Adult ixodid ticks on two cattle breeds in the south-western Free State, and their seasonal dynamics

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ABSTRACT

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A study was conducted to compare the species of adult ixodid ticks on Friesian and Bonsmara cattle and their seasonal dynamics. Between five and ten animals of each breed were kept on natural False Upper Karoo vegetation, typical of the south-western Free State. Between May 1990 and October 1991, the animals were examined once or twice a month for the presence of adult ticks which were removed, counted and identified. Six species of ixodid ticks were recorded. The species composition on the two cattle breeds was remarkably similar. *Ixodes rubicundus* was dominant (55–57,7% of all ticks collected), followed by *Hyalomma marginatum rufipes* (28,9–31,5%) and *Rhipicephalus punctatus* (6,2–6,7%). Only small numbers of *Hyalomma truncatum*, *Rhipicephalus evertsi evertsi* and *Rhipicephalus gertrudae* were recorded. Almost twice as many ticks were collected from Friesian as from Bonsmara cattle. *Ixodes rubicundus* showed a typical winter-activity period. The other species were either active mostly during the warmer months, or their numbers were too low to determine any seasonal pattern. Apart from information on the diversity of ticks which infest cattle in the region, the study has also shown a greater resistance by Bonsmara cattle (a mixed *Bos taurus/Bos indicus* breed) to tick infestation. *Bos indicus* cattle can play an increasingly important role in integrated tick-management practices in southern Africa.

Keywords: Adult, cattle breed, ixodid, seasonal dynamics, tick

INTRODUCTION

Various factors currently contribute towards altering the traditional concept of tick control to one of tick-population management, in which the various ecological factors that affect tick populations are considered (Spickett 1994). Knowledge of the species composition and seasonal dynamics of ticks that parasitize domestic hosts, is important for several reasons. Firstly, it provides information on the burdens and diversity of ticks that can potentially transmit or cause diseases. Secondly, knowledge of the seasonal dynamics provides information essential to the timing of acaricide treatment. Thirdly, it could provide information on host resistance and the ability of the host to harbour ticks which can affect other, perhaps more susceptible, hosts.

Except for a research note (Fourie & Horak 1990) on the parasites of cattle in the south-western Free State and another on differences between *Ixodes rubicundus* infestations on Friesian and Bonsmara cattle (Fourie & Kok 1995), no information is available. The purpose of this study was to compare the species of adult ixodid ticks and their seasonal dynamics on Friesian and Bonsmara cattle in the south-western Free State.

