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Research Article

The Seasonality of Free-Living Ticks on Döhne Sourveld Pastures Grazed by Bonsmara or by Nguni Cattle in the Eastern Cape Province

N Nyangiwe[1]*, S Goni[1], I G Horak[2] and S Ndlebe[3]

[1]*Döhne Agricultural Development Institute, Private Bag X15, Stutterheim, South Africa*

[2]*Department of Veterinary Tropical Diseases, Faculty of Veterinary Science, University of Pretoria, Onderstepoort, South Africa*

[3]*Department of Rural Development and Agrarian Reform, Private Bag x 5002, Mthatha, South Africa*

***Corresponding Author**: N Nyangiwe, Döhne Agricultural Development Institute, Private Bag X15, Stutterheim, South Africa.

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Abstract

The objective of this study was to establish the seasonal abundance of questing tick larvae on Döhne Sourveld pastures grazed by Bonsmara or by Nguni cattle. Ticks questing for hosts were collected monthly for a period of 3 years (2005, 2006, 2007) by dragging flannel strips attached to a wooden spar over the vegetation. At each occasion six replicate drag-samples were made in separate camps grazed by Bonsmara cattle, or by Nguni cattle. The most numerous of the questing larvae collected were those of *Rhipicephalus* (*Boophilus*) *microplus* (61%) followed by *Rhipicephalus evertsi evertsi* (14%), *Rhipicephalus* (*Boophilus*) *decoloratus* (13%) and *Rhipicephalus appendiculatus* (12%). The composite separate seasonality's of larvae of the four tick species in the camps was nearly identical for the two breeds of cattle, but peaks in larval numbers were always higher in camps grazed by Bonsmara cattle than in those grazed by Nguni cattle.

Keywords: *Cattle; Eastern Cape Province; Free-Living Ticks; Seasonal Occurrence; Rhipicephalus (Boophilus) decoloratus; Rhipicephalus (Boophilus) microplus; Rhipicephalus appendiculatus; Rhipicephalus evertsi evertsi*

Introduction

Ticks are the most important external parasites of domestic animals in South Africa and can constitute a limiting factor to successful stock farming unless appropriate measures are taken to control them [1]. Production losses due to ticks and tick-borne diseases therefore pose important and significant impediments to improved animal health [2]. In addition to transmitting certain protozoal, rickettsial and viral disease, they damage skins causing hides to be downgraded, and heavy infestations may reduce milk production and increase susceptibility to other diseases [3]. One of the methods of control is strategic application of acaricide during seasonal peaks in tick abundance. It is aimed mainly at adult ticks so as to decrease their numbers to levels at which economic damage is less than the cost of control [1]. To do this successfully it is necessary to know the seasonality of the major tick species in a region. Another method of control is the introduction of cattle breeds that are capable of acquiring resistance to tick infestation. Nguni cattle are a breed that has this attribute [4].

Objective of the Study

The objective of this study was to establish the seasonal abundance of questing free-living tick larvae on Döhne Sourveld pastures grazed by Bonsmara or Nguni Cattle. Not only would this reflect the seasonal occurrence of adult ticks infesting cattle on the pasture, but also whether there are differences in the numbers of questing tick larvae on the pastures grazed by the two breeds of cattle.

Materials and Methods

Study area

The study was conducted at the Döhne Agricultural Development Institute (hereafter referred to as Döhne) in the Amahlathi District, Eastern Cape Province. Döhne (32° 31'S; 27° 28'E) comprises an area of 992 ha and its vegetation is defined as Döhne Sourveld [5]. The most common grass species are *Eragrostis curvula*, *Eragrostis plana*, *Sporobolus africanus* and *Themeda triandra*. The climate varies between hot-wet to extreme cold with sometimes snowfall during winter. The average annual rainfall varies between 600mm and 900mm per annum and rain falls mainly between November and April. The slope and soil depth ranges between 1% - 7% and 200 - 800 mm respectively. Soils are generally characterised by yellow brown fine sandy loam overlying a reddish brown fine concretionary fine sandy clay loam. The soil pH is within the range of 4 and 5. The geology of the area is composed predominantly of grey horizontally laminated fine grained sandstone of the Beaufort Group of the Karroo Sequence.

