Cattle Scabies

IRWIN H. ROBERTS AND N. G. COBBETT

SCABIES is a contagious skin disease caused by minute parasitic organisms known as mites. It affects cattle of all ages and breeds. Sometimes it is referred to as scab, mange, or barn itch. Similar infections attack other classes of livestock, wild animals, and birds, as well as people.

Scabies, the medical term for which is acariasis, is common throughout the world. It generally causes a severe inflammation of the skin and itching.

Mites are related to ticks, spiders, and scorpions, and are not true insects. Unlike insects, adult mites have 4 pairs of legs instead of 3. They are wingless and usually are so small that they can barely be seen with the naked eye.

Of the thousands of known kinds of mites, four are commonly parasitic to cattle. Each of the four produces a different type of skin reaction. Two, known as psoroptic and chorioptic mites, live on the surface of the skin and cause a condition generally spoken of as scabies. Two others, the sarcoptic and the demodectic mites, burrow under the surface of the skin and produce mange.

PSOROPTIC SCABIES, also known as common scab, was prevalent in range cattle in the Western States until about 1938. It is caused by Psoroptes equi var. hovis, a whitish mite, which can be seen as a minute speck if it is placed against a dark background. It spends its entire life cycle on the animal. Female mites deposit about 20 eggs on the surface of the skin. The eggs hatch in about 4 days, and minute larvae, each with three pairs of legs, emerge. These molt, or shed their skins, become nymphs, molt again, become adults, reach maturity, and mate, and the females of the new generation begin laying eggs. The entire cycle takes no more than 12 days.

Psoroptic mites attack the hairy parts of the body. They generally begin an infestation over the withers, but sometimes also over the back or around the tailhead. The mites prick the skin to obtain food. Tissue fluids ooze from the wounds. After many mites have fed, the fluids dry, become mixed with tissue debris, and form scabs.

The lesions made by the mites spread as the parasites increase in number and involve large areas of the back and sides. The condition may advance over practically the entire body if it is not checked. As the disease worsens, hair falls out, and the body is covered with thick, rough crusts. The skin becomes hard and thickened and it takes on a corrugated look.

CHORIOPTIC SCABIES occurs chiefly in farm herds. It is widely distributed from the Atlantic coast to the States east of the Rocky Mountains. A persistent disease, it spreads slowly over the infected animal, but may travel from one animal to most of the animals in a small herd in a year.

The mite responsible for it is Chorioptes bovis var. bovis. Like the psoroptic mites, it lives on the surface of the skin. Its life history is similar to that of the psoroptic mites, and it obtains nourishment in the same way.

Chorioptic scabies mites do not usually produce such extensive and prominent lesions as psoroptic mites, and the injury they cause is less severe. This form of scabies usually begins on the inside surface of the hind legs in the fetlock region, high on the rear surface of the udder or scrotum, or on the inside of the flanks and thighs. The infection is known commonly as leg or foot mange.
Chorioptic mites produce an infection by piercing the skin. The serum, or tissue fluid, that exudes from this wound forms a minute blister. The mites multiply, the blisters unite and break, and their dried contents slowly build up into little scabs or crusts, beneath which the skin is raw and bleeds easily.

The mites live in colonies under the scabs. If a scab is removed with the fingers and placed on a dark surface in some warm place, the flesh-colored mites will be seen, just about visible to the naked eye, crawling rapidly away in every direction. A reading glass will help one find the parasites.

The mites from one small lesion spread after a few months to various places about the hindquarters, establishing new colonies. The disease eventually may involve large portions of the underparts, side, and back.

Sometimes the disease progresses so slowly that scabs the size of a half dollar, in various places about the hindquarters, may go unnoticed for a year or two.

In highly susceptible animals, the condition may eventually spread to the underparts of the body, forward along the midline, around the outer surface of the legs, and over the sides and back.

Sarcoptic mange used to be considered of no economic importance in cattle in the United States. By 1950, however, 30 percent of the scabies-infested cattle in one Northeastern State were infested with the sarcoptic variety of the disease, either alone or in combination with chorioptic scabies.

As in chorioptic scabies, sarcoptic mange often is found in purebred herds and may be spread about the country with the sale of breeding stock.

The mite that causes it is Sarcoptes scabiei var. bovis. It spends its entire life cycle on the body of the animal. The mature female makes long channels within the horny surface of the skin. In the burrows the female deposits her eggs, which are almost as large as she is. The mature female usually stays in the burrow her entire life. The mite begins laying eggs within a few hours after starting her burrow. She deposits the eggs every second or third day for as long as 2 months, stringing the eggs out behind her as she lengthens her burrow. She usually lays about 30 eggs in her lifetime.

The eggs hatch in about 5 days, after which the larvae leave the channels. They move about on the skin, where they molt, become nymphs, and molt again to become adult males or immature females.

