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Sheep Scab

E.L. Moore

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**South Dakota
Agricultural
Experiment Station**

South Dakota State College of Agriculture
and Mechanic Arts

BROOKINGS, S. DAK.

Sheep Scab

Department of Veterinary Medicine

**H. C. SESSIONS & SONS
SIOUX FALLS, S. D.**



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Introduction

In the year 1905 the Bureau of Animal Industry of the United States Department of Agriculture began investigations to determine the relative efficiency of the various constituents of coal-tar dips in the treatment of Sheep Scab, in order to provide some standard whereby the efficiency of these dips could be determined by laboratory methods. The co-operation of the South Dakota Agricultural Experiment Station was enlisted in the practical testing of coal-tar dips of various known composition which were prepared by the Biochemic Division of the Bureau of Animal Industry. For this purpose sheep with well developed cases of scab were procured and divided into small lots for each of which a separate dip was employed. Each lot was then placed in a separate pen and observations made from time to time as to its condition and progress. Undipped scabby sheep were kept under observation for a similar length of time for the purpose of comparison. It has been deemed inexpedient to burden this bulletin with statistics or detailed data accumulated during the two years covered by these experiments. While some dips other than the coal-tar dips were employed, the experiment had to do largely with the latter class. The information contained in the sections dealing with coal-tar creosote dips and cresol dips has been largely obtained through the co-operative experiments conducted by this Station and the Bureau of Animal Industry. These experiments have demonstrated that coal-tar dips properly prepared and which when diluted for use contained certain percentages of coal-tar oil and cresylic acid, or cresylic acid alone are effective remedies against sheep scab.

Notwithstanding the joint character of the experimental work itself, it must be understood that this bulletin is issued as a separate publication of the South Dakota Agricultural Experiment Station, the Bureau of Animal Industry having had no part in its preparation.

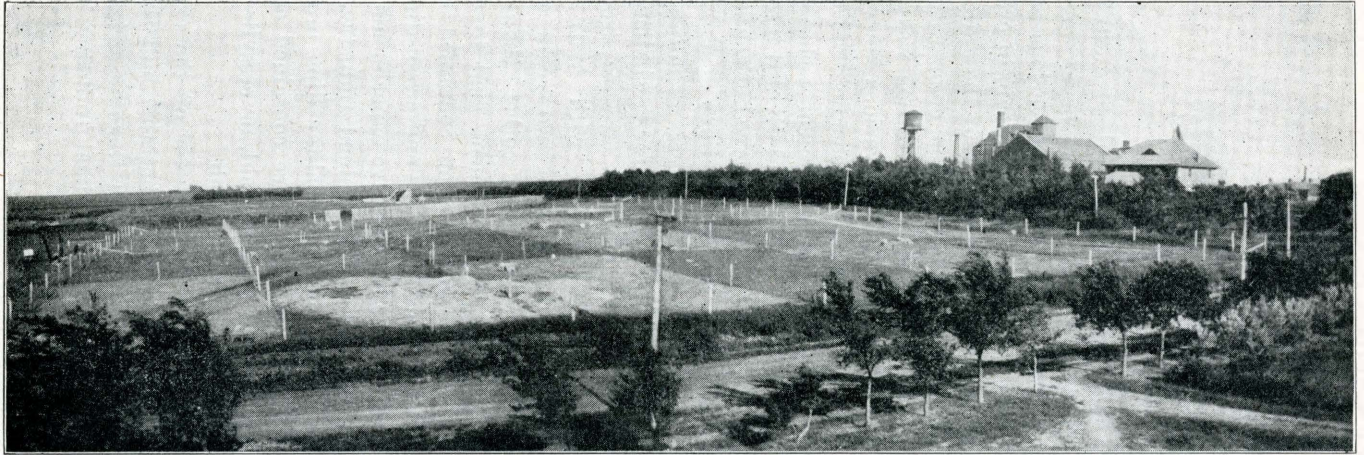


FIG. I.—Experimental Pens.

SHEEP SCAB.

E. L. Moore

This disease recognized under the various names of scab, scabies, mange, itch, acariasis, etc., is of great economic importance to the sheep industry, occasioning loss of wool, loss of condition, emaciation and death. Owing to its rapid extension and the serious loss thereby entailed sheep scab, by an Act of Congress dated March 2, 1895, was designated as one of the contagious diseases of domestic animals and the Bureau of Animal Industry was directed to enforce measures for its extinction. In this same year such animals were prohibited from entering into inter-state trade, or into places where sheep are handled for inter-state trade. In 1899, inasmuch as some preparations used in the dipping of scabby sheep proved non-efficacious, order No. 38 of the Bureau of Animal Industry was issued which contained instructions that no such scabby sheep should be received for inter-state trade unless dipped in a mixture approved by the United States Department of Agriculture. Such approved dips were, Tobacco and Sulphur, and Lime and Sulphur. Owing to the fact that the disease was not being stamped out as rapidly as desirable, the Bureau of Animal Industry inaugurated a more active campaign against this disease in the Western States. Through an increase in the force of inspectors it became possible to enforce the inspection of all sheep that entered into inter-state trade from these States. These regulations virtually acting as a quarantine, came into effect in South Dakota about four years ago. Through the co-operation of the State authorities further regulations were enforced whereby the inspection of sheep passing from one county to another within the limits of the State also became obligatory. The results were almost immediate and the number of cases of sheep scab in this State has been reduced to an almost inconsiderable amount.

Scab in sheep may assume four different forms, in each case the causative agent being of a different nature. These forms

are, *sarcoptic* mange, affecting the head exclusively, *psoroptic* mange affecting that part of the body covered by long wool, *symbiotic* or *chorioptic* mange affecting legs, scrotum and udder, and *demodectic* mange affecting the eyelids. Sarcoptic, symbiotic and demodectic mange are apparently rare, being more localized in area are more benign in their effects, and so far as this Station is concerned attention has not been drawn to their existence, so that a description of them will be eliminated from this discussion entirely.

