INFESTATION OF THE SKIN, ETC., OF SHEEP BY GRASS SEEDS.

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THE condition in sheep due to the penetration of the skin, etc., by certain grass seeds is, in parts of the State and following good seasons, a very common one and of some economic importance. It is very familiar to sheep owners, and practically every season in which the trouble is more evident than usual short references to it appear in the pastoral press. It is not peculiar to Australia. The pathogenic action of this type of grass has occasionally been briefly noted in other countries, the latest reference to it being by Veterinary Major Velu: "The Pathogenic Rôle of a Moroccan Grass (*Stipa tortilis*)."
Recueil de Médecine Vétérinaire, January and February 1917.

It is thought that the following notes, collected from various sources and supplemented by the writer's personal knowledge of the subject, may be of interest to readers.

Prevalence of Grass-Seed Infestation.

In a number of districts in New South Wales little or no sheep breeding is carried on, and consequently these areas are not taken into consideration. In the remaining part of the State, and by far the larger, sheep-raising is carried on to a greater or less extent. The following information is collected from fifty-one districts which are under the charge of Pastoral Protection Boards and vary considerably in extent. The incidence of the trouble varies very greatly in different districts, and often in the same district; while in some it is never met with or is seen only occasionally, in others it is stated to be more or less prevalent every year. In all cases, however, where it does occur, the intensity of the infestation and the consequent injury inflicted on the sheep vary with the seasons. In good seasons grass is plentiful and it seeds freely. In dry seasons the opposite is seen. The season of the year in which the trouble is generally most evident is late spring or summer, which are the periods when the grass seeds are ripening and before they have been shed. Finally, even in the districts where it is recorded, the trouble does not manifest itself over the entire area, but is usually seen in only part of it. Various factors will account for this, the chief, of course, being the presence or absence of the particular grasses responsible for the infestation; another is whether the country is lightly or heavily stocked, the former permitting much of the grass to ripen and seed, while the latter helps to prevent it. The burning off of the grass at the proper time, where and when practicable, is also a factor. Finally, the management of the property is

important, that is, whether the manager or owner intelligently takes timely precautions against what may occur, or merely allows things to take their own course.

Grasses Responsible for the Condition.

Quite a number of grasses are held responsible in the fifty-one districts mentioned, some being common to a number of districts, and others seen only in a few areas. The local names are, Corkscrew, Spear, Barley Silver No. 9 and No. 10, Blue, Foxtail, Wire, and Forked Grass. There are also a few others which only occasionally cause trouble. Mr Maiden, Government Botanist, to whom the matter was referred, says that it is impossible in the absence of specimens themselves to give the botanical species corresponding to the common name or names, but that the so-called Corkscrew or Spear grasses all belong to the genus *Stipa*. The so-called wire grasses belong generally to the genus *Aristida*. Barley grass is generally *Hordeum murinum*, and Silver grass *Festuca bromoides*. The name Blue grass is generally applied to the genus *Andropogon*. He further says that the seeds of species of the genera *Stipa*, *Aristida*, and *Hordeum*, also *Festuca bromoides*, and possibly those of the genus *Andropogon*, are likely to infest sheep.

The trouble does not occur when the particular grasses concerned are not bearing seed.

Age and Class of Sheep Mainly Affected.

Sheep of any age may suffer, but lambs and weaners more particularly. Reports state that the merino is affected more than other breeds, but possibly this in some measure is due to the fact that in many districts the merino is the only breed carried. Of the merino, wrinkled sheep become much more heavily infested and suffer more than plain-bodied sheep. Cross breeds and English breeds which have clean faces and open wool do not suffer so greatly. It appears to be the general opinion that the merino wool, on account of its nature, retains the grass seeds more readily than do other types of wool.

Reasons Advanced why Sheep of Certain Ages are more Prone to Infestation and to Suffer more than Others.

Young sheep do not avoid the long grass, where seeds are abundant, as do older animals, the latter having learned what to avoid by painful experience. Furthermore, the bodies of young sheep are nearer the ground, and their skin more tender and more readily punctured by the sharp pointed seeds than that of adults. Some sheep, especially some merinos, have more wool about the eyes than others, and consequently cannot see so readily what to avoid. Merino rams, on account of their horns and wrinkles in the skin, are more liable to collect seeds around the head and neck. Lambs at the period of grass seeding are usually carrying more wool on their bodies than adult sheep, and therefore afford a greater and better catchment surface for the seeds.