Sampling of free-living ticks

Tick larvae questing for hosts from the vegetation were collected monthly by drag-sampling the vegetation for a period of 3 years from January 2005 to December 2007. This was done by an operator dragging a wooden spar, with ten flannel strips, each 1m long by 100 mm wide attached to it over the vegetation [6]. At each sampling site six replicate drags 100 m long and approximately 50 m apart were made in camps grazed by Bonsmara cattle or by Nguni cattle. After each drag all ticks on the flannel strips were collected by means of fine-point forceps and stored in vials containing 70% ethanol for later identification and counting. Composite graphs of seasonal abundance were constructed by calculating the average number of larvae collected in each month.

Results and Discussion

A total of 2 582 tick larvae belonging to four of the major species infesting cattle were collected from the vegetation during the study period (Table 1).

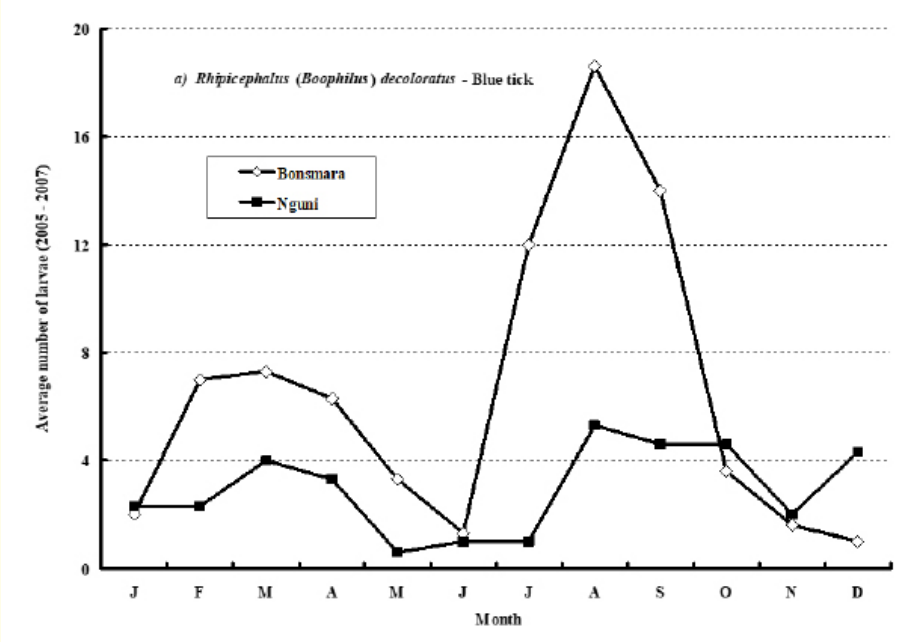
Tick species	Total number of larvae collected	
	Bonsmara camps	Nguni camps
Rhipicephalus (Boophilus) decoloratus	235	107
Rhipicephalus (Boophilus) microplus	1 191	388
Rhipicephalus appendiculatus	200	109
Rhipicephalus evertsi evertsi	261	91
Total	1887	695

Table 1: *Questing larvae of major tick species on Döhne Sourveld pastures grazed by Bonsmara or Nguni cattle.*

The most abundant larvae were those of the Asiatic blue tick, *Rhipicephalus* (*Boophilus*) *microplus*, constituting 61% of the ticks collected. Other larvae in order of abundance were those of the red-legged tick, *Rhipicephalus evertsi evertsi* (14%), the African blue tick, *Rhipicephalus* (*Boophilus*) *decoloratus* (13%) and the brown ear tick, *Rhipicephalus appendiculatus* (12%). Considerably more larvae of each tick species were collected from the vegetation of pastures grazed by Bonsmara cattle than those grazed by Nguni cattle. The dominance of *R.* (*Boophilus*) *microplus* larvae is similar to findings of a study in the communal farming areas of the eastern region of the Eastern Cape Province, in which larvae of this tick were widespread as well as being the most frequently collected from the vegetation [7].

