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FATOR P® EVALUATION, AN ORGANIC ADDITIVE, IN THE FEEDING OF LACTATING HOLSTEIN ¾ COWS TO REDUCE INFESTATIONS BY RHIPICEPHALUS (BOOPHILUS) MICROPLUS

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Abstract

Due the losses caused by the *Rhipicephalus* (*boophilus*) microplus tick in dairy cattle in several countries, this research evaluated the action of Factor P® as an aid in this ectoparasite control. This organic additive is supplied daily in the diet through supplementation. For this, 20 lactating Holstein cows were selected. The animals were divided into two groups, Treated Group (TG) and Control Group (CG). The animals were stratified based on the count of telegynes above 4.5 mm, present on the left side of each animal. To evaluate the action of the additive, counts were performed on days 3, 5, 7, 14, 21, 28, 57, 86, 115, 144, 172, 200, 227, 254 and 281 after the beginning of treatment. Over the 281 days, the control group received 28 sprays and the group treated with Factor P® received 10 sprays, 64% fewer interventions. Thus, it is concluded that the additive had an auxiliary effect in the control of bovine ticks, reducing the percentage of infestation, the use of acaricides and reducing additional management, favoring animal and environmental well-being with cost reduction, since using the additive Factor P®, the milk doesn't need to be discarded as in the case of conventional treatment.

Keywords

Acaricide efficacy, alternative control, animal nutrition.

INTRODUCTION

Milk is a food of widely consumed and, therefore, there is a demand for production in quantity and also for food quality/safety, which leads to changes and challenges for the producer, directly interfering with the cost of production and altering the profit margin (FIGUEIREDO et al., 2018). The milk production chain has become one of the most complex and representative of Brazilian agribusiness. According to EMBRAPA (2021), Brazil is highlighted among the largest producers, reaching the amount of 798 thousand tons, with the majority (83%) coming from cattle.

Interfering with the efficiency of the herd, *Rhipicephalus (boophilus) microplus* (cattle tick) is the main ectoparasite found in livestock in several regions (tropical and subtropical), being responsible for significant economic losses. This hematophagous arachnid is a vector of parasitic diseases such as anaplasmosis and babesiosis, known as "bovine parasitic sadness"(SANTOS et al., 2017). An annual loss of US$ 3 billion caused by the parasite in Brazil has been estimated. In addition to Brazil, Australia, many places in Africa and South American countries suffer from tick infestation, with financial and productivity losses (MOLENTO, 2020; MIRABALLES and RIET-CORREA; 2018; LATROFA et al., 2014).

One of the factors to be considered is that the prophylactic methods present in the veterinary pharmaceutical market, so far, do not show good results, with the control methods being more effective in the form of treatment, through the use of chemical products, either by aspersion baths, dorsal application, subcutaneous application or even, by earrings impregnated with products (DOLENGA et al., 2022).

In this context, it is worth remembering that in addition to the costs of conventional antiparasitic agents and the labor for application, there is a grace period to be followed and the milk produced is not in conditions for human consumption within a period of 3 days. Given the price currently paid to the producer (approximately R$3.2 per liter), a cow that produces 20L/day in average, would have 60L of discarded milk, that is, R$192.00. Considering the current dollar of US$ 6.14, the producer would not include around US$ 31.27 per animal/day in the revenue.

Researchers and producers from the most diverse segments are looking for

new techniques with the intention of maximizing food production around the world, thus providing a way to ensure that they are of good quality and can contribute positively to individuals (MONTEIRO et al., 2015).

It is also important to pay attention to animal welfare, without prejudice to the quality of imported and exported products, leading to actions that minimize the impacts during the production, storage, and distribution of food (BARRETA et al., 2020).

The present methods are becoming obsolete due to the increase of parasitic groups that present immunoresistance to the products on the market (ABOELHADID et al., 2018), and further studies are needed to find new substances. In this context, the natural additive Factor P® appears as a possible aid in the alternative control of ectoparasites. Fator P® is an organic, environmentally friendly additive on the market and has been tested for over 20 years, proving to be an effective aid in combating ectoparasites, reducing methane emissions and improving animal performance (LEITE et al., 2019).

All of this considered, the aim of the present research was to evaluate the action of an organic additive as an aid in the control of ticks in crossbred cattle (Bos taurus x Bos indicus) naturally infested by *Rhipicephalus (boophilus) microplus*.

MATERIAL AND METHODS

The trial was carried out in Patrocínio Paulista, SP (Latitude: 20° 38' 21'' South, Longitude: 47° 16' 56'' West). Corresponding to an ideal period/region for tick infestation.

There isn't conflict of interest in this research and it was submitted to and approved by the ethics committee for the use of animals in research at the University of Franca (UNIFRAN), registered under CEUA n° 4477021017 and had as selection criteria only healthy animals, naturally infested by a minimum of 10 ticks per animal.

To evaluate the effectiveness of reducing infestation by *Rhipicephalus (boophilus) microplus* in cattle treated with food supplementation of an organic additive complex, 20 crossbred females (Bos taurus x Bos taurus indicus) aged over 24 months, used in dairy cattle, with an identification system from a rural property were selected. The animals were housed in open paddocks with adequate space (1 AU per Ha), composed of *Brachiaria spp* grass and exposed to natural light and temperature

conditions. The paddock was supplied with troughs for mineral salt and water.

