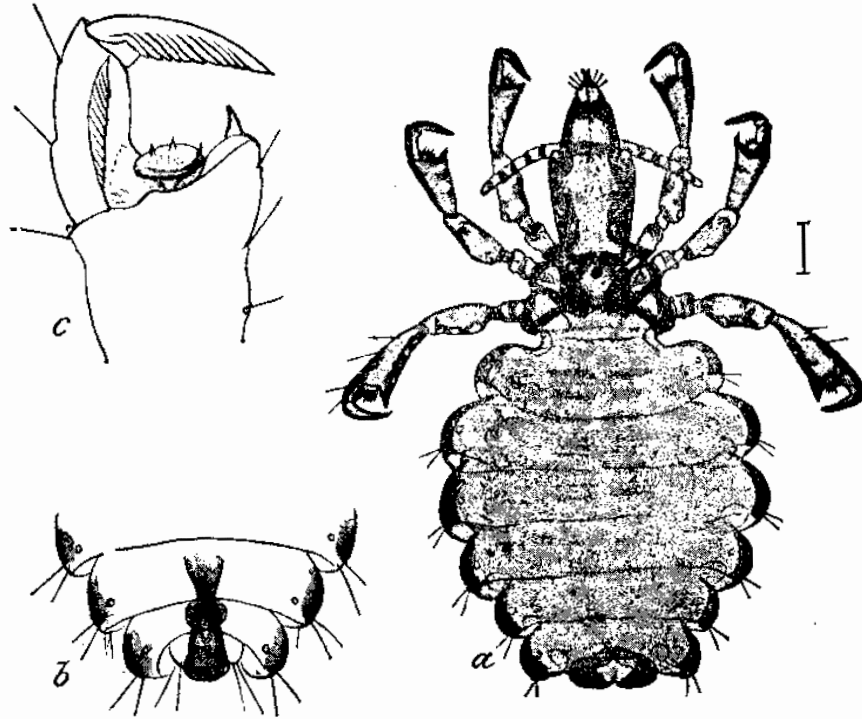


Fig. 6. Hog louse, (*Haematopinus urius* Nitzsch) a, female; b, posterior segments of male c, leg showing disk of tibia. From Osborn, U. S. Department of Agriculture.

The results of all of the laboratory tests with Creolin, Zenoleum, Car-Sul and Lincoln disinfectant showed that not less than a two per cent solution can be relied on to kill the lice. By immersing the parasites in the above solutions the length of time an animal may be kept in the vat it was found that the lice were killed in from one to three hours after the use of the dip. To facilitate the work of applying dips a vat was constructed in which the college and station hogs are dipped as often as is necessary to keep them free from lice. The work is always accomplished without injuring or worrying the hogs to any extent.

## DIPPING VAT.

The location of the vat should be such that it will be as convenient as possible to the water and pens. By using movable panels of fence there will be very little difficulty in getting hogs to and from the vat. Wooden vats could be constructed for less money than the cost of the vat used in these experiments but they will not be as durable and consequently more expensive in the end. Galvanized iron, twenty-two gauge, and half inch gas pipe was used in constructing the vat. The entire cost was less than \$25.00.

After using the vat for some time certain changes seemed desirable, especially changes in the dimensions and using a steep incline at the entrance to the vat instead of the perpendicular end as in the present vat. With these changes the cost for construction should not exceed \$30.00. The frame of the vat must be rigid and nothing less than half-inch pipe should be used in its construction. By using couplings at the corners a very rigid and cheap frame can be made over which the iron is placed and the seams riveted and soldered. Before the vat is placed in the ground it should be filled with water and every leak stopped. Make an excavation sufficiently large for the vat and place a solid floor in the bottom on which the vat can rest. Braces should extend from the floor to the top of the vat to prevent bulging of the sides which will occur when the vat is filled and the ground becomes wet. Floor the inclines leading into and from the vat and nail cleats every six or eight inches on the one leading from the vat to assist the hog in climbing out. The dripping platform should be tight so as to conduct all of the drippings back into the vat and it should have cleats nailed on to prevent the hogs from slipping. Allow the vat to extend about four inches above the ground, protect it with fences and when not in use it should be kept covered to prevent the loss of dip by evaporation.