So far as the effects are concerned, the constitution of adult sheep is usually more robust than that of young animals, and therefore the pain due to the irritation of the penetrated grass seeds is more readily borne by the former.

Symptoms of gross Infestation by Grass Seeds.

For convenience, the term "Infestation" is intended to include not merely the presence of grass seeds in the wool, but the actual penetration through the skin. Until the skin or eyes, etc., are affected, the presence of grass seeds in the wool merely causes the animal inconvenience.

Sheep heavily infested with seeds stand apart from their fellows. They are disinclined to move about; and, when they do so, it is with a peculiar stiff gait, at times as if the skin had lost its flexibility, at others as if the animal were walking on hot stones. The stiff carriage of the body is due in the first instance to the thick mass of grass seeds embedded in the wool, and secondly, to the pain produced by the sharp seeds piercing the skin. The tender gait is due to the seeds piercing the skin between the digits and around the coronet.

Ophthalmia, often followed by blindness, particularly in animals with very woolly faces, is common. It is caused by the seeds getting into the eyes whilst grazing.

In badly infested animals the masses of seeds in the wool give the sheep a brown appearance. The skin becomes hard and loses its pliability. The fleece feels rough on being handled. On account of the considerable pain set up by the seeds piercing the skin, affected animals show more or less irritation of the body, biting and scratching at the places and rubbing against trees, etc. This produces a rough appearance of the wool, and may lead an inexperienced observer into thinking that the animal is infested with vermin.

On account of the pain produced by the innumerable seeds piercing the skin, there is more or less considerable loss of condition with fever. The animal refuses to seek for feed. It suffers pain on being handled or moved, although this may pass unnoticed even by the observant. Some consider that the loss of condition is due not merely to pain, but also to want of sleep. Drovers, realising the consequences of infestation, endeavour to keep their sheep off badly seeded country, as neglect may end in it being impossible to travel many of them.

Lesions Produced.

The cutaneous lesions individually are not very considerable, but they may cover practically the whole of the body except the axillæ and inner parts of the thigh. The grass seeds, armed with their extremely sharp points, pierce the skin, and, aided by the movements of the animal's body, gradually work their way through, and, in the majority of cases, come to rest in the subcutaneous areolar tissue. In bad cases one may find on skinning the animal that the

under surface of the skin is literally peppered with countless grass seeds, brownish-black in colour, about $\frac{3}{8}$ to $\frac{1}{2}$ inch long, mostly lying parallel to the surface of the skin, although cases have been noted where the latter appeared to have been pinned to the flesh by the seeds. At times, numerous small subcutaneous abscesses may be found containing a grass seed; at others, small superficial ulcers on the surface of the skin occur. It is, however, rather remarkable that in the majority of cases no suppuration at all is produced, the seeds lying buried in the loose subcutaneous tissue without any pronounced reaction. In some instances the pus of the abscess is of a greenish character and appears to be due to the Priesz-Nocard bacillus.

As already noted, the majority of the seeds come to rest in the subcutaneous tissues, but some proceed further and are found in muscles, mainly the superficial set. Sometimes they penetrate into the deep layers. Not rarely also they may even pierce the thorax and abdomen and come to rest in the pleura or peritoneum. Here they may give rise to a fatal or pleurisy peritonitis, due to accompanying bacteria. Seeds have also occasionally been detected in the internal organs, viz., liver, kidney and lungs. When they do reach such localities they become encysted if bacteria-free, but if bacteria are carried in with them the consequence is often fatal.

The lesions of the eyes are either an inflammation of the conjunctiva or of the cornea, usually of a purulent character. If nothing is done to relieve the condition ulceration of the cornea often results, and then loss of sight of the affected eye.

Lesions about the feet are very common. The seeds pierce the thin skin between the digits and also around the coronet. The result is often more grave than that produced in the trunk because secondary bacterial invasion is much more likely to take place, independently of the great pain caused by the mere presence of the seeds in the foot. If not attended to, the suppuration may extend and involve the joint.

Mortality.

This naturally varies very considerably in different districts and in different seasons, just as the incidence and the degree of infestation do. At some places, even where grass seed is prevalent, the loss, owing to precautions taken, is practically nil.