Psoroptic mange or scab is due to a small external parasite, usually referred to as a mite, which is known to the scientist as *Psoroptesvis* (Hering 1838). While historically sheep scab is one of the oldest known diseases, exact knowledge with reference to the biology of the parasite producing it was not obtained until the nineteenth century through the researches especially of Hering (1838), Hertwig (1835), Delafond and Bourguignon (1856) and Gerlach (1857). The scab mite while visible to the naked eye is so extremely small that it may readily enough escape detection by the ordinary observer. Thus, the adult female is 0.65 mm. (1.40 in.) long by 0.40 mm. (1.60 in.) wide; while the adult male is 0.48 mm. (1.50 in.) long by 0.30 mm. (1.80 in.) wide. To the presence of this small parasite do we owe all of the disasters summed up in the name "sheep scab!"

The life history of the mites producing the different forms of scab is similar. The following description of the changes through which these mites pass is largely due to the investigations of Delafond and Bourguignon, Furstenberg, and Megnin. From the egg laid by the ovigerous female is hatched a small six-legged *larva*; this larva after passing through several moultings becomes an eight-legged *nympha*, which while still lacking sexual organs, allows of a distinction being made between males and females, owing to the latter being larger; from the moulting which ends the last stage of the nympha arises the adult *male* and *female*, with distinct sexual organs. Copulation occurs, the male dies, and the female passing through another moult reaches the last stage in its life history, the *ovigerous fe-*

male, in the transparent abdomen of which may be seen several eggs. Placing the egg product of a single female at 15, Gerlach estimates that the natural increase in ninety days will be 1,000,000 females and 500,000 males. The period of incubation for the egg varies from 3 to 10 days according to surrounding conditions, therefore if the second dipping is made on the tenth day we destroy those parasites hatching subsequently from the eggs not killed by the first dipping.

Sheep scab is transmitted (a), by immediate contact of the diseased animal with the healthy; (b), by mediate contact, the healthy sheep coming into contact with some object or medium upon which the diseased animal has rubbed, leaving thereon crusts, scabs, and pieces of wool which harbor the mites. Thus healthy sheep may contract the disease not only from contact with scabby sheep but from pastures, yards, barns, sheds, stock yards, cars, etc., in which scabby sheep have been. According to Hertwig, Gerlach, and also Delafond, the mites of sheep scab may live apart from the sheep's body in scabs, in wool, or in pieces of fresh skin for from 10 to 20 days. An experiment conducted at this Station to show how long under ordinary conditions an infected yard may still be able to transmit the disease was rendered void through the destruction of the experimental sheep by dogs. Attention must be emphatically drawn to the fact that the psoropt of sheep can be transmitted only to sheep, and not to horses, cattle, etc. Transferred directly to man it produces some irritation with the formation of a small pimple from which the mite can be obtained, it does not, however, produce an itch eruption and soon disappears of itself.

The parasites live upon those parts of the body covered by thick wool. Through the irritation produced by their pricking the skin, and doubtless also on account of the irritating character of their salivary secretions these parasites induce grave pathological changes in the skin which may be summed up as follows, marked redness of the skin, loss of wool, thickenings, exudation of serum, the formation of crusts, and an intense itching or pruritus. The attendant may first suspicion

something wrong by reason of slight changes which have occurred in the fleece, which becomes tufted and matted in places. If the suspected animal is watched it will be seen to rub itself, scratch itself with its feet, nibble at itself, and pull out pieces of wool with its teeth. When rubbed or scratched with the hand over the affected parts the sheep responds by a nibbling motion of its lips, nods the head, tries to pinch its skin with its teeth, and scratches itself with its hind feet. Crowding the sheep together or driving them so as to raise the body temperature increases the pruritus. An early examination of the skin shows the presence of yellowish "pimples" or papules resulting from the pricking of the mites. On account of the great number of pricks sustained, the papules approach each other and become confluent. Serum collects at their summits, transforming them into vesicles and then into pustules, which upon drying, form crusts. Under the influence of the mites the process of inflammation extends to the deeper layers of the skin, the crusts become replaced by more or less thickened scabs, while the wool cut off from its supply of nourishment becomes detached, leaving scabby areas of various size. The intense itching causes the animal to rub itself violently, leading to the formation of cracks and excoriated surfaces. Sometimes the skin may become uniformly thickened, hard and leather-like. The mites leave those places where the crusts have become dry, compact and hard, but may be found in large numbers, around the periphery where they induce like changes until large areas have become involved. The fleece of a scabby sheep has also a characteristic appearance. The wool is matted and agglutinated in certain places, hanging in long tufts, in other places it is lacking, while over areas where it appears to be still intact it can be readily detached by even gentle pulling. The season of the year, the length and fineness of the fleece, the age and health of the animal, the race, the hygienic surroundings and the feeding, all have an influence on the progress and termination of the disease. During the winter, with close housing in warm sheds, with insufficient nourishment the disease runs a more rapid course and the percentage of deaths may become very large. In one out-

break coming under my observation the fatality, including those rendered too weak by the disease to successfully withstand dipping or the labor of lambing, was fully 75%. Allowed to run its course unchecked, scab results in an interruption of the natural functions of the skin, fatigue, restlessness, loss of flesh, debility, and finally death from cachexia.

