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The Relation of Disease in Range Sheep to Sheep Feeding in the Corn Belt

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Sheep husbandry in the United States may be divided in a general way into three classifications—farm flocks, the range sheep business, and the feeding industry. From the standpoint of the control of disease, the important diseases and the methods of control differ in these three main subdivisions of the industry, although of course there are many disease problems that are common to all sheep operations. Although the diseases of major significance in the range states differ to some extent from those of the feeding and farm flock areas, a very large percentage of the sheep produced in the range states sooner or later lands in the feed-lots or farm flocks of the central states. The wether lambs and part of the ewe lambs from the range are shipped to the feed-lots. The range breeders sell their 6-year-old ewes either into the feed-lots or to the farm as breeders. Therefore, the feeders and farmers of the corn country are concerned with the health of the sheep of the range country.

The disease which was responsible for most of the regulations governing the movement of sheep interstate was scabies. In the early years of this century scabies was common in range sheep, but as a result of a scabies eradication program carried out over a period of years by the U. S. Bureau of Animal Industry and the livestock sanitary authorities of the states, the whole range area of the West is practically free of sheep scab. There has not been a case of sheep scab in Montana for 25 years.

Another condition which may occasion-ally occur in either ewes or lambs, and for which careful inspection is made when sheep are loaded for shipment, is foot-rot. This condition may be considered rare in range sheep, but there have been times when foot-rot has occurred in limited areas in the range country. In Montana it is the practice to institute vigorous control measures whenever a focus of this infection appears. It has been found that the only way to clean up this infection in a band is to set up every sheep and examine every foot, regardless of observed lameness. Wherever any evidence of a lesion appears, a thorough job of cutting away the horn and necrotic tissue is followed by walking all the sheep through a foot-bath of a saturated solution of copper sulphate. We know now that the infective agent lives only a short time in the soil of infected premises, which greatly simplifies the problem of eradication of the infection.

Feedlot Diseases

Speaking particularly of feeder lambs, there are a few diseases which occur in the feed-lots which may or may not be related to the health of the lambs before they left the range. One of these is contagious ecthyma, commonly called core-mouth. The virus of this disease is widely distributed and the condition may occur almost anywhere. I believe it is true, however, that a very large percentage of feeder lambs leaving the northwestern ranges have never shown any evidence of contagious ecthyma. It is recognized that some feed-lots are permanently infected, and clean lambs going to the feed-lot may become infected there. In the range coun-

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try, the replacement lambs carried over sometimes develop a rather severe form of the disease, but usually the course is benign. The vaccine for sore-mouth is very effective, and is used quite extensively in the southwest. In Montana, sheepmen who have experienced contagious ecthyma in the more serious form are using the vaccine. As this product is a living virus, we have not encouraged its use except on ranches where the infection has been rather severe.

Scours

In the early stages of feeding, the abnormal condition which is most often reported by lamb-feeders is described under the term “scours”. This condition may, of course, be produced by one of several causative agents. The feeders have been inclined to classify lambs developing diarrhea as “wormy”, and to ascribe this presumed “wormy” condition to heavy parasite infection developing on the ranches where the lambs were produced. Diarrhea caused by intestinal parasites may occur in lambs in the feed-lots, but, according to observations in the feed-lots of eastern Montana, this form of diarrhea is seldom seen in the feed-lots where western lambs are fattened.

Coccidiosis

There have been very serious losses, however, from coccidiosis, which is characterized by a severe diarrhea, often accompanied by hemorrhage, and with a mortality ranging from 10 per cent to 35 per cent. This acute condition develops between 15 and 20 days after the lambs are placed in the feed-lots and the outbreak runs its course in a period of 2 to 3 weeks. The pathological conditions characteristic of fatal cases of this disease are hemorrhagic typhlitis and colitis. Coccidial infection has been generally accepted as the cause of this condition.

