

The Immunisation of Cattle against East Coast Fever.

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In the First Report of the Director of Veterinary Research it was shewn that out of 170 cattle inoculated at the Laboratory in various ways, 84 survived injection, tick infestation and natural infection, representing 50 per cent. of the total number treated. The method had also been introduced on a small scale in the practise, and since then the field of operation was extended from Natal into the Native Territories in the Cape Province.

Up to the end of September, 1912, some 133,833 cattle had been inoculated in the Transkei, the object being to save as many cattle as possible, since dipping could not be resorted to. It has, of course, not been possible to keep records of nearly all these cattle, but in Part I of this article over 900 cattle have been accounted for, of which 193 were inoculated in Natal and the remainder in the Transkei. It is with much pleasure that I have to express my appreciation of the valuable assistance rendered by Messrs. Kirkpatrick, Goodall and Chambers, to whom I entrusted the supervision of the experiments in the field.

Coinciding with the experiments in the field, further investigations were carried out at the Laboratory, with a view of conferring a greater immunity by inoculation; and this was particularly the case in the experiments quoted where the pulp was allowed to become saturated with varying strengths of Quinine Hydrochloride.

Knowing that Quinine was a plasma poison, it was thought that the addition of such material to the pulp would have an attenuating effect, and the object of the experiments was to find what this attenuating effect would amount to in the varying strengths of the solution. The pulp was allowed to be soaked in the solution for 30 minutes.

Different grains of pulp were also used, *i.e.*, fine, half medium, medium, etc., the method of preparation being as follows:—

Fine grain.—A Latapie apparatus was used for obtaining a fine grain.

Half Medium, Medium grain.—The pulp was minced once in a "Spong" apparatus, No. 42, medium size 12 teeth to give the "medium grain", and to obtain the "Half medium grain" it was put through the mincer twice.

Coarse and Half Coarse grain.—An ordinary mincing machine, size No. 10, was used, the pulp being put through the mincer, once for "Coarse grain" and twice for "Half Coarse grain."

It will be noted in some of the later experiments that under the heading of "Result of Exposure Tests", the words "still alive" have been used instead of N.R. (no reaction), the reason being that the daily registration of temperatures was discontinued.

The appendix refers to 65 head of cattle inoculated in April and May, 1911, by Mr. Frank Chambers, M.R.C.V.S., before this officer had received instructions concerning the method of immunisation that was in vogue in this Laboratory.

PART I.

THE IMMUNISATION OF CATTLE AGAINST EAST COAST FEVER IN THE FIELD.

In the following experiments, it has not always been possible to keep detailed records of the result of the injection on each individual animal, owing to the extreme difficulties encountered in the way of kraaling and tethering them, but the main object, namely that of ascertaining the percentage of animals that survived injection and exposure has always been kept in view. In the Transkeian Territories, the majority of the cattle were obtained from natives, and further obstacles were met with there, particularly in regard to the general apathy of the natives, and the necessity of overcoming their numerous superstitions and beliefs.

These experiments may be subdivided into (1) the immunisation of cattle obtained from non-infected areas and the exposure of the inoculated cattle to natural infection at varying intervals, and (2) the immunisation under the typical conditions of the field, namely, or cattle that had been running on infected veld previous to inoculation.

Experiments Nos. 16 and 17 have not been included in the statistics, as they refer to the inoculation of calves and the effect of a double injection respectively.

(A) THE IMMUNISATION OF CATTLE OBTAINED FROM NON-INFECTED AREAS.

Experiment No. 1. To note the effect of the intrajugular injection of 5 and 10 c.c. Spleen and Gland pulp (coarse grain), obtained from an animal that was slaughtered in the last stages of East Coast Fever, pure and mixed with Peptone; the injected animals were immediately turned out into grossly infected veld, where they remained for just over 3 months.

Date: May 31st, 1911.

(Under the supervision of Mr. A. C. Kirkpatrick, M.R.C.V.S., on the farm Burnside, near Dundee, Natal.)

| Reference No. | No. of animal injected. | Injections. | | Remarks. |
|---------------|-------------------------|----------------------------|-------------|---|
| | | Quantity of pulp injected. | Mixed with. | |
| 1 | 1598 | 5 c.c. | Peptone | R.P.R. |
| 2 | 1599 | 5 c.c. | " | I.R., P.R. |
| 3 | 1600 | 5 c.c. | " | R.P.† 20th day. |
| 4 | 1601 | 5 c.c. | " | R.P.† 21st day. |
| 5 | 1602 | 5 c.c. | " | Slaughtered on 4th day having strayed on to an adjoining farm |
| 6 | 1603 | 10 c.c. | " | R.P.† 19th day. |
| 7 | 1604 | 10 c.c. | " | I.R. |
| 8 | 1605 | 10 c.c. | " | R.P.R. |
| 9 | 1606 | 15 c.c. | " | R.P.R. |
| 10 | 1607 | 15 c.c. | " | R.P.† 23rd day. |
| 11 | 1608 | 5 c.c. | Pure | R.P.R. |
| 12 | 1609 | 5 c.c. | " | R.P.† 27th day. |
| 13 | 1610 | 5 c.c. | " | R.P.† 29th day. |
| 14 | 1611 | 5 c.c. | " | R.P.R. |
| 15 | 1612 | 5 c.c. | " | R.P.† 29th day. |
| 16 | 1613 | 10 c.c. | " | R.P.† 23rd day. |
| 17 | 1614 | 10 c.c. | " | R.P.† 17th day. |
| 18 | 1615 | 10 c.c. | " | R.R. |
| 19 | 1616 | 15 c.c. | " | R.P.† 17th day. |
| 20 | 1617 | 15 c.c. | " | N.R. |

Explanation of Symbols.

- R.P.† Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.
R.P.R. Indicates that the animal had a reaction accompanied with the presence of plasma bodies and re-overed.
R.R. Indicates that the animal had a reaction and recovered but that plasma bodies were not detected.
I.R. Indicates that the animal had an irregular reaction and recovered.
N.R. Indicates that the animal did not react.

Summary of Experiment No. 1 (Animals exposed to natural infection immediately after inoculation).

- (a) Of 5 cattle injected with 5 c.c. Spleen and Gland pulp (coarse grain) 3 died of East Coast Fever and the remaining two reacted to the injection and proved to be immune.
(b) Of 4 cattle injected with 5 c.c. Spleen and Gland pulp (coarse grain) mixed with Peptone (excluding the slaughtered animal), 2 died of East Coast Fever, and the remaining 2 reacted to the injection and proved to be immune.
(c) Of 3 cattle injected with 10 c.c. Spleen and Gland pulp (coarse grain) 2 died of East Coast Fever and the third one reacted and proved to be immune.
(d) Of 3 cattle injected with 10 c.c. Spleen and Gland pulp (coarse grain) mixed with Peptone, one died of East Coast Fever and the remaining two proved to be immune.
(e) Of 2 cattle injected with 15 c.c. Spleen and Gland pulp (coarse grain) one died of East Coast Fever and the other one failed to react to the injection, but proved to be immune.
(f) Of 2 cattle injected with 15 c.c. Spleen and Gland pulp (coarse grain) mixed with Peptone, one died of East Coast Fever and the other reacted to the injection and proved to be immune.

Results.—Of 19 animals injected intrajugularly with varying doses of Spleen and gland pulp (coarse grain), and immediately exposed to natural infection, 9 survived = 47.4%.

Experiment No. 2. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (coarse grain) obtained from animals that were slaughtered in the last stages of East Coast Fever, mixed with Peptone, when the injected animals were exposed to heavy veld infection 14 days later where they remained for just over 3 months.

(Under the supervision of Mr. A. C. Kirkpatrick, M.R.C.V.S., in Utrecht, Natal.)

| Reference No. | No. of Animal injected. | Date of Injection. | Remarks. |
|---------------|-------------------------|--------------------|--|
| 1 | 1618 | 22/6/11 | R.P.R. |
| 2 | 1619 | | R.P.R. |
| 3 | 1620 | | N.R. |
| 4 | 1621 | | R.P. † 35th day. |
| 5 | 1622 | | R.P.R. |
| 6 | 1623 | | R.P.R. |
| 7 | 1624 | | R.P. † 26th day. |
| 8 | 1625 | | R.P.R. |
| 9 | 1648 | | R.P.R. |
| 10 | 1649 | | R.P.R. to injection but died of East Coast Fever on 6th September (relapse). |
| 11 | 1650 | | R.P.R. |
| 12 | 1651 | | R.P.R. |
| 13 | 1652 | | R.P.R. |
| 14 | 1653 | | N.R. |
| 15 | 1654 | | R.P.R. |
| 16 | 1655 | | R.P.R. |
| 17 | 1656 | | R.P. † 29th day. |
| 18 | 1657 | | R.P.R. |
| 19 | 1658 | | R.P. † 29th day. |
| 20 | 1659 | | R.P. † 28th day. |
| 21 | 1679 | 8/7/11 | R.P.R. |
| 22 | 1680 | | R.P.R. |
| 23 | 1681 | | R.P.R. |
| 24 | 1682 | | R.P.R. |
| 25 | 1683 | | R.P.R. |
| 26 | 1684 | | R.P.R. |
| 27 | 1685 | | R.P. † 22nd day. |
| 28 | 1686 | | R.P. † 31st day. |
| 29 | 1687 | | N.R. |
| 30 | 1688 | | R.P. † 19th day. |
| 31 | 1689 | | R.P. † 23rd day. |
| 32 | 1690 | | R.P. † 21st day. |
| 33 | 1691 | | R.P. † 21st day. |
| 34 | 1692 | | R.P.R. |
| 35 | 1693 | | R.P.R. |
| 36 | 1694 | | R.P.R. |
| 37 | 1695 | | R.P. † 26th day. |
| 38 | 1696 | | R.P.R. |
| 39 | 1697 | | R.P.R. to injection but died of East Coast Fever on 28th August, 1911 (relapse). |
| 40 | 1698 | | R.P.R. |

Explanation of Symbols :

R.P.R. Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

R.P. † Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

N.R. Indicates that the animal did not react.

Summary of Experiment No. 2 (animals exposed to natural infection 14 days after inoculation).

Results.—Of 40 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (coarse grain) mixed with Peptone, 12 died of East Coast Fever, 25 reacted to the injection and 3 failed to react. Of the 28 survivors, two died of East Coast Fever when exposed to natural infection.

Percentage of survivors = 65 %.

NOTE.—Two animals, Nos. 1,649 and 1,697, reacted to the injection, showing the presence of plasma bodies, but after recovering from this attack they again contracted East Coast Fever as a result of natural infection, from which they succumbed on the 76th and 51st days respectively.

Experiment No. 3. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (various grains) obtained from an animal that was slaughtered in the last stages of East Coast Fever. The injected animals were turned out on to infected veld 13 days after inoculation.

Date: 19th October, 1911.

(Under the supervision of Mr. A. Goodall, M.R.C.V.S., in Bizana, Transkeian Territories, Cape Province.)

| Reference Number. | Grain of Mixture. | Mixed with. | Result. |
|-------------------|-------------------|----------------|--|
| 1 | Coarse ... | Pure ... | Reaction and recovered. |
| 2 | " ... | " ... | Died of East Coast Fever. |
| 3 | " ... | " ... | Reaction and recovered. |
| 4 | Control animal | Control animal | died of East Coast Fever on the 29th day. |
| 5 | Coarse ... | Pure ... | Reaction and recovered. |
| 6 | " ... | " ... | Died of East Coast Fever. |
| 7 | " ... | " ... | " " " |
| 8 | " ... | Peptone | " " " |
| 9 | " ... | " ... | " " " |
| 10 | " ... | " ... | " " " |
| 11 | " ... | " ... | " " " |
| 12 | " ... | " ... | " " " |
| 13 | Control animal | Control animal | Reacted to East Coast Fever and recovered. |
| 14 | Coarse ... | Peptone | Reaction and recovered. |
| 15 | Half coarse... | Pure ... | Died of East Coast Fever. |
| 16 | " ... | " ... | " " " |
| 17 | " ... | " ... | " " " |
| 18 | " ... | " ... | " " " |
| 19 | " ... | " ... | Still alive. |
| 20 | " ... | " ... | Reaction and recovered. |
| 21 | " ... | Peptone | Died of East Coast Fever. |
| 22 | " ... | " ... | Reaction and recovered. |
| 23 | " ... | " ... | " " " |
| 24 | " ... | " ... | Died of East Coast Fever. |
| 25 | " ... | " ... | " " " |
| 26 | " ... | " ... | Reaction and recovered. |
| 27 | Medium ... | Pure ... | Died of East Coast Fever. |
| 28 | " ... | " ... | Reaction and recovered. |
| 29 | " ... | " ... | Died of East Coast Fever. |
| 30 | " ... | " ... | Still alive. |
| 31 | " ... | " ... | " " " |
| 32 | " ... | " ... | Died of East Coast Fever. |
| 33 | " ... | Peptone | Reaction and recovered. |
| 34 | " ... | " ... | " " " |
| 35 | " ... | " ... | " " " |
| 36 | " ... | " ... | Died of East Coast Fever. |
| 37 | " ... | " ... | Reaction and recovered. |
| 38 | " ... | " ... | " " " |
| 39 | Half medium | Pure ... | Died of East Coast Fever. |
| 40 | Control animal | Control animal | died of East Coast Fever on the 30th day. |
| 41 | Half medium | Pure ... | Died of East Coast Fever. |
| 42 | " ... | " ... | " " " |
| 43 | " ... | " ... | " " " |
| 44 | " ... | " ... | Reaction and recovered. |
| 45 | " ... | " ... | Died of East Coast Fever. |
| 46 | " ... | Peptone | " " " |
| 47 | " ... | " ... | Reaction and recovered. |
| 48 | " ... | " ... | " " " |
| 49 | " ... | " ... | " " " |
| 50 | " ... | " ... | Died of East Coast Fever. |
| 51 | " ... | " ... | Still alive. |
| 52 | Control animal | Control animal | died of East Coast Fever on the 30th day. |

Summary of Experiment No. 3. (Animals exposed to natural infection thirteen days after inoculation).

- (a) Of 6 cattle injected with 5 c.c. Spleen and Gland pulp (coarse grain) three died of East Coast Fever and three reacted and recovered, the latter proving to be immune when exposed to veld infection.
- (b) Of 6 cattle injected with 5 c.c. Spleen and Gland pulp (coarse grain) mixed with Peptone, five died of East Coast Fever and the remaining animal reacted and recovered, proving to be immune when exposed to veld infection.
- (c) Of 6 cattle injected with 5 c.c. Spleen and Gland pulp ($\frac{1}{2}$ coarse grain) four died of East Coast Fever, one reacted and recovered, and one failed to react. The two survivors proved to be immune when exposed to natural infection.
- (d) Of 6 cattle injected with 5 c.c. Spleen and Gland pulp ($\frac{1}{2}$ coarse grain) mixed with Peptone, three died of East Coast Fever, and three reacted and recovered, the latter proving to be immune to natural infection.
- (e) Of 6 cattle injected with 5 c.c. Spleen and Gland (medium grain) three died of East Coast Fever, one reacted and recovered and two failed to react. All three survivors proved to be immune when exposed to veld infection.
- (f) Of 6 cattle injected with 5 c.c. Spleen and Gland pulp (medium grain) mixed with Peptone, one died of East Coast Fever and five reacted and recovered, the latter proving to be immune when exposed to natural infection.
- (g) Of 6 cattle injected with 5 cc Spleen and Gland pulp (half medium grain) five died of East Coast Fever. The remaining animal reached to the injection and proved to be immune when exposed to veld infection.
- (g) Of 6 cattle injected with 5 c.c. Spleen and Gland pulp (half medium grain) mixed with Peptone, two died of East Coast Fever, three reacted and recovered and one failed to react. All four survivors proved to be immune when exposed to natural infection.
- (i) Of the four animals which served as controls in this and the following experiment, three died of East Coast Fever, and the remaining animal reacted to the injection, but recovered.

Results.—Of 48 animals injected with 5 c.c. Spleen and Gland pulp (various grains) and exposed to natural infection 13 days later, 22 survived = 45.8 %.

