

Registered 27.6.23.

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BLOW-FLY PEST.

Remedial Steps Suggested.

University Extension Lecture.

Zoological problems in connection with Australian primary industries provide the subject matter for a series of three lectures, which has been undertaken by Professor Harvey Johnston in association with the Adelaide University extension lectures movement this winter. The first address was on the question of the prickly pear, and the title of the second was "The sheep maggot-fly problem in Australia." The latter was to have been delivered by the professor at the University on Tuesday evening; but, as he was too unwell to be present himself, his manuscript on the question was read by Professor Cleland, who also described a most interesting collection of lantern slide.

Before beginning the reading, Professor Cleland apologized for the absence of the author of the lecture and said he desired to call attention to the fact that in Professor Johnston the State had one of the ablest investigators in Australia, a man whose worth was recognized throughout the world. That gentleman was prepared to spend a considerable amount of his spare time in supervising and carrying out research work of great practical value to the pastoral and other industries of Australia. To enable him to do so it was necessary that funds should be available, so that the work he outlined and supervised could be carried out expeditiously and thoroughly by young graduates taking the course of zoology at the Adelaide, or any other Australian University. Considering the enormous loss that some of our primary industries suffered from the attacks of animal pests, some of those who were directly concerned, and the bodies which represented their interests, such as pastoral associations, might well organize a fund which could be made available for the purpose in view. As Professor Johnston's lecture would show, the loss due to the sheep maggot infestation ran into very many thousands of pounds a year. Surely as a purely business proposition, it would repay the expenditure of one thousand, or even several thousands of pounds, a year to make an attempt to mitigate even to a small extent the vast damage done by the pests.

The Pest in Australia.

In a historical reference to the existence of the pest the lecturer said that the blowfly problem had become particularly acute in Queensland, so much so that in 1913 Messrs. Cory and Jarvis, who were connected with the Department of Agriculture in that State, were appointed to enquire into the whole matter. They reported that out of over one million sheep in Central Queensland an average of 23 per cent. had been "struck," and that on some stations from 40 per cent. to 70 per cent. of the animals had been effected. They recommended that experiments should be made with various traps, dip fluids, and poisons. These were begun in 1914, and were continued at some places for four years. A return of the New South Wales infestation, taken in 1914, showed that the total estimated loss of the State during the period had been 13 per cent. He had been informed in 1920 that the loss from the fly probably averaged 5 per cent. of the Queensland flocks, which was as great as the loss from all natural causes combined. The loss was even greater in New South Wales, where sheep raising was carried on more extensively. Fly infestation had occurred, although to a lesser extent, in the other States. In the Sydney Morning Herald in December, 1921, it was said that the destruction of sheep, the resultant reduction in wool, and other losses, directly due to the attacks of blowflies, cost Australia over £5,000,000 a year. The time when the pest was at its worst was from March to May and from September to October.

The Culprits and Their Destruction.

In the earliest accounts of the Australian infestation the Government entomologist of New South Wales (Mr. W. W. Froggatt) reported that the culprits were the two most common native blowflies, the calliphora oceanica, and the calliphora rollosa. Subsequently it was suggested that the chrysomya albiceps was one of the worst kinds. One of the possible methods of controlling the pest might be the breeding of crossbred of a merino

devoid of the wrinkled skin and of heavy wool in the rump region. The Queensland blowfly committee had stated that sick or worm-infested sheep were more susceptible to fly attack than the healthy animal; hence, any measures which tended to restore such sheep to a normal condition were of distinct advantage. All blowflies which attacked sheep normally bred in decomposing animal matter, although some could also be induced to breed in decomposing vegetation. The most important measure against blowflies was the systematic destruction of all carrion, offal, or animal debris which were the normal breeding places of the flies. Such destruction might be brought about by burning or by thorough poisoning, as well as by the protection of insectivorous birds. There was a possible biological control of the fly problem by utilizing parasites and predators at the maggot and pupal stages. Among the predators on larvae one might mention insectivorous birds, various ants—including the small red ant—beetles, and even mice. It was, however, from wasps that better results were hoped for. Various dips had been experimented with in Queensland and New South Wales, but the writer of the lecture suggested that an arsenical treatment, by whatever method, might owe its efficacy as a protection against the fly to the fact that the poison destroyed the bacteria present in the soil, or damped wool, or in sores; and thus might render such treated parts quite useless as a source of food supply for any larvae which might be deposited. The following poisonous mixture had been recommended:—Water, 25 gallons; oil, 20 gallons; soap, 10 lb.; arsenate of soda, 1½ lb.

A Summary.