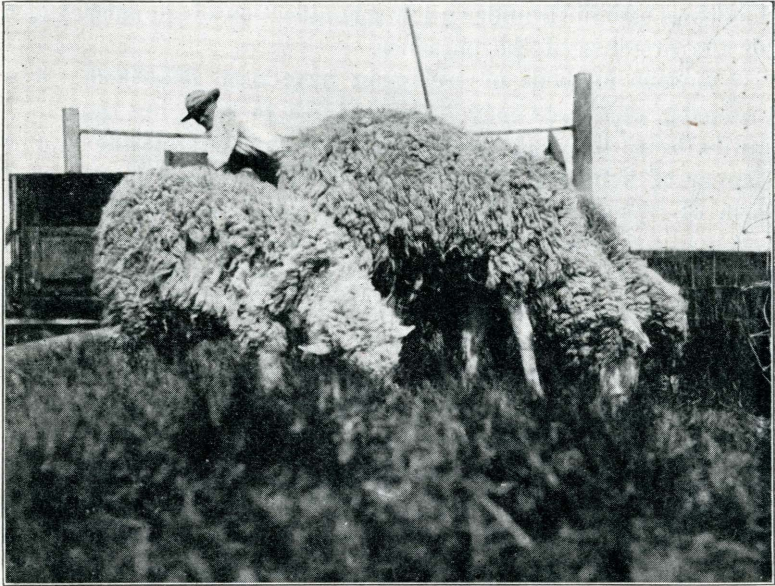


FIG. II.—Slightly Advanced Case of Sheep Scab.

The diagnosis of scab depends upon the intense itching, the location of the affection (it being found primarily along the shoulders, back, and loins), the formation of crusts, and finally upon the detection of the parasite. For the latter purpose wool and crusts are removed from a fresh lesion, and may be examined in the direct sunlight by the naked eye or preferably by a hand lens magnifying about eight diameters; or the material may be pulled and teased apart over a piece of black paper which is then placed in a warm place in the sun. Upon becom-

ing warmed up the parasites become active and may be seen as minute white dots moving over the black paper. Still another method is to place the suspected material in a conical shaped graduate and cover it with a 1% solution of caustic soda or potash. This dissolves out the grease, separates the fibres of the wool, and allows dirt and parasites to settle to the bottom. After a few hours the supernatant liquid may be poured off and the debris examined under a low magnification of the microscope for the presence of the parasites.

Various methods of treatment have been described. The European shepherds may have recourse to smearing, pouring, and bathing; but such methods are not at all applicable to our manner of handling sheep. Consequently dipping is the only form of treatment that should be considered. Recalling what has been already said with reference to the enormous rate of increase of the parasite, and the method of transmission, if any individual in the flock is found to be scabby the entire flock should be considered affected and treated. A useful type of dipping plant for conditions found in this State consists of a corral and crowding chute so that the animals have to enter the vat singly; a galvanized iron dipping tank, which for a small flock might be of the following dimensions, length on top, 8 feet, width on top 2 feet, length on bottom 4 feet, width on bottom 8 inches. The sheep on coming out of the inclined end of the vat should pass to a dripping pen capable of holding 30 to 50 sheep; this pen should be divided lengthways into two compartments closed at the vat-end by a swinging gate, which holds those in one-half to drain off while the other half is being filled. The absolute dimensions will depend on the size of flock to be handled. In addition there should be a steam boiler or other contrivance to maintain the dip at a proper temperature. In dipping for sheep scab the sheep should be held in the dip for at least two minutes, and just before coming out the head should be entirely submerged once. The dip should be kept at a constant temperature of from 103 degrees to 105 degrees F. No matter what kind of dip is used the flock should be dipped the second time ten to fourteen days after the first dipping in



FIG. III.



FIG. IV.—Advanced Cases of Sheep Scab.

order to catch those mites that have hatched out after the first dipping.

MERCURIAL DIPS.

Mercurial dips have been used and some have reported favorably on them, but the advantage of mercurial preparations as a parasiticide is more than offset by the danger of mercurial poisoning from absorption. It is usually employed in an aqueous solution of a strength of 1-500, sometimes even stronger.

LIME AND SULPHUR.

The efficacy of this as a scab eradicator is beyond dispute as attested by the results obtained in the dippings conducted at different stock yards under the direction of the Bureau of Animal Industry, statistics showing that about 98% of affected sheep dipped have recovered, the number of animals dipped running well into the millions. The chief objection raised to the use of lime and sulphur dips is the injury occasioned to the wool. If the dip is properly prepared so that all the lime unites with the sulphur, and the dipping is performed shortly after the sheep are shorn, this objection proves specious. In preparing this dip weigh out 8 pounds of unslacked lime and 24 pounds of the flowers of sulphur. Place the lime in a mortar box and add enough water to slake the lime, forming a sort of paste or putty. To this add the sifted sulphur and stir or mix well together. Put this mixture into a kettle or boiler and add 30 gallons of boiling water. This mixture should be boiled for at least two hours, stirring frequently, and occasionally adding fresh water to maintain the original quantity. This is then placed in a cask or other receptacle and allowed to settle for several hours. When fully settled draw off the clear liquid into the vat, but *do not allow any of the sediment to pass over into the vat.* Add sufficient warm water to bring the total quantity up to 100 gallons.

TOBACCO AND SULPHUR.