Experiment No. 4. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (various grains) obtained from an animal that was slaughtered in the last stage of East Coast Fever. The injected animals to be turned out on to infected veld 15 days after inoculation.

Date: October 17, 1911.

(Under the supervision of Mr. A. Goodall, M.R.C.V.S., in Bizana, Transkeian Territories, Cape Province.)

| Reference Number. | No. of animals Injected. | Grain of Mixture. | Mixed with. | Result. |
|-------------------|--------------------------|-------------------|-------------|--|
| 1 | 1951 | Coarse | Pure | Re-action and recovered. |
| 2 | 1952 | " | " | Died of East Coast Fever. |
| 3 | 1953 | " | " | Re-action and recovered. |
| 4 | 1954 | " | " | Still alive. |
| 5 | 1955 | " | " | Died of East Coast Fever. |
| 6 | 1956 | " | Peptone | Still alive. |
| 7 | 1957 | " | " | Re-action and recovered. |
| 8 | 1958 | " | " | Died of East Coast Fever. |
| 9 | 1959 | " | " | " " " " |
| 10 | 1960 | " | " | Still alive. |
| 11 | 1961 | Half coarse | Pure | " " |
| 12 | 1962 | " | " | " " |
| 13 | 1963 | " | " | Re-action and recovered. |
| 14 | 1964 | " | " | " " " |
| 15 | 1965 | " | " | " " " |
| 16 | 1966 | " | Peptone | " " " |
| 17 | 1967 | " | " | Still alive. |
| 18 | 1968 | " | " | Died of East Coast Fever. |
| 19 | 1969 | " | " | Re-action and recovered. |
| 20 | 1970 | " | " | " " " |
| 21 | 1971 | Medium | Pure | " " " |
| 22 | 1972 | " | " | Still alive. |
| 23 | 1973 | " | " | Died of East Coast Fever. |
| 24 | 1974 | " | " | Recovered from injection but died of East Coast Fever on 54th day. |
| 25 | 1975 | " | " | Recovered from injection but died of East Coast Fever on 52nd day. |
| 26 | 1976 | " | Peptone | Still alive. |
| 27 | 1977 | " | " | Re-action and recovered. |
| 28 | 1978 | " | " | Still alive. |
| 29 | 1979 | " | " | Re-action and recovered. |
| 30 | 1980 | " | " | Died of East Coast Fever. |
| 31 | 1981 | Half medium | Pure | " " " " |
| 32 | 1982 | " | " | " " " " |
| 33 | 1983 | " | " | Still alive. |
| 34 | 1984 | " | " | Died of East Coast Fever. |
| 35 | 1985 | " | " | " " " " |
| 36 | 1986 | " | " | " " " " |
| 37 | 1987 | " | Peptone | Re-action and recovered. |
| 38 | 1988 | " | " | Still alive. |
| 39 | 1989 | " | " | Re-action and recovered. |
| 40 | 1990 | " | " | Still alive. |
| 41 | 1991 | " | " | Re-action and recovered. |
| 42 | 1992 | " | " | Died of East Coast Fever. |

Summary of Experiment No. 4. (Animals exposed to natural infection 15 days after inoculation).

- (a) Of 5 cattle injected with 5 c.c. Spleen and Gland pulp (coarse grain), two died of East Coast Fever, two reacted and recovered, and one failed to react; all three survivors proved to be immune when exposed to natural infection.
- (b) Of 5 cattle injected with 5 c.c. Spleen and Gland pulp (coarse grain) mixed with Peptone, two died of East Coast Fever, one reacted and recovered, and two failed to react; the three survivors all proved to be immune.
- (c) Of 5 cattle injected with 5 c.c. Spleen and Gland pulp (coarse grain), three reacted and recovered and the remaining two failed to shew any reaction. All five proved to be immune when exposed to natural infection.
- (d) Of 5 cattle injected with 5 c.c. Spleen and Gland pulp ($\frac{1}{2}$ coarse grain) mixed with Peptone, one died of East Coast Fever, three reacted and recovered and the remaining one failed to react. All four survivors proved to be immune when exposed to veld infection.
- (e) Of 5 cattle injected with 5 c.c. Spleen and Gland pulp (medium grain), one died of East Coast Fever, three reacted and recovered, and the remaining one failed to react. Of the four survivors two died of East Coast Fever when exposed to natural infection, and the remaining two proved to be immune.
- (f) Of 5 cattle injected with 5 c.c. Spleen and Gland pulp (medium grain) mixed with Peptone, one died of East Coast Fever, two reacted and recovered, and two failed to react. All four proved to be immune when exposed to veld infection.
- (g) Of 6 cattle injected with 5 c.c. Spleen and Gland pulp (half medium grain), five died of East Coast Fever and the remaining one proved to be immune.
- (h) Of 6 cattle injected with 5 c.c. Spleen and Gland pulp (half medium grain), one died of East Coast Fever, three reacted and recovered and two failed to react. All five survivors proved to be immune when exposed to veld infection.

Results.—Of 42 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (various grains) and exposed to natural infection, 15 days later, 27 survived = 64.3%.

Tabulated Summary of Experiments Nos. 1—4, shewing the final result of the injection of “clean” animals, according to various doses, grains, etc.

| No. of animals injected. | Dose given. | Grain of pulp. | Mixed with. | Interval between injection and exposure. | No. that survived. | Per cent. of number that survived the number injected. |
|--------------------------|-------------|----------------|-------------|--|--------------------|--|
| 4 | 5 c.c. | Coarse | Peptone | Immediate | 2 | 50% |
| 3 | 10 c.c. | " | " | " | 2 | 67% |
| 2 | 15 c.c. | " | " | " | 1 | 50% |
| 5 | 5 c.c. | " | Pure | " | 2 | 40% |
| 3 | 10 c.c. | " | " | " | 1 | 33% |
| 2 | 15 c.c. | " | " | " | 1 | 50% |
| 40 | 5 c.c. | " | Peptone | 14 days | 26 | 65% |
| 6 | 5 c.c. | " | Pure | 13 days | 3 | 50% |
| 6 | 5 c.c. | " | Peptone | " | 1 | 17% |
| 6 | 5 c.c. | Half coarse | Pure | " | 2 | 33% |
| 6 | 5 c.c. | " | Peptone | " | 3 | 50% |
| 6 | 5 c.c. | Medium | Pure | " | 3 | 50% |
| 6 | 5 c.c. | " | Peptone | " | 5 | 83% |
| 6 | 5 c.c. | Half medium | Pure | " | 1 | 16% |
| 6 | 5 c.c. | " | Peptone | " | 4 | 67% |
| 5 | 5 c.c. | Coarse | Pure | 15 days | 3 | 60% |
| 5 | 5 c.c. | " | Peptone | " | 3 | 60% |
| 5 | 5 c.c. | Half coarse | Pure | " | 5 | 100% |
| 5 | 5 c.c. | " | Peptone | " | 4 | 80% |
| 5 | 5 c.c. | Medium | Pure | " | 2 | 40% |
| 5 | 5 c.c. | " | Peptone | " | 4 | 80% |
| 6 | 5 c.c. | Half medium | Pure | " | 1 | 16% |
| 6 | 5 c.c. | " | Peptone | " | 5 | 83% |
| 149 | | | | | 84 | 56.4% |

In order to arrive at an opinion of the value of the various methods, it is advisable to consider the results according to each of the four separate factors.

(a) *Dosage.*

Of 139 animals injected with 5 c.c. of pulp 79 or 56.8% survived.

Of 6 animals injected with 10 c.c. of pulp 3 or 50% survived.

Of 6 animals injected with 15 c.c. of pulp 2 or 33% survived.

(b) *Grain.*

Of 22 animals injected with medium grain pulp 14 or 63.6% survived.

Of 22 animals injected with half coarse pulp 14 or 63.6% survived.

Of 81 animals injected with coarse grain pulp 45 or 55.6% survived.

Of 24 animals injected with half medium pulp 11 or 45.8% survived.

(c) *Mixture.*

Of 94 animals injected with pulp mixed with Peptone 60 or 63.8% survived.

Whilst of 55 animals injected with pure pulp only 24 or 43.6% survived.

(d) *Interval between inoculation and exposure.*

Of 40 animals exposed to infection 14 days after inoculation 26 or 65% survived.

Of 42 animals exposed to infection 15 days after inoculation 28 or 64.3% survived.

Of 19 animals exposed to infection immediately after inoculation 9 or 47.4% survived.

Of 48 animals exposed to infection 13 days after inoculation 22 or 45.8% survived.

CONCLUSION.—For the inoculation of cattle in a non-infected area, the experience in the field indicates that the best results are to be obtained by the injection of 5 c.c. Spleen and Gland pulp (medium or half coarse grain), mixed with Peptone, the injected animals to be exposed to veld infection 14 or 15 days later.

(B). THE IMMUNISATION OF CATTLE IN INFECTED AREAS.

Experiment No. 5. To note the effect of intrajugular injection of 5 c.c. Spleen and Gland pulp, medium grain, obtained from an animal that was slaughtered in the last stage of East Coast Fever, mixed with Peptone. The injected animals were turned out to graze on infected veld directly afterwards.

(Under the supervision of Mr. A. C. Kirkpatrick, M.R.C.V.S., in Vryheid, Natal.)

Twenty-four full grown oxen were inoculated on the 25/9/11. One died of East Coast Fever on the 15th day.*

| | | | | |
|---|---|---|---|------------|
| ” | ” | ” | ” | 17th day.* |
| ” | ” | ” | ” | 20th day.* |
| ” | ” | ” | ” | 21st day.* |

Five died of East Coast Fever between the 22nd and 28th days.

Five ” ” ” ” on the 16th day, having been in-spanned and worked by the owner two days previously.

Results.—Of 24 oxen injected as above and exposed immediately afterwards, 10 survived, and of the remaining 14 four were infected previous to inoculation and five died as a result of being worked whilst passing through the reaction.

By excluding these 5 animals the number of survivors is therefore 10 out of 19 or 52.6%.

NOTE.—For statistical purposes animals infected previous to inoculation have been included both in this and in the following experiments, as this is one of the factors to be expected when the animals have been running on infected veld.

Experiment No. 6. To note the effect of the intrajugular injection of 10 c.c. Spleen and Gland pulp (medium grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever, mixed with Peptone and Aleuronat. The material was obtained from the slaughtered animal at 9.30 a.m., and the injections were commenced at 12.15 p.m. The animals were turned out on to infected veld immediately after injection.

Date: September 2nd, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., at Zimbane, Transkeian Territories, Cape Province.)

| | |
|---------------------------|----------------|
| No. of cattle inoculated. | No. that died. |
| 43 | 21 |

Results.—Of 43 cattle injected as above and exposed immediately afterwards 22 or 51.2% survived.

Experiment No. 7. To note the effect of the intrajugular injection of 10 c.c. Spleen and Gland pulp (medium grain) obtained from

**Note.*—These four animals were undoubtedly infected previous to inoculation, laymen having reported them as sick on the 4th, 8th and 12th days.

an animal that was slaughtered in the last stage of East Coast Fever, mixed with Peptone. The material was obtained from the slaughtered animal at 8 a.m., and the inoculations were commenced at 2.30 p.m., lasting until 3.30 p.m. The animals were exposed to natural infection immediately after injection.

Date: September 2nd, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., at Zimbane, Transkeian Territories, Cape Province.)

No. of cattle inoculated.
31

No. that died.
17

Results.—Of 31 animals injected as above and exposed directly afterwards, 14 or 45.2% survived.

Experiment No. 8. To note the effect of the intrajugular injection of 10 c.c. Spleen and Gland pulp (medium grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever, mixed with Aleuronat. The cattle were removed to a clean farm until the 10th day, when they were exposed to natural infection.

Date: August 30th, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., at Zimbane, Transkeian Territories, Cape Province.)

| Reference Number. | Animal. | Number. | Result of Injection. |
|-------------------|---------|---------|--|
| 1 | Bull | 1883 | Died 11th day from East Coast Fever. |
| 2 | Ox | 1884 | Died 22nd day, cause unknown, but not East Coast Fever. |
| 3 | Ox | 1885 | Died 28th day from poverty. |
| 4 | Ox | 1886 | Still alive. |
| 5 | Ox | 1887 | Died 9th day, cause of death unknown. |
| 6 | Ox | 1888 | Still alive. |
| 7 | Ox | 1889 | Died 40th day from East Coast Fever. |
| 8 | Ox | 1890 | Died 10th day from East Coast Fever. |
| 9 | Ox | 1891 | Still alive. |
| 10 | Ox | 1892 | Died 22nd day, cause of death unknown but not East Coast Fever. |
| 11 | Ox | 1893 | Died on 25th day from East Coast Fever. |
| 12 | Ox | 1894 | Still alive. |
| 13 | Ox | 1895 | Still alive. |
| 14 | Ox | 1896 | Died on the 33rd day from East Coast Fever. |
| 15 | Ox | 1897 | Still alive. |
| 16 | Ox | 1898 | Still alive. |
| 17 | Ox | 1899 | Died 25th day (result of injection?). |
| 18 | Ox | 1900 | Still alive. |
| 19 | Ox | 1901 | Died 24th day (result of injection?). |
| 20 | Ox | 1902 | Still alive. |
| 21 | Ox | 1903 | Still alive. |
| 22 | Ox | 1904 | Died 22nd day from East Coast Fever. |
| 23 | Ox | 1905 | Died 21st day from poverty. |
| 24 | Ox | 1906 | Still alive. |
| 25 | Ox | 1907 | Died 28th day from East Coast Fever. |
| 26 | Ox | 1908 | Still alive. |
| 27 | Ox | 1909 | Died 33rd day, cause of death unknown, but not East Coast Fever. |
| 28 | Cow | 1910 | Still alive. |
| 29 | Ox | 1911 | Died 23rd day, cause of death unknown, but not East Coast Fever. |
| 30 | Ox | 1912 | Still alive. |

Results: Of 30 animals injected as above and exposed to natural infection on the 10th day, 7 died of East Coast Fever, 2 died on the 24th and 25th days respectively, East Coast Fever probably being responsible, 7 died of either poverty or from some cause unknown, and 14 survived, or 46.7%.

Experiment No. 9. To note the effect of the intrajugular injection of 10 c.c. Spleen Pulp (coarse grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever.

The injected animals were removed to clean veld for 10 days before being turned out to natural infection.

Date: September 19th, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., at Hluleka, Ngqeleni District, Transkeian Territories, Cape Province.)

| No. of cattle inoculated. | No. that contracted East Coast Fever and recovered. | No. that died. |
|---------------------------|---|----------------|
| 48 | 4 | 26 |

Results.—Of 48 cattle injected as above and exposed to veld infection after 10 days, 22 survived or 45.8%.

Experiment No. 10. To note the effect of intrajugular injection of 10 c.c. Spleen and Gland Pulp (coarse grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever and mixed with Aleuronat.

The injected animals were removed to clean veld for 10 days before being exposed to natural infection.

Date: September 29th, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., at Hluleka, Ngqeleni District, Transkeian Territories, Cape Province.)

| No. of cattle inoculated. | No. that contracted East Coast Fever and recovered. | No. that contracted East Coast Fever and died. |
|---------------------------|---|--|
| 64 | 7 | 18 |

Results.—Of 64 cattle injected as above and exposed to natural infection after 10 days, 46 survived or 71.9%.

Experiment No. 11. To note the effect of the intrajugular injection of 10 c.c. Spleen and Gland pulp (coarse grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever. The cattle were removed to a clean farm until the 14th day when they were exposed to natural infection.

