OBSERVATIONS ON SURVIVAL OF CATTLE TICK, *BOOPHILUS MICROPLUS* (Can.) IN NORTH QUEENSLAND

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SUMMARY

In a preliminary study of cattle tick survival near Townsville, female ticks were placed in guinea grass tussocks on 14 occasions between July 1956 and July 1957. Weekly observations were made on the development period of the eggs and on the survival of the larvae.

The longest survival period from the collection of the parent female ticks to the death of all larvae was 19 weeks. These ticks were put out in March. Egg development period varied from 3 weeks in summer to 10 weeks in winter.

In one series the female ticks were flooded for 24 hours and many of their eggs failed to hatch.

The relevance of the results to possible improvements in tick control in the Townsville area is discussed.

I. INTRODUCTION

There is a paucity of information on cattle tick survival in North Queensland pastures and this information is needed in formulating plans for improved tick control by pasture spelling (Wilkinson 1957) or strategic dipping (Norris 1957). This tick has become resistant to many acaricides, and control methods are often difficult and expensive (Wilkinson 1957). Snowball (1957) and Wilkinson and Wilson (1959) have described observations on tick survival in southern and central Queensland, discussed the methods used and reviewed the literature.

These observations were carried out at the Animal Health Station at Oonoonba, three miles south of Townsville. Recently, it became possible to initiate more intensive observations over a wider range of sites in the Ingham-Townsville-Charters Towers area, but as it may be several years before the results of the latter observations are published, it is considered desirable to record the results of the Oonoonba observations. Legg (1930) made some observations on larval survival in the same area, using laboratory-bred larvae, but his data refer chiefly to the maximum possible survival time and are not suitable for the purpose outlined above.

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II. METHODS

Engorged female ticks obtained from Animal Health Station cattle, or collected from stalled animals at Brisbane and transported by air to Townsville, were placed in gauze cylinders similar to those described by Snowball (1957). The cylinders were inserted vertically in holes made in the centres of guinea grass (*Panicum maximum* Jacq.) tussocks so that each cylinder was entirely surrounded by soil and grass tissue, except for the upper surface of the top cork. In this position the tops of the cylinders were somewhat above the soil level around the tussocks, so that the cylinder contents were in a moderately well drained situation and were sheltered from insolation and free air circulation. The tussocks chosen were 6 ft. or more apart.

In the first placement, 10 cylinders were put out, with 1–5 ticks per cylinder, but on the remaining occasions each cylinder contained three ticks. The number of cylinders put out on each occasion is shown in Figure 2. The ticks were inspected each week. When hatching was first seen the top cork was removed