Both species of *R. (Boophilus)* are one-host ticks, and both can complete more than one life cycle annually. The early spring rise during August in the numbers of larvae of the two *R.* (*Boophilus*) species (Figure 1a and 1b) follows synchronous hatching of larvae from eggs

that have over-wintered on the pastures [8]. The increase in numbers of questing larvae in spring is immediately followed by an increase in the numbers of parasitic larvae, nymphs and adult ticks of the one-host *R.* (*Boophilus*) spp. on host animals [9].



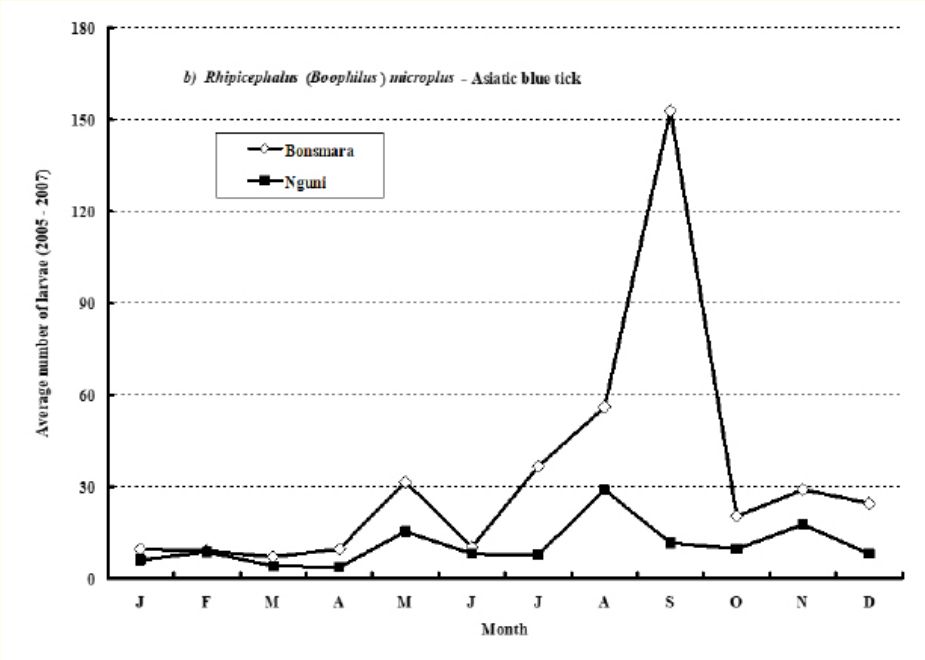


Figure 1: *Seasonal abundance of a) Rhipicephalus (Boophilus) decoloratus and b) Rhipicephalus (Boophilus) microplus larvae on pastures grazed by Bonsmara or Nguni cattle (2005 to 2007).*

