

### QUARTER-EVIL IN SOUTHERN RHODESIA.

By LL. E. W. BEVAN, M.R.C.V.S., Government Veterinary Bacteriologist, Southern Rhodesia, and T. G. MILLINGTON, M.R.C.V.S., D.V.H., Assistant at the Veterinary Laboratories, Salisbury, Rhodesia.

QUARTER-EVIL was first recognised in Rhodesia early in June 1911, when it occurred as two outbreaks, viz., at Redbank and Insiza, districts of Matabeleland. Certain clinical symptoms described by G. V. S. Hooper-Sharpe while investigating the disease in the field, and usual laboratory results, raised the suspicion that the local disease might not be identical with the quarter-evil or black-quarter which is common in certain parts of South Africa and Europe. The question was of some importance from the point of view of prophylaxis, for it was deemed unwise to make use of the vaccines protective against black-quarter if the disease in this country was not identical, as in using them protection might not be afforded but a disease new to this country might be introduced. Experiments, therefore, were carried out to determine whether the black-quarter vaccine issued by the Bacteriological Laboratory, Pretoria, conferred immunity against the form of quarter-evil occurring in Matabeleland. This it was found to do, not only in cattle but also in sheep. A vaccine was also prepared from a Rhodesian virus, and this again proved to be protective against the Transvaal quarter-evil.

Later it became possible to conduct cross-immunity experiments between the South African strains and one form of English quarter-evil, namely, that known in Romney Marsh, Kent, as "struck" of sheep.

#### EXPERIMENTS—SERIES I.

To determine whether the black-quarter vaccine issued by the Bacteriological Laboratory, Pretoria, affords immunity against the form of quarter-evil occurring in Matabeleland.

*Vaccine.*—As above stated.

In order that a smaller dose could be used for sheep, the powder was rubbed up with exactly twice the usual quantity of water.

*Dose.*—2 cc. of above for cattle, and 1 cc. for sheep, injected in front of the shoulder.

The virus used to test the efficacy of the vaccine was an emulsion of muscle tissue from an ox which had died with typical lesions of the disease at Insiza.

In the course of these experiments the mistake was made of introducing the test virus too soon after the injection of vaccine, and before full immunity could have been derived. The results do not appear to have been influenced thereby.

*Animals Vaccinated.*—A yearling half-bred Shorthorn steer, and a ewe in very fat condition, four teeth.

*Controls.*—A yearling half-bred Shorthorn steer, and a ewe in good condition.

These animals were selected as agreeing as nearly as possible in age and condition with the vaccinated animals.

*Experiment A.*

*Subject.*—Steer, half-bred Shorthorn, in fair condition, two adult incisors.

*Vaccine.*—Transvaal black-quarter vaccine.

*Dose.*—2 cc. emulsion (as explained above).

*Date.*—5th August 1911.

<i>Date.</i>	<i>Temperature.</i>	<i>Remarks.</i>
5.8.11	—	Vaccinated.
7.8.11	100·4	
8.8.11	101·3	Inoculated with local virus in near hind leg.
9.8.11	105·2	Slightly lame.
10.8.11	102·0	Leg swollen, very lame.
11.8.11	101·6	Swelling reduced.
12.8.11	101·6	
13.8.11	103·0	
14.8.11	101·4	
16.8.11	101·6	
17.8.11	101·2	

*Control.*

*Subject.*—Steer, two years old, half-bred Shorthorn.

<i>Date.</i>	<i>Temperature.</i>	<i>Remarks.</i>
8.8.11	—	Inoculated into the muscles of hind leg with 2 cc. emulsion of muscle juice of dead ox at Insiza.
9.8.11	103·2	Near hind leg immensely swollen. Animal only moves with great difficulty.
10.8.11	103·0	
11.8.11	101·8	
12.8.11	102·4	
13.8.11	102·0	Swelling reduced.
14.8.11	102·4	
16.8.11	101·2	
17.8.11	101·4	

*Remarks.*—The vaccinated animal responded to inoculation with infected muscle juice with a very much more acute temperature reaction than the untreated animal, but the local reaction in the case of the vaccinated animal was far less severe than in the unvaccinated one, in which the limb became enormously enlarged, and did not regain its normal dimensions for some days. It was, however, a matter for surprise that the non-vaccinated animal did not succumb.