The death-rate is higher in lambs and weaners than in adult sheep, for the same reasons given when discussing the age of the animals affected. Opinion is unanimous that when care is taken the death-rate resulting from grass seed infestation is low, but if preventive and other measures are neglected the mortality is heavy. An instance is known of a sheep station in 1917 where the mortality among neglected weaners was 75 per cent. Actual statistics of the death-rate are unobtainable, but, taking the estimates from fifty-one sheep-raising districts, it may be accepted that in seasons when grass-seed infestation is light the mortality from this cause is negligible, but in seasons when grass is abundant and seeding heavily the mortality varies from $\frac{1}{4}$ to 50 per cent. in lambs and from $\frac{1}{8}$ to 10 per

cent. in adult sheep. The lightest losses occur where seeds are not abundant, or precautions to prevent infestation are taken in time, and the heaviest losses where the reverse is the case.

Economic Loss.

There is not a shadow of doubt that the economic loss to the owner as a result of grass-seed infestation is in other directions much greater than the actual loss by death. The skin is depreciated in value on account of the presence of so many seeds. Loss of condition also affects the value of the animal, dead or alive. The subsequent health and growth of the young animal after bad seed infestation is often affected to a marked degree. The growth of the lamb is checked, and when mature the animal does not obtain the size and development of an unaffected sheep. It is said, however, that some lambs, after the shearing subsequent to the grass seed season, quite make up for any check that has been occasioned to their well being, and that no permanent injury is noted.

Measures taken to cope with Grass-Seed Infestation.

It has to be borne in mind that these measures are in many instances only necessary when seeds are abundant, and trouble can often be avoided to a great extent by taking precautions before infestation has occurred. The steps taken by various sheep owners are by the nature of things nearly entirely preventive. They comprise different plans to prevent the sheep coming in contact with the ripe grass before the seeds are shed, or in some cases trying to prevent the seeds reaching the skin. Once the seeds have fallen no more trouble is apprehended, save perhaps from the hoofs.

On some stations nothing whatever is done to minimise the trouble.

The principal measures are as follows:—

- (1) Keeping the young sheep in certain paddocks in which the grass has been prevented from seeding by means of heavy stocking.
- (2) Burning off the grass as it is ripening, where practicable.
- (3) Running cattle and horses in the badly seeded paddocks in order not only to graze them down, but also to knock the seed-bearing grass about during their movements over the paddocks, and so cause the seeds to fall sooner than usual.
- (4) Shearing the lambs early, and keeping the sheep away from the heavily seeded paddocks until the seeds are fallen.
- (5) Fencing off into small paddocks, so that the stock may be readily controlled and compelled to eat the particular grass before it ripens.
- (6) Clipping the wool from around the eyes to a considerable extent prevents the seeds from reaching them and causing ophthalmia and blindness.

Where mixed farming is carried on, cultivation paddocks or fallow land is usually available to run the sheep on until the seeds have been shed. On large stations where on account of the prolific season none of the above precautions are practicable, some owners

have mown wide tracks to the dams and tanks and around the sheep's camping places.

In small paddocks the fall of the seed may be hastened by dragging brush harrows over the grass a few times.

Many advocate the early shearing of the sheep, in order to offer less surface for the seeds to catch hold of.

When animals have become infested it is the practice of many owners to swim their sheep through a creek, dip, or other place. It is said that this procedure causes the seeds to swell up and soften in the wool, and so prevents further penetration. On the other hand, some state that this measure has met with but little success.

Various other measures are adopted in different localities, but they are mainly variations of those already enumerated.

CAGE PARALYSIS IN MONKEYS.

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CAGE paralysis in monkeys appears to be a disease of wide distribution, as it is said to occur in Zoological Gardens throughout the world. From time to time sufferers are found in the Zoological Gardens in Sydney, and, through the courtesy of Mr A. S. Le Souëf, the Director of these Gardens, victims have been placed at our disposal for both clinical and *post-mortem* examination.

Incidentally we may remark that we happened to observe our first cases at a time when a mild epidemic of infantile paralysis (acute poliomyelitis) was attacking the children of Sydney, and that we set out with the object of ascertaining whether there was any relation between these two diseases. In this respect our examination proved negative. We found changes in the nervous system, but they were not those of acute poliomyelitis. They were gross changes, however, and very interesting, and since in the medical records accessible to us we have discovered no report of similar findings, nor, indeed, of previous investigations of any kind bearing on this disease, we are induced to offer this note of our observations.

Concerning the symptomatology of cage paralysis, we may say that the disease is manifested by the somewhat rapid supervention, in a previously weak animal, of a very decided ataxic paresis, specially affecting the hind limbs, which, while fatal in some cases, in others is followed by slow, more or less complete, recovery. And the fact is noteworthy that the affection may arise not only in monkeys closely confined in cages, but also in those which are