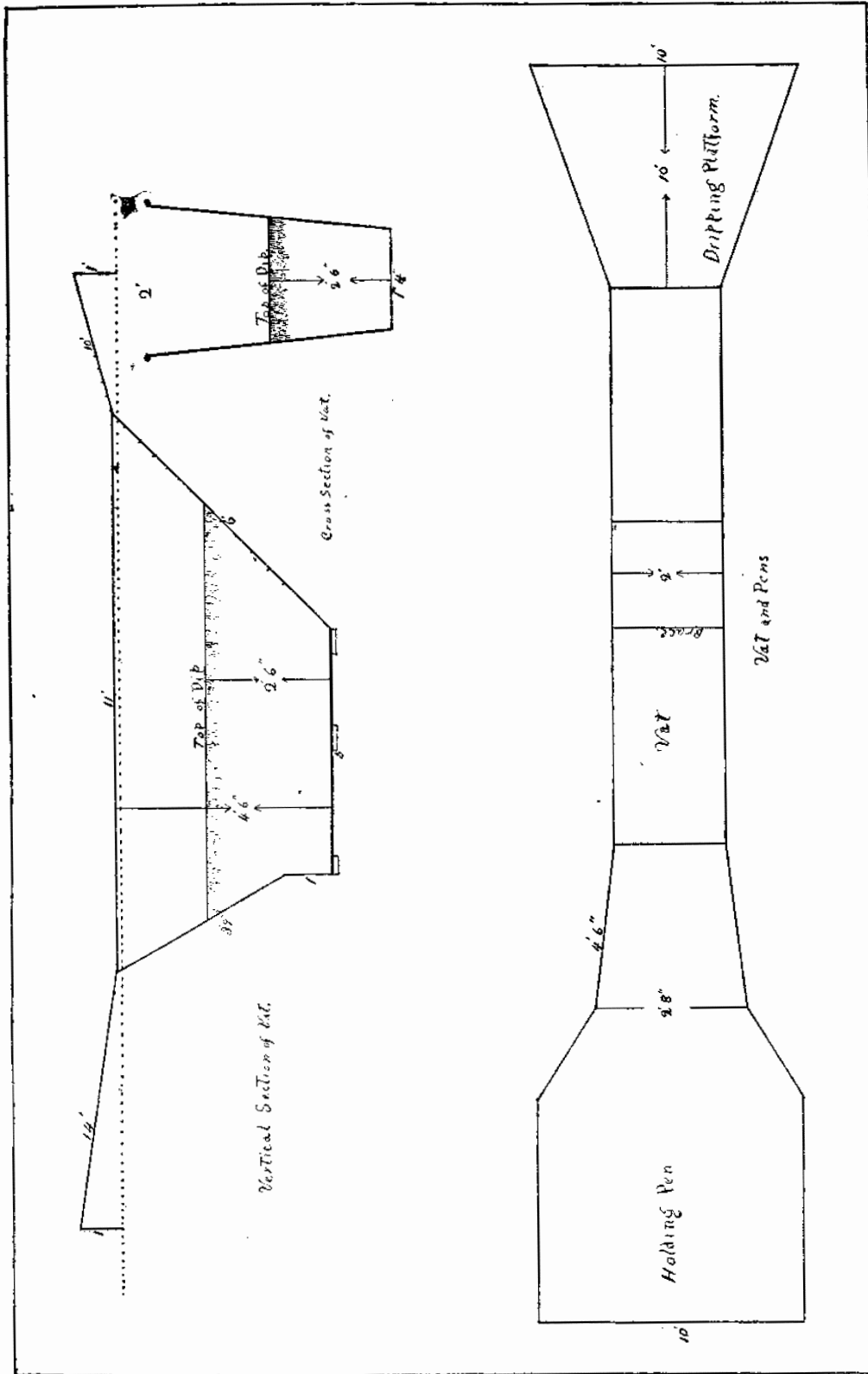


Fig. 7. General plan of dipping vat for hogs.



