

THE SEASONAL ACTIVITY OF ADULT IXODID TICKS ON ANGORA GOATS IN THE SOUTH WESTERN ORANGE FREE STATE

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ABSTRACT

Adult ixodid ticks were collected at 2-weekly intervals for a period of 23 consecutive months from 15 to 20 Angora goats on a farm in the south western Orange Free State. A total of 6 ixodid tick species were recovered. *Rhipicephalus punctatus* was the most abundant and prevalent tick. It was present from spring to late summer. *Ixodes rubicundus* was the next most abundant tick and was present mainly from March or April to July with peak numbers present in April or May. The onset of this tick's activity appeared to be stimulated by low atmospheric temperatures.

Key words: Angora goats, ixodid ticks, seasonal activity

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INTRODUCTION

Although sheep and cattle comprise the major portion of the livestock industry in the southern Orange Free State, about 60 000 Angora goats are also farmed in this province. Some research on tick infestation of Angora goats has been done in the eastern Cape Province^{6, 7, 8} and the mortality of Angora goats caused by a paralysis-inducing tick species occurring in the southern Orange Free State has been recorded². The present paper describes the seasonal activity of adult ixodid ticks on Angora goats on a farm in the south western Orange Free State. Similar studies on sheep and cattle on this farm have already been published^{3, 5}.

MATERIALS AND METHODS

The study was conducted on the farm "Preezfontein", which is situated 10 km from the town of Fauresmith (29° 46'S; 25° 19'E) in the south western Orange

Free State. The farm comprises an area approximately 6 000 ha in extent and topographically consists of flat as well as hilly ground. The vegetation in the area is defined as False Upper Karoo¹. A fenced camp on the farm, encompassing 190 ha of vegetation typical of the region, was selected for this study.

The climate is semi-arid, with 69% of the annual rainfall occurring during the summer months. Mild to severe droughts occur periodically. Air temperatures exhibit major circadian and seasonal fluctuations with absolute temperatures varying between 39°C and -6,3°C. Total monthly rainfall during the study period was recorded at "Preezfontein" and mean maximum and minimum temperatures were obtained from a weather station at Fauresmith.

Four age and sex class categories of Angora goats were used, namely adult ewes, adult wethers, young wethers (7 months old) and kids. Each group initially consisted of 10 animals. Because tick-induced paralysis and other causes resulted in mortality, the groups of young goats and kids eventually contained between 5 and 10 animals each. The study on adult and young goats started during March 1988. During October 1988, the

ewes on the farm kidded and their kids became the fourth group. During March 1989 the young wethers were excluded from the study and the kids born during the previous year were then considered as the young goat group. Angora ewes on the farm kidded again during December 1989, and the first observations on the second group of kids were made during January 1990.

Five animals belonging to each of the 3 or 4 survey groups were examined for ticks at 2-weekly intervals from March 1988 to January 1990. Each body region was carefully searched by parting the hair and visually inspecting the epidermis. All the adult ixodid ticks found were collected, placed in labelled bottles, identified and counted using a stereoscopic microscope. Burdens were expressed in terms of infestation density (numbers of ticks per kg host mass) and results presented in tabular and graphical form. To test for significant differences between sex ratios a Chi-squared test was used. Where reference is made to tick activity, it is inferred that these ticks actively quest for hosts either from the ground or from vantage points on the vegetation and then enter the parasitic phase of their life cycles.

In order to quantify seasonal abundance, the tick infestation densities of the various groups of goats were pooled. Except for *I. rubicundus* and *R. punctatus*, the numbers of the other tick species were too low to determine seasonal tendencies.

RESULTS

Total monthly rainfall and mean atmospheric temperatures are graphically illustrated in Fig. 1 & 2.

The total numbers and relative abundance of adult ixodid ticks collected from the goats are summarised in Table 1. Except for *Rhipicephalus evertsi evertsi* and *Rhipicephalus gertrudae*, where the sample sizes were too small, there were significant differences ($p < 0,05$) in the sex ratios of male to female ticks. With the exception of *I. rubicundus*, more male than female ticks were present on the goats.

The seasonal abundances of *I. rubicundus* and *R. punctatus* are graphically illustrated in Fig. 3 & 4.

