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AN INVESTIGATION INTO THE ECOLOGY,  
BIOLOGY, DISTRIBUTION AND CONTROL  
OF HAEMAPHYSALIS LONGICORNIS  
NEUMANN, 1901.

A thesis presented in partial fulfilment  
of the requirements for the degree of  
Master of Veterinary Science at  
Massey University.

Frederick James Alexander Neilson B.V.Sc.

1980

## A B S T R A C T

In 1974, questionnaires were distributed to farmers in the East Coast and Hawke's Bay areas of the North Island of New Zealand. The tick Haemaphysalis longicornis Neumann 1901 was present on 59% of farms in the East Coast-Northern Hawke's Bay area and 7% of farms in the remainder of the Hawke's Bay area. In the former area the tick appeared to have spread rapidly between 1964 and 1974.

In the East Coast-Northern Hawke's Bay area, approximately one third of all farmers considered that the tick was a significant problem on their farm. In the Central and Southern Hawke's Bay area the tick was not considered a problem and conditions were probably marginal for tick survival.

The distribution of the tick was related to temperature, rainfall and altitude. Almost all farms where ticks were present were situated at less than 300 metres above sea level.

The distribution of tick counts of sheep were positively skewed and it was shown that the data should be normalized by transforming to logarithms or square roots. Square roots represent the easiest method of transformation.

A comparison between tick counts of the left ear, right ear, both ears and the body, showed that overall ear counts contribute to nearly 50% of the total tick count. However, the proportion of ticks on the ears compared with on the body varied over the counting period and ear counts were not highly correlated with body counts (highest correlation,  $r = 0.38$ ).

The diamide, amitraz, showed a higher initial efficacy against H. longicornis compared with Chlorfenvinphos, but the latter appeared to have a longer period of residual activity.

In the Northern Hawke's Bay and East Coast area most (84%) sheep owners dip between January and March and over half (54%) dip in January or March and this period does not coincide with the adult and larval peaks.

Increasing sheep numbers from 3 per 1000 m<sup>2</sup> (equivalent to 30 per hectare) to 3 per 500 m<sup>2</sup> (equivalent to 60 per hectare) resulted in lower tick survival in the more heavily stocked areas.

An examination of the water balance of the unfed stages showed that larvae were very susceptible to desiccation at humidities below 80% R.H. Adults were more resistant to desiccation than nymphs. Larvae and nymphs regain water rapidly after desiccation. The critical equilibrium activities for the unfed stages was found to be approximately 0.8, 0.7 and 0.9 for larvae, nymphs and adults respectively.

Immersion of unfed and engorged stages in water indicated that the former survive immersion for > 18 days while the latter showed lower survival.

Evidence is presented to suggest H. longicornis can cause deaths from anaemia in young Red Deer.

## A C K N O W L E D G E M E N T S

The investigations reported in this thesis were carried out from 1974 - 1980 while the author was a veterinary officer with the Ministry of Agriculture and Fisheries. Some experimental work was carried out at Wallaceville Animal Research Centre and the remainder on farms in the East Coast and Hawke's Bay area.

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Finally, to Mrs A. WiRepa, my heartfelt thanks for typing the  
draft and final copy of this thesis.

A handwritten signature in cursive script, appearing to read 'F.J.A. Neilson'. The signature is fluid and somewhat stylized, with the first letters of the first and last names being capitalized and prominent.

F.J.A. NEILSON

December, 1980

P R E F A C E

Between 1970 and 1974 the range and prevalence of Haemaphysalis longicornis appeared to be increasing on farms in the East Coast and Northern Hawke's Bay area. Because of this apparent increase in tick numbers a census was posted to farmers in the area with the aim of mapping tick distribution. Then by a process of inductive reasoning it was hoped to examine various factors that might influence this distribution. The Central Hawke's Bay area was included in the census as only a few ticks had been reported from this area.

Some farmers in the East Coast and Northern H.B. area considered that the tick was economically important so selected farm practices (e.g. stocking rate, time of dipping or showering, choice of insecticide) were investigated as it was hoped this might provide information on which recommendations for the control of the tick could be based.

Water balance is essential for the survival of all animal species but it is crucial to the existence of ticks because of their surface to volume ratio. As the water relations of eggs and engorged stages of *H. longicornis* have been thoroughly investigated (Heath, 1974) so it was decided to investigate this relationship in the unfed stages. It was hoped that this might lead to a better understanding of the survival and hence the distribution of the tick.

"The tick is generated from couch grass."

Aristotle in *Historia Animalium*, circa 300 B.C.

"After treatment there will be no sores and the wool will be more plentiful and in better condition and the ricini (ticks) will not be troublesome".

M. Porcius Cata 200 B.C.

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