So far as efficiency is concerned, these dips rank in about the same position as lime and sulphur. There is no possible chance of injury to the wool further than slight discoloration, when tobacco and sulphur is used, and on this account it is preferable to lime and sulphur in treating unshorn sheep. The chief objection to tobacco and sulphur is that it is apt to cause some of the sheep to sicken and may even produce nausea in some of the attendants. While this dip may be prepared by the owner himself from the tobacco leaves, on account of the difficulty of obtaining them, as well as on account of the variation in the amount of nicotine in different samples of tobacco, so that it is impossible to prepare a mixture of a desired strength, he is advised to buy a prepared tobacco dip with a guaranteed statement as to the percentage of nicotine contained therein. In using a dip of this kind for sheep scab there should be enough of the active principle of tobacco, nicotine, in the dip to give a solution of 0.05% nicotine, and sufficient sulphur to give a 2% solution. Thus in 100 gallons of dip (about 835 pounds) there should be 0.42 pounds of nicotine and 16.7 pounds of sulphur. To calculate how much of the tobacco solution should be added to 100 gallons of water to make it contain the required percentage of nicotine, divide the quantity of nicotine required in the dip by the proportion of nicotine which the tobacco solution contains. Thus, supposing one purchases a tobacco dip or solution, guaranteed to contain 20% nicotine, then $0.42 \div 0.20 = 2.1$. That is, 2.1 pounds of this purchased tobacco solution should be added to each 100 gallons of dip to give a 0.05% solution of nicotine. Again, suppose that the purchased solution contains only 1.5% of nicotine. Then $0.42 \div 0.015 = 28$, and 28 pounds of this solution must be added to the 100 gallons to give us the same percentage of nicotine. The sulphur should be added to the tobacco solution and both thoroughly mixed before adding them to the water in the vat. In case sulphur is omitted in the first dipping sufficient tobacco extract or nicotine solution should be used to give a mixture containing not less than 0.07% of nicotine.

ARSENICAL DIPS.

These have been much employed in France. Tessier's bath, which has been used in that country for a long time, has the following formula:

Arsenic trioxide, 1.5 kilos, about 3.3 lbs.

Sulfate of iron, 10.0 kilos, about 22 lbs.

Water, 100.0 litres, about 26.5 gals.

These should be boiled for ten minutes.

Clement's bath replaces the sulfate of iron with one-half as much sulfate of zinc; Mathieu's bath substitutes an equal amount of alum for sulfate of iron. The purpose of adding any of these astringents is two-fold, to prevent absorption of the arsenic by the skin, and to deter the sheep from licking themselves. Melun has shown that cutaneous absorption is not to be feared unless the amount of dissolved arsenic exceeds 150 grains per quart, especially if the period of immersion does not exceed 5 minutes.

Objections that have been raised to arsenical dips are, their effects as parasiticides are not always to be relied upon, they produce a harsh and drying effect upon the skin and wool, they are dangerous on account of arsenic being a deadly poison. In order to guard against fatalities on this score it becomes necessary to take the following precautions. After coming out of the dip the sheep should be placed on the dripping pen until no more dip drips off the wool; they should then be placed in a bare yard devoid of grass or other food until thoroughly dry. If turned on grass the drippings poison the forage so that the sheep may take in sufficient arsenic with its food to poison them. Even after the sheep have dried off, a sudden shower will wash off enough arsenic upon the grass to poison animals eating it (Law). Any of the dip left over after dipping the sheep must be disposed of in such a manner that no animals can have access to it. In spite of the fact that the sheep used in experiments conducted here were handled in the most careful manner possible the mortality ran from 25% to 50% from arsenical dipping, death occurring in from twenty-four to forty-

eight hours after dipping. The only criticism that could be possibly raised to the method in which the sheep were handled being that they were not held for twenty-four hours in a bare pen as recommended by Tessier; they were held, however, until all dripping from the wet wool had ceased. The claim is not made that in the run of dipping the mortality will reach the figures just given, but it does point forcibly to the moral that for general dipping arsenical dips cannot be recommended as safe. Further the results of the experiments showed that arsenic must be considered as possessed of doubtful efficacy as a scab eradicator.

COAL TAR DIPS.

When bituminous coal is subjected to dry distillation there are given off gases which are used for lighting purposes; there is a residue left of charcoal or coke which is used for fuel. In this process of distillation 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. Once considered as a useless by-product coal-tar under various methods of treatment now furnishes us with an innumerable number of derivatives utilized in medicine, the arts and sciences. From among these coal-tar products are made the large number of so-called coal-tar dips, the uses of which have become so familiar.

The coal-tar dips may be considered under two divisions:

A. COAL-TAR CREOSOTE DIPS:

These contain coal-tar creosote, or coal-tar oils and cresylic acid which are rendered capable of being emulsified through the admixture of resin soap forming thereby on the addition of water, a whitish, milky mixture. Not only was this class of dips when properly prepared found to be efficient in the treatment of sheep scab, quickly destroying the scab mite, but they

also leave the wool in a clean, soft, pliable condition. Further advantages claimed for these dips upon which, however, no data was secured in these experiments, are that they are more effective as tick and lice destroyers, and they possibly are more destructive to the egg of the scab mite. The latter consideration carries little weight as the second dipping is necessary for all scabby sheep with the single exception of those shipped for immediate slaughter.

B. CRESOL DIPS:

These dips are made from a coal-tar product, cresylic acid and soap. They are very similar in composition to Liquor Cresolis Compositus of the U. S. Pharmacopoeia, or to the possibly more familiar product, Lysol. When diluted with water ready for use these dips form a more or less transparent soapy solution. While cresol dips were found to be effective in the treatment of sheep scab, in some cases they showed a tendency to leave the wool in a rather dry, harsh condition. If this defect proves to be a common one it places the cresol dips at a disadvantage as compared with coal-tar creosote dips. Before using coal-tar dips they should be tested on a small scale with the water and under conditions to be employed in dipping in order to avoid possible injury to stock. The diluted sample should be allowed to stand for at least an hour. If after this length of time there is a separation of an oily layer the dip should not be used with that kind of water. Much better results would therefore be accomplished in the use of these two kinds of dips in this country where the water is so hard, if it is first softened or cleansed by the addition of lye in the manner practiced by the laundress. The amount of lye to be added is a matter for individual experimentation as it will vary with the different degrees of hardness of the water.