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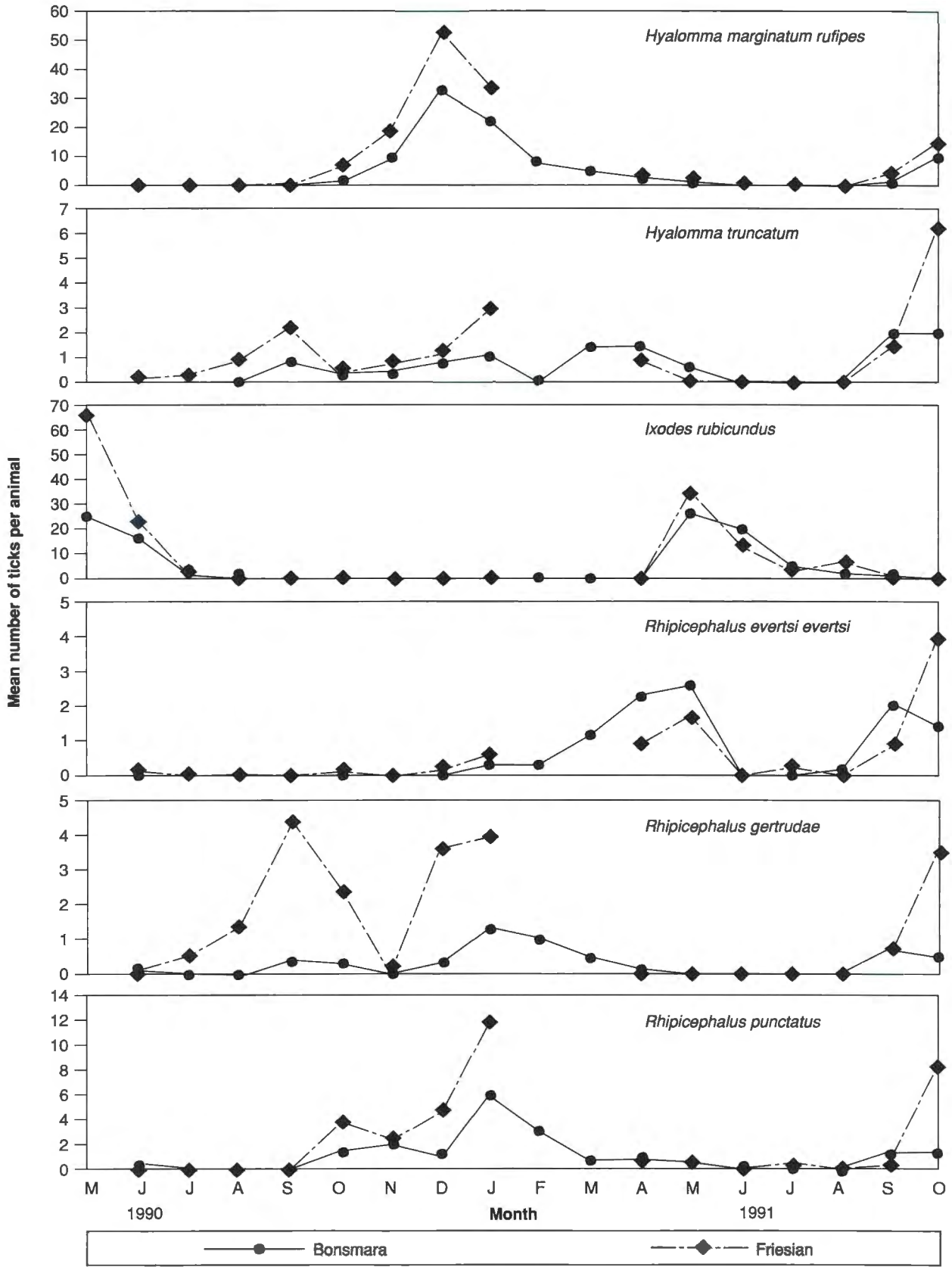

FIG. 1 Changes in the seasonal occurrence of ixodid ticks infesting Bonsmara and Friesian cattle on the farm Preezfontein (note that no Friesians were available in February and March 1991)

MATERIAL AND METHODS

Study area

The study was conducted on the farm Preezfontein, which is situated 10 km from the town Fauresmith (29°46´S; 25°19´E) in the south-western Free State. The vegetation in the area is defined as False Upper Karoo (Acocks 1988). A fenced camp on the farm, encompassing 190 ha of vegetation typical of the region, was selected for this study. The camp consisted of flat as well as hilly areas.

Survey animals

During the period May 1990 to October 1991, between five and ten Bonsmara and Friesian cattle were examined once or twice a month (except for February and March 1991 when no Friesians were available) for the presence of adult ticks. The animals consisted of heifers and oxen < 18 months old at the start of the survey. During April 1991, the cattle were replaced. Age-and-sex composition was as before. The cattle were restrained in a crushpen equipped with a neck clamp. The body of each animal was carefully examined, visually and by palpation of the skin on both sides, for the presence of ticks. All the ticks were removed with forceps and placed in labelled vials for later identification and counting.

RESULTS

Six different ixodid species were recorded on the cattle. The percentage composition of the adult tick species on both cattle breeds was remarkably similar. *Ixodes rubicundus*, the Karoo paralysis tick, was the commonest species (55–55,7% of all ticks collected) on both cattle breeds, followed by *Hyalomma marginatum rufipes* (28,9–31,5%) and *Rhipicephalus punctatus* (6,2–6,7%) (Table 1). Almost twice as many ticks (based on relative densities) were collected from Friesian as from Bonsmara cattle (Table 1). In the case of *I. rubicundus*, females dominated, and in all other cases, except for *R. punctatus*, males dominated (Table 1). For *R. punctatus* the sex ratio on both Bonsmara and Friesian cattle was 1:1.

