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AGRICULTURAL EXPERIMENT STATION

SOUTH DAKOTA STATE COLLEGE OF AGRICULTURE
AND MECHANIC ARTS

VETERINARY DEPARTMENT

SCABIES (MANGE) IN CATTLE

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SCABIES (MANGE) IN CATTLE

E. L. Moore

Bulletin No. 107 of this Station, issued by the Department of Veterinary Medicine, contains a report of the results obtained by this department in a co-operative experiment with the United States Department of Agriculture, in order to determine the relative efficiency of the various constituents of coal-tar dips in the treatment of sheep scab. Subsequently, the experiments were continued in co-operation with the Bio-Chemic Division of the Bureau of Animal Industry, in order to determine the percentage of the different constituents of coal-tar dips which should be present to render them effective in the treatment of scabies in cattle. In order to render the results more intelligible to the present reader it will be necessary to repeat portions of the above mentioned bulletin.

In the distillation of bituminous coal there are given off numerous volatile bodies which are condensed into a dark, thick liquid, or semi-liquid substance to which has been given the name of coal-tar. The composition of coal-tar is very complex and varies considerably with the temperature at which the distillation of the coal is effected. From among the various products obtained by this distillation we have a large number of so called coal-tar dips, the uses of which have become so familiar. These dips contain a varying percentage of coal-tar oils and cresylic acid (cresols and other phenols) which are rendered capable of being emulsified by the addition of resin or linseed-oil soaps.

While there are at least three different forms of Scabies in cattle the most common one is Psoroptic scabies, and it is exclusively this form of mange which will be under discussion.

The essential cause of this disease is a small parasite known as the *Psoroptes bovis* which does not differ materially in appearance from the *Psoroptes* of the horse or of



FIG. 1.—*Psoroptes bovis*, the parasite producing cattle mange

the sheep. The differentiation of this parasite into various species is based not upon any marked anatomical differences but rather on its adaptability to live only on certain species of animals. Efforts to transfer the Psoroptes from horses to cattle, from cattle to horses, or from sheep to either horses or cattle, have all been accompanied by failure. When transferred from one genus of animal to another they live but a short time, and any eruption which appears recovers spontaneously. Figure I. is from a photo-micrograph of the Psoroptes bovis. Favoring causes are to be found in mal-nutrition and stabling during the winter months. At this period of the year the parasites are driven downward by the cold, attacking the skin and causing greater irritation. It is well recognized by all those who are familiar with this disease that when the stock is turned out to pasture in the spring the irritation largely, if not entirely, ceases, it being maintained that the freer secretions supply the wants of the parasite so that it does not care to bite.

Neumann observed that the Psoroptes exist during the summer, although the cattle appear to be cured. Gerlach and Mueller found the parasites in large numbers around the neck and the horns during the summer months. Knowles of Montana, found the parasites in large numbers during the summer months although there was but a slight amount of skin irritation at that time. Peters of Illinois, records observations made on three different herds in which the disease had existed during the winter, nothing having been done in the line of treatment. During the month of June in every instance, the parasites were found at the base of the horns and on the neck, the animals showing no symptoms whatever of inconvenience. From the latter author we quote, "It may be that these mites seem to disappear during the summer months as the ranchmen have discovered, but from our observations they still infest the animal, but cause no noticeable inconvenience during this time; hence, it must be that they feed on the

surface and hair of the animal; whereas during the fall of the year these mites begin to burrow into the skin and produce this intense itching (puritus.)”

SYMPTOMS.

Most frequently the disease appears at the root of the tail, the thighs, or it may be at the neck or withers. Figure II. shows the root of the tail and the thighs to be affected. Later the neck, the shoulders, the sides of the chest or any portion of the entire body with the exception of the legs, may become involved. There is a violent itching or puritus, the animal rubbing itself against all possible objects, and frequently to such an extent as to cause bleeding of the affected portions. A careful examination of a freshly attacked spot shows the presence of small elevations of the skin about the size of millet seeds, which may become confluent and are filled with serum. These break and agglutinate the hair, and drying, form crusts of increasing thickness which become very adherent, and which gradually increase in number, size, and extent. Underneath these crusts, particularly around the margins of the same, may be found the multiplying *Psoroptes* which can be detected by the naked eyes or better by means of a lens when the crusts are placed on a sheet of black paper in the warm sun. The skin loses its hair and becomes dry, thickened, and marked with crevices or cracks particularly in the region of the neck, shoulders or the chest. A careful study of Figure III. will show this thickening and cracking of the skin over the shoulders, while at the top of the shoulders will be found a more recently invaded area. The affected animals gradually pass into a state of cachexia, becoming emaciated and eventually dying from mal-nutrition.

DIAGNOSIS.