The various experiments made in treating scab with coal-tar products were performed with dips made by the Department of Agriculture. In this way it was possible to definitely compare the value of one constituent of one dip with that of

another without complicating the proposition in any other manner. This method, however, the sheep owner is not advised to follow, since all materials entering into the composition of these dips are not readily obtainable, and their preparation involves considerable technical skill. If one wishes to make use of a coal-tar dip he should purchase a proprietary article, but should be sure that it has the approval of the Department of Agriculture. All coal-tar dips that have been so approved bear 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, and that the dip should be used in such and such proportions in the treatment of sheep scab, the Department specifying in what proportions the dip shall be used for this purpose. Coal-tar dips are therefore now in the list of approved dips in the treatment of scab in sheep.

DIPPING.

(1). Dipping should preferably be performed shortly after shearing, dipping all the sheep at the one time.

(2). Select a lime and sulphur, tobacco and sulphur, or an approved coal-tar dip.

(3). Keep the temperature of the vat at from 103 degrees to 105 degrees F.

(4). Hold each sheep in the dip two minutes by the watch, guessing at the time is not reliable. Completely immerse the head once.

(5). Ten days later dip the entire flock a second time.

(6). After the second dipping place the flock on a portion of the farm from which they have been excluded for at least four weeks previously.

ADDITIONAL PRECAUTIONARY MEASURES.

(1). Scabby sheep should never be driven along a public road; (2) sheds and barns in which scabby sheep have been should be thoroughly cleaned and disinfected; use a coal-tar dip

or crude carbolic acid as a disinfectant. Leave these places unused for four weeks or longer before placing healthy sheep therein; (3) pastures should not be used for four weeks before healthy sheep are admitted, although drenching rains will aid in their disinfection, the posts, etc., should be disinfected; (4) add lime to the disinfectant to show where it has been applied; (5) observation shows that the greatest amount of loss from scab may be directly attributed to the owner's neglect or procrastination; don't wait until the sheep begin to die from scab before dipping, dip early in the disease.

FEDERAL REGULATIONS TO PREVENT THE SPREAD OF SCABIES IN SHEEP.

Effective April 15, 1907.

Regulation 29. No sheep which are diseased with scabies shall be shipped, trailed, otherwise removed, or allowed to drift from one State, Territory, or the District of Columbia, into another State, Territory, or the District of Columbia, except as hereinafter provided; and no sheep shall be shipped, trailed, otherwise removed, or allowed to drift from a State or Territory or portion thereof quarantined for the disease of scabies in sheep into another State, Territory, or the District of Columbia, except as hereinafter provided, until the sheep shall have been inspected by an inspector of the Bureau of Animal Industry, found to be free from the disease and from exposure thereto, and are accompanied by a certificate from the said inspector. All of the sheep in a certain flock or shipment in which the disease is present shall be classed as diseased sheep, and none of them shall be removed or offered for interstate shipment until dipped as hereinafter provided. The practice of "picking" a flock—i. e., removing sheep which are visibly diseased and then offering any portion of the remaining sheep for either inspection or interstate shipment, or both—is directly and positively prohibited.

Regulation 30. Healthy sheep in an area not quarantined for the disease of scabies in sheep which have not been exposed

to the disease may be shipped or trailed interstate without restriction by the regulations of the Secretary of Agriculture to prevent the spread of scabies in sheep; but if said sheep be unloaded en route or at destination and are placed in infectious premises they shall thereafter be treated as exposed sheep and shall not be forwarded to destination for purposes other than immediate slaughter until they shall have been dipped under the supervision of an inspector of the Bureau of Animal Industry.

Regulation 31. Sheep that are diseased with scabies and that have been dipped once in one of the approved dips, under the supervision of an inspector of the Bureau of Animal Industry within ten days of date of shipment, may be shipped interstate for immediate slaughter to a recognized slaughtering center, and when so shipped the said sheep shall not be diverted en route and shall be slaughtered within two weeks after arrival at destination. If diseased sheep are to be shipped interstate for stocking or feeding purposes they shall be dipped twice as above indicated, ten days apart, and shall be submitted to inspection before shipment.

Sheep that are not diseased with scabies, but which have been exposed to the contagion of the disease, may be moved interstate for feeding or stocking purposes after one dipping, or they may be shipped interstate by rail or boat to a recognized slaughtering center for immediate slaughter without dipping.

Regulation 32. When diseased sheep have been dipped once and are shipped interstate for slaughter in accordance with Regulation 31, or when exposed sheep are shipped interstate without dipping for immediate slaughter in accordance with Regulation 31, the proper officers of the transportation company shall affix to both sides of each car a durable placard not less than $5\frac{1}{2}$ by 8 inches in size, on which shall be printed with permanent black ink in bold-face letters not less than $1\frac{1}{2}$ inches in height the words "Dipped Scabby Sheep" or "Exposed Sheep For Slaughter," as the case may be. These placards shall also show the name of the place from which the shipment was made, the date of shipment (which must correspond with the date of the waybills and other papers), the name of the transportation

company, and the name of the place of destination. Each of the waybills, conductors' manifests, memoranda, and bills of lading pertaining to such shipments by cars or boats shall have the words "Dipped Scabby Sheep" or "Exposed Sheep for Slaughter," as the case may be, written or stamped upon its face. Whenever such shipments are transferred to another transportation company or into other cars or into other boats, or are rebilled or reconsigned to a point other than the original destination the cars into which said sheep are transferred and the new waybills, conductors' manifests, memoranda, and bills of lading covering such shipments by cars or boats shall be marked as herein specified for cars first carrying said sheep and for the billing, etc., covering the same. If for any reason the placards required by this regulation are removed from the car or are destroyed or rendered illegible, they shall be immediately replaced by the transportation company or its agents, the intention being that legible placards shall be maintained on the cars from the time of shipment until they arrive at destination, and the disposition of the cars is indicated by an inspector of the Bureau of Animal Industry.

