GEEL DIKKOP.

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NEVER having seen any reference made to it in English veterinary literature, and only a slight notice taken of it in the South African journals, I am giving a brief outline of the characteristics of this disease, which exists over a considerable area of Cape Colony in certain seasons, in the hope that veterinarians who may possibly have seen the disease in other countries will help to elucidate certain of its obscure peculiarities.

“Geel Dikkop” literally interpreted means “yellow thick head.”

Animals Affected.—Principally merino sheep, more rarely Africander sheep and Angora goats.

Local Conditions Connected with Outbreaks.—The flock previous to the outbreak is usually grazing in a low lying vlei, rain having fallen two or three days before, and been succeeded by hot winds; these conditions are particularly dangerous if previous to the rains there has been a long period of drought.

It is also stated by some farmers that the disease is apt to occur if the sheep drink hot stagnant water when in a heated condition, but this probably happens many times during the season without any occurrence of the disease, whereas, on the other hand, on particular farms after a period of drought the farmers know for a certainty that if they allow their flocks to graze in the low vleis within a few days after the rains the disease will break out, although no cases may have occurred on the farm during the past year or more.

I have seen the disease suddenly break out throughout a whole district in the course of a week or two, the rains having fallen after a long period of drought. It will be noticed that both in the local conditions connected with outbreaks and in the method serviceable for prevention there is a very great similarity between this disease and horse-sickness; but I do not wish to imply that the two diseases are related in any way, never having seen a case of horse-sickness in the districts in which Geel Dikkop was constantly occurring.

Methods of Prevention.—The outbreak can be with certainty checked by removing the diseased flock to the high veldt, by kraaling them on this veldt, and by not allowing them to graze before the sun has risen in the morning, or after the sun has set at night.

All vleis should be avoided for some period after the rains have fallen, especially if these have been preceded by a drought.

Reputed Causes of the Disease.—It is believed by some farmers that a small insect which may be commonly found in the stem of the “Dubbeltje doorn” plant causes the disease; but in numerous outbreaks of the disease I have been unable to find the insects in the stems during the period of the outbreaks. I have also found the insect in the stem at other periods when no outbreaks of the disease have occurred.

It is also stated that the “Dubbeltje doorn” plant itself in a certain withered condition will give rise to the disease. This is, however, entirely disproved both by experience and by experimental work.

In the first place, experienced farmers state that they have seen the disease in places where none of the plant was to be found. Again, Mr Dixon, Government Veterinary Surgeon, Cape Colony, fed sheep entirely on the plant for some days and failed to produce "Geel Dikkop," but the argument raised against these experiments was that the plant was not in the supposed toxic condition; and to clear up that point I drenched a healthy sheep with a concentrated solution of the contents of the rumen taken from a sheep which had been sick about two days. This did not produce any positive result.

If a plant were the cause of the disease it would still be present in the rumen, and if it possessed any toxic properties these would probably have been present in the solution.

Symptoms.—The flock may appear to be perfectly healthy over night, but on the following morning a number of them show no inclination to graze, preferring to lie in shade under the bushes to avoid the heat and light. Their heads are noticeably enlarged, the enlargement being due to a general dropsical condition of the face. Their temperature frequently rises to 103° - 104° F.

Subsequently through the day they persist in lying in the shade, but exhibit great thirst. In a few cases the dropsical condition of the face may disappear in a day or two, the animal making an apparent recovery; but as a rule the swelling persists, and is especially noticeable in the ears, a considerable quantity of clear fluid being present between the cartilage and the skin.

If no treatment is attempted the fluid gradually disappears, the ears become hard and brittle, the lips and nostrils contract, shrivel up, and become quite hard. The breathing is laboured, and feeding becomes in many cases quite impossible.

There is frequently a copious discharge from the eyes in the early stages, followed by ulceration of the cornea and collapse of the eyeball, the eyelids shrivelling up also.

These symptoms are accompanied by a rapid loss of condition, and a general jaundiced condition of the whole body. Cases frequently live in this miserable state for a week or more, but usually end fatally.

A favourable symptom which is recognised generally by farmers is a tendency for the skin to peel off the eyelids, mouth, and nostrils; this is usually accompanied by an improvement in the appetite and a clearing of the visible membranes.

I have seen cases which were similar in some respects to cases of malarial catarrhal fever of sheep, namely, in that the tongue was frequently ulcerated and of a bluish colour, the greater portion of the mucous membrane being removed, and that there was lameness accompanied by a ringed condition of the wall of the hoof.

In a number of the cases the animals stand continually with the head bent rigidly backwards, the eyes staring vacantly into space, whilst others stand continually with their heads pushed against a wall.

Post-mortem Lesions.—A general jaundiced condition of the body, accompanied by emaciation. The liver is very soft and of a yellowish colour, and the gall-bladder is distended, the bile being in some cases very thick and of a dark green colour. The lining membrane of the

gall-bladder is sometimes inflamed, and I have noticed that if the duct be intact it is impossible by pressing on the gall-bladder to force the bile into the duodenum, but that if the duct be cut across about 2 inches from the duodenum the bile will flow quite easily. This may be due to an obstruction at the opening into the duodenum, or to a diseased condition of the duct itself. In healthy carcasses the bile will flow into the duodenum quite easily if pressure is brought to bear on the gall-bladder.