Larvae and nymphs can be found in the skin follicles. The adult males and young females make short burrows, in which they remain briefly. Mating takes place on the skin. After mating, the fertilized female burrows into the skin to lay her eggs and start a new generation. The full cycle takes about 14 days.

A female theoretically could have more than a million descendants in six generations, or 90 days.

When huge numbers of mites are present on an animal, they are rather easily found under scabs, which can be removed from the skin with the fingers or a dull knife edge. Their burrowing habits in the early stages make it rather hard to find the mites. However, skin scrapings made with a knife edge, deep enough to draw the blood, will usually disclose the active parasites. They are barely visible, but a reading glass will show them as moving specks if they are placed against a dark background.

Sarcoptic mange mites may produce lesions anywhere on the body of cattle. They appear to adapt themselves best in locations where the skin is thin and tender and the haircoat is thin. They are commonly found high on the rear surface of the udder or scrotum, and on the rear and inner surfaces of the thighs, where the lesions they produce may exist side by side with those caused by chorioptic mites.

Sarcoptic mites may also start infes-
tations at the root of the tail or the lower parts of the neck and brisket. Before many months a large portion of the body surfaces may be involved. Itching is more intense than in other forms of scabies or mange.

Shortly after the onset of the disease, hairless spots appear, dandruff is abundant, and the skin may become thickened, hard, and covered with crusts or scabs. The skin may crack and ooze blood and pus. It may bleed where the scabs become detached. The disease may spread rapidly—from one cow to practically every animal in a dairy barn in a winter.

**Demodectic**, or follicular, mange of cattle is widespread in the United States, but few cattlemen are aware of its existence.

It is caused by the mite *Demodex folliculorum bovis*, a microscopic, cigar-shaped, sluggish organism that lives within the skin.

The lesions in the skin take the form of nodules, usually in the region of the neck, shoulders, and brisket, and sometimes on other parts of the body. The size of the nodules may vary from that of a match head to that of a hazelnut. The nodules appear to result from the formation of pus, which accompanies the mite. Frequently the nodules are pitted. Sometimes they break and discharge their cheesy-white contents over the surrounding hair.

The mite occasionally can be found in this material, but often one has to lance the nodule and extract the contents. It can be seen only with a microscope. Dairymen sometimes become aware of the swellings or nodules on the neck or brisket, which usually can be felt more easily than they can be seen. Little is known about the life history of this strange, wormlike mite.

**The seasonal occurrence** of psoroptic and chorioptic scabies and sarcoptic mange follows a similar pattern.

The mites multiply the most rapidly, produce the most severe skin lesions, and cause the greatest annoyance during the fall, winter, and spring. Owners have observed that the lesions appear to clear up and disappear spontaneously when an infested herd is turned out to pasture. Some mites, however, survive the summer, and infestations almost invariably become serious again when the weather gets cool.

Often there is much less change in the status of infestations on animals that remain housed or in close contact with each other during the summer. The presence of oils in the skin, the increased activity of skin glands, and the improved nutritional state of the animals when they are on pasture may be responsible for the diminished activity of the mites in summer.

Demodectic mange shows no response to the change of seasons. The nodules almost invariably discharge their contents or are reabsorbed on the body, regardless of time of year.

**The spread of scabies and mange mites** from one animal to another nearly always takes place through direct contact. Infection in a herd usually starts when an animal with scabies lesions too small to be noticed is introduced into a clean herd. Mites spread most rapidly in a herd when the dairy barn, feed lot, or barnyard are crowded. A bull that has mites may infect many animals, even on the range.

Mites parasitic on cattle can live apart from their hosts for varying periods. The length of life varies according to species, humidity, and the temperature. When the weather is damp and cool, the scabies mites may survive up to 3 weeks, but direct sunlight and dryness may destroy them in 48 hours or less.

The eggs may persist on barn walls, stanchions, fence posts, railway cars, and cattle trucks, but it is not very likely that cattle will acquire infection in that way. It is possible, though, that infection may be spread by such objects as currycombs, brushes, and halters.
Sarcoptic mange is the most contagious of all forms of scabies and mange on cattle. The way in which demodectic mange is transmitted from animal to animal is not known.

The damage done by parasitic mites to cattle depends on the extent of the disease. Scabies causes noticeable and sometimes intense itching in its early stage. Cattle may be so annoyed and spend so much time rubbing that they fail to eat properly or to gain weight.

When the affected areas of the body become extensive and the skin takes on a thickened, wrinkled appearance resembling elephant hide, there is loss of condition and weight. Emaciation and weakness may happen in severe, chronic cases.

Under range conditions or in any environment in which the injury is compounded by poor nutrition and exposure to cold, heavily infested animals may die from psoroptic scabies.