Regulation 33. The dips now approved are:

(a). The tobacco-and-sulphur dip, made with sufficient extract of tobacco or nicotine solution to give a mixture containing not less than five one-hundredths of 1 per cent of nicotine and 2 per cent flowers of sulphur: Provided, That for the first dipping of infected sheep, in lieu of the sulphur herein prescribed, a sufficient additional amount of extract of tobacco or nicotine solution shall be used to give a mixture containing not less than seven one-hundredths of 1 per cent of nicotine.

(b). The lime-and-sulphur dip, made by mixing 8 pounds of unslacked lime and 24 pounds of flowers of sulphur and boiling with 30 gallons of water for not less than two hours. All sediment should be allowed to subside before the liquid is placed in the dipping vat. This liquid should be diluted sufficiently to make 100 gallons before use.

And pending further investigation, the following described dips:

(c). The cresol dip, which consists of a mixture of cresylic acid * with soap. When diluted ready for use this dip should contain one-half of 1 per cent of cresylic acid.

(d). The coal-tar creosote dip, which is made by mixing coal-tar creosote or coal-tar oils and cresylic acid separately with resin soap in varying proportions. This dip should contain when diluted ready for use not less than 1 per cent by weight of coal-tar oils and cresylic acid. In no case should the diluted dip contain more than four-tenths of 1 per cent nor less than one-tenth of 1 per cent of cresylic acid; but when the proportion of cresylic acid falls below two-tenths of 1 per cent the coal-tar oils should be increased sufficiently to bring the total of the tar oils and the cresylic acid in the diluted dip up to 1.2 per cent by weight.

The cresol dip and the coal-tar creosote dip should always be tested on a small scale with the water and under the conditions to be employed in dipping in order to avoid possible injury to stock. The diluted sample should be allowed to stand for at least an hour. If after this length of time there is a separation of an oily layer the dip should not be used with that kind of water. Especial care in this connection is necessary where hard water is to be used.

In the undiluted coal-tar creosote dips there may be, in cold weather especially, a separation of naphthalene and other constituents of the dip. Care should therefore be taken to see that the concentrated dip is homogeneous in character before using any portion of it.

Manufacturers who desire the Department to approve their dips for official dipping should submit a sample of their product to the Bureau of Animal Industry in Washington and accompany this with the formula used in preparing the dip.

*By the term cresylic acid as used in these regulations is meant cresols and other phenols derived from coal tar, none of which boils below 185 degrees C. nor above 250 degrees C.

Before a proprietary substance is approved for use in official dipping the manufacturer must agree as follows:

(1) To recommend for sheep scab a dilution of the product, so as to conform to the requirements of the Department of Agriculture.

(2) To maintain said product at a uniform composition.

(3) To place on packages of dips which have been examined and found to conform to the requirements of the Department the following statement:

“A sample of this product has been submitted to the United States Department of Agriculture for examination. We guarantee the contents of this package to be of the same composition as the sample submitted to the Department, and that when diluted according to the directions printed thereon for the treatment of sheep scab it will give a dipping fluid of the composition required of a ——— * dip by the regulations of the Secretary of Agriculture governing sheep scab.”

(4) To have on containers or advertising matter no reference to the United States Government or any of its Departments except as provided in the preceding paragraph, unless such reference has been submitted to and approved by the Department of Agriculture, and to have on containers or advertising matter no false or misleading statement.

Regulation 34. The dipping shall be done carefully and the sheep handled as humanely as possible. The Department disclaims responsibility for any loss or damage resulting from the dipping, and those who wish to avoid any risks that may be incident to dipping at the stock yards, as well as to avoid liability to prosecution, should see that their sheep are free from disease before shipping them to market.

Regulation 35. Sheep shipped interstate under a certificate from an inspector of the Bureau of Animal Industry are not guaranteed uninterrupted transit; for in the event of the discovery of scabies or of exposure thereto en route the sheep shall

*There should be inserted here the name of the *class* of dips to which the product belongs, such as “cresol” or “lime and sulphur,” etc.

thereafter be handled as diseased or exposed sheep, as hereinbefore provided, and the cars or other vehicles and the chutes, alleys, and pens which have been occupied by them shall be cleaned and disinfected, as hereinafter provided.

Regulation 36. Public stock yards shall be considered infectious and the sheep yarded therein as having been exposed to the disease, and no sheep shall be shipped interstate therefrom, except for immediate slaughter, without dipping. Where, however, a part or all of the stock yards is reserved and set apart for the reception of uninfected shipments of sheep and is kept free of disease, sheep may be shipped interstate from the uninfected yards or portions thereof without dipping. If diseased sheep are introduced into the uninfected yards or portions thereof, they shall be immediately removed therefrom and the chutes, alleys, and pens occupied by the said sheep shall be thoroughly cleaned and disinfected. No sheep shall be shipped interstate for feeding or stocking purposes from any stock yards where an inspector of the Bureau of Animal Industry is stationed without a certificate of inspection or of dipping issued by the said inspector.

Regulation 37. Cars and other vehicles, yards, pens, sheds, chutes, etc., that have contained diseased sheep shall be cleaned and disinfected in the following manner: Remove all litter and manure and then saturate the interior surfaces of the cars and the woodwork, flooring, and ground of the sheds, alleyways and pens with a solution containing 5 per cent of pure carbolic acid or with a solution containing 2 per cent of cresol. When cresol is used it must be mixed with soft soap in order to render it easily soluble in cold water. Cars and premises are not required to be cleaned and disinfected on account of their having contained "dipped scabby sheep" that have been dipped within ten days or sheep that have been exposed to scabies. In determining exposure, all sheep in a flock or shipment in which disease is present shall be classed as diseased.

**STATE REGULATIONS TO
PREVENT THE SPREAD OF SHEEP SCAB.**

(An Act to provide for the Inspection of Sheep.)