The seasonal occurrence of the different tick species is presented graphically in Fig. 1. *H. marginatum rufipes* showed a typical summer-activity period with peak numbers being recorded during December. In the case of *Hyalomma truncatum*, no distinctive seasonal-activity pattern was evident. There was, however, a tendency for the ticks to be more prevalent on the hosts during spring and mid- to late summer. *Ixodes rubicundus* showed a typical winter-activity period with peak burdens recorded on the cattle during May, after which infestation levels decreased steadily up to September. *Rhipicephalus evertsi evertsi* ticks showed peaks in infestation levels during the autumn and spring. During the spring of 1990, infestation levels of both cattle breeds with *R. evertsi evertsi* were very low. *Rhipicephalus gertrudae* infested the cattle from July to April, with peak infestations recorded during September and January. Similarly, *R. punctatus* was active only during the warmer months of the year, with peak infestations recorded during January.

DISCUSSION

During a previous study on the farm Preezfontein, five different ixodid tick species (*Amblyomma marmoreum, H. marginatum rufipes, H. truncatum, I. rubicundus* and *R. punctatus*) and one argasid tick species (*Otobius megnini*) were obtained from Friesian cattle (Fourie & Horak 1990). *A. marmoreum* and *O. megnini*, of which only immature ticks were collected during the 1990 study, were not collected during the present study. Conversely, *R. evertsi evertsi* and *R. gertrudae* were collected from all the cattle during the present study, but not from the Friesians during the previous study. In the previous study, the cattle were slaughtered and their skins scrubbed, which made the collection of immature ticks such as *A. marmoreum* possible. Immature ticks are difficult to locate with the techniques used during the present study. Furthermore, Friesians studied previously, were raised in kraals where they acquired the *O. megnini* infestations (Fourie & Horak 1990). This was not the case in the present study, which explains the absence of this tick species.

Two tick species, namely *H. marginatum rufipes* and *I. rubicundus*, constituted more than 80% of the ticks sampled from the Friesian and Bonsmara cattle. Both of these ticks are of veterinary importance. It is not known whether *H. marginatum rufipes* transmits any pathogenic organisms in the region where the study was conducted, but their bites can cause considerable damage, often associated with secondary bacterial infections at attachment sites (Howell, Walker & Nevill 1983). Engorging female *I. rubicundus* can cause paralysis in game (Fourie & Horak 1987) and livestock, including cattle (Spickett & Heyne 1988). Paralysis of cattle in the southern Free State is not an uncommon phenomenon (Fourie, personal observations 1991).

A comparison between the relative abundance of ixodid ticks sampled from Angora goats (Fourie & Horak 1991), Merino sheep (Fourie, Horak & Marais 1988), and Bonsmara and Friesian cattle (this study) is given in Table 2. All of these studies were conducted in the same camp on the farm Preezfontein. Compared with Angora goats and Merino sheep, the cattle were infested with a greater proportion (28,9–31,5%) of *H. marginatum rufipes* ticks. In the case of Angora goats, this tick constituted < 1% of the ticks sampled. Compared with *H. marginatum rufipes,*

TABLE 1 Total numbers and relative dominance (% of total) of the different ixodid tick species sampled from Bonsmara and Friesian cattle on the farm Preezfontein during the period of study

Tick species	Male ticks		Female ticks		Total	% of total
	No.	Mean no./ host[a]	No.	Mean no./ host[a]		
Tick infestation on Bonsmara cattle (n = 231)						
Hyalomma marginatum rufipes	798	3,45	389	1,68	1187	31,49
Hyalomma truncatum	72	0,31	40	0,17	112	2,97
Ixodes rubicundus	529	2,29	1 546	6,69	2 075	55,04
Rhipicephalus evertsi evertsi	70	0,30	33	0,14	103	2,73
Rhipicephalus gertrudae	24	0,10	35	0,15	59	1,56
Rhipicephalus punctatus	117	0,51	117	0,51	234	6,21
Total	1 610		2 160		3 770	
Tick infestation on Friesian cattle (n = 154)						
Hyalomma marginatum rufipes	876	5,69	412	2,68	1 288	28,94
Hyalomma truncatum	83	0,54	51	0,33	134	3,01
Ixodes rubicundus	758	4,92	1 721	11,17	2 479	55,71
Rhipicephalus evertsi evertsi	54	0,35	40	0,26	94	2,12
Rhipicephalus gertrudae	92	0,60	67	0,44	159	3,57
Rhipicephalus punctatus	148	0,96	148	0,96	296	6,65
Total	2 011		2 439		4 450	