Certain other affections of the skin may possibly be mistaken for Scabies. Lice, will produce violent itching

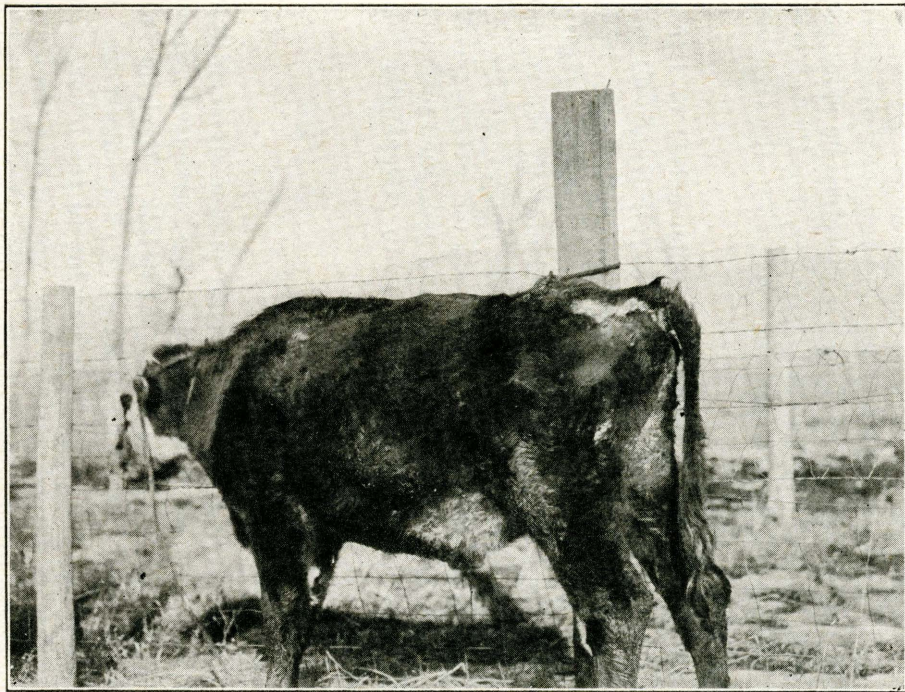


FIG. II.—A typical case of Scabies. Rump, inside of quarters and shoulders affected.

and occasion a loss of hair. There is not, however, the tendency toward the formation of thick crusts as will be found in Scabies. This condition is readily diagnosed by the recognition of the lice which are especially to be found at the base of the horns, the upper portion of the neck or at the root of the tail. It must be kept in mind, however, that these two conditions of Scabies and lousiness frequently co-exist and the examination must therefore be more than a superficial one. In general, however, the line of treatment adopted for Scabies proves effective in the treatment of lousiness.

Ring-worm, found frequently upon calves or it even may be upon adult cattle, produces a well defined circular, scaly lesion, the favorite locations in cattle being in the neighborhood of the eyes and ears. A positive diagnosis of Scabies can of course be obtained only by the recognition of the *Psoroptes bovis*. For this purpose crusts from the affected portions are to be teased out over a piece of black paper in the direct sunlight and examined preferably with a lens magnifying from ten to twenty-five diameters.

TREATMENT.

In conducting the experiments previously mentioned in the use of coal-tar dips, cattle were purchased affected with Scabies and divided into eight lots. Each lot was separated from the other by an alley of about 24 feet, in order to avoid infection from one lot to the other. The animals were dipped in the cage type of vat, and after each lot was dipped the vat was thoroughly cleansed before another kind of dip was added. The dips used were prepared by the Bio-Chemic Division of the Bureau of Animal Industry and when ready for use contained the following per-centages of cresylic acid and coal-tar oils. (By the term cresylic acid as here used is meant cresols and