In dipping we have found it necessary to have some one place a board on the incline leading from the vat to hold the animal in the dip a sufficient length of time to allow the solution to kill the lice. If the hogs are not held in the vat they will not be exposed to the action of the dip a sufficient length of time for it to kill the lice. When the animal is stopped by the board we use a broom to splash the dip over the head and shoulders. The animals should be kept in the vat about twenty seconds, this is not long enough to worry the hogs and will be sufficiently long for the dip to kill the lice.

In the dipping experiments one per cent solutions of Zenoleum and Chloro-Naphtholeum were used and were found to be of very little use as the greater number of the parasites were not killed. In later work two and two and one-half per cent solutions were used with better success as practically all of the lice were killed. Eggs taken from the animals after dipping were hatched in the laboratory showing that animals must be dipped two or three times to effectually rid them of lice. A comparison of the results of dipping in the two and two and one-half per cent solutions showed very little difference in their effectiveness. A few hogs showed a slight irritation of the eyes and the Chester Whites showed a redness of the skin for a few hours after dipping but in no case was the dip injurious.

Kerosene emulsion is a very effective remedy and has the advantage of being easily prepared and the material can be obtained from any groceryman. The emulsion used was made according to the following formula.

Hard soap,  $\frac{1}{2}$  pound.

Kerosene, (cheap grade) 2 gallons.

Water, 1 gallon.

Cut the soap into shavings and boil in the water until the soap is dissolved. Remove from the fire and add the kerosene, and churn or spray back until thoroughly emulsified. To the emulsion add seven gallons of water and use this for spraying. The cost of ten gallons of the emulsion will be less than forty cents. The emulsion can be made in large quantities and the vat used for dipping the hogs.

#### SOUTHERN CATTLE TICK.

The relation of this parasite to Texas fever and the efforts made to prevent the spread of the disease by means of quarantine lines make it the most important parasite found on any of the domestic

animals in Oklahoma. At one time very few believed that the tick was the means of spreading Texas fever but at the present time practically all such opposition has been overcome and the quarantine laws are more easily enforced than when stockmen had the idea that such restrictions were unnecessary.

On account of the relation of the tick to Texas fever efforts have been made to secure a dip that would be effective in ridding cattle of the ticks and that would not be injurious to the cattle. The Oklahoma Experiment Station conducted some experiments along this line which are reported in bulletin No. 39 to which those interested are referred. There are two reasons for desiring such a dip: first, it would enable any one to dip and ship cattle at any season of the year, and second, the advantage of being able to rid cattle of ticks on ranges and pastures where the infection is sufficient to interfere with the development of the animal. A practical and successful dip to be used in connection with shipping cattle north during the open season, must kill every tick and must not be injurious to the animal. The oils tried in the experiments referred to do not fully meet these conditions. Where dipping is practiced on the range and cattle after being dipped are turned back on the infected pasture it is not necessary that a dip to be practical and useful should kill every tick. The object of such work is to rid animals of the large number of ticks with which they are infected during the summer months. The dipping may be repeated as often as is necessary to keep the cattle practically free from ticks. The expense and trouble connected with such work will be more than repaid by the increased growth of the cattle.

Since experimental work has demonstrated that dipping is profitable a number of dips have been placed on the market. Probably none are better adapted for general use on range and farm cattle than the coal tar dips. They are cheap and can be used in from one to two per cent solutions without any injury whatever to the stock. Two per cent solution of Chloro-Naphtholeum has been tried in vats by two persons near here, who dipped their cattle at intervals during the summer months. The effect of repeated dipping during the summer was to keep the cattle free from screw worms, lice, etc., as well as to kill the ticks.