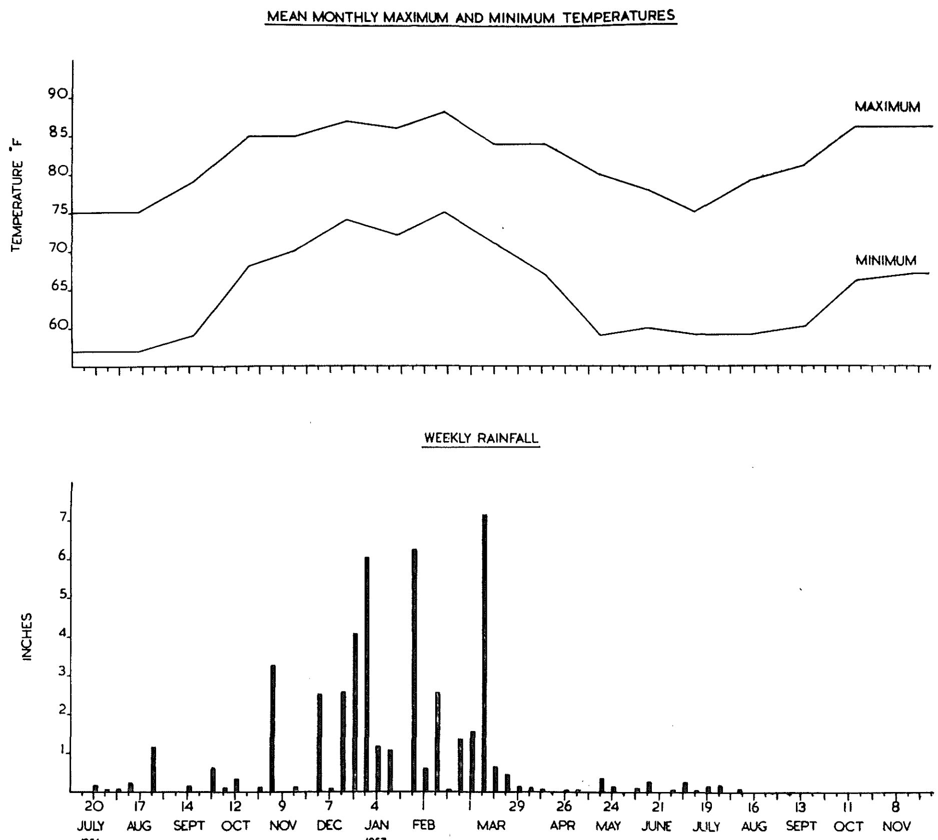

Fig. 1

Meteorological conditions during the observations, as recorded at Garbutt airfield, five miles from Oonoonba.

from the cylinder, allowing the larvae to escape. The observations continued for three weeks after larvae could no longer be found on the grass blades by careful examination. On April 5, in addition to the ticks put out in unshaded tussocks, a cylinder containing three ticks was put out under each of seven tussocks shaded by hessian screens (3 ft × 3 ft) suspended horizontally at a height of 4 ft.

Meteorological data (Figure 1) were taken from Garbutt (Townsville) airfield, five miles away.

III. RESULTS

The records for ticks on unshaded tussocks are summarized in Figure 2. The pre-hatch period and duration of larval survival of those larvae which survived longest out of each batch are shown, together with the mean of the periods recorded from all the cylinders in each batch.

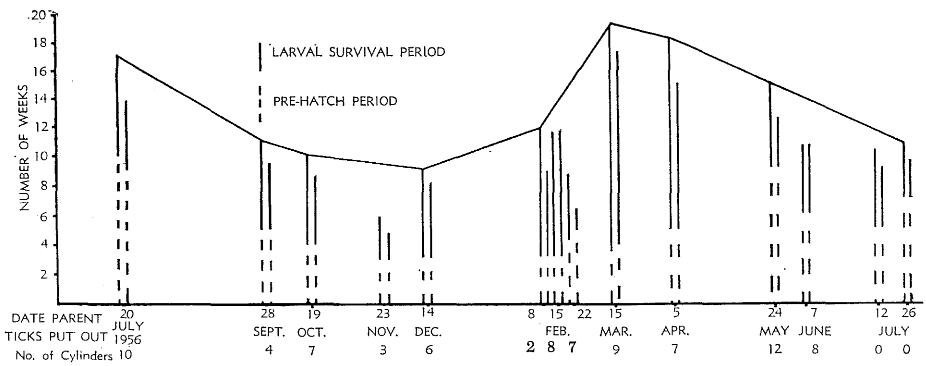

Fig. 2

Duration of survival of cattle tick larvae on grass at Oonoonba. The left-hand line of each pair refers to the longest surviving larvae of each batch, the right-hand line to the mean of the pre-hatch and survival periods recorded for all cylinders in each series.

The arbitrarily smoothed line joining the summits of the lines is intended as a provisional guide to pasture spelling periods in the district.

The eggs from ticks put out on February 22 were flooded for 24 hours, due to heavy rain in the week commencing March 8.

During the greater part of the year the non-parasitic survival was less than 17 weeks. The longest survival time was 19 weeks, but only a small percentage of these larvae survived longer than 17 weeks.

Heavy rain fell during the week beginning March 8, 1957, and most of the eggs under observation were covered with water for more than 24 hours. Many of these eggs failed to hatch. In another series the number of larvae on the grass plants was not markedly reduced, compared with an observation five days previously, although 6 in. of rain were recorded in the 24 hours preceding the second observation. The first hatch of larvae had occurred only one week before the first of these two observations, so it was possible that fresh larvae had hatched between these observations and replaced those dislodged by rain.