Date: July 29th, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., in Clarkebury, Transkeian Territories, Cape Province.)

| Reference No. | Animal. | No. | Result. |
|---------------|---------|------|--|
| 1 | Ox | 1837 | Still alive. |
| 2 | " | 1850 | Died 19th day (result of injection?). |
| 3 | " | 1852 | Still alive. |
| 4 | " | 1857 | " " |
| 5 | " | 1858 | Died 25th day, cause of death unknown, but not East Coast Fever. |
| 6. | Cow | 1860 | Died 21st day from East Coast Fever. |
| 7 | " | 1862 | Drowned on the 66th day. |
| 8 | Heifer | 1863 | Died 19th day (result of injection?). |
| 9 | Cow | 1865 | Died 22nd day (result of injection?). |
| 10 | Ox | 1867 | Died 20th day from East Coast Fever. |
| 11 | " | 1868 | Still alive. |
| 12 | " | 1870 | Died 18th day from East Coast Fever. |
| 13 | Heifer | 1871 | Still alive. |
| 14 | " | 1873 | " " |
| 15 | Bull | 1875 | Died 29th day from East Coast Fever. |
| 16 | Cow | 1878 | Died 27th day, cause unknown, but not East Coast Fever |
| 17 | Ox | 1881 | Died 27th day from East Coast Fever. |

Results.—Of 17 animals injected as above and exposed to veld infection on the 14th day, 8 died of East Coast Fever or as a result of the injection, 2 from causes unknown, and one was drowned on the 66th day. By excluding this latter animal the number of survivors can therefore be considered to be 6 out of 16 or 37.5%.

Experiment No. 12. To note the effect of the intrajugular injection of 10 c.c Spleen and Gland pulp (coarse grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever and mixed with Aleuronat. The cattle were obtained from infected areas and after injection remained on a clean farm until the 14th day, when they were exposed to natural infection.

Date: July 29th, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., in Clarkebury, Transkeian Territories, Cape Province.)

| Reference No. | Animal. | No. of Animal. | Result. |
|---------------|---------|----------------|---|
| 1 | Ox | 1833 | Still alive. |
| 2 | " | 1834 | " |
| 3 | " | 1835 | " |
| 4 | " | 1836 | " |
| 5 | " | 1838 | Died 20th day from Pneumonia. |
| 6 | " | 1839 | Died 18th day from Blackquarter. |
| 7 | " | 1840 | Still alive. |
| 8 | " | 1841 | Died 20th day of Poverty. |
| 9 | " | 1842 | Died 25th day of East Coast Fever. |
| 10 | Bull | 1843 | Still alive. |
| 11 | Ox | 1844 | Died 19th day (result of injection?). |
| 12 | " | 1845 | Still alive. |
| 13 | " | 1846 | Died 18th day from Poverty. |
| 14 | " | 1847 | Still alive. |
| 15 | " | 1848 | Died 27th day from East Coast Fever. |
| 16 | " | 1849 | Died 23rd day from Blackquarter. |
| 17 | " | 1851 | Still alive. |
| 18 | Cow | 1853 | Proved immune to East Coast Fever, but died of anaplasmosis in April, 1912. |
| 19 | " | 1854 | Drowned 15th day. |
| 20 | Ox | 1855 | Still alive. |
| 21 | " | 1856 | Died 19th day (result of injection?). |
| 22 | " | 1859 | Died 23rd day (result of injection?). |
| 23 | " | 1861 | Still alive. |
| 24 | " | 1864 | Died 23rd day (result of injection?). |
| 25 | " | 1866 | Still alive. |
| 26 | Bull | 1869 | Died 19th day from Septicaemia. |
| 27 | Ox | 1872 | Died 62nd day from East Coast Fever. |
| 28 | " | 1874 | Still alive. |
| 29 | " | 1876 | " |
| 30 | " | 1877 | " |
| 31 | " | 1879 | Died 23rd day from East Coast Fever. |
| 32 | " | 1880 | Drowned on 15th day (no smears taken). |
| 33 | " | 1882 | Still alive. |

Results.—Of 33 animals injected as above and exposed to infection on the 14th day, 7 died of East Coast Fever or as a result of the injection, 2 were drowned on the 15th day and have therefore to be excluded from the statistics, 6 died of other causes (poverty, etc.) and the remaining 18 survived. Of these 18, one died of East Coast Fever on the 62nd day.

The survivors would therefore be 17 out of 31 or 54.8%.

Experiment No. 13. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (coarse grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever and mixed with Peptone. The cattle were kept on clean veld for 14 days before being exposed to natural infection.

Date: August 2nd, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., in Clakebury, Transkeian Territories, Cape Pvince).

No. of cattle inoculated.
266.

No. that died.
112.

Results.—Of 266 cattle injected as above and exposed to veld infection on the 14th day, 154 survived or 57.9%.

Experiment No. 14. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (medium and coarse grain) obtained from animals that were slaughtered in the last stages of East Coast Fever mixed with Peptone and with Peptone and Aleuronat.

NOTE.—The injected animals had previously been running on the infected townlands of Utrecht, Natal, and at the time of injection some were possibly in the incubative stage of the disease. They were inoculated and kept in a clean paddock for 14 days before being exposed to heavy veld infection.

(Under the supervision of Mr. A. C. Kirkpatrick, M.R.C.V.S.)

| No. of animals injected. | Date of injection. | Pulp mixed with. | Result of injection. | No. that survived after exposure for 6 weeks on infected veld. |
|--------------------------|--------------------|---|--|--|
| 33 | 29/8/11 | Coarse grain and Peptone. | One died of E.C.F. on 7th day. Fourteen died of E.C.F. between the 16th and 23rd days. | 18 |
| 9 | | Coarse grain and Peptone and Aleuronat. | Four died of E.C.F. between the 16th and 27th days. | 5 |
| 6 | | Medium grain and Peptone and Aleuronat. | Three died of E.C.F. between the 16th and 27th days. | 3 |
| 13 | 14/9/11 | Medium grain and Peptone. | Three died of E.C.F. between the 18th and 27th days. | 10 |
| 13 | | Medium grain (pure) | Four died of E.C.F. between the 17th and 28th days. | |
| 14 | | Coarse grain and Peptone. | Five died of E.C.F. between the 17th and 29th days. | 9 |
| 13 | | Coarse grain (pure). | Three died of E.C.F. between the 24th and 30th days. | 10 |
| 8 | 15/9/11 | Medium grain and Peptone. | None died. | 8 |

Results.—Of 109 animals injected with 5 c.c. Spleen and Gland pulp as above, and exposed to veld infection on the 14th day, 72 survived or 66%.

Experiment No. 15. To note the effect of the intrajugular injection of 10 c.c. Spleen and Gland pulp (coarse grain), obtained from an animal that was slaughtered in the last stage of East Coast Fever, and mixed with Peptone.

The injected animals were removed to clean ground for 14 days before being turned out to natural infection.

Date: September 17th, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., at Hluleka, Ngqeleni district, Transkeian Territories, Cape Province.)

| | | |
|---------------------------|--|---|
| No. of cattle inoculated. | No that contracted East Coast Fever and recovered. | No that contracted East Coast Fever and died. |
| 142. | 15. | 45. |

Results.—Of 142 cattle injected as above and exposed to veld infection on the 14th day, 97 survived or 68·3%.

Tabulated Summary of Experiments Nos. 5—15 showing the final result of the injection of cattle from infected herds, with Spleen and Gland pulp, according to various doses and grains, etc.

| Exp't No. | No. of Animals injected. | Dose given. | Grain of Pulp. | Mixed with. | Interval between injection and exposure. | No. that survived. | Percentage of number that survived to number injected. |
|-----------|--------------------------|-------------|----------------------------------|---------------------|--|--------------------|--|
| 5 | 19 | 5 c.c. | Medium ... | Peptone ... | Immediate | 10 | 52·6% |
| 6 | 43 | 10 c.c. | " ... | Peptone & Aleuronat | " | 22 | 51·2% |
| 7 | 31 | 10 c.c. | " ... | Peptone ... | " | 14 | 45·2% |
| 8 | 30 | 10 c.c. | " ... | Aleuronat | 10 days ... | 14 | 46·7% |
| 9 | 48 | 10 c.c. | Coarse ... (Spleen pulp only) | Pure ... | " ... | 22 | 45·8% |
| 10 | 64 | 10 c.c. | Coarse ... | Aleuronat | " ... | 46 | 71·9% |
| 11 | 16 | 10 c.c. | " ... | Pure ... | 14 days ... | 6 | 37·5% |
| 12 | 31 | 10 c.c. | " ... | Aleuronat | " ... | 17 | 54·8% |
| 13 | 266 | 5 c.c. | " ... | Peptone ... | " ... | 154 | 57·9% |
| 14 | 33 | 5 c.c. | " ... | " ... | " ... | 18 | 54·5% |
| | 9 | 5 c.c. | " ... | Peptone & Aleuronat | " ... | 5 | 55· % |
| | 6 | 5 c.c. | Medium ... | Peptone & Aleuronat | " ... | 3 | 50 % |
| | 13 | 5 c.c. | " ... | Peptone ... | " ... | 10 | 76·9% |
| | 13 | 5 c.c. | " ... | Pure ... | " ... | 9 | 69·2% |
| | 14 | 5 c.c. | Coarse ... | Peptone ... | " ... | 9 | 64·3% |
| | 13 | 5 c.c. | " ... | Pure ... | " ... | 10 | 76·9% |
| | 8 | 5 c.c. | Medium ... | Peptone ... | " ... | 8 | 100 % |
| 15 | 142 | 5 c.c. | Coarse ... | " ... | " ... | 97 | 68·3% |
| | 799 | | | | | 474 | 59·3% |

The summary of these results, according to the various factors, is as follows:—

(a) *Dosage.*

Of 536 animals injected with 5 c.c. of pulp 333 or 62·1% survived.

Of 263 animals injected with 10 c.c. of pulp 141 or 53·6% survived.

(b) *Grain.*

Of 636 animals injected with coarse grain pulp 384 or 60·4% survived.

Of 163 animals injected with medium grain pulp 90 or 55·2% survived.

(c) *Mixture.*

Of 125 animals injected with pulp mixed with Aleuronat 77 or 61·6% survived.

Of 526 animals injected with pulp mixed with Peptone 320 or 60·8% survived.

Of 90 animals injected with pure pulp 47 or 52·2% survived.

Of 58 animals injected with pulp mixed with Aleuronat and Peptone 30 or 51·7% survived.

(d) *Interval between inoculation and exposure.*

Of 564 animals injected and exposed 14 days later, 346 or 61.3% survived.

Of 142 animals injected and exposed 10 days later, 82 or 57.7% survived.

Of 93 animals injected and exposed immediately afterwards, 46 or 49.5% survived.

CONCLUSION.—For the inoculation of cattle in infected herds the experience in the field indicates that the best results are to be obtained by the intrajugular injection of 5 c.c. Spleen and Gland pulp (coarse grain), mixed with either Aleuronat or Peptone, the injected animals to be exposed to veld infection 14 days later.

(C). INOCULATION OF CALVES.

Experiment No. 16. To note the effect of the intrajugular injection of Spleen and Gland pulp on calves of 3 weeks to 3 months old.

(a) Twenty-two calves were inoculated with 5 c.c. Spleen and Gland pulp (medium grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever and mixed with Peptone. The calves were obtained from a clean area and remained there for 14 days after inoculation when they were exposed to natural infection.

Date: 21st September, 1911.

(Under the supervision of Mr. Frank Chambers, M.R.C.V.S., at Hluleka, Ngqeleni District, Transkeian Territories, Cape Province.)

| No. of calves inoculated. | No. that died. | Percentage of Survivors. |
|---------------------------|----------------|--------------------------|
| 22 | 15 | 31.7% |

(b) Eight calves were inoculated on the 25/9/11 with 5 c.c. Spleen and Gland pulp (medium grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever, mixed with Peptone. These calves were allowed to graze over infected veld immediately after inoculation.

Date: 25th September, 1911.

(Under the supervision of Mr. A. C. Kirkpatrick, M.R.C.V.S., in Vryheid, Natal.)

| No. of calves inoculated. | No. that died. | Percentage of Survivors. |
|---------------------------|----------------|--------------------------|
| 8 | 5 | 35% |

CONCLUSION.—The inoculation of calves in the field indicates that the results are not likely to be as good as in full-grown animals.

(D) DOUBLE INJECTION.

Experiment No. 17. To note the effect of a double injection in the practice.

NOTE.—Twenty-three head of cattle were inoculated by Mr. Frank Chambers on the 15th June, 1911, with a fine emulsion of Spleen pulp.

By the 10th October 18 were still alive, and these animals were then injected with 10 c.c. Spleen and Gland pulp, mixed with Peptone.

Result.—Six died from East Coast Fever as a result of this second injection.

CONCLUSION.—The double inoculation does not appear to have any material advantage, as only 12 out of 23 or 52.1% survived both injections, a lower percentage than that resulting from a single injection.

PART II.

THE IMMUNISATION OF CATTLE AGAINST EAST COAST FEVER AT THE LABORATORY.

Experiment No. 18. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (fine grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever.

| Refer- ence. No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|------------------------|---------------------|-----------------------|-------------------------|--|--------------------------------|---|---------------------------|
| | Animal injected. | Date of injection. | Result of injection. | Tick Infestations. | | Exposure Tests. | |
| | | | | No. of times animal was in- fested with ticks | Result of in- festation. | Date of ex- posure on the farm Burnside. | Result of exposure. |
| A. | Cow 870 | 11/7/11 | R.P.R. | Twice | Negative | 20/9/11 | N.R. |
| B. | Ox 1675 | " | R.R. | " | " | " | †Redwater 25/10/11 |

Explanation of Symbols:

N.R.—Indicates that the animal did not react.

R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

R.P.R.—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

Summary of Experiment No. 18. Of 2 animals injected as above, both reacted and survived the critical period of the test.

Experiment No. 19. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (fine grain) obtained from animals that were slaughtered in the last stages of East Coast Fever, mixed with Aleuronat.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------|----------------------|--|------------------------|--|--------------------------------------|
| | Animal injected. | Date of injection. | Result of injection. | Tick Infestations. | | Exposure Tests. | |
| | | | | No. of times animal was infested with ticks. | Result of infestation. | Date of exposure on the farm Burnside. | Result of exposure. |
| A. | Ox 1699 | 11/7/11 | I.R. | Twice | Negative | 20/9/11 | N.R. |
| B. | Heifer 1455 | " | R.R. | " | " | " | " |
| C. | Ox 1634 | " | " | " | R.P.† | " | " |
| D. | Ox 1628 | " | N.R. | " | Negative | 20/9/11 | R.R. |
| E. | Ox 1647 | " | R.R. | " | N.R. | " | I.R. |
| F. | Ox 1642 | " | N.R. | " | R.P.† | " | " |
| G. | Heifer 1444 | 29/7/11 | I.R. | — | — | 4/10/11 | R.P.† |
| H. | Heifer 1515 | " | " | — | — | " | R.P.† (complicated with Redwater) |
| I. | Heifer 1443 | " | R.P.R. | — | — | " | N.R. |
| J. | Heifer 1450 | " | I.R. | — | — | " | " |
| K. | Heifer 1451 | " | " | — | — | " | R.P.R. |

Explanation of Symbols :

R.P.†—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

R.P.R.—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

R.R.—Indicates that the animal had a reaction and recovered, but the plasma bodies were not detected.

I.R.—Indicates that the animal had an irregular reaction and recovered.

N.R.—Indicates that the animal did not react.

(1) *Summary of Experiment No. 19.* Of 11 animals injected intra-jugularly with 5 c.c. Spleen and Gland pulp (fine grain) mixed with Aleuronat, one showed the presence of plasma bodies, and all survived. Of these 11 survivors, six were tested with ticks and two died of East Coast Fever. The four animals that survived tick infestation were exposed to natural infection, and were still alive at the date of writing.

The other five animals that survived injection were exposed to natural infection, and two died of East Coast Fever, one of them being complicated with Redwater.