#### SCREW WORMS.

This pest is very common during the summer and fall and is seldom noticed before the first of June. Cattle are troubled more than

any of the domestic animals as they are more apt to be wounded by brush, barb wire, etc., and in many cases the worms are found where ticks have been mashed or have fallen off, leaving a drop of blood which attracts the fly. The habit of the worm to burrow into sound flesh soon produces a considerable wound. The fly will deposit eggs in fresh wounds on an animal and they have occasionally given serious trouble to man. Specimens of the fly measure less than half an inch in length and are greenish in color with metallic reflections. The fly may be distinguished from other forms by the presence of three stripes on the thorax as shown in the figure.

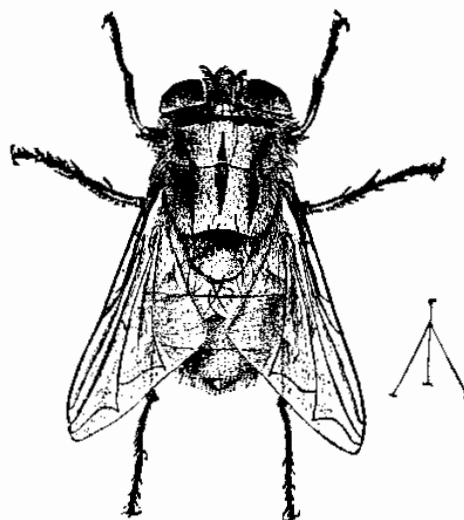


Fig. 8. Screw worm fly, (*Comptosia macellaria*) enlarged, after Francis. From Osborn, U. S. Dep. of Agriculture.

*Treatment:* Almost every stockman has a remedy for the screw worms. Some of these remedies are very effective while others

are used in such a concentrated form as to be injurious to the animal. Frequently severe burns are seen where carbolic acid has been used too freely. Chloroform is one of the best remedies as it will penetrate every part of the wound and kills all worms that it comes in contact with. The disadvantage in its use is that it will not keep the flies from depositing eggs in the wound. Gasoline, carbolic acid in three per cent solution, creolin, zenoleum and chloro-naphtholcum in five per cent solutions are all very effective in killing the worms. The principal difficulty is to get the remedy to all parts of the wound.

#### HEN FLEA.

This pest was reported in the vicinity of Noble in Cleveland County, several parties complaining that they were losing poultry on account of the fleas. The parasite is very troublesome when once established, annoying people as well as fowls. In general appearance it resembles the common flea but is peculiar in its manner of locomotion. As a rule it does not hop but moves by crawling. Another peculiarity is that they attach themselves very firmly to the skin of the head and neck of the fowl so that it was necessary to remove them by

means of forceps to get specimens for examination.

Creolin was used in a two per cent solution and was very effective, killing all of the parasites in a short time after the application of the remedy.

#### HORN FLY.

This pest gets the popular name of horn fly from its habit of resting on the horns of cattle. They frequently collect on and around the base of the horns until these parts are covered. All of the flies by no means seek this region as they are frequently so plentiful as to cover the sides and back. There is much discussion in regard to the injury caused by this fly. After observing the effects of its presence there can be no doubt of the loss on account of the continual annoyance and worry of cattle when covered with the flies.

A description of the fly is unnecessary as it is of such general occurrence that every one is familiar with it. The fly does not occur in sufficient numbers to annoy cattle until about July, then they are so numerous as to be a pest until cool weather.

Several remedies have been tried in order to give some protection to cattle but only two have given results that would justify their use. One is a mixture of creolin, fish oil and kerosene of the cheaper grade.

Creolin, four parts.

Fish oil, two parts.

Kerosene, ninety-four parts.

When this preparation is thoroughly mixed and applied by means of a brush or mop to the back and sides it afforded considerable protection for several days. Another preparation used last year was prepared by the agricultural department of the station and was found to be very effective.

Pulverized resin, 2 parts.

Soap shavings, one part.

Water, one-half part.

Fish oil, one part.

Oil of tar, one part.

Kerosene, one part.

Water, three parts.

Place the resin, fish oil, soap and one-half part of water in a pan and boil until the resin and soap are dissolved, then add the remain-

der of the ingredients and boil for fifteen minutes. Apply lightly to the head, back and sides by means of a brush.