The longest living larvae on the shaded tussocks survived a week longer than those on the unshaded tussocks. Since they hatched a week later, the period from first observed hatch to death of all larvae was the same as on unshaded tussocks. The mean of the survival periods recorded for the larvae from the seven shaded cylinders was 18 weeks, that is, two weeks longer than the mean for the unshaded ticks.

IV. DISCUSSION

Observations on ticks in relatively small plots do not give as much detailed information on the rate of decline of the larval population as is obtained by the more laborious procedure of pasture sampling, and it is advisable to confirm the small-plot results by admitting cattle to larger paddocks at suitable intervals after destocking and examining the cattle for tick infestation. However, by inference from earlier work (Wilkinson 1957), it is considered probable that tick populations in paddocks near Townsville would be reduced to a low level if cattle were removed for periods corresponding to the longest survivals, for the particular time of the year, observed on the Oonoonba plot. Until data are available from more frequent tick exposures, these periods are probably best determined from the arbitrarily smoothed line (Figure 2) running through the upper extremities of the vertical columns. The average survival figures may not give a true indication, because the shortest periods are probably much affected by chance factors, but they illustrate the variability of the results.

The shaded series was included at a time of year when survival was likely to be long, because it appeared that the duration of the stages was longer where there was intermittent shade from trees bordering the plot. The observations on the failure of heavy rainfall to reduce larval numbers are of interest, since Wilkinson and Wilson (1959) discussed the possible importance of rain and wind in reducing tick survival. In this instance, apart from the possibility of fresh larvae hatching, the original larvae may have been washed off and have re-ascended, and this re-ascension would deplete their limited energy reserves. Observations during heavy rainfall and rain-with-wind would be of interest.

In contrast to the results in southern Queensland (Snowball 1957), development of the eggs can be completed at any time of the year at Oonoonba. Pre-hatch periods tend to be shorter than those observed by Wilkinson and Wilson (1959) in central Queensland. These authors have pointed out that longer larval survival can be expected if observations are made on larvae arising from a massed placement of several ticks, compared with observations on the progeny of single ticks. In this respect the present study is intermediate between the individual ticks used in central Queensland and the work in southern Queensland in which a number of the progeny of 20 ticks was allowed to ascend grass over a small area (18 in. × 12 in.).

The present results support the view that the pasture spelling periods proposed earlier (Anon. 1955) should be adequate for the Townsville district, but as pointed out in that publication, these are only some of the possible ways in which advantage can be taken of the limited survival of the non-parasitic stages of this tick. One important factor influencing the choice of the pasture spelling regimen is the rate at which tick populations can be expected to increase when lightly infested cattle enter an uninfested paddock. This rate of increase will be influenced by many things, for instance, the vegetation of the area and the degree of tick-resistance of the cattle (Wilkinson 1955).

Some remarks on the foreseeable role of pasture spelling in North Queensland seem appropriate. Harbour (1957), apparently referring to Caribbean conditions, expressed doubt on the practicability of the method. He advocated dipping at intervals as short as seven days. On many North Queensland stations, owing to the large areas and large numbers of cattle for each stockman employed, it is not possible to muster most of the cattle even every three weeks, as for "strategic dipping". Seddon (1951) quoted an estimate that about 2½ million Queensland cattle are dipped fewer than five times a year. On some properties pasture spelling has proved practicable and improved tick control, with infrequent musterings, has been reported. On the other hand, "strategic dippings" may be preferred for dairy herds or smaller herds of beef cattle.

The effects of pasture spelling on the growth and survival of the more useful fodder plants has to be considered. Few publications on this aspect of tropical pasture management have come to notice. It has been reported by Nunn and Suijendorp (1954) and Nunn (1958) that deferred grazing for two or three months resulted in extensive pasture regeneration in tropical Western Australia. It will probably be many years before the advantages and disadvantages of pasture spelling can be adequately assessed, but it should be considered as a method of tick control, particularly where the time of survival of the non-parasitic stages is short.

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