Experiment No. 20. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (fine grain) obtained from animals that were slaughtered in the last stages of East Coast Fever, mixed with Peptone.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------|----------------------|--|------------------------|--|---|
| | Animal injected. | Date of injection. | Result of injection. | Tick Infestation. | | Exposure Tests. | |
| | | | | No. of times animal was infested with ticks. | Result of infestation. | Date of exposure on the farm Burnside. | Result of exposure. |
| A. | Ox 1377 | 28/6/11 | R.P.R. | Twice | N.R. | 20/9/11 | N.R. |
| B. | Ox 1393 | " | N.R. | Twice | R.P.† | — | — |
| C. | Ox 1457 | " | I.R. | Twice | N.R. | 20/9/11 | N.R. |
| D. | Ox 1463 | " | N.R. | Twice | R.P.† | — | — |
| E. | Ox 1469 | " | N.R. | Twice | R.P.† | — | — |
| F. | Ox 1631 | 11/7/11 | N.R. | Twice | R.P.R. | 20/9/11 | N.R. |
| G. | Ox 1644 | " | I.R. | Twice | N.R. | " | R.P.R. |
| H. | Ox 1637 | " | N.R. | Twice | R.P.† | — | — |
| I. | Bull 1509 | " | R.P.R. | Twice | N.R. | 20/9/11 | †Redwater 23rd day. |
| J. | Ox 1635 | " | N.R. | Twice | N.R. | " | N.R. |
| K. | Ox 1645 | " | N.R. | Twice | R.P.† | — | — |
| L. | Ox 1714 | 29/7/11 | R.R. | — | — | 4/10/11 | R.P.R. |
| M. | Heifer 1452 | " | I.R. | — | — | " | R.P.R. |
| N. | Ox 1707 | " | I.R. | — | — | " | †R.P. (Complicated with Red- water). |
| O. | Ox 1705 | " | I.R. | — | — | " | †R.P. |
| P. | Ox 1702 | " | R.P.† | — | — | — | — |

Explanation of Symbols:

- R.P.†—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.
 R.P.R.—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.
 R.R.—Indicates that the animal had a reaction and recovered, but that Plasma bodies were not detected.
 I.R.—Indicates that the animal had an irregular reaction and recovered.
 N.R.—Indicates that the animal did not react.

(2) *Summary of Experiment No 20.* Of 16 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (fine grain) mixed with Peptone, one died of East Coast Fever and two showed the presence of plasma bodies; these two together with the remaining 13 all survived.

Of these 15 survivors 11 were tested with ticks and 5 died of East Coast Fever. The 6 that survived tick infestation were exposed to natural infection, and 5 were still alive at the date of writing, one having died of Redwater on the 23rd day.

The other 4 animals that survived injection were exposed to natural infection, and two died of East Coast Fever, both being complicated with Redwater.

Experiment No. 21. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (fine grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever, mixed with Peptone and Aleuronat.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | |
|---------------|------------------|--------------------|----------------------|--|-----------------------------|
| | Animal injected. | Date of injection. | Result of injection. | Date of exposure on the farm Burnside. | Result of exposure. |
| A. | Ox 1706 | 29/7/11 | I.R. | 4/10/11 | †66th day East Coast Fever? |
| B. | Ox 1708 | " | R.P.R. | " | R.P.R. |
| C. | Ox 1703 | " | N.R. | " | R.P.† |
| D. | Ox 1719 | " | " | " | R.P.† |
| E. | Ox 1720 | " | R.P.† | — | — |

Explanation of Symbols:

R.P.†—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

R.P.R.—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

I.R.—Indicates that the animal had an irregular reaction and recovered.

N.R.—Indicates that the animal did not react.

(3) *Summary of Experiment No. 21.* Of 5 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (fine grain) mixed with Peptone and Aleuronat, one died of East Coast Fever, and one showed the presence of plasma bodies. This latter animal, together with the remaining 4, were exposed to natural infection of which lot 3 died of East Coast Fever.

It will be noticed that Ox 1,708 reacted to the injection and also to the exposure test, thus showing plasma bodies on two occasions.

Experiment No. 22. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (half medium grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | |
|---------------|------------------|--------------------|----------------------|--|---------------------|
| | Animal injected. | Date of injection. | Result of injection. | Date of exposure on the farm Burnside. | Result of exposure. |
| A. | Ox 1789 | 21/9/11 | R.P.R. | 26/10/11 | I.R. |
| B. | Ox 1805 | " | " | " | R.P.R. |
| C. | Ox 1814 | " | " | " | " |

Explanation of Symbols:

R.P.R.—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

I.R.—Indicates that the animal had an irregular reaction and recovered.

(4) *Summary of Experiment No. 22.* Of 3 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (half medium grain), all showed the presence of plasma bodies and survived. They were then exposed to natural infection, and were still alive at the time of writing.

In two oxen, Nos. 1,805 and 1,814, plasma bodies were noticed, both after injection and test.

Experiment No. 23. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (half medium grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever and mixed with Peptone.

| Reference No. | INJECTIONS. | | | IMMUNITY TEST. | |
|---|------------------|--------------------|----------------------|--|---------------------|
| | Animal injected. | Date of injection. | Result of injection. | Date of exposure on the farm Burrside. | Result of exposure. |
| A | Ox 1798. | 21/9/11. | R.P.† | — | — |
| B | Calf 1116. | „ | N.R. | 26/10/11. | R.P.† |
| NOTE.—Had been injected twice previously (<i>vide</i> Rep. Director of Veterinary Research, 1911.) | | | | | |

Explanation of Symbols.

R.P.† Indicates that the animal had a reaction accompanied with the presence of plasma bodies, and died of East Coast Fever.

N.R. Indicates that the animal did not react.

(5) *Summary of Experiment No. 23.* Of 2 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (half medium grain) mixed with Peptone, one did not react, and the other died of East Coast Fever. The survivor (which had been injected previously), died of East Coast Fever when exposed to veld infection.

Experiment No. 24. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (medium grain) obtained from animals that were slaughtered in the last stages of East Coast Fever.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | |
|---------------|------------------|--------------------|----------------------|--|---------------------|
| | Animal injected. | Date of injection. | Result of injection. | Date of exposure on the farm Buraside. | Result of exposure. |
| A | Ox 1709. | 11/8/11. | R.P.† | — | — |
| B | Ox 1721. | „ | R.P.† | — | — |
| C | Calf 1128. | 16/9/11. | †Anæmia on 28th day. | NOTE.—Had been injected in March with negative results (<i>vide</i> 1st Report of Director of Veterinary Research, 1911.) | — |
| D | Ox 1804. | 21/9/11. | R.P.† | — | — |
| E | Ox 1820. | „ | R.P.R. | 26/10/11. | N.R. |
| F | Calf 1093. | „ | R.P.† | — | — |

Explanation of Symbols.

R.P.† Indicates that the animal had a reaction accompanied with the presence of plasma bodies, and died of East Coast Fever.

R.P.R. Indicates that the animal had a reaction accompanied with the presence of plasma bodies, and recovered.

N.R. Indicates that the animal did not react.

(6) *Summary of Experiment No. 24.* Of 6 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (medium grain), 4 died of East Coast Fever and one of anaemia. The remaining animal reacted to the injection and proved to be immune when exposed.

Experiment No. 25. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (medium grain) obtained from animals that were slaughtered in the last stage of East Coast Fever, mixed with Peptone.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | |
|---------------|------------------|--------------------|----------------------|--|------------------------------------|
| | Animal injected. | Date of injection. | Result of injection. | Date of exposure on the farm Burnside. | Result of exposure. |
| A | Heifer 1513. | 31/8/11. | R.P.R. | 23/10/11. | R.P.† |
| B | Heifer 1514. | " | I.R. | " | R.P.† |
| C | Ox 1778. | " | R.P.R. | " | R.R. |
| D | Ox 1795. | " | N.R. | " | R.P.R. |
| E | Ox 1803. | " | R.P.† | — | — |
| F | Ox 1809. | " | R.P.† | — | — |
| G | Ox 1812. | " | N.R. | 23/10/11. | R.P.† (complicated with Redwater.) |
| H | Ox 1819. | " | R.R. | " | N.R. |
| I | Calf 1130. | 16/9/11. | I.R. | " | R.P.† |
| J | Ox 1785. | 21/9/11. | R.P.R. | " | R.R. |
| K | Ox 1787. | " | R.P.R. | " | R.R. |
| L | Ox 1794. | " | R.P.R. | 26/10/11. | R.R. |
| M | Ox 1815. | " | I.R. | " | R.R. |

Explanation of Symbols.

R.P. †Indicates that the animal had a reaction accompanied with the presence of plasma bodies, and died of East Coast Fever.

R.P.R. Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

N.R. Indicates that the animal did not react.

I.R. Indicates that the animal had an irregular reaction and recovered.

R.R. Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

Summary of Experiment No. 25. Of 13 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (medium grain) mixed with Peptone, 2 died of East Coast Fever and 5 showed the presence of plasma bodies. These latter 5, together with the remaining 6, were exposed to natural infection, and 4 died of East Coast Fever, one of them being complicated with Redwater.

Heifer 1,513 showed the presence of plasma bodies on two occasions, once as a result of the injection, and secondly, after exposure, when it succumbed.

Experiment No. 26. To note the effect of the intrajugular injection of 5 c.c. mixture consisting of Spleen and Gland pulp (medium grain) obtained from animals that were slaughtered in the last stages of East Coast Fever, added to pulverised Gelatine and Physiological water.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | |
|---------------|------------------|--------------------|---|--|---------|
| | Animal injected. | Date of injection. | Result. | Date of exposure on the farm Burnside. | Result. |
| A | Ox 1723. | 31/8/11. | I.R. | 23/10/11. | R.P. † |
| B | Ox 1728. | " | R.R. | " | R.P. † |
| C | Ox 1736. | " | N.R. | " | R.P.R. |
| D | Ox 1782. | " | R.P.R. | " | R.R. |
| E | Ox 1786. | " | R.P.R. | " | R.P.R. |
| F | Ox 1797. | " | R.P.R. | " | R.P.R. |
| G | Ox 1807. | " | R.P.R. | " | N.R. |
| H | Ox 1816. | " | R.R. Died in October, of Debility. | — | — |

Explanation of Symbols :

I.R.—Indicates that the animal had an irregular reaction and recovered.

N.R.—Indicates that the animal did not react.

R.P.R.—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

R.P.†—Indicates that the animal had a reaction accompanied with the presence of plasma bodies, and died of East Coast Fever.

Summary of Experiment No. 26. Of 8 animals injected with 5 c.c. Spleen and Gland pulp (medium grain mixed with Gelatine and Physiological water) 6 reacted, one of which died later of debility before its immunity could be tested. Of the 7 survivors two died of East Coast Fever when exposed to natural infection, and the remainder were still alive at the date of writing.

Two oxen, Nos. 1,786 and 1,797, showed the presence of plasma bodies after injection and again after the test.

Experiment No. 27. To note the effect of the intrajugular injection of 5 c.c Spleen and Gland pulp (half coarse grain) obtained from animals that were slaughtered in the last stage of East Coast Fever.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | |
|---------------|------------------|--------------------|----------------------|--|---------------------|
| | Animal injected. | Date of injection. | Result of injection. | Date of exposure on the farm Burnside. | Result of exposure. |
| A. | Ox 1792 | 21/9/11 | R.R. | 26/10/11 | I.R. |
| B. | Ox 1821 | " | I.R. | " | N.R. |
| C. | Calf 1170 | " | R.R. | " | R.R. |

Explanation of Symbols :

I.R. Indicates that the animal had an irregular reaction and recovered.

N.R. Indicates that the animal did not react.

R.R. Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

(8) *Summary of Experiment No 27.* Of 3 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (half coarse grain) all reacted and recovered. They were exposed to natural infection, and were still alive at the time of writing.

Experiment No. 28. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (half coarse grain) obtained from animals that were slaughtered in the last stages of East Coast Fever, mixed with Peptone.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------|---|---|---------|--|---|
| | Animal injected. | Date of injection. | Result. | Tick Infestations. | | Exposure Tests. | |
| | | | | No. of times animal was infested with infested ticks. | Result. | Date of exposure on the farm Burnside. | Result. |
| A | Ox 1727. | 31/8/11. | N.R., killed in October | — | — | (broken leg). | — |
| B | Ox 1737. | " | R.P.R. | — | — | 23/10/11. | N.R. |
| C | Ox 1738. | " | R.P.† | — | — | — | — |
| D | Ox 1739. | " | R.P.R. | — | — | 23/10/11. | I.R. |
| E | Ox 1777. | " | R.P.R. | — | — | — | R.P.R. |
| F | Ox 1781. | " | R.P.R. | — | — | — | N.R. |
| G | Ox 1813. | " | R.P.R. | — | — | — | R.P.R. |
| H | Ox 1818. | " | R.P.R. | — | — | — | N.R. |
| I | Ox 1793. | 21/9/11. | R.P.† | — | — | — | — |
| J | Ox 1799. | " | R.P.R. | — | — | 26/10/11. | R.P.R. |
| K | Ox 1810. | " | N.R. | — | — | — | N.R. |
| L | Heifer 1124. | 21/12/11. | R.P.R. | Once. | I.R. | 17/4/12. | Still alive. |
| M | Heifer 1144. | " | N.R. | " | N.R. | " | Died of debility, 9/5/12. |
| N | Heifer 1162. | " | N.R. | " | R.R. | " | Still alive. |
| O | Bull 1169. | " | R.P.R. | " | N.R. | " | Died of debility, 9/9/12. |
| P | Cow 1824. | " | N.R. | " | R.P.† | — | — |
| Q | Heifer 1745. | " | R.P.† | " | — | — | — |
| R | Ox 170. | 4/1/12. | R.P.R. | Once. | N.R. | 17/4/12. | Still alive. |
| S | Ox 1733. | " | R.P.† | — | — | — | — |
| T | Ox 1734. | " | R.P.R. | Once. | N.R. | 17/4/12. | Still alive. |
| U | Heifer 1744. | " | R.R. | " | N.R. | " | " |
| V | Ox 2026. | " | R.P.R. | " | N.R. | " | " |
| W | Ox 2041. | 31/1/12. | R.R. | " | R.P.R. | " | " |
| X | Ox 1923. | 8/2/12. | R.P.R. | " | N.R. | " | " |
| Y | Ox 2044. | " | I.R. | " | R.R. | " | Died of debility 24th May, 1912. |
| Z | Ox 2052. | " | R.P.R. | " | R.R. | " | Died from an accident, 17th June, 1912. |
| AA | Heifer 2077. | 4/3/12. | R.P.R. | " | N.R. | 5/6/12. | Still alive. |
| BB | Heifer 2079. | " | R.P.R. | " | N.R. | " | " |
| CC | Heifer 2082. | " | R.P.R. | " | N.R. | " | " |
| DD | Ox 1933. | 22/4/12. | I.R., killed in May, 1912 | — | — | (pneumonia). | — |
| EE | Ox 2064. | " | R.P.† | — | — | — | — |
| FF | Ox 2068. | " | R.P.R. | Once. | R.P.R. | 27/7/12. | Still alive. |
| GG | Ox 2071. | " | Died of endocarditis and pneumonia, 4/5/12. | — | — | — | — |
| HH | Cow 2210. | " | Died of pneumonia, 19/5/12. | — | — | — | — |
| II | Bull 1165. | 13/5/12. | R.P.† | — | — | — | — |
| JJ | Heifer 1185. | " | R.P.R. | Once. | R.R. | 27/7/12. | Died of poverty, 9/9/12. |
| KK | Bull 1210. | " | R.P.† | — | — | — | — |
| LL | Heifer 1522. | " | R.P.† | — | — | — | — |
| MM | Heifer 1669. | " | R.P.† | — | — | — | — |
| NN | Heifer 2222. | 18/6/12. | R.P.† | — | — | — | — |
| OO | Heifer 2233. | " | N.R. | — | — | 12/8/12. | Still alive. |
| PP | Cow 2234. | " | R.P.† | — | — | — | — |
| QQ | Heifer 2235. | " | R.P.† | — | — | — | — |
| RR | Cow 2237. | " | R.P.† | — | — | — | — |
| SS | Ox 2528. | 11/7/12. | R.R. | — | — | 22/8/12. | Still alive. |
| TT | Ox 2542. | " | R.R. | — | — | " | " |
| UU | Ox 2543. | " | R.R. | — | — | " | " |
| VV | Ox 2547. | " | R.P.R. | — | — | " | " |
| WW | Ox 2549. | " | R.P.† | — | — | " | " |
| XX | Ox 2554. | " | R.P.R. | — | — | 22/8/12. | Still alive. |
| YY | Ox 2558. | " | R.P.R. | — | — | " | " |
| ZZ | Ox 2559. | " | R.R. | — | — | " | " |

Explanation of Symbols.

R.P. Indicates that the animal had a reaction accompanied with a presence of plasma bodies and died of East Coast Fever.

R.P.R. Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

R.R. Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

I.R.† Indicates that the animal had an irregular reaction and recovered.

