The External Parasites of Sheep.

III. Scab Mites and Lice.

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Sheep Scab.

Scab in sheep is a specific inflammatory condition of the skin caused by the sheep scab mite, Psoroptes communis var. ovina, and is characterized by fairly copious exudation with the formation of crusts or scabs, and the loss of wool accompanied by great irritation.

It is a well-known disease in many parts of the world, and in South Africa it has been responsible for enormous economic loss, with the result that determined efforts, involving a very extensive organization on the part of the Government, have been made to eradicate it.

Description and Life Cycle of the Parasite.

The adult scab mite (Fig. 12) is a minute pearly-white oval parasite, with 4 pairs of legs which are armed with suckers or bristles, or both. The males are distinctly smaller than the females, the former being about 1/60th inch in length and the latter about 1/50th inch.

The eggs are laid on the surface of the skin around and beneath the crusts which are formed due to the irritation set up by the parasite. They are very minute oval objects, creamy-white in colour. Hatching takes place in 1 to 3 days. The larva has 3 pairs of legs, the two anterior pairs each bearing a sucker at the elb of the body and a single hair, and the third pair each two long hairs. Moulting to the nymphal stage takes place in about 12 hours. The nymphal stage has 4 pairs of legs, the anterior two pairs being the same as in the larval stage, while the third pair bears two long hairs, and the fourth pair 1 long hair and a sucker. The nymphal stage lasts from 3 to 4 days, and a moult then takes place which is followed by the appearance of the males and, in the case of the females, by the pubescence female. This latter stage is characterized by the presence of a genital opening and the fact that the fourth pair of legs bears two bristles. At the posterior margin of the body two prominences, which assist in the act of copulation, which takes place after a short period of feeding, are present. After the sexes have paired moulting takes place, after which the sexually mature or ovigerous female makes her appearance. The male is easily recognized by being distinctly smaller than the female, and by the extreme development of the third pair of legs, which bear a sucker in addition to a long hair. The fourth pair of legs are small and anleged. The life cycle is completed in 8 to 9 days, and from the hatching of the egg the eggs of the next generation can be deposited on the ninth day.

The ovigerous female is able to live on the sheep for periods of up to 30 to 40 days, during which period she is capable of laying almost 100 eggs.

Symptoms of Scab.

The initial lesion of scab is generally caused by a single parasite, or at any rate by a very limited number. It commences as a slight reddening of the skin, followed by a yellowish swelling which sometimes has a greenish tinge. This swelling shows the presence of a clear yellowish exudate, and soon becomes covered with a crust due to the drying of the exudate. Irritation is severe, which causes the sheep to bite or kick at the affected part, depending upon its position and accessibility. The lesion spreads rapidly to start with, but later progress is slower, and it then increases its total diameter by roughly one inch per month. A large quantity of wool is lost, most of which is pulled or rubbed off, yet in some sheep, notably rams, where a lesser degree of sensiveness, with consequently less biting, etc., is displayed, and also in cases where the head is affected, the wool may be left almost intact, but in such cases it takes on a whitish, harsh, lifeless appearance.

The intensity of infection and the rapidity of spread vary very greatly, however, depending upon a number of factors. Sheep in good condition, especially when the wool contains a large amount of yolk, are much less susceptible to the disease, and it is a known fact that sheep may rarely even rid themselves of the parasites spontaneously. A great deal of rain is deleterious, and facilitates the rapid progress of the scab, the reason given being that a large percentage of the yolk which normally hinders the spread of infection, is washed out of the fleece. Certain types of haired sheep are much more resistant than woolled ones, and it is frequently noted that in long-tailed African sheep the disease may remain confined for long periods to the fold near the tip of the tail, where it is seen only with difficulty.