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Table 1: Adult ixodid ticks collected from Angora goats on the farm "Preezfontein"

Tick species	Numbers recovered			Relative abundance	% goats infested
	Males	Females	Total		
<i>Hyalomma marginatum rufipes</i>	33	8	41	0,69	3,6
<i>Hyalomma truncatum</i>	45	27	72	1,21	4,7
<i>Ixodes rubicundus</i>	897	1155	2052	34,34	36,2
<i>Rhipicephalus evertsi evertsi</i>	3	0	3	0,05	1,4
<i>Rhipicephalus gertrudae</i>	16	10	26	0,44	0,4
<i>Rhipicephalus punctatus</i>	2084	1698	3782	63,29	53,6

the long term, differentially affect the epidemiology of the toxicoses caused.

Hyalomma truncatum was the most abundant of the 2 *Hyalomma* species collected. Most (>65%) of these ticks were collected during the summer months (January - March). The relatively low number collected from goats in the present study, suggests either that these animals are poor hosts of these ticks or that Angora goats minimise contact with the ticks through behavioural patterns. Both *H. marginatum rufipes* and *H. truncatum* seek hosts from the ground and not from the vegetation and this may affect tick/host contact.

Although free-living, newly moulted adult *I. rubicundus* are already present during December or January (summer), this tick is parasitic virtually only during the winter months, and it is reasonable to assume that low temperatures stimulate the onset of tick activity. A comparison of mean minimum temperatures for 1988 and 1989 shows that those for the 3 months preceding tick activity (January-March) were lower during 1989 than during the 1988 season. During March 1989

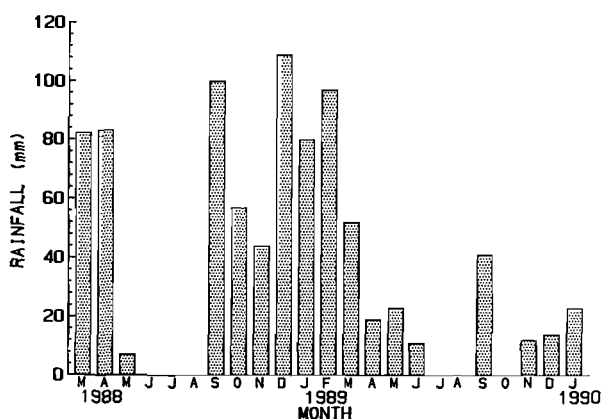


Fig. 1: Total monthly rainfall on the farm "Preezfontein" from March 1988 to January 1990

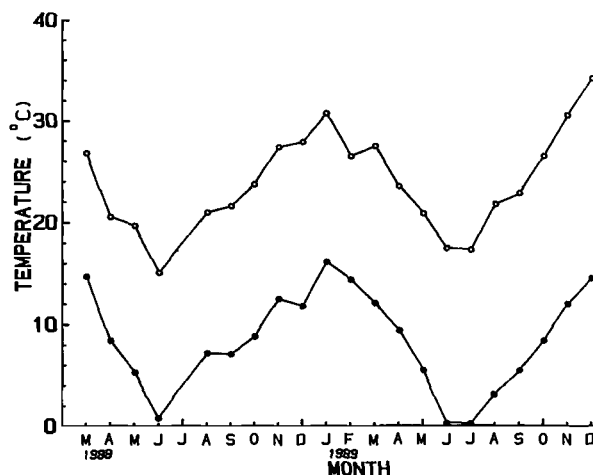


Fig. 2: Mean monthly minimum and maximum temperatures at Fauresmith for the period March 1988 to December 1989

DISCUSSION

There are some differences in the relative abundance of adult ticks of the various species infesting the goats and those recovered from sheep and cattle examined on the same farm in previous surveys. The relative abundances of the 4 major tick species recovered from the 3 host species on the farm, are summarised in Table 2.