There is evidence that practically all sheep carry coccidia in the intestine, but clinical coccidiosis is rare except during the first month of feeding in feed-lots. It may be stated that the lambs bring coccidia with them from the range, but not coccidiosis. It has been demonstrated experimentally, and in practice in Montana feed-lots, that the development of clinical coccidiosis can be prevented by proper methods of changing lambs from a range status to a feed-lot status. This involves shipping with the least shrink possible, and, when the lambs arrived at the feeding place, giving them a chance to get settled on grass or grass hay for perhaps a week or 10 days before they are gradually changed to alfalfa, grain, and beet products.

In the past few years there has been much concern in lamb-buying and lamb-feeding circles over intestinal parasitism in lambs produced in the northern great plains country, particularly western North Dakota, western South Dakota, eastern Montana, and northeastern Wyoming. Lambs from this area are known as “prairie” lambs, as distinguished from the “mountain” lambs originating farther west. It has been a matter of common knowledge for many years that prairie lambs in general average 10 to 15 pounds lighter than mountain lambs. The reasons for this difference have not been experimentally determined, but several factors have been considered to cause the difference, such as the green feed of the mountain summer range, with its variety of forage plants, lower summer temperature, and abundant water. Some years ago the feeder demand was for lighter lambs, but recently heavy lambs have been in demand, which has caused a certain amount of discrimination against the light end of the prairie lambs, and an increased interest in possible causes of lack of development to the heavier weights.

Parasitism

During the past 5 years there has been a tendency to ascribe light weight to intestinal parasites, and, as a result, rather extensive observations have been made in southeastern Montana and western South Dakota, in an attempt to gain information on this point. Speaking particularly for eastern Montana, we had considered clinical parasitism as practically non-existent in range lambs. But in recent years there have been many cases where lambs have developed serious diarr-
rhea at the age of 2 to 3 months. The cause of this diarrhea has not yet been definitely determined. It has been found that lambs in that area are quite generally infected with Moniezia in considerable number, but their pathogenic effect has been discounted by parasitologists. There is also reason to suspect intestinal nematodes, particularly Trichostrongylus, but in general the number of these worms has been less than has usually been considered necessary to produce symptoms. Observations and experimental work are being continued in the effort to determine just what the significance of parasites may be in that area. Meanwhile, improved range management and preventive treatment are being advised and put into effect, with the objective of reducing the effect of such parasites as the sheep may carry.

**Lamb Diarrhea**

It has been observed that the diarrhea in lambs develops particularly in the small bands where little attention is paid to range rotation, and the sheep are allowed to concentrate too much on small areas. In general, the lambs of the larger outfits are usually free from the symptoms ascribed to parasitism, which may be correlated with methods of range management which keep the sheep moving frequently to fresh range. This, of course, accomplishes the same objectives as pasture rotation, and should hold parasite infection to a minimum.

Where sheep will take salt freely, we have advocated the use of phenothiazine in salt on the range, beginning before lambing and continuing during the summer. There are areas in the prairie country where sheep take very little salt, which makes it more or less impracticable to supply phenothiazine in this manner. Treatment of the ewes in the winter, to minimize infection of lambing range, may be advised, but the results have not been as good as expected, particularly with *Trichostrongylus*.

It should be noted that the range sheep in the Northwest are free from *Oesophagostomum*, and that *Haemonchus* infection, in the western portion of the plains area, at least, is of relatively minor importance.

In connection with the movement of old ewes from the range to the farms, there are three disease conditions which should be mentioned, two of which are recognized by most buyers of old ewes. One of these is that respiratory disease which causes the affected ewes to be designated by sheepmen as "lungers" or "heavers." This is a chronic, slowly developing disease of the lungs, characterized by increasing dyspnea of a characteristic type, progressive emaciation, and finally death. The primary lesion appears to be cellular infiltration of the alveolar walls, gradually reducing the size of the air-space in the alveoli. Advanced cases show lymphoid nodules, proliferation of bronchioles producing adenoma-like areas, and changes produced by secondary infections. The lungs gradually become consolidated, firm, grayish in color, and increase in size and weight. The cause of this disease is as yet unknown. Speaking in broad general terms, in the course of a year about 2 per cent of many range bands developed symptoms of this condition in the older ewes, although it may occur at any age after the first year. The only known control measure is to eliminate the affected ewes from the band as soon as symptoms appear. If they are recognized early enough, they still may have some mutton value, but any feed put into them is wasted, and they never raise a lamb.