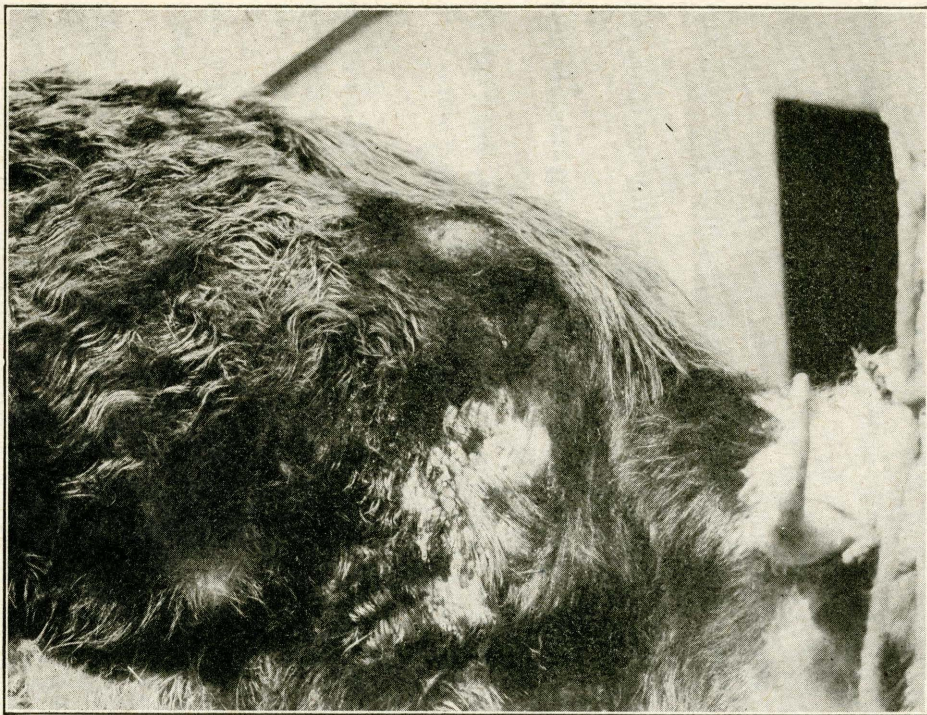


FIG. III.—Shoulders scabby. Skin of shoulders thickened and furrowed.

other phenols derived from coal-tar, none of which boils below 185 degrees Centigrade nor above 250 degrees Centigrade).

Lot. I. Cresylic acid one-tenth of a per cent, coal-tar oils one and two-tenths per cent.

Lot II. Cresylic acid four-tenths of a per cent, coal-tar oils one per cent.

Lot III. Cresylic acid two-tenths of a per cent, coal-tar oils one per cent.

Lot IV. Cresylic acid five-tenths of a per cent, coal-tar oils none.

Lot V. Cresylic acid three-fourths of a per cent, coal-tar oils none.

Lot VI. Cresylic acid one per cent, coal tar oils none, kerosene one and two-tenths per cent.

Lot VII. Cresylic acid one per cent, coal tar oils none, crude petroleum one and two-tenths per cent.

Lot VIII. Controls, untreated.

It will thus be seen that three different classes of dips were used in this experiment. Lots 1, 2 and 3 were treated with coal-tar cresote dips, that is they contained coal-tar creosote or coal-tar oils and cresylic acid; lots 4 and 5 were treated with a cresol dip; while lots 6 and 7 were treated with a cresol dip to which was respectively added kerosene and crude petroleum.

Owing to unavoidable delays considerable time elapsed between the purchase of the cattle and the dipping, and at the time when the dipping actually occurred many of the animals showed only a slight infection. For this reason the apparently favorable results obtained in the first four lots of cattle have not been deemed trustworthy.

Summarizing the results obtained, lots one to four, inclusive, remained free from Scabies for one year after dipping. The lice, however, with which these cattle were infest-

ed, at the time of dipping, were not eradicated. The cattle contained in lots five to seven inclusive, remained scabby after treatment. It will thus be seen that the results obtained through the use of Cresol dips in the treatment of Scabbies in cattle are entirely at variance with those obtained in the use of the same class of dips in the treatment of sheep scab. While the coal-tar dips in solutions similar to those used above were found effective in the treatment of sheep scab, their use can by no means be recommended in the treatment of Scabies in cattle. Mercurial or arsenical dips should be avoided on account of the danger of poisoning from absorption through the skin as well as from that of poisoning through the bovine habit of licking themselves.

Undoubtedly, therefore, the best results in the treatment of this affection are to be obtained through the use of tobacco and sulphur or lime and sulphur preparations.

The tobacco and sulphur dip is the same as that used for sheep scab, that is, there should be sufficient extract of tobacco or nicotine solution to give a mixture containing not less than five one-hundredths of one per cent of nicotine and sufficient sulphur to give a two per cent solution.

The lime and sulphur dip contains more lime than when made up for the treatment of sheep scab. It should contain 12 pounds of unslacked lime and 24 pounds of flowers of sulphur to 100 gallons of water. The lime is to be placed in a mortar box and sufficient water added to slack the lime and form a sort of paste or putty. To this the finely sifted sulphur is added and the mixture thoroughly stirred.

This is then placed in a boiler, 30 gallons of water added and the mixture boiled for at least two hours with frequent stirring, occasionally adding fresh water to retain the original quantity. This is then placed in a cask or other receptacle and allowed to settle for several hours. When fully settled the clear liquid is drawn off into the

vat and sufficient water added to bring the total quantity up to 100 gallons. Owing to the labor involved in preparing the tobacco and sulphur, and lime and sulphur dips, many prefer to make use of some one of the proprietary products. The purchaser should, however, assure himself that the dip he contemplates using has the approval of the Department of Agriculture, as shown by a label stating that the manufacturers of that dip guarantee the contents to be of the same composition as the sample submitted to the Department of Agriculture.