N.R. Indicates that the animal did not react.

Summary of Experiment No. 28. Of 51 animals (excluding Ox 1,727) injected intrajugularly with 5 c.c. Spleen and Gland pulp (half coarse grain) mixed with Peptone, 14 died of East Coast Fever, two succumbed to Pneumonia, one died of Pneumonia and Endocarditis, 22 reacted showing plasma bodies and recovered, 7 showed reaction without plasma bodies, and the remaining five failed to react typically.

Of the 34 survivors, one died of East Coast Fever when tested with ticks; five reacted accompanied with the presence of plasma bodies and recovered, and the remaining 28 all survived the critical period of the test, although three died some months afterwards from other causes.

Experiment No 29. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (half coarse grain) obtained from animals that were slaughtered in the last stages of East Coast Fever, mixed with Peptone and varying strengths of Hydro-Quinine.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------------------------|-----------------------------|---|---------|--|--------------|
| | | | | Tick Infestations. | | Exposure Tests. | |
| | Animal injected. | Date of injection. | Result. | No. of times animal was infested with infested ticks. | Result. | Date of exposure on the farm Burnside. | Result. |
| 1 | Heifer 1746. | (a) 0.4% Solution of Hydro-Quinine. | R.P.† | — | — | — | — |
| | | (b) 0.5% Solution of Hydro-Quinine. | | | | | |
| 2 | Ox 1921. | 22/4/12. | R.P.† | — | — | — | — |
| 3 | Ox 1932. | " | R.P.† | — | — | — | — |
| 4 | Ox 1934. | " | N.R. | Once. | R.P.† | — | — |
| 5 | Ox 1935. | " | R.P.† | — | — | — | — |
| 6 | Ox 2060. | " | Died of Pneumonia 30th day. | | | | |
| 7 | Ox 2065. | " | N.R. | Once. | R.P.† | — | — |
| 8 | Ox 2072. | " | R.R. | Twice. | N.R. | 27/7/12. | Still alive. |
| | | (c) 0.6% Solution of Hydro-Quinine. | | | | | |
| 9 | Heifer 1626. | 18/6/12. | I.R. | — | — | 2/8/12. | " |
| 10 | Bull 1919. | " | R.P.R. | — | — | " | " |
| 11 | Bull 1943. | " | N.R. | — | — | " | " |
| 12 | Cow 654. | " | N.R. | — | — | " | " |
| 13 | Heifer 2090. | " | R.P.R. | — | — | " | " |
| 14 | Cow 2205. | " | R.P.† | — | — | — | — |
| 15 | Cow 2206. | " | N.R. | — | — | 2/8/12. | Still alive. |
| 16 | Cow 2214. | " | R.R. | — | — | " | R.P.† |
| 17 | Heifer 2223. | " | R.P.† | — | — | — | — |
| 18 | Cow 2236. | " | I.R. | — | — | 2/8/12. | R.P.† |
| | | (d) 0.65% Solution of Hydro-Quinine. | | | | | |
| 19 | Ox 2527. | 11/7/12. | R.P.R. | — | — | 22/8/12. | Still alive. |
| 20 | Ox 2529. | " | R.R. | — | — | " | " |
| 21 | Ox 2530. | " | R.P.† | — | — | " | — |
| 22 | Ox 2535. | " | R.P.† | — | — | — | — |
| 23 | Ox 2546. | " | R.R. | — | — | 22/8/12. | Still alive. |
| 24 | Ox 2555. | " | I.R. | — | — | " | " |
| 25 | Ox 2556. | " | R.P.† | — | — | — | — |
| 26 | Ox 2563. | " | R.R. | — | — | 22/8/12. | Still alive. |
| | | (e) 0.7% Solution of Hydro-Quinine. | | | | | |
| 27 | Ox 2531. | 11/7/12. | I.R. | — | — | " | " |
| 28 | Ox 2532. | " | R.P.† | — | — | — | — |
| 29 | Ox 2537. | " | R.R. | — | — | 22/8/12. | Still alive. |
| 30 | Ox 2540. | " | I.R. | — | — | " | " |
| 31 | Ox 2541. | " | N.R. | — | — | " | " |
| 32 | Ox 2553. | " | R.P.R. | — | — | " | " |
| 33 | Ox 2561. | " | R.P.† | — | — | — | — |
| 34 | Ox 2564. | " | R.R. | — | — | 22/8/12. | Still alive. |

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------|------------------------------|---|---------|--|--|
| | | | | Tick Infestations. | | Exposure Tests. | |
| | Animal injected. | Date of injection. | Result. | No. of times animal was infested with infected ticks. | Result. | Date of exposure on the farm Burnside. | Result. |
| | | (f) | 0.75% | <i>Solution of Hydro-Quinine.</i> | | | |
| 35 | Ox 1924. | 22/4/12. | N.R. | Once. | R.P.† | — | — |
| 36 | Ox 1931. | " | R.P.† | — | — | — | — |
| 37 | Ox 2033. | " | I.R. | Twice. | R.P.† | — | — |
| 38 | Ox 2059. | " | I.R. | " | R.R. | 27/7/12. | Killed (broken leg.) Aug. 4th, 1912. Still alive. |
| 39 | Ox 2066. | " | I.R. | " | R.R. | " | " |
| 40 | Ox 2099. | " | N.R. | " | I.R. | " | " |
| 41 | Ox 2100. | " | I.R. | Once. | R.P.† | — | — |
| | | (g) | 1% | <i>Solution of Hydro-Quinine.</i> | | | |
| 42 | Bull 1094. | 4/3/12. | R.P.R. | Once. | N.R. | 5/6/12. | Died poverty, 12/9/12. |
| 43 | Heifer 1831. | " | I.R. | " | R.P.† | — | — |
| 44 | Heifer 2084. | " | R.P.R. | " | N.R. | 5/6/12. | Still alive. |
| 45 | Ox 182. | 22/4/12. | Died of Pyæmia 9/5/12. | — | — | — | — |
| | | (h) | 2% | <i>Solution of Hydro-Quinine.</i> | | | |
| 46 | Ox 1930. | 31/1/12. | I.R. | Once. | R.P.R. | 17/4/12. | Still alive: |
| 47 | Ox 2036. | 8/2/12. | I.R. | " | I.R. | " | " |
| 48 | Ox 2046. | " | N.R. | " | N.R. | " | " |
| 49 | Ox 2053. | " | R.P.R. | " | N.R. | " | " |
| 50 | Heifer 1120. | 4/3/12. | N.R. | " | R.P.† | — | — |
| 51 | Heifer 2074. | " | N.R. | " | R.P.† | — | — |
| 52 | Heifer 2080. | " | N.R. | " | R.P.† | — | — |
| | | (i) | 4% | <i>Solution of Hydro-Quinine.</i> | | | |
| 53 | Heifer 1373. | 4/3/12. | I.R. | Once. | R.P.† | — | — |
| 54 | Heifer 1829. | " | N.R. | " | R.P.† | — | — |
| 55 | Heifer 2078. | " | N.R. | " | R.P.† | — | — |
| | | (j) | 5% | <i>Solution of Hydro-Quinine.</i> | | | |
| 56 | Ox 2062. | 31/1/12. | N.R. | Once. | R.P.† | — | — |
| | | (k) | 10% | <i>Solution of Hydro-Quinine.</i> | | | |
| 57 | Heifer 2076. | 31/1/12. | N.R. | Once. | R.P.† | — | — |
| | | (l) | 20% | <i>Solution of Hydro-Quinine.</i> | | | |
| 58 | Heifer 1521. | 21/12/12. | I.R. | Once. | R.P.† | — | — |
| 59 | Heifer 1823. | " | N.R. | " | R.P.† | — | — |
| 60 | Heifer 1662. | " | I.R. | " | R.P.† | — | — |
| 61 | Heifer 1667. | " | N.R. | " | R.P.† | — | — |

Explanation of Symbols :

R.P.† Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

R.P.R. Indicates that the animal had a re-action accompanied with the presence of plasma bodies and recovered.

R.R. Indicates that the animal had an irregular reaction and recovered but that plasma bodies were not detected.

I.R. Indicates that the animal had an irregular reaction and recovered.

N.R. Indicates that the animal did not react.

L

Summary of Experiment No. 29. Of 59 animals (excluding Nos. 2,060 and 182) injected with 5 c.c. Spleen and Gland pulp (half coarse grain) mixed with Peptone and varying quantities of Hydro-Quinine, the results are as follows:—

| No. of Animals injected. | Solution of Hydro-Quinine. | Died of East Coast Fever from injection. | Survived injection. | Died of East Coast Fever from tests. | Survived the critical period of Tests. |
|--------------------------|----------------------------|--|---------------------|--------------------------------------|--|
| 1 | 0.4% | 1 | — | — | — |
| 6 | 0.5% | 3 | 3 | 2 | 1 |
| 10 | 0.6% | 2 | 8 | 2 | 6 |
| 8 | 0.65% | 3 | 5 | — | 5 |
| 8 | 0.7% | 2 | 6 | — | 6 |
| 7 | 0.75% | 1 | 6 | 3 | 3 |
| 3 | 1% | — | 3 | 1 | 2 |
| 7 | 2% | — | 7 | 3 | 4 |
| 3 | 4% | — | 3 | 3 | Nil. |
| 1 | 5% | — | 1 | 1 | Nil. |
| 1 | 10% | — | 1 | 1 | Nil. |
| 4 | 20% | — | 4 | 4 | Nil. |
| 59 | | 12 | 47 | 20 | 27 |

CONCLUSION.—The saturation of pulp with Hydro-Quinine in the strength of 4% and over resulted in the complete failure to immunise the 9 animals. The optimal dose of Hydro-Quinine appears to lie between 0.6% and 0.7%.

Experiment No. 30. To note the effect of the intrajugular injection of 5 c.c. of a mixture consisting of Spleen and Gland pulp (half coarse grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever, added to pulverised Gelatine and Physiological water.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | |
|---------------|------------------|--------------------|----------------------|--|-------------------------------------|
| | Animal injected. | Date of injection. | Result of injection. | Date of exposure on the farm Burnside. | Result of exposures. |
| A | Ox 1722. | 31/8/11. | R.P.R. | 23/10/11. | I.R. |
| B | Ox 1724. | " | R.P.R. | " | N.R. |
| C | Ox 1729. | " | R.P.R. | " | R.R. |
| D | Ox 1730. | " | R.P.† | " | — |
| E | Ox 1740. | " | R.P.† | " | — |
| F | Ox 1780. | " | R.P.R. | 23/10/11. | R.P.† |
| G | Ox 1783. | " | R.P.R. | " | N.R. |
| | | | | | (Died of Debility in January 1912.) |
| H | Ox 1790. | " | R.P.R. | " | N.R. |

Explanation of Symbols:

R.P.†—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

R.P.R.—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

R.R.—Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

I.R.—Indicates that the animal had an irregular reaction and recovered.

N.R.—Indicates that the animal did not react.

(9) *Summary of Experiment No. 30.* Of 8 animals injected intrajugularly with 5 c.c. Spleen and Gland pulp (half coarse grain) added to pulverised Gelatine and Physiological water, all showed the presence of plasma bodies, and two died.

The 6 survivors were exposed to natural infection. One died of East Coast Fever and another one, which survived the critical period of the test, died later of debility.

One ox, No. 1,780, which showed plasma bodies as a result of the injection, reacted and died of East Coast Fever when exposed to veld infection.

Experiment No. 31. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (coarse grain) obtained from animals that were slaughtered in the last stages of East Coast Fever.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------|----------------------|--|------------------------|--|---------------------|
| | Animal injected. | Date of injection. | Result of injection. | Tick Infestation. | | Exposure Tests. | |
| | | | | No. of times animal was infested with ticks. | Result of infestation. | Date of exposure on the farm Burnside. | Result of exposure. |
| A | Ox 1638. | 11/7/11. | R.P.R. | Twice. | N.R. | 20/9/11. | R.P.R. |
| B | Ox 1640. | " | R.P.† | — | — | — | — |
| C | Ox 1641. | " | R.P.† | — | — | — | — |
| D | Ox 1636. | " | R.P.† | — | — | — | — |
| E | Ox 1643. | " | R.P.† | — | — | — | — |
| F | *Calf 1133 | 16/9/11. | I.R. | — | — | 23/10/11. | R.P.† |
| G | Ox 1784. | 21/9/11. | R.P.† | — | — | — | — |
| H | Ox 1791. | " | I.R. | — | — | 23/10/11. | N.R. |
| I | Calf 1152. | " | R.P.† | — | — | — | — |

* Had been inoculated in March, 1912, *vide* 1st Report of Director of Veterinary Research without result.

Explanation of Symbols :

R.P.†—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

R.P.R.—Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

I.R.—Indicates that the animal had an irregular reaction and recovered.

N.R.—Indicates that the animal did not react.

Summary of Experiment No. 31. Of 9 animals injected with 5 c.c. Spleen and Gland pulp (coarse grain) six died of East Coast Fever and one reacted and recovered. This latter animal was tested with ticks and proved immune, but reacted later when exposed to natural infection.

The remaining two survivors were exposed to natural infection, when one died of East Coast Fever and the other proved immune.

One ox, No. 1,638, showed plasma bodies on two occasions, once as a result of the injection and once after exposure.

Experiment No. 32. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (coarse grain) obtained from animals that were slaughtered in the last stages of East Coast Fever mixed with Aleuronat.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------|----------------------|--|------------------------|--|---|
| | Animal injected. | Date of injection. | Result of injection. | Tick Infestation. | | Exposure Tests. | |
| | | | | No. of times animal was infested with ticks. | Result of infestation. | Date of exposure on the farm Burnside. | Result of exposure. |
| A | Ox 1639. | 11/7/11. | R.R. | Twice. | N.R. | 20/9/11. | N.R. |
| B | Ox 1672. | " | R.P.† | — | — | — | — |
| C | Ox 1674. | " | R.R. | Twice. | N.R. | 20/9/11. | I.R. |
| D | Ox 1671. | " | R.P.† | — | — | — | — |
| E | Ox 1646. | " | R.R.† | — | — | 4/10/11. | R.P.R. |
| F | Ox 1677. | " | R.P.† | — | — | — | — |
| G | Heifer 1360. | 29/7/11. | I.R. | — | — | 4/10/11. | I.R. |
| H | Ox 1704. | " | I.R. | — | — | " | R.P.R., died in January, 1912. of debility. |
| I | Ox 1716. | " | R.P.† | — | — | — | — |
| J | Ox 1715. | " | R.P.† | — | — | — | — |
| K | Ox 1710. | " | R.P.† | — | — | — | — |

Explanation of Symbols.

R.P.† Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

R.P.R. Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

R.R. Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

I.R. Indicates that the animal had an irregular reaction and recovered.

N.R. Indicates that the animal did not react.

Summary of Experiment No. 32. Of 11 animals injected with 5 c.c. Spleen and Gland pulp (coarse grain) mixed with Aleuronat, six died of East Coast Fever. Of the remaining five, two were tested with ticks and later exposed to natural infection, proving to be immune on both occasions. The other three that survived injection were exposed to natural infection, when two developed East Coast Fever and recovered, the other proving to be immune.

Experiment No. 33. To note the effect of the intrajugular injection of 10 c.c. Spleen and Gland pulp (coarse grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever, mixed with Aleuronat.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------|----------------------|--|------------------------|--|---------------------|
| | | | | Tick Infestation. | | Exposure Tests. | |
| | Animal injected. | Date of injection. | Result of injection. | No. of times animal was infested with ticks. | Result of infestation. | Date of exposure on the farm Burnside. | Result of exposure. |
| A | Bull 1404 | 28/6/11. | I.R. | Twice. | R.P.† | — | — |
| B | Ox 1406. | " | N.R. | " | R.P.† | — | — |
| C | Ox 1499. | " | R.R. | " | N.R. | 20/9/11. | N.R. |
| D | Ox 1629. | " | N.R. | " | R.R. | " | N.R. |
| E | Ox 1627. | " | I.R. | " | R.P.† | — | — |

Explanation of Symbols.

R.P.† Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast Fever.

R.R. Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

I.R. Indicates that the animal had an irregular reaction and recovered.