[a] Relative density or abundance

TABLE 2 The relative dominance (%) of adult ixodid tick species sampled from Angora goats, Merino sheep and Bonsmara and Friesian cattle on the farm Preezfontein (data from Fourie & Horak 1991; Fourie, Horak & Marais 1988; and the present study)

Tick species	Angora	Merino	Bonsmara	Friesian
Hyalomma marginatum rufipes	0,69	16,30	31,49	28,94
Hyalomma truncatum	1,21	0,07	2,97	3,01
Ixodes rubicundus	34,34	82,22	55,04	55,71
Rhipicephalus evertsi evertsi	0,05	1,00	2,73	2,12
Rhipicephalus evertsi mimeticus	–	2,00	–	–
Rhipicephalus gertrudae	0,44	–	1,56	3,57
Rhipicephalus punctatus	63,29	1,37	6,21	6,65

infestations of the livestock with *H. truncatum* were light, generally < 4%. In the same region, Kok & Fourie (1995) reported an initial *H. truncatum* dominance early in the season, which soon changed to a distinct *H. marginatum rufipes* dominance in samples of *Hyalomma* ticks collected from Merino and Dorper sheep. *Ixodes rubicundus* was the most abundant tick, infesting both Merino sheep and cattle. However, in the case of Angora goats, *R. punctatus* was the dominant tick species (63,3%), followed by *I. rubicundus* (34,3%). For both sheep and cattle, the proportion of *R. punctatus* ticks that infested these hosts was < 7%. The other three *Rhipicephalus* spp. which infested the livestock, occurred in small (< 4%) numbers (Table 2).

The differences in the relative abundance of ticks on the various breeds of animals can possibly be attributed to several factors. Host preferences of the ticks are important. Furthermore, small ruminants are generally less successful as hosts for adult ticks than are large ruminants (Horak 1984). The distribution of the ticks within the habitat used by the host can also have a major influence on tick-host contact (Fourie & Kok 1992).

The seasonal dynamics of *H. marginatum rufipes* on cattle are similar, both to those previously recorded on Merino sheep at Preezfontein (Fourie *et al.* 1988) and to those recorded on cattle in the northern Transvaal (Horak 1982). Since the numbers of *H. truncatum* ticks collected from the cattle on Preezfontein were small, our records of the seasonal occurrence of this tick cannot be considered meaningful. This is also the case with *R. evertsi evertsi* and *R. gertrudae*. All these ticks, however, are active mainly during the

warmer periods of the year. From the data presented, it is evident that *R. punctatus* also prefers the warmer temperatures of spring and summer. Its seasonal abundance on cattle is fairly similar to that previously recorded on Angora goats (Fourie & Horak 1991). The seasonal occurrence of *I. rubicundus*, whose adults are active during the cold part of the year, is also similar to that recorded on Angora goats (Fourie *et al.* 1988) at Preezfontein.

From the relative density of ticks collected from the Friesian and Bonsmara cattle, respectively, it is evident that the Friesians harboured almost twice as many ticks as the Bonsmaras. Although the differences in relative density varied according to the tick species, it was always higher on the Friesians than on the Bonsmaras. This is consistent with previous reports which indicate that breeds which show greater resistance to one tick species also express resistance to other species of ticks (Spickett, De Klerk, Enslin & Scholtz 1989; Rechav, Dauth & Els 1990). Various studies have shown that *Bos indicus* cattle carry significantly fewer ticks than do exotic *Bos taurus* cattle (Spickett *et al.* 1989; Rechav, Kostrzeuske & Els 1991; Fivaz, De Waal & Lander 1992). Crossbred cattle such as Bonsmara (*Bos taurus* x *Bos indicus*) carry intermediate numbers of ticks (Spickett *et al.* 1989). Within the context of this study, pure *Bos indicus* cattle can play an important role in integrated tick-management practices, particularly against *I. rubicundus* (Fourie & Kok 1995). Since the chances of an animal becoming paralysed are related to its tick burden (Fourie, Petney, Horak & De Jager 1989; Fourie, Horak & Van Zyl 1992), control should be aimed at reducing the aphagous tick populations (Fourie, Kok, Krugel, Snyman & Van der Lingen, in press) as well as the number of engorging females. This can be achieved either by chemical treatment, use of resistant hosts and vegetation management or by a combination of the different control methods.

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