Hyalomma marginatum rufipes was proportionately most abundant on cattle, *I. rubicundus* on sheep and *R. punctatus* on the goats. *H. marginatum rufipes* was least abundant on the goats, *Hyalomma*

truncatum on the sheep and *I. rubicundus* on the cattle. These differences in relative abundance are probably due either to host preference of the ticks, to habitat preference of the ticks or hosts, or to behavioural differences of the hosts which may affect tick-host contacts. Accordingly, depending on the number and type of hosts frequenting a specific area, the numbers of ticks within this area may increase because of the greater availability of suitable hosts. Since *H. truncatum*, *I. rubicundus* and *R. punctatus* can all cause tick toxicosis^{2,4}, stocking densities may, in

minimum temperatures fell below 10°C on 6 occasions, compared to only once during March 1988. This may explain why infestation occurred about one month earlier during 1989 than in 1988.

The variation in the commencement of tick activity and peak activity periods between years is significant. In an earlier survey on sheep *I. rubicundus* became active on "Preezfontein" during April 1987 and reached a peak during May³. In both surveys, tick burdens reached a peak within 4 weeks after the commencement of the activity.

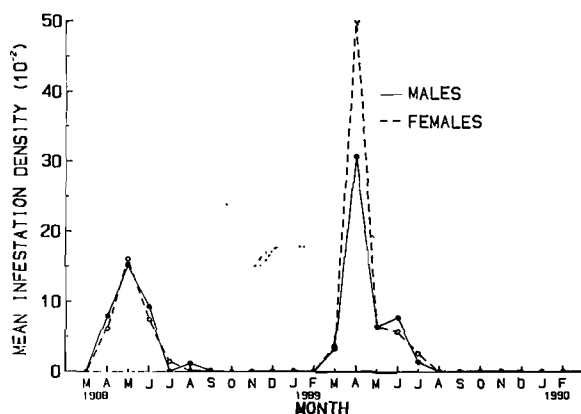


Fig. 3: The seasonal abundance of adult *Ixodes rubicundus* on Angora goats on the farm "Preezfontein" in the south western Orange Free State (infestation density = number of ticks per kg host body mass)

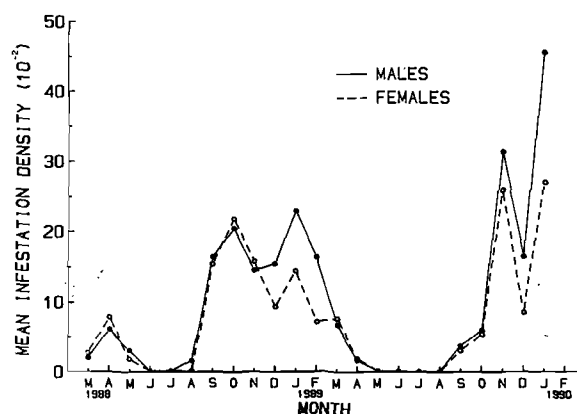


Fig. 4: The seasonal abundance of adult *Rhipicephalus punctatus* on Angora goats on the farm "Preezfontein" in the south western Orange Free State (infestation density = number of ticks per kg host body mass)

It is important to know when the ticks become active in order to remove stock from infested camps or apply acaracidal treatment before peak burdens are reached. On farms in the southern Orange Free State and parts of the Karoo, where these precautions were not taken during 1989, the earlier than expected activity of the ticks caused severe stock losses, with reports of up to 100 small stock mortalities on a single property not uncommon. The development of a weather-based model in order to predict the onset of tick activity is therefore regarded as a high priority and is currently receiving attention.

Unlike *I. rubicundus* the period of activity of *R. punctatus* commenced one month later in 1989 than during 1988. One could speculate that as this tick normally prefers the warmer temperatures of spring and summer, the colder winter of 1989 delayed the onset of its activity during that year.

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Table 2: The relative abundance of the major tick species recovered from goats, sheep and cattle on the farm "Preezfontein"

Tick species	Relative abundance (%) on:		
	Goats	Sheep	Cattle
<i>Hyalomma marginatum rufipes</i>	0,7	16,3	36,2
<i>Hyalomma truncatum</i>	1,2	0,1	7,1
<i>Ixodes rubicundus</i>	34,3	82,2	3,2
<i>Rhipicephalus punctatus</i>	63,3	1,3	9,4
Other species	0,5	0,1	44,1