#### BITING LOUSE OF HORSES, MULES, ETC.

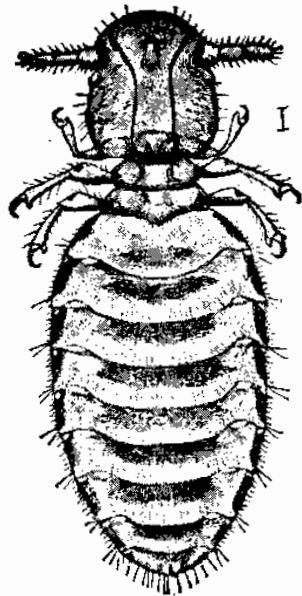


Fig. 9. Biting louse of the horse. (*Trichodectes parumpilosus*) From Osborn United States Department of Agriculture.

This louse is very well known to stockmen and can usually be found on colts and horses in the early spring. They occur most abundantly on the neck, especially in the mane and around the base of the tail. Horses frequently rub the mane and tail in such a manner as to make them unsightly and if these parts are examined closely lice will usually be found. The lice are the color of the biting lice of cattle and any one not familiar with their slight differences would easily mistake one for the other but we have never found cattle lice on horses even when horses have been kept in the same barn or stalls that have been occupied by lousy cattle.

#### THE SUCKING HORSE LOUSE.

This species of louse is as common here as the biting louse although it is commonly reported as being very scarce. As in the case of the other suctorial lice this one obtains its food by piercing the skin with its mouth parts and the irritation caused is produced in this way. The louse is darker in color than the preceding species and it is also smaller.

The same remedies may be used to rid horses of lice as are used against cattle. Usually the lice are not distributed over the body of the horse making it comparatively easy to treat them.

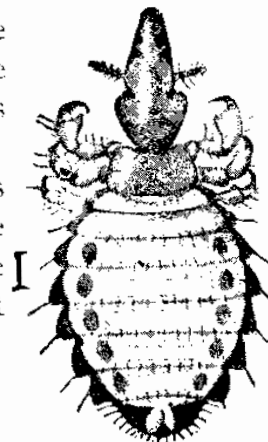


Fig. 10. Sucking louse of the horse. (*Haematopinus asini*) From Comstock.

#### THE OX BOT FLY.

This fly is more commonly known in the west as the heel fly and it is the cause of much annoyance to cattle. When attacked by this

fly cattle show extreme fear as they will run considerable distances in order to reach mud or water where they will remain for hours in order to protect themselves from the fly.

The "warbles" or lumps found on the backs of cattle during the late winter and early spring are caused by the larvae or grub of the fly. The eggs are deposited on the body and the larvae are taken

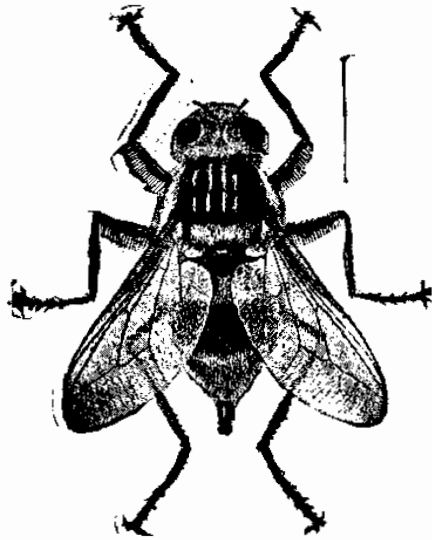


Fig. 11. The ox bot-fly (*Hypoderma lineata*) female, natural size indicated by side line. From Osborn. U. S. Dep. Ag.

into the mouth and pass by way of the oesophagus to the tissues along the back.

The injury done by the fly is the annoyance they cause cattle and the damage to hides on account of the holes that are made when the grub escapes from the back. By examining cattle during February and March one can easily locate the larvae and a close inspection will show the opening in the skin through which the grub breathes and through which it will escape from the tissues.