*Experiment B.*

*Subject.*—Sheep (fat-tail).

*Vaccine.*—1 cc. of emulsion (half-strength) of Transvaal black-quarter vaccine.

<i>Date.</i>	<i>Temperature.</i>	<i>Remarks.</i>
5.8.11	—	Vaccinated.
7.8.11	101'4	Inoculated with virulent muscle juice.
8.8.11	100'6	Slightly lame.
9.8.11	103'6	
10.8.11	102'2	
11.8.11	101'8	
12.8.11	103'4	
13.8.11	103'0	
14.8.11	102'8	
15.8.11	103'6	
16.8.11	101'4	
17.8.11	101'8	
18.8.11	103'2	
19.8.11	102'4	
20.8.11	101'8	
22.8.11	101'0	
23.8.11	101'8	
24.8.11	100'0	
25.8.11	100'8	
26.8.11	101'4	
27.8.11	101'6	

*Control.*

*Subject.*—Sheep (fat-tail).

*Virus.*—2 cc. virulent emulsion of muscle tissue.

<i>Date.</i>	<i>Temperature.</i>	<i>Remarks.</i>
8.8.11	—	Inoculated as above.
9.8.11	101'4	Unable to stand; leg and vulva swollen.

Died during the night.

*Remarks.*—The vaccinated sheep reacted slightly to inoculation. The inoculated leg became slightly swollen and painful, but soon regained a normal condition. The animal did not appear to be seriously inconvenienced thereby, and fed quite regularly throughout.

The untreated sheep, however, died within twenty-four hours, with immense swelling of the limb and characteristic œdematous condition of the vulva, tail, and perinæum.

*Conclusions.*

(1) That the Transvaal black-quarter vaccine, in suitable doses, can be safely applied to sheep.

(2) That this vaccine has the power to modify the reaction due to the inoculation with the local strain of virus.

## EXPERIMENTS—SERIES II.

These experiments were made to test whether an animal immunised with a Rhodesian vaccine would resist inoculation with a fatal dose of virulent muscle obtained from the Transvaal.

*Vaccine.*—Muscle from a sheep dead as the result of inoculation with muscle emulsion from an ox dead at Insiza was dried in a hot oven. It was ground to a fine powder, mixed into a paste with water, spread on glass plates, and exposed to a temperature of from 85° to 90° C. for six hours. It was then scraped off the glass and stored in sterile bottles.

*Virus.*—The virus was kindly sent by Dr Theiler in the form of pieces of black-quarter muscle, and was labelled "1st generation."

*Experiment A.*

*Subject.*—Red and white hornless ewe.

*Vaccine.*—Rhodesian vaccine inoculated near tip of tail.

<i>Date.</i>	<i>Temperature.</i>		<i>Remarks.</i>
	A.M.	P.M.	
28.10.11	101·6	—	Inoculated with 2 cgm. Rhodesian vaccine.
30.10.11	103·2	—	No local changes.
31.10.11	102·6	104·0	
1.11.11	101·6	104·0	
2.11.11	101·8	101·6	
3.11.11	102·2	102·4	
4.11.11	101·2	102·4	
5.11.11	102·6	103·0	
6.11.11	104·0	103·2	
7.11.11	103·4	103·4	
8.11.11	103·0	103·0	
9.11.11	103·2	102·8	
10.11.11	102·0	102·2	
11.11.11	102·0	101·6	
12.11.11	101·2	101·0	
13.11.11	102·4	102·6	
14.11.11	101·6	102·6	
15.11.11	101·4	101·8	Inoculated with 2 cgm. Rhodesian vaccine.
16.11.11	102·2	102·6	
17.11.11	101·4	102·6	
18.11.11	101·6	102·8	Tested $\frac{1}{2}$ gr. Transvaal quarter - evil muscle powder in emulsion. No reaction.
19.11.11	101·8	102·2	
20.11.11	101·8	102·2	
21.11.11	101·4	101·8	
22.11.11	101·2	102·0	
23.11.11	102·0	102·4	

*Control.*

*Subject.*—Half-bred Persian ram.