In summarizing his views on the question, Professor Johnston wrote that he believed the solution of the Australian sheep maggot fly problem lay in the destruction of the fly before it had had an opportunity to deposit eggs or larvae on living sheep. Extermination could not be hoped for, but fly control was not only a possibility but also a necessity under the present condition of sheep raising. Fly control could be most successfully established by the systematic destruction (by burning or poisoning) of carcasses and carriers. Co-operation among sheep owners was essential, as neglect on one sheep-raising property might easily lead to infestation in a neighbouring station as well, since it was known that blowflies could travel with, against, or across the wind for many miles in a very short time. Of secondary importance as a means of controlling flies was the utilization of traps for the adult insects and of various chalcid wasps which attacked either the larval or pupal stages of such flies. The preservation of insectivorous and carrion-feeding birds was highly desirable. Experimental work in Queensland was demonstrating the value of applications to the sheep of a strong arsenical solution as a means of destroying any maggots and other external parasites already present, and for affording a very marked measure of protection for periods of from six weeks to three months, such applications being made especially in the form of jettling or else that of showering, dipping, or swabbing. Such treatment, could be accompanied by crutching in order to clear away "dags" and soiled wool. It had been suggested that bacterial activity might be a prime factor in inducing blowfly attack, and that arsenical treatment might owe its protective efficacy to its bactericidal action. It might be advisable for sheep breeders to dispense with wrinkled sheep, as they were most liable to infection, and to breed a type of animal carrying very little wool on the breech. It was well known that crossbreds were less liable to infestation than were merinos. A change in the time of shearing might be advantageous in order that the sheep might not carry heavy fleeces during the seasons when fly attack was most likely, namely, during the autumn and spring.

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ELDER HALL RECITALS AND THE NATIONAL ANTHEM.

From W. T. LONG:—May I draw the attention of the citizens of Adelaide to the fact that when recitals are given on the Elder Hall organ, on Thursdays, "God Save the King" is not played. I think that this being a public institution (as it is attached to the Conservatorium) the director should see that the National Anthem is played, either before or after each performance. I sincerely hope that this omission will be remedied at future recitals.

THE BLOWFLY PEST.

GRAPPLING WITH THE PROBLEM.

A lecture of particular interest to those connected with the pastoral industry was delivered in the Prince of Wales Theatre at the University on Tuesday evening. The lecture, which dealt with the problem of the Australian sheep maggot-fly, was the second one prepared by Professor T. Harvey Johnston, who was prevented through illness from reading it. Professor J. B. Cleland, who has carried out a number of experiments with regard to the same question, acted as his substitute, reading the lecture and explaining the various points to the audience.

The lecturer stated that although the sheep blowfly problem occurred in Great Britain, South Africa, and New Zealand, and some of the Pacific Islands, it had developed more especially in the eastern half of Australia. At least 40 years ago certain blowflies were known to deposit their eggs on larvae on injuries in rams' heads, on blankets, saddle-cloths, and wool bales, but it was not until about 1896 that fly infestations of lambs was first noticed. Following the drought years 1900 to 1902, it became more pronounced, until in 1913 out of more than one million sheep in Central Queensland an average of 23 per cent. had been "struck," and in some stations from 40 to 70 per cent. of the animals were affected. Traps, dip fluids, and dressings of all kinds were experimented with in the endeavor to find a remedy for this serious menace to the pastoral industry. In 1920 two Queensland stations reported the loss of 15,000 sheep apiece from the blowfly pest, and the probable loss throughout the State amounted to 5 per cent. of the flocks, which was as great as that from all other natural causes put together. It was probably greater in New South Wales, and every State in the Commonwealth suffered more or less, the annual loss both directly and indirectly amounting to several million pounds sterling.

The time of year when the blowflies were most troublesome varied in the different States, but the worst periods generally appeared to be during autumn and at lambing time. In South Australia, where infestation was reported 13 years ago, the trouble was said to occur chiefly in March, April, and May, particularly May, and again in spring. The earliest accounts of Australian infestation gave the two most common brown native blowflies as the chief culprits. Other varieties had subsequently been reported, and no fewer than seven different kinds were now known to infest wool on sheep. It had not yet been established whether any one kind of blowfly virtually led the attack, setting up conditions which attracted others. The two common blowflies already mentioned would blow woolen material, and they had been reported as infesting sheep. Hairy maggots, however, would breed in abundance on carrion, and it was quite probable that these were present on wool in the dual role of carrion feeder and predator. Flies were readily attracted to those places where bacterial decomposition was going on, and soiled wool was a favorite breeding ground for them, the larvae feeding on the dead and decomposed wool. It would appear from this that one very important line of defence would be to check bacterial activity. There were certain predisposing factors towards fly attack. The sheep-breeder, for instance, had changed the character of the Australian Merino by making practically every part of the animal produce wool, even encouraging the development of a wrinkled skin in order to give a greater wool-producing surface, and even the rump portion, which was, of course, easily soiled, now carries a mass of wool. This artificial increase in weight, quantity, and fineness of wool, was accompanied by an increased secretion of yolk, forming an additional attraction for flies and supplying food for the maggots, according to Froggatt (1922). Woodburn considered that ewes, lambs, weaners, and Merino sheep (especially if wrinkled), were more liable to attack than plain-bodied sheep. Out of 6,000 weaners, Merino ewes showed a loss of 40 per cent., Merino wethers 3 per cent., Lincoln-Merino crossbred ewes 15 per cent., and crossbred wethers nil. From this it would appear that one possible method of controlling the problem might be the breeding either of crossbreds, or of a Merino devoid of a wrinkled skin, and heavy wool on the rump. Sick or worm-infested sheep were more susceptible to fly attack than healthy animals, and diarrhoea favored fly attack through fouling the wool.