N.R. Indicates that the animal did not react.

Summary of Experiment No. 33. Of 5 animals injected with 10 c.c. Spleen and Gland pulp (coarse grain), all survived; three died of East Coast Fever when tested with ticks, and the other two survived tick infestation and natural infection.

Experiment No. 34. To note the effect of the intrajugular injection 5 c.c. Spleen and Gland pulp (coarse grain) obtained from animals that were slaughtered in the last stages of East Coast Fever, mixed with Peptone.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------|----------------------|--|------------------------|--|---------------------|
| | | | | Tick Infestation. | | Exposure Tests. | |
| | Animal injected. | Date of injection. | Result of injection. | No. of times animal was infested with ticks. | Result of infestation. | Date of exposure on the farm Burnside. | Result of exposure. |
| A. | Cow 398. | 11/7/11. | R.P.† | — | — | — | — |
| B. | Ox 1386. | " | R.P.R. | Twice. | N.R. | 20/9/11. | N.R. |
| C. | Ox 1396. | " | R.R. | " | I.R. | " | R.P.R. |
| D. | Heifer 1446. | 29/7/11. | R.R. | — | — | 4/10/11. | R.R. |
| E. | Heifer 1445. | " | R.P.R. | — | — | " | R.P.R. |
| F. | Ox 1712. | " | R.R. | — | — | " | R.P.† |
| G. | Ox 1717. | " | R.P.† | — | — | — | — |
| H. | Calf 1125. | 16/9/11. | I.R. | — | — | 23/10/11. | I.R. |
| I. | Ox 1800. | 21/9/11. | R.P.† | — | — | — | — |
| J. | Ox 1811. | " | R.R. | — | — | 26/10/11. | N.R. |
| K. | Ox 1817. | " | R.P.R. | — | — | " | I.R. |

Explanation of Symbols:

R.P.† Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

R.P.R. Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

R.R. Indicates that the animal had a reaction and recovered but that plasma bodies were not detected.

I.R. Indicates that the animal had an irregular reaction and recovered.

N.R. Indicates that the animal did not react.

Summary of Experiment No. 34. Of 11 animals injected with 5 c.c. Spleen and Gland pulp (coarse grain) mixed with Peptone, six reacted, of which 3 died and 3 recovered. Two of the survivors were tested with ticks and proved to be immune, but when exposed to natural infection one reacted to East Coast Fever and recovered. The remaining six were exposed to veld infection, when one died of East Coast Fever, one had a relapse and recovered, the other four proved to be immune.

One Heifer, No. 1,445, showed the presence of plasma bodies, both after injection and exposure.

Experiment No. 35. To note the effect of the intrajugular injection of 10 c.c. Spleen and Gland pulp (coarse grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever, mixed with Peptone.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | | | |
|---------------|------------------|--------------------|----------------------|---|-----------------------|--|---------------------|
| | Animal injected. | Date of injection. | Result of injection. | Tick Infestation. | | Exposure Tests. | |
| | | | | No. of times animal was infested with infested ticks. | Result of infestation | Date of exposure on the farm Burnside. | Result of exposure. |
| A. | Ox 1385. | 28/6/11. | N.R. | Twice. | N.R. | 20/9/11. | R.R. |
| B. | Ox 1407. | " | R.P.† | — | — | — | — |
| C. | Ox 1493. | " | R.R. | Twice. | N.R. | 20/9/11. | R.R. |
| D. | Ox 1498. | " | N.R. | " | R.R. | " | N.R. |
| E. | Ox 1501. | " | R.P.† | — | — | — | — |

Explanation of Symbols :

R.P † Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

R.R. Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

N.R. Indicates that the animal did not react.

Summary of Experiment No. 35. Of 5 animals injected with 10 c.c. Spleen and Gland pulp (coarse grain) mixed with Peptone, two died of East Coast Fever. The remaining 3 were tested with ticks and afterwards exposed to natural infection, proving to be immune on both occasions.

Experiment No. 36. To note the effect of the intrajugular injection of 5 c.c. Spleen and Gland pulp (coarse grain) obtained from an animal that was slaughtered in the last stage of East Coast Fever, mixed with Peptone and Aleuronat.

| Reference No. | INJECTIONS. | | | IMMUNITY TESTS. | |
|---------------|------------------|--------------------|----------------------|--|---------------------|
| | Animal injected. | Date of injection. | Result of injection. | Date of exposure on the farm. Burnside | Result of exposure. |
| A. | Heifer 1359. | 29/7/11. | I.R. | 4/10/11. | R.P.† |
| B. | Ox 1711. | " | R.P.† | — | — |
| C. | Ox 1701. | " | R.P.† | — | — |
| D. | Ox 1700. | " | I.R. | 4/10/11. | N.R. |
| E. | Ox 1713. | " | R.P.R. | " | R.P.† |

Explanation of Symbols:

R.P.† Indicates that the animal had a reaction accompanied with the presence of plasma bodies and died of East Coast Fever.

R.P.R. Indicates that the animal had a reaction accompanied with the presence of plasma bodies and recovered.

I.R. Indicates that the animal had an irregular reaction and recovered.

N.R. Indicates that the animal did not react.

R.R. Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

Summary of Experiment No. 36. Of 5 animals injected with 5 c.c. Spleen and Gland pulp (coarse grain) mixed with Peptone and Aleuronat, three reacted to the injection and two of them died. The three survivors were exposed to veld infection and two died of East Coast Fever.

One animal, No. 1,713, contracted the disease from the injection and recovered, but died later of East Coast Fever when exposed to natural infection.

Experiment No. 37. To note the effect of the double intrajugular injection of 5 c.c. Spleen and Gland pulp according to various grains and mixtures.

| Reference No. | INJECTIONS. | | | | IMMUNITY TESTS. | | | |
|---------------|--|------------------------|------------------------|---------|-----------------------------------|---------|---------------------|---|
| | Animal injected. | Date of 1st injection. | Date of 2nd injection. | Result. | Tick Infestation. | | Exposure Tests. | |
| | | | | | No. of times animal was infested. | Result. | Date of experiment. | Result. |
| (a) | 1st injection, medium grain—pure; 2nd injection, medium grain mixed with peptone. | | | | | | | |
| A | Ox 1731 | 11/8/11. | 1/9/11. | N.R. | — | — | 26/10/11. | N.R. |
| B | Ox 1735 | " | " | R.P.R. | — | — | " | I.R. |
| C | Ox 1801 | " | " | R.R. | — | — | " | R.P.R. |
| (b) | 1st and 2nd injections, half coarse grain mixed with peptone. | | | | | | | |
| D | Ox 2030 | 31/1/12. | 9/3/12. | N.R. | Once. | R.P.R. | 5/6/12. | Died, poverty, August 20th, 1912. |
| (c) | 1st injection, medium grain mixed with aleuronat and peptone; 2nd injection, half coarse grain—pure. | | | | | | | |
| E | Ox 1725 | 11/8/11. | 1/9/11. | R.P.R. | — | — | 26/10/11. | R.P.† |
| F | Ox 1726 | " | " | I.R. | — | — | " | R.R. (died of debility in April, 1912.) |
| G | Ox 1779 | " | " | R.R. | — | — | " | I.R. |
| H | Ox 1788 | " | " | R.R. | — | — | " | I.R. |
| I | Ox 1796 | " | " | R.R. | — | — | " | I.R. |
| J | Ox 1808 | " | " | R.R. | — | — | " | N.R. |
| (d) | 1st injection, half coarse grain mixed with peptone. 2nd injection, half coarse grain mixed with peptone, and 1% solution of hydroquinine. | | | | | | | |
| K | Ox 2040 | 31/1/12. | 9/3/12. | N.R. | 15/4/12. | N.R. | 5/6/12. | Still alive. |
| (e) | 1st injection, half coarse grain mixed with peptone, and 10% solution of hydroquinine; 2nd injection, half coarse grain mixed with peptone. | | | | | | | |
| L | Heifer 2081 | 31/1/12. | 9/3/12. | N.R. | 15/4/12. | N.R. | 5/6/12. | Still alive. |

Explanation of Symbols.

N.R. Indicates that the animal did not react.

I.R. Indicates that the animal had an irregular reaction and recovered.

R.P.R. Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and recovered.

R.P. Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast Fever.

R.R. Indicates that the animal had a reaction and recovered, but that plasma bodies were not detected.

Results—Of 12 animals injected on two occasions, none died from East Coast Fever, but when tested, one of the animals which had shown plasma bodies after injection, reacted and died of East Coast Fever.

Experiment No. 38. To note the effect of the double intrajugular injection of 5 c.c. Spleen and Gland pulp (half coarse grain) mixed with Peptone and varying strengths of Hydro-Quinine.

| Reference No. | INJECTIONS. | | | | IMMUNITY TESTS. | | | | | |
|---------------|------------------|------------------------|------------------------|--------|----------------------------|----------------|------------------------|------------------------|-------------------|---------------------|
| | Animal injected. | Date of 1st injection. | Date of 2nd injection. | Result | Strength of Hydro-Quinine. | | No. of times infested. | Result of infestation. | Date of exposure. | Result of exposure. |
| | | | | | 1st injection. | 2nd injection. | | | | |
| A | Ox 2069. | 22/4/12. | 13/5/12. | R.P.R. | 1% | 0.1% | Once. | N.R. | 27/7/12. | Still alive. |
| B | *Ox 2037. | " | " | R.P.† | 1% | 0.3% | " | " | " | " |
| C | *Ox 2047. | " | " | R.P.† | 1% | 0.3% | " | " | " | " |
| D | Ox 2028. | " | " | R.P.R. | 1% | 0.4% | Once. | I.R. | 27/7/12. | Still alive. |
| E | Ox 2043. | " | " | I.R. | 1% | 0.4% | " | N.R. | " | Still alive. |
| F | Ox 2098. | " | " | R.P.† | 1% | 0.4% | " | " | " | " |
| G | Heifer 1742. | " | " | R.P.† | 1.25% | 0.1% | " | " | " | " |
| H | Heifer 1822. | " | " | R.P.† | 1.25% | 0.2% | " | " | " | " |
| I | Heifer 1826. | " | " | R.P.R. | 1.25% | 0.2% | Once. | I.R. | 27/7/12. | Still alive. |
| J | Heifer 2204. | " | " | R.P.† | 1.25% | 0.2% | " | " | " | " |
| K | Heifer 1664. | " | " | R.P.R. | 1.25% | 0.2% | " | I.R. | 27/7/12. | Still alive. |
| L | Heifer 1751. | " | " | R.P.† | 1.25% | 0.3% | " | " | " | " |
| M | Ox 183. | " | " | R.R. | 1.25% | 0.4% | Once. | I.R. | 27/7/12. | Still alive. |
| N | Heifer 1519. | " | " | R.P.† | 1.5% | 0.1% | " | " | " | " |
| O | Ox 2041. | " | " | R.P.† | 1.5% | 0.1% | " | " | " | " |
| P | Heifer 2202. | " | " | R.P.† | 1.5% | 0.1% | " | " | " | " |
| Q | Heifer 1146. | " | " | R.P.† | 1.5% | 0.2% | " | " | " | " |
| R | Heifer 1172. | " | " | R.P.† | 1.5% | 0.3% | " | " | " | " |
| S | Ox 1922. | " | " | I.R. | 1.5% | 0.3% | Once. | N.R. | 27/7/12. | Still alive. |
| T | Heifer 2075. | 31/1/12. | 9/3/12. | N.R. | 10% | 2% | " | R.P.† | " | " |
| U | Heifer 1129. | 21/12/11. | " | N.R. | 20% | 1% | " | R.P.† | " | " |
| V | Heifer 1126. | " | " | I.R. | 20% | 1.5% | " | R.P.† | " | " |
| W | Heifer 1512. | " | " | N.R. | 20% | 2% | " | R.P.† | " | " |
| X | Heifer 1523. | " | " | N.R. | 20% | 2% | " | R.P.† | " | " |
| Y | Heifer 1751. | 4/1/12. | " | N.R. | 40% | 1.5% | Twice. | R.P.† | " | " |

* Death complicated with pneumonia.

Explanation of Symbols.

N.R. Indicates that the animal did not react.

I.R. Indicates that the animal had an irregular reaction and recovered.

R.P.† Indicates that the animal had a reaction, accompanied with the presence of plasma bodies, and died of East Coast Fever.

Summary of Experiment No. 38. Of 25 animals injected on two occasions with 5 c.c. Spleen and Gland pulp (half coarse grain) mixed with Peptone and varying strengths of Hydro-Quinine, 12 died of East Coast Fever (2 cases being complicated with Pneumonia).

Of the 13 survivors, six died of East Coast Fever when submitted to the immunity test, but as will be seen from the table, all these six animals that had not acquired immunity from the injection, had received pulp which had been soaked in Hydro-Quinine of from 10—40% strength.

Experiment No. 39. To note the effect of the triple intrajugular injection of 5 c.c. Spleen and Gland pulp according to various grains and mixtures.

| Reference Number. | Animal injected. | INJECTIONS. | | | | | | | | | Result. | TESTS. | |
|-------------------|------------------|----------------|--------------------|----------------------------|----------------|--------------------|----------------------------|----------------|--------------------|----------------------------|---------|--------------------------------------|--------------|
| | | 1ST INJECTION. | | | 2ND INJECTION. | | | 3RD INJECTION. | | | | Exposed on the farm Burnside. | Result. |
| | | Date. | Grain of Material. | Mixed with. | Date. | Grain of Material. | Mixed with. | Date. | Grain of Material. | Mixed with. | | | |
| A. | Ox 1673. | 11/7/11. | Coarse. | — | 11/8/11. | Medium. | — | 1/9/11. | ½ Coarse. | Peptone. | I.R. | 26/10/11. | R.R. |
| B. | Ox 229. | " | Fine. | — | " | " | — | " | " | " | " | " | N.R. |
| C. | Ox 579. | " | " | — | " | " | Aleuronat and Peptone. | " | " | " | " | " | " |
| D. | Ox 1384. | " | " | — | " | " | — | " | " | " | R.R. | " | " |
| E. | Ox 1676. | " | " | — | " | " | — | " | " | " | I.R. | " | " |
| F. | Ox 1489. | 28/6/11. | Coarse. | Aleuronat. | " | " | — | " | " | " | " | " | " |
| G. | Ox 1492. | " | " | " | " | " | — | " | " | " | N.R. | " | I.R. |
| H. | Ox 1505. | " | " | " | " | " | — | " | " | " | R.R. | Died of Poverty, 27th October, 1911. | |
| I. | Ox 1507. | " | " | " | " | " | — | " | " | " | I.R. | 26/10/11. | I.R. |
| J. | Ox 1633. | " | " | " | " | " | — | " | " | " | R.R. | " | R.R. |
| K. | Cow 421. | 11/7/11. | " | Peptone. | " | " | — | " | " | " | I.R. | " | N.R. |
| L. | Ox 184. | " | " | " | " | " | — | " | " | " | N.R. | 23/10/11. | R.P.† |
| M. | Ox 177. | " | " | " | " | Coarse. | — | " | " | " | " | " | R.P.E. |
| N. | Ox 175. | 4/1/12. | ½ Coarse. | Peptone and Hydro-Quinine. | 9/3/12. | ½ Coarse | Peptone. | 14/5/12. | " | Peptone and Hydro-Quinine. | " | Infested with ticks. | R.P.† |
| O. | Ox 1925. | 31/1/12. | " | " | " | " | — | " | " | Peptone. | I.R. | 27/7/12. | Still alive. |
| P. | Ox 2034. | 8/2/12. | " | " | " | " | Peptone and Hydro-Quinine. | " | " | " | " | " | " |
| Q. | Ox 562. | 31/1/12. | " | " | " | " | — | " | " | " | N.R. | " | R.P.† |
| R. | Ox 305. | 8/2/12. | " | " | " | " | — | " | " | " | " | " | Still alive. |
| S. | Ox 2032. | " | " | " | " | " | Peptone. | " | " | " | I.R. | " | " |
| T. | Ox 174. | 4/1/12. | " | " | " | " | Peptone and Hydro-Quinine. | " | " | Peptone and Hydro-Quinine. | N.R. | " | " |
| U. | Ox 1927. | 31/1/12. | " | " | " | " | — | " | " | " | R.P.† | — | — |
| V. | Ox 269. | " | " | " | " | " | — | " | " | " | N.R. | *27/7.12. | Still alive. |
| W. | Ox 619. | 8/2/12. | " | " | " | " | — | " | " | " | R.P.† | — | — |
| X. | Ox 481. | " | " | " | " | " | — | " | " | " | N.R. | Infested with ticks. | R.P.† |
| Y. | Ox 2056. | " | " | " | " | " | — | " | " | " | I.R. | 27/7/12. | Still alive. |

* Also infested on the 15/6/12 with ticks of the same batch that caused the death of Oxen 175 and 481.