Be it enacted by the Legislature of the State of South Dakota:

APPOINTMENT OF INSPECTOR

Section 1. In every county in this State containing two thousand sheep or more the county commissioners shall appoint a sheep inspector, who shall be selected by the sheep owners of the county at a meeting held for that purpose. Such inspector shall hold his office for the period of two years, and until his successor is selected and has qualified, unless sooner removed for cause. Any inspector may act in any other county of the State having no inspector on the request of the county commissioners thereof. The meeting mentioned in this section shall be called by the county commissioners, and they shall give notice of such meeting by notice published in a newspaper of the county for two successive weeks immediately prior to the date of such meeting, and such notice shall state the time and place of holding such meeting.

DUTY OF INSPECTOR

Section 2. It shall be the duty of the sheep inspector whenever he shall have knowledge or information that any sheep within his jurisdiction have the scab or any infectious or contagious disease, to inspect said sheep; and should he find them so affected, he shall forthwith notify the owner or person in charge of them of the fact, upon a proper printed form to be furnished by the county, and shall also file a copy of said notice in the office of the county auditor of his county; and said inspector shall at once place such infected sheep in quarantine, and shall also give to the owner or person in charge of them directions for treatment, and shall furthermore brand every sheep in the affected flock with the symbol Z. And the inspector shall instruct the owner or person in charge of the infected sheep to

keep said sheep so branded until cured, and until discharged by written order of the inspector. The inspector shall also visit such infected flock once a month for the purpose of seeing that they are being treated according to his directions, and shall file written reports of such visits with the county auditor until such a time as he finds said flock to be cured, when he shall give the owner or person in charge thereof a certificate of freedom from disease, and shall thereupon allow the owner or person in charge to obliterate the symbol so placed upon said sheep as above provided, and shall make a written report of the same to the county auditor. It shall also be the duty of the sheep inspector to inspect all sheep unloaded from the railroad cars, and to compel the owner or person in charge thereof to thoroughly dip said sheep in some good sheep dip before permitting them to be taken out of the railroad company's yards, whether the sheep come from within this State or from without this State. It shall also be the duty of the sheep inspector, should he find sheep unloaded from the railroad cars to be affected with the scab or any infectious or contagious disease, to prohibit their removal from the yards under any circumstances. In the event of sheep developing scab after inspection and removal, the inspector shall proceed as provided in section 2 of this act. The inspector shall cause a printed notice of the law regarding the duties of parties shipping sheep over the railroad in this State to be posted in a conspicuous place in every depot or unloading place in his district. The inspector may appoint deputies at the various unloading points in his district to superintend the unloading of sheep from the cars, and see to the sheep being held in the stock yards until the inspector arrives to inspect them.

LIABILITY OF RAILROAD; PENALTY.

Section 3. Upon the arrival of any sheep at any unloading point in this State, the person in charge of them shall immediately report them to the inspector or his deputy for inspection, and the inspector shall thereupon inspect and report as provided in section 2 of this act; and it shall be unlawful for any railroad

company to release from their yards any sheep until so inspected; and in case any railroad company shall release from their yards the sheep before being inspected, and in case of failure from any cause of the person in charge of such sheep to report the same for inspection as above provided, or for any disobedience to the lawful instructions of the inspector after inspection, a fine of one hundred dollars shall be imposed upon said railroad company or said person, as the case may be, for each offence, in any court of competent jurisdiction, which fine when collected shall be paid into the county treasury for the use of the sheep inspector's fund, and any judgment for such fine against the person in charge of such sheep or against the owner thereof shall be a lien upon said stock until paid.

RESTRICTIONS ON DISEASED ANIMALS

Section 4. The person in charge of said flock, when the same is reported by the inspector to be diseased, shall immediately herd or house the same under the direction of the inspector, so that they can not range upon any ground accustomed to be ranged upon by any other sheep, and shall restrain them from passing over or traveling upon any public highway or other road. The person in charge of such sheep shall at once follow any directions for treatment prescribed by the inspector, and promptly and faithfully carry out the same until a cure is effected, or until discharged by the inspector.

PENALTY FOR HINDRANCE

Section 5. The owner or person in charge of any sheep about to be inspected shall afford the inspector all reasonable facilities and assistance for making his inspection, and for every violation of the provisions of this section the owner or person in charge of such sheep shall be fined in any sum not less than ten dollars nor more than one hundred dollars, and every separate day's neglect or refusal so to do shall constitute a separate offense; and the written report of an offense made by an inspector under oath shall be prima facie evidence of the com-

mission of the offense, and any justice of the peace of the county where the offense is committed shall have jurisdiction thereof; and the inspector shall ex-officio report all violations of the provisions of this act of which he has knowledge, and shall prosecute the same.

OATH AND BOND OF INSPECTOR

Section 6. Every inspector before entering upon the duties of his office shall take the oath of office prescribed by law, and shall give bond to the State of South Dakota in the penal sum of one thousand dollars, with sufficient sureties, conditioned that he will faithfully perform the duties of his office; said bond to be approved by the county auditor, who shall after approval indorse upon every bond he shall approve as follows: "I am acquainted with the sureties herein, and believe them to be worth the amount of the within bond, over and above their debts and liabilities."

SUIT AGAINST BOND

Section 7. Such bond, with the oath thereon, shall be recorded in the office of the register of deeds of the county in which the inspector shall reside, and may be sued on by any person injured on account of the unfaithful performance of said inspector's duty: *provided*, that no suit shall be so instituted after more than twelve months have elapsed from the time the cause of action accrued.

RECORD.

Section 8. Every inspector shall keep a fair and correct record of all his official acts, and, if required, give a certified copy of any record upon payment of the fees therefor; and in case of the inspector's death, resignation, removal, or expiration of his term, said record shall be deposited with the county auditor, to be delivered to the successor of such inspector.

SALARY

Section 9. The inspector shall receive three dollars a day while necessarily employed in inspecting sheep, and his deputies shall receive the same pay, and all fines and penalties shall be paid to the county treasurer, to be set aside as an inspection fund.