In some cases the spleen is enlarged and softer than normal, and frequently there are patches of inflammation in the intestines and the fourth stomach. The urine may be of a dark colour.

Erosions may be present on the tongue, and there may be foot lesions. The ears are shrivelled and resemble dried leather; in some cases they are so brittle that pieces can be broken off.

Lung lesions due to the food going down the trachea are seen in some cases.

Treatment.—Mr Dixon in a report stated that he had tried a number of remedies, such as Stockholm tar, nitrate and chlorate of potassium, Epsom salts, salt, Cooper's dip, calomel, and quinine, with variable success, but he recommended the use of calomel and chloride of ammonium. I have personally seen these drugs used with very favourable results, especially if the cases are treated in the early stages and are well nursed.

The doses advised are 5 to 10 grains of calomel, according to the size and age of the sheep, followed in six hours' time with 40 to 60 grains of ammonium chloride, the latter drug being repeated twice a day.

Good nursing is most essential, and may be carried out by turning the sick animals into a shaded lucerne patch or garden (this being often the only suitable place on up-country farms), allowing them free access to water and a supply of green forage. In cases where the nostrils are contracted they frequently become sealed with the nasal discharges, and these should be attended to.

It is also advisable to slit up the ears and to scarify the face in the early stages, to allow the escape of the oedematous fluid, a little salt being commonly rubbed into the incisions.

The average mortality in the districts I visited in February and March 1904 was 40 per cent. in those outbreaks which were not treated; I am convinced that proper treatment would reduce this percentage very perceptibly.

Nature of the Disease.—Experience in outbreaks proves that the disease is not contagious, and so far attempts to infect susceptible animals experimentally have not given positive results.

The predisposing causes, the methods of prevention, the symptoms, and the *post-mortem* lesions strike one as being very similar to certain other diseases which may be classed as of a "malarial" nature; yet microscopical examinations of blood from the general circulation, the spleen, the liver, the coronary artery of the heart, and the bile duct have all given negative results.

Supposing the disease to be a form of malaria, then how is it conveyed? In this case the tick is probably not the offender, since the districts worst affected are practically free from ticks; again, the sudden appearance of the disease, usually immediately after the rains,

is more consistent with the view that the supposed intermediate host is rather of the nature of a winged insect which frequents the dams and vleis.

The inability to transmit the disease by direct inoculation is not a strong argument against the theory that the disease is a form of malaria, for the same difficulty arises with African coast fever, which is due to a definite piroplasma.

Experimental Inoculation Tests.—In 1895 Mr Dixon reported that he had inoculated a healthy sheep subcutaneously in the thigh with 40 drops of the cedematous fluid, and in another case he injected some of the blood taken from the spleen of an animal which had died of the disease into a healthy one, but failed to produce positive results.

In February 1904 I carried out the following experiments, making use of a Merino ewe which had been suffering from the disease for about two days.

A healthy Merino ewe was inoculated subcutaneously with 10 cc. of blood taken from the jugular vein of the sick ewe.

A second healthy Merino ewe was inoculated intravenously with 9 cc. of blood taken from the carotid artery of the sick ewe.

A third healthy Merino ewe was drenched with 2 pints of a strong solution of the contents of the diseased ewe's rumen.

The only abnormal symptoms noticed subsequently were as follows :—

The ewe which was drenched had a slight cough for a day or two, which was probably due to some of the solution going down the trachea.

The ewe which was inoculated subcutaneously gave a temperature reaction on the seventh day of 105.8° , and her conjunctiva appeared to be slightly injected.

The ewe which was inoculated intravenously gave a temperature reaction to 106° on the twelfth day, and her conjunctiva was also slightly injected.

In March 1904 I secured an Angora goat and a Merino sheep, both animals being the subject of geel dikkop (the goat had been ill about fourteen days, the sheep about eight days), and proceeded to carry out the following experiments :—

Six healthy Merino sheep were inoculated from the Angora goat, two with blood intravenously (doses 12 cc. and 20 cc.), and four subcutaneously with an emulsion of the spleen in sterile water (doses 10 cc., 14 cc., 15 cc., and 20 cc.). Six other healthy Merino sheep were inoculated from the sick Merino sheep, four with blood intravenously (doses 9 cc., 9 cc., 18 cc., and 27 cc.) and two with blood subcutaneously (doses 9 cc.).

Of these animals one died suddenly, death being probably due to an accident. In the case of the sheep inoculated from the Angora goat, no temperature reactions were obtained; but in the case of those inoculated from the sheep most of them gave decided temperature reactions about the fourth, fifth, and sixth days after inoculation. No clinical symptoms were observed, however, by the attendants, and the sheep were ultimately allowed to return to the veldt. Unfortunately, owing to my headquarters being changed from that part of the colony, I was unable to follow up the experimental work any further.