Summary of Experiment No. 39. Of 25 animals injected three times two died from the injection. One died of poverty before it could be tested, and of the remaining 22 four died of East Coast Fever when tested, the other 18 proving to be immune.

Table A—Results of Intrajugular Injections at the Laboratory, arranged according to the percentage of immunity conferred.

| INJECTIONS WITH SPLEEN AND GLAND PULP. | INJECTIONS. | | | | | | | | | | TESTS. | | | | | |
|--|--------------------------------|---|---------------------|-----------------------------------|--|---|---------------------------|---|--|---------|--|---|---------|---|------|---|
| | Number of Animals injected. | Animals that contracted East Coast Fever from injection. | | | | Animals that did not show plasma bodies as a result of the injection. | | | | | Total number of animals tested. (Cols. 5 & 7). | Animals that contracted E. C. F. and died. | | Animals that survived the critical period of test. | | Percentage of animals that survived the critical period of the test, as compared to the total number injected. (Cols. 2 & 14). |
| | | And died of E. C. F. | | And recovered. | | And were tested. (Col. 11). | And died before tests. | Total No. of non-reactors. (Cols. 7 & 8). | Percentage of non-reactors. (Cols. 2 & 9). | Number. | | Percentage. (Cols. 11 & 12). | Number. | Percentage. (Cols. 11 & 14). | | |
| | | No. | % (Cols. 2 & 3). | And were tested. (Col. 11). | Percentage of recovery. (Cols. 2 & 9). | | | | | | | | | | | |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. | 16. | |
| 5 c.c. Fine Grain | 2 | nil. | nil. | 1 | 50% | 1 | nil. | 1 | 50% | 2 | nil. | nil. | 2 | 100% | 100% | |
| 5 c.c. Half Medium Grain | 3 | nil. | nil. | 3 | 100% | nil. | nil. | nil. | nil. | 3 | nil. | nil. | 3 | 100% | 100% | |
| 5 c.c. Half Coarse Grain | 3 | nil. | nil. | nil. | nil. | 3 | nil. | 3 | 100% | 3 | nil. | nil. | 3 | 100% | 100% | |
| 5 c.c. Fine Grain with Aleuronat... .. | 11 | nil. | nil. | 1 | 9% | 10 | nil. | 10 | 91% | 11 | 4 | 37% | 7 | 63% | 64% | |
| 5 c.c. Coarse Grain with Peptone... .. | 11 | 3 | 26% | 3 | 27% | 5 | nil. | 5 | 47% | 8 | 1 | 12% | 7 | 88% | 64% | |
| 5 c.c. Half Coarse Grain with Peptone | 52 | 17 | 33% | 22 | 42% | 12 | 1 | 13 | 25% | 34 | 1 | 3% | 33 | 97% | 63% | |
| 5 c.c. Medium Grain with Gelatine and Phys. Water | 8 | nil. | nil. | 4 | 50% | 3 | 1 | 4 | 50% | 7 | 2 | 28% | 5 | 72% | 62% | |
| 5 c.c. Half Coarse Grain with Gelatine and Phys. Water | 8 | 2 | 25% | 6 | 75% | nil. | nil. | nil. | nil. | 6 | 1 | 16% | 5 | 84% | 62% | |
| 10 c.c. Half Coarse Grain | 5 | 2 | 40% | nil. | nil. | 3 | nil. | 3 | 60% | 3 | nil. | nil. | 3 | 100% | 60% | |
| 5 c.c. Medium Grain with Peptone | 13 | 2 | 15% | 5 | 38% | 6 | nil. | 6 | 47% | 11 | 4 | 37% | 7 | 63% | 54% | |
| 5 c.c. Fine Grain with Peptone | 16 | 1 | 6% | 2 | 12% | 13 | nil. | 13 | 82% | 15 | 7 | 47% | 8 | 53% | 50% | |
| 5 c.c. Coarse Grain with Aleuronat | 11 | 6 | 55% | nil. | nil. | 5 | nil. | 5 | 45% | 5 | nil. | nil. | 5 | 100% | 45% | |
| 10 c.c. Coarse Grain | 5 | nil. | nil. | nil. | nil. | 5 | nil. | 5 | 100% | 5 | 3 | 60% | 2 | 40% | 40% | |
| 5 c.c. Coarse Grain | 9 | 6 | 67% | 1 | 11% | 2 | nil. | 2 | 22% | 3 | 1 | 33% | 2 | 67% | 22% | |
| 5 c.c. Fine Grain with Peptone and Aleuronat | 5 | 1 | 20% | 1 | 20% | 3 | nil. | 3 | 60% | 4 | 3 | 75% | 1 | 25% | 20% | |
| 5 c.c. Coarse Grain with Peptone and Aleuronat | 5 | 2 | 40% | 1 | 20% | 2 | nil. | 2 | 40% | 3 | 2 | 67% | 1 | 33% | 20% | |
| 5 c.c. Medium Grain | 6 | 4 | 67% | 1 | 17% | nil. | 1 | 1 | 16% | 1 | nil. | nil. | 1 | 100% | 16% | |
| 5 c.c. Half Medium with Peptone | 2 | 1 | 50% | nil. | nil. | 1 | nil. | 1 | 50% | 1 | 1 | 100% | nil. | nil. | nil. | |
| 5 c.c. Half Coarse Grain with Hydro- Quinine (<i>vide</i> Table "B.") | 175 | 47 | 27% | 51 | 29% | 74 | 3 | 77 | 44% | 125 | 30 | 24% | 95 | 76% | 54% | |
| | 61 | 12 | 20% | 7 | 11% | 40 | 2 | 42 | 69% | 47 | 20 | 43% | 27 | 57% | 44% | |
| | 236 | 59 | 25% | 58 | 25% | 114 | 5 | 119 | 50% | 172 | 50 | 29% | 122 | 71% | 51% | |

Table B.—Results of intrajugular injections at the Laboratory with pulp which had been saturated in varying strengths of Hydro-Quinine. Dose: 5 c.c. Spleen and Gland pulp (half coarse grain).

| STRENGTH OF HYDRO-QUININE SOLUTION. | INJECTIONS. | | | | | | | | | TESTS. | | | | | Percentage of animals that survived the critical period of the test as compared to the total number injected. (Cols. 2 and 14.) |
|-------------------------------------|-----------------------------|--|------------------------------|-----------------------------|--|---|------------------------|--|--|--|--|--------------------------------|--|--------------------------------|---|
| | Number of animals injected. | Animals that contracted East Coast Fever from injection, | | | | Animals that did not show plasma bodies as a result of the injection. | | | | Total number of animals tested. (Cols. 5 and 7). | Animals that contracted E.C.F. and died. | | Animals that survived the critical period of test. | | |
| | | And died of E.C.F. | | And recovered. | | And were tested. (Col. 11.) | And died before tests. | Total number of non-reactors. (Cols. 7 and 8.) | Percentage of non-reactors. (Cols. 2 and 9.) | | Number. | Percentage. (Cols. 11 and 12.) | Number. | Percentage. (Cols. 11 and 14.) | |
| | | No. | Percentage. (Cols. 2 and 3.) | And were tested. (Col. 13.) | Percentage of recoveries. (Cols. 2 and 5.) | | | | | | | | | | |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. | 16. |
| 0.4% Solution | 1 | 1 | 100% | Nil. | Nil. | — | — | — | — | — | — | — | — | — | Nil. |
| 0.5% " | 7 | 3 | 43% | " | " | 3 | 1 | 4 | 57% | 3 | 2 | 67% | 1 | 33% | 14% |
| 0.6% " | 10 | 2 | 20% | 2 | 20% | 6 | Nil. | 6 | 60% | 8 | 2 | 25% | 6 | 75% | 6% |
| 0.65% " | 8 | 3 | 37% | 1 | 12% | 4 | " | 4 | 50% | 5 | Nil. | Nil. | 5 | 100% | 62% |
| 0.7% " | 8 | 2 | 25% | 1 | 12% | 5 | " | 5 | 62% | 6 | " | " | 6 | 100% | 75% |
| 0.75% " | 7 | 1 | 14% | Nil. | Nil. | 6 | " | 6 | 86% | 6 | 3 | 50% | 3 | 50% | 43% |
| 1.0% " | 4 | Nil. | Nil. | 2 | 50% | 1 | 1 | 2 | 50% | 3 | 1 | 33% | 2 | 67% | 50% |
| 2.0% " | 7 | " | " | 1 | 14% | 6 | Nil. | 6 | 86% | 7 | 3 | 43% | 4 | 57% | 57% |
| 4.0% " | 3 | " | " | Nil. | Nil. | 3 | " | 3 | 100% | 3 | 3 | 100% | Nil. | Nil. | Nil. |
| 5.0% " | 1 | " | " | " | " | 1 | " | 1 | 100% | 1 | 1 | 100% | " | " | " |
| 10.0% " | 1 | " | " | " | " | 1 | " | 1 | 100% | 1 | 1 | 100% | " | " | " |
| 20.0% " | 4 | " | " | " | " | 4 | " | 4 | 100% | 4 | 4 | 100% | " | " | " |
| Total | 61 | 12 | 28% | 7 | 11% | 40 | 2 | 42 | 69% | 47 | 20 | 43% | 27 | 57% | 44% |

Table C.—Results of Intrajugular Injections at the Laboratory, arranged according to (a) Grain of Pulp and (b) Mixture (irrespective of other factors, and excluding experiments with Hydro-Quinine).

| GRAIN AND MIXTURE. | INJECTIONS. | | | | | | | | | TESTS. | | | | | |
|---------------------------------|--------------------------------|---|-------------------------------|-----------------------------------|--|---|---------------------------|---|--|--|---|---------------------------------|---|---------------------------------|---|
| | Number of Animals injected. | Animals that contracted East Coast Fever from injection. | | | | Animals that did not show plasma bodies as a result of the injection. | | | | Total number of Animals tested. (Cols. 5 & 7.) | Animals that contracted E. C. F. and died. | | Animals that survived the critical period of test. | | Percentage of animals that survived the critical period of the test, as compared to the total number injected. (Cols. 2 & 14.) |
| | | And died of E. C. F. | | And recovered. | | And were tested. (Col. 11.) | And died before tests. | Total No. of non-reactors. (Cols. 7 & 8.) | Percentage of non-reactors. (Cols. 2 & 9.) | | Number. | Percentage. (Cols. 11 & 12.) | Number. | Percentage. (Cols. 11 & 14.) | |
| | | No. | Percentage. (Cols. 2 & 3.) | And were tested. (Col. 11.) | Percentage of recovers. (Cols. 2 & 3.) | | | | | | | | | | |
| 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. | 16. | |
| 1. | | | | | | | | | | | | | | | |
| (a) Grain of Pulp. | | | | | | | | | | | | | | | |
| Half Coarse | 63 | 19 | 30% | 28 | 45% | 15 | 1 | 16 | 25% | 43 | 2 | 5% | 41 | 95% | 65% |
| Half Medium | 5 | 1 | 20% | 3 | 60% | 1 | Nil. | 1 | 20% | 4 | 1 | 25% | 3 | 75% | 60% |
| Fine | 34 | 2 | 6% | 5 | 14% | 27 | Nil. | 27 | 80% | 32 | 14 | 44% | 18 | 56% | 53% |
| Medium | 27 | 6 | 22% | 10 | 37% | 9 | 2 | 11 | 41% | 19 | 6 | 32% | 13 | 68% | 48% |
| Coarse | 46 | 19 | 41% | 5 | 11% | 22 | Nil. | 22 | 48% | 27 | 7 | 26% | 20 | 74% | 43% |
| Total | 175 | 47 | 27% | 51 | 29% | 74 | 3 | 77 | 44% | 125 | 30 | 24% | 95 | 76% | 54% |
| (b) Mixture. | | | | | | | | | | | | | | | |
| Gelatine and Phys. Water | 16 | 2 | 12% | 10 | 63% | 3 | 1 | 4 | 25% | 13 | 3 | 23% | 10 | 77% | 63% |
| Peptone | 94 | 24 | 26% | 32 | 34% | 37 | 1 | 38 | 51% | 69 | 14 | 20% | 55 | 80% | 58% |
| A ¹ euronat | 22 | 6 | 27% | 1 | 5% | 15 | — | 15 | 68% | 16 | 4 | 25% | 12 | 75% | 55% |
| Pure | 33 | 12 | 36% | 6 | 18% | 14 | 1 | 15 | 46% | 20 | 4 | 20% | 16 | 80% | 48% |
| Aleuronat and Peptone | 10 | 3 | 30% | 2 | 20% | 5 | — | 5 | 50% | 7 | 5 | 71% | 2 | 29% | 20% |
| Total | 175 | 47 | 27% | 51 | 29% | 74 | 3 | 77 | 44% | 125 | 30 | 24% | 95 | 76% | 54% |

Table D.—Statement showing the results of the Intrajugular injection of 5 c.c. Spleen and Gland pulp. (half coarse grain): (a) Pulp mixed with Peptone, as compared with (b) Pulp mixed with Peptone and then soaked in a solution of Quinine Hydrochloride for 30 minutes.

| METHOD. | INJECTIONS. | | | | | | | | | TESTS. | | | | | Percentage of animals that survived the critical period of the test as compared to the total number injected. (Cols. 2 and 14.) |
|--|-----------------------------|--|------------------------------|-----------------------------|--|---|------------------------|--|--|---|--|--------------------------------|--|--------------------------------|---|
| | Number of animals injected. | Animals that contracted East Coast Fever from injection. | | | | Animals that did not show plasma bodies as a result of the injection. | | | | Total number of animal tested. (Cols. 5 and 7.) | Animals that contracted E.C.F. and died. | | Animals that survived the critical period of test. | | |
| | | And died of E.C.F. | | And recovered. | | And were tested. (Col. 11.) | And died before tests. | Total number of non-reactors. (Cols. 7 and 8.) | Percentage of non-reactors. (Cols. 2 and 9.) | | Number. | Percentage. (Cols. 11 and 12.) | Number. | Percentage. (Cols. 11 and 14.) | |
| | | No. | Percentage. (Cols. 2 and 3.) | And were tested. (Col. 11.) | Percentage of recoveries. (Cols. 2 and 5.) | | | | | | | | | | |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. | 16. |
| Pulp mixed with Peptone | 52 | 17 | 33% | 22 | 42% | 12 | 1 | 13 | 25% | 34 | 1 | 3% | 33 | 97% | 63% |
| Pulp mixed with Peptone and soaked in Quinine Hydrochloride for 30 minutes. Solution. | 10 | 2 | 20% | 2 | 20% | 6 | Nil. | 6 | 60% | 8 | 2 | 25% | 6 | 75% | 60% |
| | 8 | 3 | 37% | 1 | 12% | 4 | " | 4 | 50% | 5 | Nil. | Nil. | 5 | 100% | 62% |
| | 8 | 2 | 25% | 1 | 12% | 5 | " | 5 | 62% | 6 | " | " | 6 | 100% | 75% |
| | Total | 26 | 7 | 27% | 4 | 15% | 15 | Nil. | 15 | 58% | 19 | 2 | 11% | 17 | 89% |

SUMMARY OF RESULTS.