In making a diagnosis of scab in sheep, it is desirable that the presence of the parasite be demonstrated. Although the lesion in itself is fairly typical, it can quite easily be confused with a number of other conditions which may closely resemble it on rough examination. Such parasites as ked, lice, ticks, etc., and irritants such as grass seeds, notably the various species of Aristida or steel grass, cause sheep to bite and pluck at the wool, which gives rise to conditions resembling scab. Skin affections such as eczema, the so-called Australian Itch (a type of dermatitis, of which the cause is not known), lumpy wool (a form of eczema caused by a fungus), etc., give rise to irritation, with the attendant consequences.

The scab parasite is quite easily seen by anyone with average eyesight, and it is to be found on the skin, principally at the edges of the lesion. In some cases the mites are met with in the wool a short distance from the skin, in which case they are much more difficult to see. It occasionally happens that the presence of parasites cannot be demonstrated, in which case it is advisable to take scrapings from the lesions, for closer examination in the laboratory.

Re-Infections of Flocks.

In dealing with scab in its practical aspect, some peculiarities in the course of the disease are sometimes met with which are worthy of note. It has been observed, for instance, that after dipping has been applied, the disease has apparently come to an end only to reappear suddenly in all severity again 5 to 6 months later. No satisfactory explanation has been found for this, but it is thought that an infestation of rough wool having killed off all the mites with the exception of a few and rendered conditions on the skin unsuitable for the parasite, so that multiplication takes
place only very slowly. A further explanation is that the dip, by killing off the greater number of parasites together with any lice that may have been present and which tended to lower further the already reduced vitality of the sheep, has given the animals an opportunity of putting on condition and increasing their protective powers, e.g. wool yolk, against the mite. Such reappearances of the disease generally occur at the beginning of winter, when the condition of the sheep has fallen off considerably. A further explanation may possibly be found in the fact that in heavily infected flocks the scab mites frequently occur in large numbers in the ears and in the small pouches below the eyes, where they are well protected from the dip by the waxy secretions in these situations. If not actually dressed by hand, such accumulations of mites in these situations form a potential source of re-infection at a later date.

Such recurrences of scab have frequently in the past been ascribed to re-infection from kraals or sleeping places which have previously housed scabby sheep. Numerous carefully planned experiments have been conducted to determine the length of time the scab parasite is capable of existing away from its host, and it has been found that 16 days represents the longest possible period for these mites to live in the absence of the sheep. The one and only method in practice whereby scab is transported from place to place, is by the actual movement of the sheep. It is for this reason therefore that, apart from the careful examination of all sheep introduced on to a farm, it is advisable to quarantine such sheep in a separate camp before allowing them to mix with the rest of the flock.

Prevention and Cure.

Dipping constitutes the most reliable method of combating the infection in a flock, and to be successful it is essential that all the sheep of the flock be dipped. As already pointed out, the reproductive powers of the scab mite are considerable, and the life cycle is completed within a very short while, so that should only one ovigorous female remain, it would not take long for the whole flock to become re-infected. To-day, there are various dipping fluids on the market, most of which are expensive, in trifling scab to a greater or lesser degree. Up to the present the best results have undoubtedly been obtained with combinations of lime and sulphur. Various proprietary lime-sulphur dips are available and these, being standardized, are undoubtedly the best to use, but where large numbers of sheep are to be dipped, dipping is fairly expensive. A very effective lime-sulphur dip can be made by the sheep farmer himself, but owing to the great difference in the quality of the lime available, the results are not always satisfactory, so that a slightly more expensive but standardized dip may pay better in the long run. In the homemade dip a good quality of unslaked lime must be used, although well slaked lime of good quality will also give good results. Either flowers of sulphur or rock sulphur, provided the latter is ground fine enough, may be used. To make up the dip, 15 lb. of unslaked lime or 20 lb. of slaked lime and 25 lb. of sulphur are thoroughly mixed together with 3 to 4 gallons of water in a suitable container. This mixture is then poured into about 25 gallons of water and boiled for 30 to 40 minutes until the liquid has a deep orange colour. After boiling, the sediment is allowed to settle out and the supernatant fluid is poured into the dipping fluid for a full two minutes gallons by the addition of water.