**"Spoiled Bag"**

The second condition in old ewes is recognized by the sheepmen as "spoiled bag." We now know that the majority of spoiled bags are the result of a specific mastitis caused by infection with a *Pasteurella* which has been called *Pasteurella mastitidis*. The disease may occur in ewes of any age, and constitutes a constant insidious drain on the ewe bands of the sheep-producing country. The infection produces a very acute mastitis, almost always unilateral, accompanied during the acute stages by high temperature. It develops so rapidly that usually when a ewe is first noticed sick, the affected side of the
udder is already much enlarged, hard, and tender, and the secretion is a turbid thin fluid carrying flakes of coagulated casein. The acute phase lasts only a few days, after which there is usually a long chronic suppurative process, with abscess formation, frequently opening to the surface. A small percentage of the cases are fatal in the acute stage. This form of mastitis has been under investigation at the Montana Experiment Station for a number of years, but no satisfactory method of control has as yet been developed. It is certain, however, that ewes going into breeding flocks should be examined carefully for any nodule formation in the region of the udder, even though both sides are lactating normally, as we know that some such ewes are carriers of the organism.

**Caseous Lymphadenitis**

The third disease which is frequently seen at slaughter of old ewes from some areas is caseous lymphadenitis. Apparently Montana ewes are practically free from this infection, as I have never seen the condition in Montana sheep. The disease is caused by infection with *Corynebacterium ovis*, and is characterized by great enlargement, suppuration, and caseous necrosis of the lymph nodes, appearing frequently in the prescapular and precrural nodes, and sometimes invading the visceral lymph system, particularly in the lungs.

To summarize, an attempt has been made to discuss very briefly the principal pathological conditions which are of mutual interest to the producer of range sheep and the operators in the farming area who feed lambs and old ewes, or buy western old ewes as breeders.

**Rabies**

Rabies belongs to the group of virus diseases. The virus is harmless when ingested, provided the mucosa is intact. Rabies is a wound infection. The disease is remarkable in several particulars, especially the period of incubation, which is more variable and more prolonged than that of any other acute infection, and its high mortality, which is practically 100 per cent. Spontaneous recovery from rabies naturally acquired is rare, if it occurs at all.

Every mammal is susceptible. Even birds may contract the disease. It is most common in dogs, but it also occurs frequently in wolves, jackals, foxes, and hyenas. Rabies in cats and skunks is comparatively rare and is but occasionally transmitted to man. Cattle, sheep and goats are infected relatively in about the same degree. It is less common in horses. Swine get rabies less frequently than other domestic animals. The average period of incubation is as follows: Dog, 21 to 40 days; horses, 28 to 56 days; cows, 28 to 56 days; pigs, 14 to 21 days; goats and sheep, 21 to 28 days; birds, 14 to 40 days; man, 40 days (apt to be shorter in children or following bites on the face).

The period of incubation depends upon the amount and virulence of the virus and the nature and site of the wound, especially with reference to its nerve supply. It requires about 15 days, counting from the last injection, to induce an active immunity to the disease by means of the Pasteur preventive treatment. There is, therefore, usually sufficient time, if started early, to prevent the development of symptoms.

Rabies virus is completely destroyed at 50°C. in one hour, and at 60°C. in 30 minutes. It is presumably killed in 1 per cent phenol at 37°C. in 24 hours (the Semple method). It is not injured by extreme cold. The relative danger of bites—wolf bites are most dangerous on account of the savage character of the wound and the virulence of the virus. Cat bites come next, and then dog bites. The relative danger of bites of other animals is as follows: foxes, jackals, horses, asses, cattle, sheep, pigs. There is no authentic instance of the transmission of the disease by the bite of man, though possible. The bites of horses and other herbivora are less dangerous because their blunt teeth usually cause contused wounds without breaking the skin.