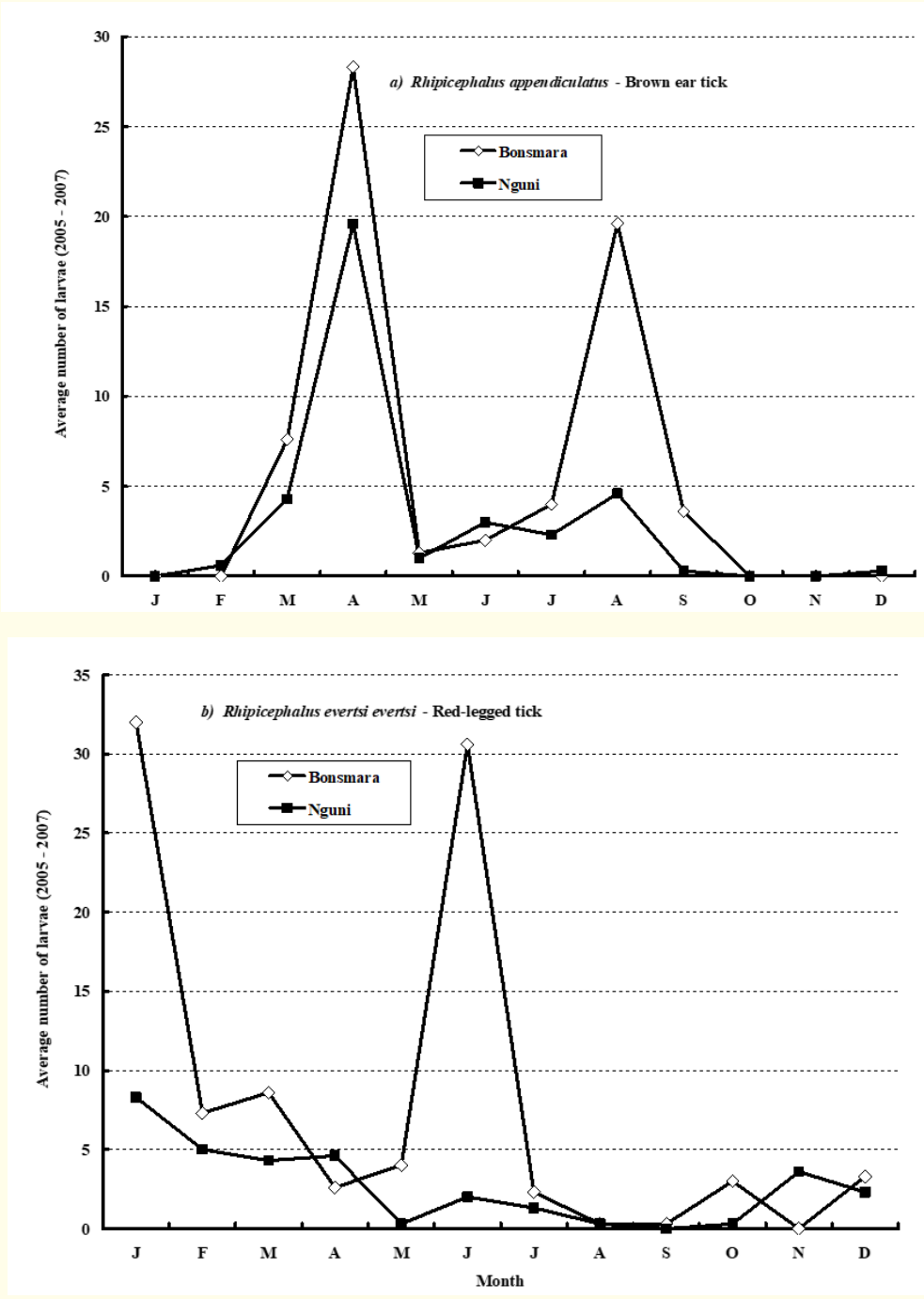


Figure 2: *Seasonal abundance of a) Rhipicephalus appendiculatus and b) Rhipicephalus evertsi evertsi larvae on pastures grazed by Bonsmara or Nguni cattle (2005 to 2007).*

The peak in numbers of *R. appendiculatus* larvae during autumn (Figure 2a) is a consequence of peak numbers of adult ticks of this three-host tick during summer [10], however, the second peak in August is unusual and could be due to larvae hatching from eggs that have over-wintered. No clear pattern of seasonal abundance is evident for the larvae of *R. evertsi evertsi* (Figure 2b), a two-host tick that can complete more than one life cycle in a year. The questing free-living larvae of three of the four major tick species on Döhne Sourveld in the Eastern Cape Province exhibited clear patterns of seasonal abundance making it possible to determine the most advantageous times to treat their adults on cattle.

Conclusion

The fact that pastures on which Nguni cattle grazed yielded considerably fewer larvae than those on which Bonsmara cattle grazed, indicates that the former breed can play an important role in integrated tick management practices in the survey region. The spreading of the Asiatic blue in the Eastern Cape Province is not only for academic interest but also has serious economic implication, as it spreads so does the babesiosis (redwater) in the livestock farming industry. Therefore, it is necessary to provide new and updated data, collected in different geographical and climatological areas, and look critically at parasitic prevalence, seroprevalence, clinical incidence, pathogen presence, and the pathogen infection and inoculation rate by ticks.

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