Rubbing and scratching by milking cows that have sarcoptic mange may cause mastitis or inflammation of the milk-producing glands. Severe itching may also cause the animals to rub so vigorously that abscesses develop on the shoulders and rump. A serious economic result of mange is the loss in milk production. Another evil is that the mites can transfer from dairy animals to people. In the Northeastern States that has been a matter of some concern, because children particularly suffer from mites they get from cows.

The injury caused by demodectic mange is of greatest concern to the leather industry. The nodules produced in the skin by demodectic mites appear in the tanning process as deep pits or holes in the hide. Because the disease may attack animals of all breeds and classes, the annual loss in terms of damaged leather is high.

The total annual loss to our cattle industry from the four species of mites was estimated in 1954 to total more than 4 million dollars. That figure does not include the sums spent to keep scabies under control.

The history of efforts to control scabies in the United States by Federal and State agencies emphasizes the enormous effort required to keep scabies from becoming a catastrophe.

Scabies was widespread throughout the Western States by 1900. A bulletin describing the disease and methods for its control, issued by the United States Department of Agriculture in 1902, described psoroptic scabies as a serious disease, chorioptic scabies as a less important one, and sarcoptic mange as being almost unknown in cattle.

The Department of Agriculture, with the cooperation of stockmen and the State livestock sanitary officials, in 1904 inspected more than a million head of cattle in the West and supervised the dipping of nearly 160,000 diseased or exposed animals. A large force of veterinarians was placed in the field by the Department in 1905. Federal quarantines were imposed in areas in which the disease was prevalent, but cattle scabies increased rapidly in many States until about 1911.

Progress thereafter was slow but encouraging. The disease was reported in 1926 to be increasing in only three Western States. More than 3 million head were inspected that year, and half that many were dipped. The work continued until 1937, when it was finally reported that the psoroptic scabies was confined chiefly to Nebraska.

After 1938, with control in sight, the numbers of animals annually inspected and dipped gradually diminished. In 1942 with infection present only in Nebraska and Kansas, 1.5 million head were inspected in the entire West, 85 thousand were dipped, and known infected herds contained only 12,000 animals.

The inspection of 1.5 million head in 1948 revealed only 550 cases of scabies. Many were chorioptic infections that had been introduced into the Western States from the East.

More than 300,000 inspections in the West in 1950 disclosed fewer than 1,000 infected animals with not a
single case of psoroptic scabies among them.

Only 320 infected animals were found in 1953. In that year, however, cattle with chorioptic scabies and sarcoptic mange were reported in 11 Midwestern and Eastern States and undoubtedly were present in many more.

An outbreak of psoroptic scabies of unknown origin involved 6 Western States in 1954. It was quickly arrested by prompt Federal and local action. The existence of scabies and mange infestations in midwestern and eastern herds of purebred beef animals and dairy cows indicates the need for constant vigilance against the return of the parasites into the range herds of the West.

The control of scabies and mange of cattle requires the external application of chemicals capable of destroying the parasites without harming the animals. For many years lime-sulfur and nicotine sulfate were used.

Many infected animals have been treated since 1948 with benzene hexachloride (BHC) and lindane, which are better than the old chemicals. They are deadlier to mites than lime-sulfur and less likely to injure cattle than nicotine sulfate.

Another chemical, toxaphene, seems to be about as effective as BHC and lindane for chorioptic scabies. It is inexpensive and relatively harmless to cattle if properly used.

Dipping is the preferred method in treating cattle for scabies. The animals are put into a tank or vat of medicated liquid. The animals are thoroughly wetted all over. Dipping plants are usually so arranged that the cattle enter a narrow vat, one at a time, swim through it, and emerge into a draining pen at the opposite end. Lime-sulfur and nicotine sulfate are effective only when applied in dip form.

Prepared concentrates of these chemicals may be purchased and should be used in amounts recommended on the containers. One difficulty associated with their use is the need to maintain a dipping solution temperature of approximately 100° F. In the case of nicotine sulfate, temperatures higher than 105° may injure cattle.

Two dippings 10 to 12 days apart will cure most cases of psoroptic and chorioptic scabies. Four dippings about 6 to 10 days apart may be needed for sarcoptic mange.

BHC and lindane applied in dip form have given good results. They may be used in cold water. The solutions are easily prepared. The animals need not spend so much time in the vats as when the older insecticides are used.

BHC or lindane should be used at a concentration of 0.075 percent of the active ingredient. A single dipping generally is enough, but for unusually severe, chronic cases, marked by heavy scab formation, two dippings applied 10 to 12 days apart are recommended.

BHC is usually obtainable in the form of wettable powders containing 6, 10, or 12 percent of the active ingredient, which is known as gamma isomer. Lindane wettable powders usually contain 25 percent of gamma isomer.