It was known that all the blowflies which attacked sheep, normally bred in decomposing animal matter, and the most important measure against blowflies would be the systematic destruction of all car-

tion, dung, or animal debris. It was the only way really to strike at the root of the problem. Such destruction might be brought about by burning, or by thorough poisoning. The propagation of insectivorous birds should also be encouraged. It was highly important that pastoralists should know how far blowflies could travel, and it had been established in Texas that the species of some of the genera to which Australian blowflies belonged were able to fly eight or ten miles within two days. Fly trapping had been widely recommended, but it was regarded by some authorities as of little value when compared with the cost of attendance. It should be borne in mind in any case that it was only supplementary to other methods of control, and the prevention of breeding was by far the most important. Some birds were known to catch and kill blowflies, as did certain wasps or "police-men flies." The last question to be considered was the possibility of applying a medicament to the sheep so that any maggots present might be destroyed and the wool poisoned, so that no longer would it be attractive to flies, and also that any larvae might die if hatched. Experiments with a variety of substances, in swim dipping, jettling, and shower dipping had been carried on for a number of years. Most of the available proprietary specific were tried, but in Professor Johnston's opinion ordinary arsenate of soda solution was the cheapest and most easily applied, and gave the best results. In "jettling" a steady pressure of from 60 lb. to 200 lb. per square inch, according to amount and density of wool (four to six months' wool requiring 100 lb. to 125 lb. pressure) would be required, and about 1½ pints of the fluid would be needed for each sheep. Up to 3,000 sheep per day could be treated by four men at a cost of one-fifth of a penny for each sheep. In ordinary weather 0.7 per cent. arsenic solution gave three months' protection at least. Sheep could be jettled three times a year with this solution. As over 90 per cent. of the fly attack was on the breech jettling was obviously the best and cheapest method of protection. Where other parts of the animal were attacked, however, resort must be had to the swim dip, and a solution up to 0.5 per cent. could safely be used. Sheep should not be overheated or driven immediately after dipping. So far, and this embraced thousands of sheep experimented upon, there had been no losses from arsenical poisoning.

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RESEARCH WORK IN ADELAIDE.

AN APPEAL FOR HELP.

In a lecture delivered at the Prince of Wales Theatre, Adelaide University on Tuesday evening, Professor J. B. Cleland made a spirited appeal for funds for a research laboratory. He said not only the University, but the general community, were exceedingly fortunate in having secured the services of a man of Professor Johnston's calibre and international reputation. Professor Johnston's work in connection with the blow-fly pest was so well-known, would like to continue his research into practical problems of a zoological nature in his spare time, and would be prepared to plan and supervise the work if funds were made available for the cost of the necessary apparatus, and for the payments of salaries for the young graduates of science from the Adelaide, or any other Commonwealth, University, who would carry out the work under his direction. Considering the enormous losses caused in the Commonwealth by the blow-fly pest alone, amounting to hundreds of thousands of pounds per annum, the comparatively small sum required should be forthcoming. Surely private individuals, personally concerned in the losses, and large and powerful associations, such, for instance, as that of the pastoralists, could help to organize a fund for the purpose. Merely as a business proposition, was not an annual expenditure of £1,000, or even, if necessary, £5,000, justifiable, over a period of 10 years, if there was a likelihood of reducing these annual losses by a few per cent.? It was even more justifiable when it was recognised that quite probably the saving would amount to 25 or 30 per cent. Knowing the capabilities of Professor Johnston, he was sure that practical results of inestimable benefit to the country would accrue. As it was a matter of vital interest to the whole community, he left the question of providing research facilities in the hands of the public, with every confidence that the people of South Australia would do the right thing.