*Virus.*— $\frac{1}{2}$  gramme Transvaal quarter-evil muscle powder in sterile water.

<i>Date.</i>	<i>Temperature.</i>		<i>Remarks.</i>
	A.M.	P.M.	
18.II.II	—	104·0	Inoculated inside right thigh.
19.II.II	105·8	106·2	Swelling at seat of inoculation.
20.II.II	101·0	Dead	Swelling extending down to hock and along abdomen.

*Conclusions.*

(1) A vaccine can be produced from the muscle of an animal dead of the Rhodesian form of quarter-evil.

(2) Such a vaccine, in suitable doses, can be applied with safety to sheep.

(3) Such a vaccine will confer immunity against a fatal dose of infective muscle of an animal dead of Transvaal black-quarter.

## EXPERIMENTS—SERIES III.

To determine whether the so-called “struck” or “strike” of Romney Marsh sheep is identical with the quarter-evil of South Africa.

*Virus.*—Muscle dried in an oven from a “struck” sheep was received from Dr R. Bevan, of London, to whom it had been sent by a Romney Marsh grazier whose sheep were dying from the disease.

On receipt it was carefully ground in a mortar, and the powder was mixed with sterile water to form an emulsion.

*Experiment A.*

*Control.*—To show whether the emulsion of “struck” muscle was still infective.

*Subject.*—Fat-tail ram.

*Virus.*—2 cc. thick emulsion of muscle powder in sterile water.

<i>Date.</i>	<i>Temperature.</i>		<i>Remarks.</i>
9.5.12	4.30 p.m.	104·0	Inoculated.
10.5.12	10 a.m.	105·2	Hot œdematous swelling extending from seat of inoculation to foot. Very lame.
10.5.12	evening.	—	Died of typical “struck.”

*Experiment B.*

To determine whether Pretoria vaccine conveys immunity against the so-called "struck" of Romney Marsh sheep.

*Vaccine.*—As described under Series I.

*Subject.*—Brown and white hornless ewe, previously treated with Pretoria vaccine on 15th November 1911.

<i>Date.</i>	<i>Temperature.</i>	<i>Remarks.</i>
8.6.12	12 noon. —	Inoculated with 2 cc. "struck" muscle emulsion.
8.6.12	4 p.m. 103·2	No local symptoms.
9.6.12	9.30 a.m. 105·2	" "
9.6.12	5 p.m. 104·0	" "
10.6.12	9.30 a.m. 103·0	" "
10.6.12	5 p.m. 103·0	" "
11.6.12	9.30 a.m. 102·2	" "
11.6.12	5 p.m. 103·0	" "
12.6.12	9.30 a.m. 102·8	" "
12.6.12	5 p.m. 103·0	" "
		Remained healthy.

*Experiment C.*

To determine whether the vaccine prepared from the Southern Rhodesian disease conveys immunity against the so-called "struck" of Romney Marsh sheep.

*Subject.*—Boer goat, previously treated with local vaccine, 19th January 1912.

*Virus.*—2 cc. thick emulsion of muscle powder in sterile water.

<i>Date.</i>	<i>Temperature.</i>	<i>Remarks.</i>
8.6.12	12 noon. —	Inoculated.
8.6.12	4 p.m. 104·0	No local symptoms.
9.6.12	9.30 a.m. 102·0	" "
9.6.12	5 p.m. 103·0	" "
10.6.12	9.30 a.m. 101·0	" "
10.6.12	5 p.m. 101·5	" "
11.6.12	9.30 a.m. 100·0	" "
11.6.12	5 p.m. 102·0	" "
12.6.12	9.30 a.m. 100·0	" "
12.6.12	5 p.m. 102·0	" "
		Remained healthy.

## CONCLUSION.

From cross-immunity experiments it would appear that a close relationship exists between the quarter-evil of various parts of South Africa and the so-called "struck" of Romney Marsh sheep (Kent, England).