In those cases where failures have been reported following the use of either of these dips when properly prepared and used, it can readily be shown to have been caused through returning the dipped animals to infested corrals, yards, etc., or from re-infection from other cattle on the range.

Irrespective of the kind of dip employed the following general directions should be adhered to:

1. The temperature of the dipping vat should be constantly maintained at from 103 degrees F. to 105 degrees F.

2. Animals badly affected are preferably to be hand dressed by scrubbing the scabby areas with a stronger solution of the dip. Where lime and sulphur is used this has the effect of softening the firm scab allowing the dip to penetrate.

3. Each animal should be held in the vat for two minutes, and completely immersed twice.

4. All animals that have been in contact with the diseased ones should be regarded as infected and dipped.

5. The dipping should be repeated in from ten to fourteen days to destroy the parasites that may have hatched out subsequently to the first dipping.

6. Dipped cattle should not be returned to infested stables or corrals.

The type of vat to be employed will be largely governed by conditions. Where only a small number of animals is to be treated the dip can be successfully applied by means of a brush or a spray pump. For larger numbers the cage type of vat costing from \$125 to \$200 may be employed. In this type of vat two or three animals are crowded into a cage which is then lowered into the vat. Throughout South Dakota however, the swimming type of vat has been more generally used. The animal is crowded forward on a trap which is then sprung precipitating it into the vat, through which it swims emerging by an inclined plane to the dripping floor.

The problem of stamping out this disease in cattle in the State of South Dakota has been a very serious one. By the method of treatment outlined Scabies has been eradicated from the eastern portion of the state so that at present a quarantine is maintained by the United States Department of Agriculture only against that portion of South Dakota lying west of the Missouri River. In those portions of the State where the farms are entirely enclosed and there is no mingling of the herds of different owners, no particular difficulty is encountered. Where, however, semi-open or range conditions exist eradication becomes more difficult. This is brought about by the difficulty, if not impossibility, of establishing a strict quarantine of undipped and of exposed herds. Perhaps one man has carefully dipped his cattle so as to eradicate the disease; but his neighbors whose cattle have also been exposed to infection, refuse to dip. Under semi-open or range conditions these cattle intermingle to a greater or less extent in spite of attempts to establish a quarantine, so that the dipped cattle become newly infected. In the experience of the writer just such factors have been largely instrumental in preventing the complete eradication of the disease in this state. It is, however, exceedingly gratifying to note that under the effective system of quarantine and inspection maintained by the Bureau of Animal In-

dustry in co-operation with our State Live Stock Sanitary Board that the disease is becoming largely eradicated and we can confidently look forward to that time in the near future when the quarantine will be raised from the entire State of South Dakota.



LIST OF AVAILABLE BULLETINS

89. Preliminary Experiments with Vapor Treatments for the Prevention of Stinking Smut in Wheat.
90. Tankage and other By-Products for Pigs; Shrunken Wheat for Swine.
91. Co-operative Vegetable Tests in 1904; Peas, Beans, Sweet Corn. Cabbage.
92. The Milling Qualities of Macaroni Wheat.
94. Alfalfa and Red Clover.
95. The Treatment of Nail Pricks of Horse's Foot.
96. Forage Plants and Cereals at Highmore Sub-Station.
97. Speltz and Millet for the Production of Baby Beef.
98. Crop Rotation.
99. Macaroni and Durum Wheats. A continuation of Bulletin 92.
100. The Value of Speltz for the Production of Beef and Pork.
101. Forage Plants at the Highmore Sub-Station, 1906.
102. Evergreens for South Dakota.
103. Breeding Hardy Strawberries.
104. Breeding Hardy Raspberries.
105. Stock Food for Pigs.
106. Sugar Beets in South Dakota.
107. Sheep Scab.
108. New Hybrid Fruits.
109. Rusts of Cereals and other Plants.
110. Progress in Variety Tests of Oats.

111. A Study of South Dakota Butter with Suggestions for Improvements.
112. The Killing of Mustard and other Noxious Weeds in Grain Fields by the use of Iron Sulphate.
113. Progress in Variety Tests of Barley.
114. Digestion Coefficients of Grains and Fodders for South Dakota.
115. Report of Work for 1907 and 1908 at Highmore Sub-Station.
116. Acidity of Creamery Butter and its Relation to Quality.
117. Sugar Beets in South Dakota.
118. Corn.
120. Progress in Variety Tests of Alfalfa.
121. Sugar Beets in South Dakota.
122. Creamery Butter.
123. Milk Powder Starters in Creameries.
124. Progress of Grain Investigations.
125. Fattening Steers of Different Ages.
126. Alkali Soils.
127. Breeding and Feeding Sheep.
128. Progress in Wheat Investigations.
129. Growing Pedigreed Sugar Beet Seed in South Dakota.
130. Some New Fruits.