Interactions Ticks, Hosts and Pastures in subequatorial zone

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INTRODUCTION

Ticks conspire big losses in livestock and hinder the introduction of improved breeds in developing countries [1-2]. Indeed, Stachurski [3] observed that exotic cattle breeds introduced in Africa are more sensitive to ticks infestations and induced diseases.

It is the case on the Kpinnou ranch in subequatorial zone of Bénin where it was observed that the Girolando dairy cattle (imported from Brazil) which graze *Panicum maximum* var. C1 are more susceptible to infestation of ticks.

Therefore, the purpose of this study was to highlight the interactions between ticks and their bovine hosts and two types of artificial grazing pastures.

MATERIAL and METHODS

Study Environment

This study was conducted on the Kpinnou ranch within 6°33'.22.0"- 6°33'.76.8" latitudinal North and 1°46'.36.0"- 1°47'.80.0" longitudinal East (Fig. 1). Kpinnou ranch enjoys a subtropical climate characterized by 2 wet seasons and 2 dry seasons with 950 mm an annual height rainfall average.

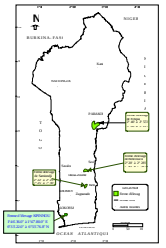
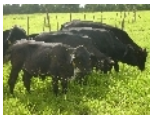


Fig. 1 Localization of Kpinnou ranch

Animal Material



19 young Girolando dairy cattle separated in 2 homogeneous groups according to : age, weight, gender, coat color and loads in ticks.

Group 1 of 10 animals ♂ & ♀ grazed on *Panicum maximum*.

Group 2 of 9 animals ♂ & ♀ grazed on *Panicum maximum* var. C1.

The coat colors of the animals were variable (fawn burnt (n=9), magpie black (n=1), magpie fawn (n=1), gray (n=2), fawn (n=2) and black (n=4)).

Study Methods

Harvest of Phytomasse for Characterization of Pastures

Some cuts are done inside the productivity plots (10 m x 10 m) on the two types of pasture. Within every plot, 7 small plots of 1 m x 1 m repeated 3 times were and randomly selected and cut for calculation of the potential productivity.

Average Density of Tufts

In the same small plots of 1 m^2 the number of tufts is counted as well as the number of stumps and the diameters of the recovered area of the stumps are measured.

The valued parameters are:

Nave = ∑ni/N; ni: number of tufts counted per small plot of $1m^2$; N: total number of sample plots; Nave: average density of tufts (number/m^2).

Average Area Covered by the Stumps

A = ∑πdi²/4; di: diameter of the recovered surface of the stumps (cm); A: average area covered by the stumps (cm^2/m^2).

Monitoring of the evolution of the load in ticks of animals

The grazing lasted two months. During this period, a weekly counting of all ticks on the animal by bodily region is achieved and the genera and species of ticks identified.

Statistical Analysis

Evaluation of the effect of the type of pasture and bovine coat color using an ANOVA variance analysis completed by the Newman and Keuls method of multiple comparisons of means.

RESULTS and DISCUSSION

Characterization of the Two Types of Pasture

For the studied parameters, fundamental differences are noted between the two types of pasture (Table 2).

Table 2: Characteristics of the two types of pasture

Forage species	*Panicum maximum*	*Panicum maximum* var. C1
Average recovery area (%)	74.14a	80.86b
Biomass (kg DM / ha)	2042.67a	2210.75a
Average height (cm)	151.11a	78.75b
Average number of stumps / m^2	96.99a	483.13b
Average area of tuft (cm^2/m^2)	1594.81a	1444.02b

Identification of Genera and Species of Ticks

Four genera of ticks with eight species have been identified:

Genera *Boophilus* (3 species: 98.56%):

B. decoloratus;  *B. geigy*;  *B. annulatus*; 

Genera *Hyalomma* (2 species: 0.96%):

H. truncatum;  *H. rufipes*; 

Genera *Amblyomma* (1 specie: 0.92%):

A. variegatum; 

Genera *Rhipicephalus* (2 species: 0.48%):

R. sanguineus;  *R. evertsi*;

The *Boophilus* genus is the most abundant (P<0.05). The high density of *Boophilus* can be justified by his monophasic cycle, unlike the other three genera (*Amblyomma, Hyalomma* and *Rhipicephalus*), which have a biphasic or triphasic cycle.

Effect of Pasture Type

The animals having grazed *Panicum maximum* var. C1 are more infested than those that have been grazed *Panicum maximum* (Fig. 2). This variation of the infection rate observed from one pasture to another could be explained by fundamental differences noted in their characteristics.

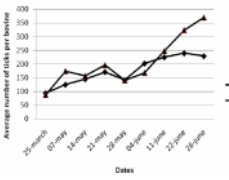
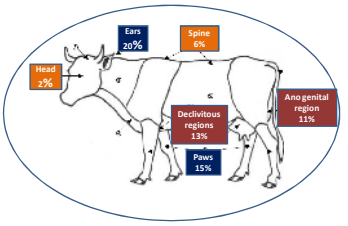


Fig. 2 Evolution of the load of ticks of cattle in both types of pasture

Indeed, *Panicum* C1 is a tufted basophilic specie that appeared more covering than *Panicum maximum* with a density of stumps five times higher ($483/m^2$ vs. $97/m^2$) creating thus better hygrometric conditions for the development of ticks [4-5].

Effect of Different Body Regions and Coat Color of Cattle

Ticks are mainly found in hidden regions where the skin is very thin (ears, declivitous regions etc.) which facilitates the fixing of the tick and permits him to hide and be protected from the risk of abduction/extraction (predators, rubbings, treatments) and against heat and desiccation [6]. This need of camouflage of the ticks and thus be undetected is best expressed through the choice of the coat color of the host animal. Indeed, the bovine of dark coat are in general more infested (P<0.05) than those of clear colour.



CONCLUSION

The results of this study are interesting, notably for the effect of the pasture type and the effect of the color of the coat and suggest a deepening of the topic.

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