The simplest method of destroying the "warbles" is to apply kerosene or other oils to the place as soon as the grub begins to develop. By means of a hypodermic syringe injections of chloroform, gasoline or weak solutions of carbolic acid may be used with good success.

#### MANGE OF DOMESTIC ANIMALS.

Practically all animals of the farm may suffer from some form of mange. In some it is more common than in others, as it is very frequent in the sheep and dog, common in the horse and rare in cattle and hogs. The disease is usually classed as contagious and it may take the form of an epizootic. The cause of mange is a small mite that lives on or under the skin. There are many forms of skin diseases that may resemble mange in some respects but true mange does not exist unless the mange mites are present. In many cases these mites may be carried from one species of animal to another, differing in this respect from the lice.

The term mange is very incomplete unless the particular mite is known as there are three different forms of mange distinguishable, as sarcoptic, psoroptic and symbiotic, according to the particular group of mites present. The sarcoptes live in the skin and cause intense itching and irritation, the psoroptes live upon the surface of the skin and obtain their food by piercing the skin while the symbiotes live upon the skin of the extremities. Psoroptic mange is probably the most common form found on cattle, horses and sheep.

#### SHEEP SCAB.

This is the only parasitic disease of sheep that is regarded by the stockman as very serious and most states and territories have laws governing the movement of infected animals. The disease is caused by a small mite that may be found under the crusts and scabs from the skin and it is easily spread in the flock by contact of animals or by pieces of scabs and wool that may be left by diseased animals on fence posts, brush, etc.

There are other diseases of the sheep that cause loss but none attract the attention or cause such vigilant measures to be adopted as scab. The loss of wool and flesh in the individual animal and the rapidity with which it may attack the entire flock makes it very important to adopt measures that will prevent the disease from spreading. If the disease is to be checked, the diseased animals must be dipped in some suitable preparation that will kill the mites. The vat used for dipping hogs may be used for this purpose and the same preparations of the coal tar dips may be used for the scab mite as recommended for lice. Such a vat is well adapted for general use for small animals. For large ranches a more extensive vat would be required.

A number of special dips can be obtained on the market but none are better than the tobacco and sulphur dip used by the New South Wales sanitary authorities:

Tobacco leaves, 1 pound.

Flowers of sulphur, 1 pound.

Water, 6 gallons.

Make an infusion of the tobacco by placing one pound of the leaves or manufactured tobacco in a gallon of water and allow to stand for twenty-four hours. On the evening before the dip is to be used bring the water near the boiling point then remove from the fire and allow to stand over night. Mix the sulphur in another gallon of wa-

ter. When ready to dip strain the tobacco from the infusion, mix this with the sulphur water and add four gallons of water. For making large quantities of the dip the amounts given in the formula are increased but they must be used in the same proportion.

#### CATTLE MANGE.

This disease is more commonly known in the west as Texas itch, but it is a true mange being caused by psoroptic mites which live on the surface of the skin. The disease is rarely seen in Oklahoma as only two cases have been reported. These came from the western part of Oklahoma and involved only a few cattle on small ranches.

Where the disease exists to any extent the only practical way to deal with it is to construct dipping vats and dip the cattle as recommended for the destruction of ticks.

#### MANGE OF THE HORSE.

The horse may be infected with any of the three groups of mange parasites. With the exception of the symbiotic mange, which is usually located about the pastern joints, the disease is most commonly seen on the sides of the neck, base of the tail or on the inner sides of the limbs. The mite is so small as to be easily overlooked in making an examination. If the mites are present they may be seen by placing pieces of crusts and scabs on dark paper when the small lighter-colored mites may be seen.

With the exception of mange of the pastern joint the disease is very difficult to cure in the horse unless it is stopped in the early stages. Sulphur ointments and washes with tobacco infusions are effective remedies but usually several applications are necessary. Carbolated glycerine or vaseline containing ten per cent. of carbolic acid are good remedies as they soften the skin and at the same time kill the mites.

As a precaution against spreading the disease to healthy stock, harness, saddles, blankets, etc., that have been used on the diseased animal should not be allowed to come in contact with other stock.