The sheep must be immersed in the dipping fluid for a full two minutes each, and during this immersion the heads should be pushed under 3 to 4 times. The interval between dippings is 9 to 10 days, and this has been based upon the life cycle of the parasite as outlined previously. Should a third dipping be necessary, this may be given 9 to 10 days after the second one.

If dipping is not carried out, the percentage of failures to cleanse a flock of scab is practically nil, but when dealing with an infection of long standing, where there is extensive crust or scab formation, it is highly desirable to shear badly affected sheep and to loosen or soften the crust are dipping by scrubbing them with a hard brush or some other object, using a small quantity of the dipping fluid for the purpose. The insides of the ears and the small pouches under the eyes should also be hand-dressed with dipping fluid or a mixture of 1 part paraffin and 2 parts oil.

It must be borne in mind that sheep scab falls within the scope of the Stock Diseases Act, and it is therefore incumbent upon all sheep owners to report all outbreaks of the disease amongst their sheep.

Mange in Sheep.

Mange is a disease which plays a very small part so far as Merino sheep are concerned, but is met with occasionally in the haired sheep. It is a chronic deep-seated inflammation of the skin caused by the mange mite, Sarcoptes scabiei, which also causes mange in other animals like goats, horses, cattle, etc. The lesion is characterized by enormous thickening of the skin, which becomes thrown into folds, showing the typical dryness and cracking with loss of hair over the affected parts. Exudate is limited, as a rule, but in some cases may be fairly copious, drying into hard yellowish crusts.

This condition, in contradistinction to scab, shows a much greater tendency to become localized, at any rate in the early stages, to certain areas on the body. The sites most commonly affected in sheep are the hairless areas, e.g. around the mouth and face, the loin fold and the side of the chest wall behind the shoulder. At a later stage the infection spreads over the lower side of the abdomen and down the legs.

Description of Parasite.

The mange mite (Fig. 13) is considerably smaller than the scab mite, and although it is visible to the naked eye when placed on a suitable dark background, it is almost impossible to find on the animal in the course of an ordinary examination. It is more or less circular in shape, whitish in colour and on the upper surface are a number of conical triangular prominences in regular rows. The legs are short and thick, and do not extend much beyond the margins of the body. The front two pairs of legs are each provided with a sucker, which is carried on the end of a short unjointed stalk. The hinder two pairs of legs are short and do not project beyond the edges of the body. In the female they are provided with bristles.

Life Cycle.

The female sarcopt burrows into the skin in which she makes small twisted tunnels. The eggs are laid at the end of the tunnel where they hatch in about 5 days. The larvae which emerge moult three times, after which the nymphs...
appear. These are of different sizes, the smaller becoming males and the larger, prehensile females after the next moult. The males do not moult again, but another change takes place before the females become sexually mature. The life cycle has not been determined quite so accurately as is the case with the scab mite, but it is apparently completed within about the same time.

The sarcopt is not able to live away from its host for longer than 16 days, so that changes such as changes in water, etc., previously occupied by infected sheep are incapable of re-infecting a flock if they are kept free of sheep for a period of 16 days.

As has already been mentioned, the mite of mange is capable of setting up the infection in a number of the domestic animals in contradistinction to the mite of scab. From the point of view of eradication of the disease this point must not be lost sight of, as failure to cleanse other domestic animals such as goats, pigs, horses, etc., can very easily lead to re-infection of a flock should they come in contact with each other.

Treatment consists of dipping all infected and in-contact animals. Lime-sulphur dip is again recommended as being most effective, and the procedure adopted is the same as that for scab, except that 3 dippings are generally advisable and great care must be taken that all hard crusts are well softened before dipping.

Mange is also a notifiable disease under the Stock Diseases Act, and as such, outbreaks amongst all classes of stock must be reported.

Lice.

As far as sheep are concerned, especially Merino sheep, lice do not play a very important part in the ordinary course of events, except in very dry years, however, when the animals are in poor condition, lice may become a menace, especially amongst the haired and bastard classes of sheep.