This table shows the amounts of wettable powder needed to prepare 100 gallons of dip:

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<th>Gamma isomer in product of water</th>
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<td>6 percent</td>
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Cattle must spend at least 2 minutes in the dipping solution if lime-sulfur or nicotine sulfate is used. When BHC or lindane is used, 30 seconds to 1 minute are enough.

All the insecticides must be used with care in the dipping vat. Newborn calves and weak or emaciated animals of any age should not be dipped.

BHC and lindane are particularly dangerous to calves of the dairy breeds. Dairy calves less than 2 weeks old should not be dipped.
All cattle should be well rested before dipping.

Spraying cattle to control parasitic mites is done in many places because dipping vats are scarce. Spraying is less effective than dipping, because it is harder to wet thoroughly the haircoat and the skin on all parts of the body. Scabies and mange can be cured, however, if generous amounts of liquid are used and if the work is done carefully.

BHC and lindane at a concentration of 0.075 percent gamma isomer, as recommended for use in dipping vats, are the insecticides of choice for this purpose.

Two sprayings with either BHC or lindane, 10 to 12 days apart, are recommended. High-pressure, power-operated equipment is usually necessary. A pressure of 200 to 400 pounds per square inch should be maintained. Newborn and sick or weak calves and calves of the dairy breeds less than 2 weeks of age should not be treated.

The amount of spray used depends on the size of the animals, the length of the haircoats, the dimensions of the quarters in which the animals are confined for treatment, and the type of equipment. Large, heavily haired beef cattle require 4 to 5 gallons or more each. All parts of the haircoat and skin must be wet. Particular attention should be paid to the hindquarters, the undersides of the body, and the inner surfaces of the legs. Total saturation provides greatest assurance of successful treatment.

Several health hazards must be considered when BHC and lindane are used. Small amounts of both are absorbed through the skin and are deposited in the tissues of treated animals. They are partly eliminated from the body through the milk.

Sprays containing 0.075 percent of lindane may be applied to producing dairy cows, but their milk is regarded as unfit for use by people for 3 to 4 days after treatment. The milk may be fed safely to calves, swine, and nonlaying poultry. Moreover, if such milk, as part of the product of a milkshed, is mixed with large quantities of milk from untreated herds before it reaches the consumers, any health hazard is probably eliminated.

When treating producing milk cows, strict adherence to the manufacturer’s recommendations for the use of an insecticide must be followed; the addition of too much of the insecticide concentrate to the spray mixture may allow the chemical to show up in harmful amounts in the milk.

Beef cattle that are intended for food for people should not be treated with BHC or lindane within 30 days of the date of slaughter.

Leftover dips of BHC and lindane should be disposed of carefully. Pools from which livestock may drink should not be allowed to collect. The insecticides should not be allowed to contaminate feed or the grass on which livestock may graze. BHC and lindane are poisonous to fish and should not be emptied into streams or ponds.

Demodectic mange of cattle does not respond to any known treatment. If the nodules are small, they will cause no perceptible injury and may be ignored.

BHC or lindane washes containing 0.075 percent of the gamma isomer can be applied to open nodules to kill the mites that may live in the pus discharged onto the skin.

Open demodex nodules infrequently become abscessed as a result of bacterial infection. If the discharge persists, such abscesses, which occasionally are as large as a pigeon’s egg, may be treated with local antiseptics. Accumulated pus can be expressed by means of light pressure and flushed away with warm, soapy water. The abscess should then be swabbed, as deeply as gentle probing will allow, with tincture of iodine applied by means of a small piece of sterile absorbent cotton tightly wrapped around the end of a toothpick.

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For further reading:

**Verminous Dermatitis**

JOHN T. LUCKER

THE ONLY truly parasitic worm known to cause a specific dermatitis, or skin disease, of cattle in the United States is a small filarial roundworm, *Stephanofilaria stilesi*.

The adult worms live and move about in the outermost, or epithelial, layer of the skin. Their progeny, known as larvae or microfilariae, are found mostly in the upper part of the underlying dermal skin layer.

The life cycle of the parasite has not been worked out, but an insect intermediate host probably is required for its completion. Transmission by one or more of the many kinds of sucking insects that attack cattle is strongly suggested by the life cycles determined for related filarial roundworms. Such dipteran insects as flies, "midge," and mosquitoes head the list of suspects.

The causative parasite has been found only in lesions in the skin of cattle. Presumably the intermediate host inoculates the skin with the infective larvae of the parasite. The irritation produced as they develop into adults apparently starts the lesions. An alternative possibility is that the transmitter is attracted to already existing sores or breaks in the skin and inoculates infective larvae into them. At any rate, the presence of the adults and their microfilariae causes tissue destruction.

*Stephanofilariasis*, also known as stephanofilarial dermatitis and stephanofilarial dermatosis, the skin disease caused by this parasite, was first recognized in western cattle in 1934. It has been found in 11 of the Eastern, Southern, and Midwestern