

Use of biotherapeutic in the control of natural infestation by *Boophilus microplus*: pilot study

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ABSTRACT

In the control of tick-borne disease (TBD), resistance to chemical products has been reported and a concern with the preservation of the environment requires alternative procedures to control infestation by *Boophilus microplus* worldwide. The use of biotherapeutic preparations is one of such alternatives. The aim of this study was to evaluate the effects of a biotherapeutic mixture including *B. microplus* in naturally infested cattle. 27 animals were divided in 3 groups (n=9): I – control, received no treatment; II- treated with amitraz dip; III- treated with a standard commercial mixture of biotherapeutic 12CH, p.o. Group III presented a statistically significant decrease of ticks when compared to the control group (p<0.05). There was no statistically significant difference between groups II (amitraz) and III (biotherapeutic) (p<0.05). These results suggest that biotherapeutic preparations might be an effective in the control of *B. microplus* in cattle.

Key words: Biotherapeutic; Tick; Alternative control; Cattle.

Introduction

Boophilus microplus (Canestrini) is a major cause of concern in the health of cattle in tropical and subtropical areas [1]. Besides wasting and transmission of pathogenic microorganisms including protozoa, rickettsias, spirochetes and virus [2], it may cause significant financial loss due to the devaluation of the leather. In Brazil, *B. microplus* finds favorable climatic conditions for its development from the Southern border to the Northern and Northeastern areas, which allow 3, 4 and potentially even 5 generations to complete their cycle in one year in areas with mean temperature above 17°C [3].

The effectiveness of chemical pesticides is restricted and besides the induction of resistance, they leave residues on animal products and subproducts. Resistance to *B. microplus* is attributed to several mechanisms, including decrease in the absorption of the pesticide, increase in its metabolization through esterases, oxidases and glutathion-transferases and structural modifications in the target [4].

Moreover, the chemical treatment aims at eliminating the ectoparasites without any consideration for public health and environmental hazards. Alternative treatments are, thus, being sought for. Treatments with highly diluted and agitated substances (“homeopathic remedies”) may be used according to different methodological guidelines: similarity between their effects on healthy individuals and the symptoms of the actual disease (homeopathy) or targeting the etiological agent of the disease (isopathy). In the latter case, the remedies are prepared through dilution and agitation of the etiological agent (biotherapeutic). Several studies attest to the effectiveness of the latter approach, including cattle diseases [5,6,7].

According to Arenales et al. [8], a commercial biotherapeutic mixture was effective in the control of ecto and endoparasitoses in cattle. The present study aimed at evaluating the effectiveness of this biotherapeutic mixture in the control of the natural infestation with *B. microplus*.

Materials and methods

The study population included 27 Purunã heifers (a race developed by Instituto Agronômico do Paraná, IAPAR), age 12-14 months, newly weaned. Animals were range grown and supplemented with concentrate (corn and soy-bran) and mineral salt according to the species requirements, 1.5 kg/day.

The animals were divided into 3 groups (n=9): 1) control, received no treatment (GI); 2) treated with amitraz (GII); 3) treated with biotherapeutic (GIII). The study lasted 12 months.

Amitraz was employed by dip, bath tub containing 1 liter amitraz/1000 4 times during the experiment in the warmest season; minimum interval was 21 days.

GIII received the biotherapeutic mixture (Arenales Fauna & Flora) containing *Boophilus microplus*, *Amblyomma cajennense*, *Haematobia irritans*, *Musca domestica*, *Bunostomum sp*, *Haemonchus contortus*, *Haemonchus placei*, *Nematodirus sp*, *Oesophagostomum sp*, *Strongyloides sp*, *Trichostrongylus axei*, *Trichostrongylus colubriformis*, *Trichuris sp*, *Eimeria sp*, *Cysticercus cellulosae*, *Dermatobia hominis*, all 12CH in a vehicle of saccharose to complete 100g. Preparation follows Farmacopéia Homeopática Brasileira [9]. The product was mixed to common mineral salt, 400 g/25 kg and given to the animals with the ration, 100g/d, corresponding to a dose of 1.6 g/animal/day. The weight of the animals was assessed once a month.

The number of engorged *B. microplus* females was assessed every 14 days (total number of ectoparasites removed from heifers). Results were analyzed through general linear model (GLM), by employing SAS software, means were compared through Tukey's test ($p < 0.05$).

Results

The animals in GIII showed a reduction of 50.5% in the mean number of engorged females during the full study time, when compared to the control ($p < 0.05$). There was no statistically significant difference between GII and GIII. (Table 1)

Table 1. Experimental Results

Treatment	Number of engorged females (mean)/year	Weight gain (kg/year)
Control	52,08 ^a	25,11 ^a
Amitraz	12,67 ^b	30,22 ^a
Biotherapeutic	25,71 ^b	45,50 ^a

Different letters in a same column indicate significant difference (Tukey $p < 0.05$)

Discussion

The development of resistance of *Boophilus microplus* to amitraz appeared worldwide 4 to 10 years after its continual use. Resistance was initially evident in Australia in 1980, where it was identified the "Ulam" strain highly resistant to amitraz and showing crossed-resistance to cymiazole and chlorimuron [10,11] Resistance may explain the similarity between the results of amitraz and biotherapeutic in this study ($p < 0.05$), as while ideally the former ought to reduce the population of engorged females in at least 90%, in our study it only did in 75.67%.

Arenales et al. [8] attribute to the biotherapeutic commercial preparation – composed of several parasites – an adequate control of endo and ectoparasitoses in cattle, besides a weight gain 37.9% higher than in the non treated control group. However in our study, no difference was detected in the living weight among all three groups in spite of a tendency in the group treated with biotherapeutic preparation to gain more weight, reaching a mean increase of 20kg/month.

Conclusions

The preparation used in this study showed significant effect in the control of the infestation with *B. microplus*, reducing in 50% the number of engorged females. Thus, the use of biotherapeutic preparations seems useful in the control of infestation in Purunã cattle.

In a comparison of susceptibility of antibiotics in bacteria isolated from daily cattle raised in organic and conventional production systems, Tikofsky et al. [12] stated that the pathogens obtained in the organic-raised animals were more susceptible to chemotherapeutic agents and therefore they presented less risk of developing resistance to drugs. Moreover, the use of phytotherapeutic agents in conventional systems of production as a part of the strategy to control parasites, may increase the useful life of drugs; [13] the same seems to be the case when biotherapeutic preparations are used.

Thus, the use of biotherapeutic preparations may decrease the number of applications of chemotherapeutic agents to animals and the selective pressure on the strains of ticks susceptible to conventional treatment; moreover, their use is allowed in organic cattle raising. On the other hand, were repetitions of the chemical agent needed, probably the odds of resistance development will be decreased if a biotherapeutic preparation is previously used.

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