The lice which play the biggest part are the so-called blue lice, which fall into the order Siphunculata or sucking lice. These lice, which are greyish-blue in colour, are provided with complex mouth-parts which enable them to pierce the skin of their hosts and suck blood. A further type of louse which is occasionally met with on sheep is the so-called red louse which falls into the order Mallophaga or biting lice. The red louse has a blunt snout in which a well-developed pair of mandibles can be made out under the microscope, and, contrary to the blue louse, this parasite does not pierce the skin of its host, but lives on the scales and superficial layers of the skin. The species of blue lice met with in South Africa are Linognathus africanus Kellogg and Paine (Fig. 14), and Linognathus pedalis (Osbourn). The first of these two is found all over the body, whereas the latter species occurs principally on the legs of sheep. Only one species of biting louse occurs on sheep in South Africa, viz. Bovicola ovis (Linnaeus) Fig. 15.

Description and Life Cycle.

Lice are extremely small insects which are flattened from above to below, and are adapted to a purely parasitic existence. The body is roughly oval in outline, and is slightly more pointed in front in the sucking lice than in the biting lice. The body is divided into three distinct portions, a head, thorax and abdomen, and the three pairs of legs which are carried on the thorax are provided with strong claws, which enable the insect to retain a very firm grip on the hairs of its host. The integument of the louse is tough and leathery, making it fairly difficult to crush the insect by pressure. Lice are remarkably specific in their choice of host, and the various species are generally not capable of existing on any but the particular host to which they are adapted. The whole life cycle is completed on a single host, and the insect is not capable of living away from its host for more than a few hours.

The eggs are extremely small greyish-white or yellowish oval objects rounded at one end and flattened at the other. They are laid singly on the hairs of the host, where they are firmly glued into position by means of a glue-like substance secreted by the adult, and are generally spoken of as nits. The life cycle of the various species of lice on animals have not been worked out precisely, and would probably differ somewhat in time from those of the human louse, but the various stages are, however, essentially the same.

In the case of the human louse the egg hatches in anything from 5 days to about 6 weeks, depending upon temperature and moisture. The larvae closely resemble the adults, except for the absence of a genital opening. After a molt the first nymphal stage appears, which is followed by a second nymphal stage, both these stages showing no marked changes from the larval stage except in slightly increased size. In the human louse the period from larva to adult occupies 11 to 13 days, and the average time the adult spends on the host is roughly 3 to 4 weeks, during which period the female lays slightly more than 100 eggs.

Symptoms.

In dry years, when animals are in poor condition, lice may increase enormously in numbers until the skin becomes infested with them. The sheep are still further debilitated by the loss of blood and the continual irritation set up by the bites of the parasites. The skin becomes scaly and dry and the wool suffers considerably, the fibres becoming thinned and harsh. In the hairless sheep a large quantity of hair falls out as a rule, or is rubbed off.

Prevention and Cure.

Close contact between sheep is responsible for the spread of infection of lice, as the parasite is not capable of existing away from its host, and its egg, although capable of hatching in the absence of the host, is only comparatively rarely detached. Sheep in good condition are capable of withstanding the infection, and even should lice chance to get on to them, they will not multiply to any extent, as back-proof fencing, which makes it possible to allow sheep to graze undisturbed over large areas of veld and obviates the necessity of close herding at night, is advocated for the prevention of the infection.

Dipping constitutes the only reliable method of combating lice infestation. Carbolic dips have been found to give the most satisfactory results, whereas arsenical dips have been proved to be of little value in themselves unless supplemented by the addition of some lice destroying preparation. In this respect a small quantity of paraffin poured over the surface of an arsenical dip, and, as soon as it is noticed that the oily film is disappearing, gives moderate results. In many parts of the country it is not possible to utilize carbolic preparations, on account of the hardness of the water preventing the formation of a suitable emulsion with the carbolic concentrates. In such cases tobacco extract dips are recommended, which give results quite as good as the carbolic preparations, but which are slightly more expensive to use.

Fig. 15.—The red or biting louse.

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