NOTICE FEES

Section 10. The notice herein provided for shall be served by the inspector, any of his deputies, or by the sheriff or any constable of the county, and the same fee shall be allowed therefor as are now allowed by law to sheriffs for like services.

FORFEITURE OF OFFICE; PENALTY

Section 11. Whenever any sheep inspector shall willfully and falsely report any sheep to be affected with disease, or willfully and falsely report any sheep inspected by him to be free from disease, he shall forfeit his office as an inspector and shall be subject to a penalty of not less than twenty-five dollars nor more than one hundred dollars.

REMOVAL OF INSPECTOR, WHEN.

Section 12. If any sheep inspector shall be found guilty of any of the offenses set forth in section 11 of this act, or if on complaint in writing signed by any three sheep breeders of the county and county commissioners, after allowing the inspector a fair hearing, shall be of the opinion that he is incompetent to discharge intelligently and efficiently the duties of his office, or that, having sufficient knowledge or information, he has for any cause willfully or negligently failed to make the required inspection, or that he has needlessly made inspections for the purpose of obtaining fees, or that his reports have been influenced by favor or prejudice, or from any cause he has wilfully or negligently failed in the proper discharge of the duties of his office, it shall be the duty of the said county commissioners to de-

clare said inspector's office vacant, and to immediately appoint a successor to such inspector.

TAXES; SALARY.

Section 13. In each county there shall be levied and assessed annually a tax of one-half of a mill upon the dollar of the assessed valuation of the sheep within the county, which shall be collected as other general taxes, and which, with penalties herein provided, shall constitute a sheep inspector's fund of the county, and which fund shall only be expended in the payment of the legal services of the sheep inspector and his deputies and for such other expenses as are provided for in this act, and said fees and expenses shall only be paid by the county treasurer, after they shall have been approved and allowed by the county commissioners in the same manner and form as claims against the county are approved and allowed by them; and from said fund the sheep inspector shall be paid not to exceed three dollars per day while actually employed in making the annual round which it is hereby made his duty to make between the tenth day of August and the tenth day of December in each year, beside three dollars per day for each day actually employed in making the inspections required by sections 2 and 3 of this act, and when he reports in substance no disease.

Section 14. All acts or parts of acts in conflict with this act are hereby repealed.

Section 15. An emergency is hereby declared to exist, and this act shall take effect and be in force from and after its passage and approval. Approved March 9, 1897.

Session Laws 1903, Page 182.

INSPECTION OF SHEEP

Chapter 157

(H. B. 98.)

Providing for the inspection of sheep.

AN ACT providing for the inspection of sheep driven into the state, and fixing the punishment for the violation thereof.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF SOUTH DAKOTA:

No. 1. Notice Must be Given to Sheep Inspector. Any person intending to drive, or cause to be driven, from any other state or territory any sheep into the State of South Dakota shall before driving them across the state line give a written notice of not less than three days to the sheep inspector of the county into which said sheep are about to be driven, or to the sheep inspector of the next nearest county having such inspector, in case the county into which said sheep are about to be driven has no sheep inspector at the time of such proposed action and of the particular point on the state line at which such crossing is intended to be made.

No. 2. Duty of Inspector. It shall then be the duty of the sheep inspector so notified to forthwith meet and inspect said sheep at the state line, and he may compel the owner thereof to thoroughly dip said sheep in some good sheep dip before permitting their entry into this state, if he shall deem such dipping necessary. If said sheep are free from scab and infectious and contagious disease said inspector shall give to the owner of said sheep a certificate to that effect, which certificate shall authorize the owner to take said sheep into the state; but should said inspector find said sheep to be affected with scab or any infectious or contagious disease, he shall take charge of them and quarantine them for ninety days, or such part thereof as he shall deem necessary, in the manner provided in Section 3026 of the revised

political code of this state. The owner of said sheep shall, under the direction of the sheep inspector, and at his own expense, then provide a suitable range in the vicinity of the state line during the period of quarantine. Said sheep shall not be taken in any manner into this state until the period of quarantine established by the inspector has expired and not until said inspector shall have furnished his certificate to the owner that said sheep are free from scab and other infectious and contagious diseases.

No. 3. Compensation of Inspector. Said sheep inspector shall receive such compensation for services required by this act as is provided by section 3033 and 3037 of the revised political code for like services in other cases.

No. 4. Violation—Misdemeanor. Any person or persons who shall drive or attempt to drive sheep from any other state or territory into this state without having given the notice to the sheep inspector as required in the foregoing section, or who shall refuse to submit to any of the acts of the sheep inspector directed by the foregoing sections, or who shall drive said sheep into this state without having first received a certificate from the proper sheep inspector that said sheep are free from scab and infectious and contagious diseases, shall be guilty of misdemeanor. Approved February 16, 1903.

From an Act creating a State Live Stock Commission passed by the State Legislature of 1905, I quote, "It shall be the duty of said state live stock commission to protect the health of all domestic animals of this state; to determine and employ the most efficient and practical means for the prevention, control and eradication of dangerous, contagious, infectious or communicable diseases among the domestic animals in the state of South Dakota; and for these purposes it is hereby authorized and empowered to make such rules, orders and regulations for the conduct of the business of said commission as it may deem necessary and expedient. In case of an epidemic of contagious, infectious or communicable diseases among the domestic animals of the state, said commission is hereby empowered to establish

a quarantine of the infected district, and to employ any and all means necessary to carry into effect any orders it may make for the purpose of enforcing said quarantine.”

Acknowledgements:—

Annual Reports, Bureau of Animal Industry, 1897, 1903, 1904.

Veterinary Medicine, Vol. V. Law.

Traite des Maladies Parasitaires, etc. Neumann.

Disease of Cattle, etc. Moussu and Dollar.