(a) *Immunisation of Cattle in the Field.*

- (1) Of 149 clean cattle inoculated in various ways in the field and exposed to East Coast Fever infected veld later, 84 or 56.4 % survived injection and exposure.
- (2) Of 799 cattle obtained from infected areas, inoculated in various ways and later exposed to infected veld, 474 or 59.3 % survived injected and exposure.
- (3) Of 30 calves varying from 3 weeks to 3 months in age, inoculated intrajugularly with 5 c.c. Spleen and Gland pulp, and later exposed to natural infection, 10 survived injection and exposure, or 33 %.
- (4) Of 23 cattle injected in June, exposed to veld infection until October and then inoculated for a second time, 12 in all survived, or 52.1 %.
- (5) Two animals which contracted East Coast Fever as a result of the injection and recovered, again developed an attack of the disease when exposed to natural infection and succumbed.

(b) *Immunisation of Cattle at the Laboratory.*

- (6) 236 cattle come into consideration (*vide* Table A) of which
 - 59 contracted East Coast Fever from the injection and died.
 - 58 " " " " " " and recovered, of which 3 reacted and died, 7 reacted and recovered when subjected to immunity tests, and 48 proved to be immune.
 - 114 did not show plasma bodies as a result of the injection, and when tested 47 contracted East Coast Fever and died, 12 contracted the disease and recovered, and 55 proved immune.
 - 5 did not show plasma bodies as a result of the injection, and died previous to the test.
- (7) One case of Endocarditis verrucosa was noted as a result of the injection.
- (8) Of 12 animals subjected to a double injection (Experiment 37), two reacted and recovered, one of them again contracting East Coast Fever when tested, from which attack it died. The percentage of immunity conferred amounted, therefore, to 92 per cent.
- (9) Of the 25 animals injected on two occasions with pulp saturated in varying strengths of Hydro-Quinine (Experiment 38), 12 died of East Coast Fever, and four reacted and recovered. Out of the 13 survivors the six that had received pulp, saturated in a 10 % and stronger solution of Hydro-Quinine, all died when exposed to natural infection.

- (10) Of 25 animals injected on three occasions (Experiment 39) with pulp soaked in Hydro-Quinine, 2 contracted East Coast Fever and died; of the remaining 23, 19 survived exposure to natural infection, or 76 %.
- (11) The inoculation of 61 cattle with pulp mixed with Peptone and saturated in Quinine Hydrochloride resulted in the deaths of 12 animals from the injection. Seven reacted and recovered, and 42 failed to react; 2 of the latter died before they could be tested, and of the remaining 47, 20 died of East Coast Fever (*vide* Table B).
- (12) A comparison between the effect of the injection of pulp, plus Peptone, and of pulp, plus Peptone soaked in the optimal doses of Quinine Hydrochloride (0.6 % to 0.7 % solution) shows a slightly higher percentage of immunity for the latter method (*vide* Table D).
- (13) The most certain method of transmitting the disease followed the use of half coarse and half medium grained pulp, mixed with either Gelatine and Physiological water or with Peptone (*vide* Table C).

CONCLUSIONS.

- (1) The experience in the field indicates that the inoculation can safely be undertaken in respect of either clean or infected cattle with the prospect of conferring immunity on 56—60 %.
- (2) The best results in the field may be expected by the injection of 5 c.c. spleen and gland pulp (medium, half coarse or coarse grain) mixed with Peptone or Aleuronat, such animals to be kept on clean veld for 14 or 15 days before they are exposed to natural infection.
- (3) The immunity conferred by the injection may not be absolute, inasmuch as 12 breakdowns were noted amongst the experimental animals, or 1 %.
- (4) The animal which supplied the spleen and gland pulp for the injection has apparently an influence on the results, as the variation in mortality from the injection cannot be considered to be due to any other factor.
- (5) As a possible improvement to the present method of immunising cattle against East Coast Fever, the saturation of the pulp in a solution of Quinine Hydrochloride is suggested, the strength of the solution to be between 0.6 % and 0.7 %

APPENDIX "A."

The following tabular statement prepared by Mr. Frank Chambers, M.R.C.V.S., shows the result of certain inoculations undertaken by him in the Transkeian Territories, Cape Province:—

RESULTS OF EXPERIMENTAL INOCULATION AGAINST EAST COAST FEVER.

| No. | DESCRIPTION. | OWNER AND ADDRESS. | HOW TREATED. | RESULTS. |
|-----|---|---|---|--|
| 1 | Red and White Cow, T. 101° F. | Various natives at Mancam, Mqanduli District | 10 c.c. coagulated spleen pulp intravenously | Inoculated on April 26th, 1911; still alive. |
| 2 | Red and White Ox, T. 102·2° F. | Mqanduli District | " " | " " |
| 3 | Black Ox, T. 101·4° F. | " | " " | Seen sick June 5th, T. 105°; Gland Smear E.C.F. positive; died on 12th June. |
| 4 | Red Cow, T. 100·6° F. | " | " " | Still alive. |
| 5 | Black and White Heifer, T. 102° F. | " | " " | " " |
| 6 | Black Ox, T. 101·8° F. | " | " " | " " |
| 7 | Dun Bull, T. 102° F. | " | 1 c.c. Gland elements into Pre-scapular Gland | On May 16th became sick, examined on 17th, T. 108; smear from blood and gland E.C.F. positive; recovered after three weeks' illness and still alive. |
| 8 | Black Cow, T. 101° F. | <i>Cattle Inoculated on</i> Hlakanyana of own Location, Umtata District. | <i>May 26th, 1911.</i> 10 c.c. Spleen pulp intravenously | Still alive; when these cattle were inoculated had lost 8, 2 were sick and 6 still alive: on 28/7/11 had only this animal left out of whole herd. |
| 9 | Black and White Cow, T. 102·2° F. | " " | " " | Died 24/7/11. |
| 10 | Red and White Cow, 3 years old, T. 102·2° F. | " " | " " | Killed for some Native rite. |
| 11 | Black and White Spotted Heifer, 3 years old, T. 102·5° F. | Lolo, of Hlakanyana's Location | " " | Died 17/8/11. |
| 12 | Red Cow, white under belly, T. 102° F.... | " " | " " | " " |
| 13 | Red and White Heifer, 4 years old, T. 103·2° F. | " " | " " | Sick 20/7/11; died. |
| 14 | Red and White Cow, T. 103° F. | Mancaka, of Hlakanyana's Location | " " | Still alive; when cattle were inoculated Loto possessed 22 herd; 7 have died, 2 sick; now possesses 3 animals, including inoculated one. |
| 15 | Red Cow, white mark under belly, T. 104·3° F. | Vanqa, of Hlakanyana's; inoculated 26/5/11 | 10 c.c. S.P. intravenously ... | Died 17/8/11, ten days after dipping; no smear taken. |
| 16 | Black and White Heifer, 3 years old, T. 102·5° F. | " " | " " | " " |

RESULTS OF EXPERIMENTAL INOCULATION AGAINST EAST COAST FEVER—*Continued.*

| No. | DESCRIPTION. | OWNER AND ADDRESS. | HOW TREATED. | RESULTS. |
|-----|--|--|---|---|
| 17 | Dark Brown Cow, white under belly, 4 years old, T. 103·2° F. | Vanga, of Hlakanyana's; inoculated 26/5/11 | 10 c.c. S.P. intravenously ... | Died 17/8/11, 10 days after dipping; no smear taken. |
| 18 | Light Red Cow, T. 102·2° F. | " " | " " | Died 17/7/11; smear E.C.F. positive. |
| 19 | Red Cow, T. 102·3° F. | Gqutsa, of Hlakanyana's ... | 40 c.c. S.P. intravenously ... | Died next day; natives say lungs were very badly congested. |
| 20 | Black Heifer, white under belly, T. 103° F. | Ngweyi | 10 c.c. Spleen pulp | Sick 19/7/11; died 21/7/11. |
| 21 | Black Cow, T. 102° F. | Ngweyi | 10 c.c. Spleen pulp | Still alive; when inoculated Ngweyi had 9 alive; 4 died on 18/8/11; all dead save inoculated. |
| 22 | Red and White Cow, T. 102·3° F. ... | Mcaku of Hlandanyana ... | " | Still alive. |
| 23 | Black Cow, white belly, T. 103° F. ... | " | " | Still alive; when inoculated Mcaku had 25 alive (16 dead), 7 sick; now has 3 in all; 1 not inoculated. |
| 24 | Red and White Ox, white throat, T. 101·2° F. | W. Beckerman, Bell Rock ... | <i>Inoculated</i> 29/5/11. 15 c.c. Splenic pulp intra-venously | Still alive. |
| 25 | Black Ox, white mark on left gland, T. 100° F. | " | 12 c.c. " | Still alive. |
| 26 | Red Bull, T. 100° F. | " | 20 c.c. " | Sick on 23/6/11; smear showed few E.C.F. parasites; Redwater plentiful (P. Bigeminum); T. 105·3° F. not feeding; no cough on 21st; appeared to improve; glands not swollen; died on 27/6/11. |
| 27 | Red Ox (Entosn), T. 100° F. | " | 20 c.c. " | First noticed sick on 12th; Salivating; E.C.F. symptoms; coughing frequently; respirations normal; temperature on 22/6/11 102·3° F.; swelling at seat of injection; did not cease ruminating; glands not enlarged; blood smear negative; recovered. |

RESULTS OF EXPERIMENTAL INOCULATION AGAINST EAST COAST FEVER—*Continued.*

| No. | DESCRIPTION. | OWNER AND ADDRESS. | HOW TREATED. | RESULTS. |
|-----|--|-----------------------------|---|--|
| 28 | Black and White Ox, short brush, 100·2° F. | W. Beckerman, Bell Rock ... | 15 c.c. Spleen pulp intravenously | Still alive. |
| 29 | Black Ox, red and white forehead and chest, T. 100·2° F. | " | 12 c.c. " | Still alive. |
| 30 | Black Ox, T. 100·2° F. | " | Gland injection of 1 c.c. gland element | Still alive. |
| 31 | Red Ox, white speckles, T. 100° F. ... | " | 15 c.c. Spleen pulp intravenously | Still alive. |
| 32 | Black Ox (Woolsack), T. 101° F. | " | 14 c.c. " | Still alive. |
| 33 | Black Ox (Kopmane), T. 100·3° F. ... | " | 14 c.c. " | Seen sick on 18/6/11 standing and not feeling; on 20th appeared better that owner inspanned him in plough; on 22nd seemed dull, eyes sunken in head; glands not enlarged; smears not taken; still alive. |
| 34 | Black Ox, white belly, T. 100° F. ... | " | 12 c.c. " | Still alive. |
| 35 | Cow, white flare (Bless), T. 100° F. ... | " | 15 c.c. " | Still alive. |
| 36 | Black Cow, "Pansey," T. 99·6° F. ... | " | 20 c.c. " | Still alive. |
| 37 | Red and White Cow, T. 101·2° F. | " | 12 c.c. " | Noticed sick on 19th; coughing badly and not feeding; died on 22/6/11. |
| 38 | Red Cow (Zwartee), T. 99·4° F. ... | " | 15 c.c. " | Still alive. |
| 39 | Black and White Cow (Dasteroke), very old, T. 100° F. | " | 15 c.c. " | Died 24/6/11. |
| 40 | Black Cow, no brush, T. 100° F. | " | 14 c.c. " | Noticed sick on 8th of June; died on 17th; subparotidean glands swollen and prescapular; purging badly; no smear taken. |
| 41 | Black Cow, T. 100° F. | " | 15 c.c. " | Still alive. |
| 42 | Black Heifer, 18 months old, T. 101° F. | " | Gland (prescapular), injection of 1 c.c. gland elements | Noticed sick on 15th; died on 18th; showed E.C.F. symptoms; lungs were dark purple colour and contained jelly-like exudate; infarcts on kidney. |
| 43 | Black and White Cow (Tshintsta), T. 101·2° F. | " | 15 c.c. Spleen pulp intravenously | Still alive. |

RESULTS OF EXPERIMENTAL INOCULATION AGAINST EAST COAST FEVER—*Continued.*

| No. | DESCRIPTION. | OWNER AND ADDRESS. | HOW TREATED. | RESULTS. |
|-----|---|------------------------------|---|---|
| 44 | S'rawberry Cow (Vetleys), T. 102° F. ... | W. Beckerman Bell Rock ... | 10 c.c. Spleen pulp intravenously. | Still alive. |
| 45 | White Cow (Vivler), T. 101.1° F. ... | " | 1 c.c. gland element in prescapular gland | Dead. |
| 46 | Black and White Heifer, white brush, T. 100.3° F. | " | 15 c.c. Spleen pulp intravenously | Still alive. |
| 47 | Black Cow (Mad), T. 100.2° F. | " | 1 c.c. gland element in pr scapular gland | Still alive. |
| 48 | Red and White Cow (Wadelwa), T. 103.1° F. | " | 10 c.c. Spleen pulp intrajugularly | On 19th noticed sick; symptoms of E.C.F.; on 22nd appeared well, bel- lowing for calf; on 24th seemed dull; T. 104° F.; blood smear showed P. Parvum; died. |
| 49 | Black Heifer, 18 months, T. 102.3° F. ... | " | 10 c.c. " | Still alive. |
| 50 | Red Heifer, T. 102.3° F. | " | 10 c.c. " | Sick on 16/6; died on 19th; P. M. liver enlarged and softened; spleen en- larged; kidneys congested; no in- farcts; lungs looked normal; spleen smear negative; P. Bigeminum plen- tiful |
| 51 | Red Cow (Daisy), not temperatured ... | " | 10 c.c. " | Still alive. |
| | | | <i>Inoculated on May 30th, 1911.</i> | |
| 52 | Red Cow, T. 102.3° F. | Cetwayo, of Novilis Location | 10 c.c. " | Still alive. |
| 53 | Red and White Ox, T. 103° F. | " " | 10 c.c. " | Still alive. |
| 54 | Red Heifer, T. 103.3° F. | " " | 10 c.c. " | Still alive. |
| 55 | Red Heifer, white mark under belly and jaw, T. 102° F. | " " | 10 c.c., " | Still alive. |
| 56 | Light Red Cow, T. 101.3° F. | " " | " " | Died on 17/6/11. |
| 57 | Red Cow, white belly | " " | " " | Still alive. |
| 58 | Black and White Cow, T. 102° F. ... | " " | " " | Appeared sick on 17/6/11 standing; swelling seat of inoculation; smear negative; recovered. |

RESULTS OF EXPERIMENTAL INOCULATION AGAINST EAST COAST FEVER—*Continued.*

| No. | DESCRIPTION. | OWNER AND ADDRESS. | HOW TREATED. | RESULTS. |
|-----|---|---------------------------------|------------------------------------|---|
| 59 | Red Heifer Calf, T. 103° F. | Cetwayo of Novilis Location ... | 10 c.c. Spleen pulp intrajugularly | Died 21/6/11 after being sprayed. |
| 60 | Red Heifer, white under belly and brush, T. 103·2° F. | " | " | Still alive. |
| 61 | Brindle Bull Calf, T. 102° F. | " | " | Still alive. |
| 62 | Brown Bull Calf, 4 white socks, T. 103° F. | " | " | Still alive. |
| 63 | Black and White Heifer, T. 102·3° F. | Gidliza of Novilis | " | Still alive. |
| 64 | Red Heifer, T. 102·4° F. | " | " | Glands much swollen on 19/6/11, was feeding; swelling seat of inoculation; smears negative. |
| 65 | Black and White Heifer, T. 103° F. ... | " | " | Died after dipping (spraying). |

TABULATED RESULTS AND PERCENTAGE OF RECOVERIES.

| No. of cattle. | Place. | When inoculated. | Number now alive. | Percentage. |
|----------------|----------------------|----------------------|-------------------|-------------|
| 7 | Mancam | April 26th, 1911 ... | 6 | 85·8% |
| 15 | Bell Rock | May 26th, 1911 ... | 6 | 40% |
| 28 | " | May 29th, 1911 ... | 20 | 71% |
| 11 | Novilis at Bell Rock | May 30th, 1911 ... | 9 | 81·8% |
| 3 | " " | " ... | 1 | 66% |
| 64 | | | 42 | |

Average percentage recoveries, 67·2 %.

All these cattle were running on infected veld from the day that they were inoculated. The disease at Hlakanyanas Location, Bell Rock, is of a particularly virulent strain. No animal once sick has recovered. Out of some 400 which were on the area, the percentage of immune animals there is not above 3 %.

(Sd.) FRANK CHAMBERS, M.R.C.V.S.,
at Umtata, September 30, 1911.