Tick counts took place in the afternoon, right after milking the lactating animals. The animals in the dry period were evaluated at the same time in the "waiting" corral, next to the milking parlor on the property. The engorged females of *R. microplus* between 4.5 and 8.0 mm in lenTGh, present on the entire left side (antimere) of each animal, were counted, as proposed by Wharton and Utech (1970).

After performing the averages of the counts of the determined days, the numbering was organized in descending order according to the number of ticks. In this order, the two animals with the highest mean counts were grouped in the first repetition, the two following were destined for the second repetition and, so on, until ten repetitions were constituted, and all animals were housed in 2 groups (Control Group (CG) and Treaty Group (TG)).

Groups were divided by stratification using the average of three consecutive counts before treatment. Soon after the definition of the experimental groups (CG and TG) they were separated in two parallel paddocks, exposed to the same environmental conditions. In the troughs, the same mineral supplement was provided *ad libitum*, one containing the tested additive (TG) and the other only the supplementation without the addition of any additive (CG).

On the initial day of treatment (D0) all animals were sprayed with a conventional antiparasitic based on chlorpyrifos, cypermethrin and fenthion at the dose recommended by the manufacturer (composed of 15% cypermethrin, 30% chlorpyrifos and 15% fenthion, diluted in water until the final concentration of 0.188 mg mL^{-1}, 0.375 mg mL^{-1} and 0.188 mg mL^{-1} respectively), to eliminate the presence of ectoparasites, starting the treatment with the additives with the animals free from ticks, thus improving the evaluation of the tested additive.

The product tested is an organic additive present in mineral supplementation for ruminants called Fator P®. This product has a formula based on a complex of organic compounds with amino acids (Lysine, Methionine and Tyrosine, 16400, 2980 and 3000 $mg.kg^{-1}$ respectively), probiotics (*Saccharomyces cerevisiae* 7 x 10^8 CFU $mg.kg^{-1}$) and essential acids (linoleic acid and oleic acid 108.9 and 99 $g.kg^{-1}$ respectively). This was administered daily to the treated group from D0 until the end of the trial. After the start of treatment, tick counts were performed on days 3, 5, 7, 14, 21 and 28 days after the start of treatment and then every 28 days until the 281st day of treatment.

In the counts performed after D0, a limit of 30 telegynes per animal was stipulated as acceptable, to prevent the animals from having an overpopulation of ticks. Based on these treatments, the number of animals treated in each group was used to evaluate the effect of the additive as an aid in the control of these ectoparasites. When intervention with an acaricide product was necessary, the same antiparasitic drug administered on D0 was used, with a residual period of 14 days, as recommended by the manufacturer.

The temperature and mean relative humidity data were obtained at the meteorological station of Franca-SP (lat -20.58 long-47.37 Altitude 968.00m). Data were submitted to analysis of variance (Two Way ANOVA and posttest Bonferroni), according to the distribution of variables. For this, the *GraphPadPrism* software was used.

RESULTS AND DISCUSSION

The means of the comparative evaluations of the experimental groups (CG) and (TG) are described in Table 1. In the analysis of the arithmetic means of counting of telegynes obtained, it was observed that from the 115th day after the beginning of the treatment with the tested additive (Days Post-Treatment (DPT)) there was a difference in the means of the telegynes counts between the Control Group (CG) and the Treated Group (TG), in which the TG obtained lower rates than the CG.

Table 1. Means and standard deviation of tick counts of the experimental groups (CG and TG) – Patrocínio Paulista, SP. Brazil. 2019.

DPT	Control group (CG)	Treated group (TG)
D+3	6.00 (±3.89)	5.10 (±5.49)
D+5	0.00 (±0.00)	0.00 (±0.00)
D+7	0.00 (±0.00)	0.00 (±0.00)
D+14	0.00 (±0.00)	0.00 (±0.00)
D+21	2.40 (±1.96)	1.90 (±0.99)
D+28	1.20 (±1.69)	3.00 (±3.86)
D+57	8.80 (±6.36)	9.80 (±5.89)
D+86	11.40* (±7.23)	26.70* (±23.72)
D+115	24.20** (±11.49)	7.60** (±2.12)
D+144	27.00 (±17.89)	16.50 (±10.73)
D+172	25.50* (±15.04)	10.70* (±9.93)
D+200	24.30* (±18.93)	9.00* (±9.76)
D+227	34.80*** (±15.53)	8.10*** (±9.65)
D+254	22.80* (±14.25)	7.90* (±11.08)
D+281	16.60 (±14.89)	9.10 (±12.28)

*P < 0.05 ** P<0.01 *** P<0.001

It is possible to note that the means of tick counts varied, due to the fact that when the animals reached counts above 30 telegynes, they were treated with conventional antiparasitic. Up to 30 ticks counted on one side of the bovine is considerable acceptable, since there are no losses related to this parasitic load on the animal (ANDREOTTI et al., 2019; de MENDONÇA et al., 2019).

During the experimental period, the ambient temperature ranged from 14 °C to 37 °C (average 26 °C), and the relative air humidity maintained an average of 81%, even in the period from June to September (115DPT-200DPT), which these are periods that hinder the free phase of the parasite (HERNÁNDEZ-ORTIZ, 2023; VASCONCELOS et al., 2014). The counting averages, mainly for the Control Group, were maintained when compared with those of another period that was more environmentally favorable to *R. microplus*. Such climatic conditions were suitable for the biology of *R. microplus* in temperature (26-28 °C) and humidity (~ 80%) (HERNÁNDEZ-ORTIZ, 2023; NICARETTA et al., 2021).

Climate change has already been listed as a factor of strong influence on pasture infestation, differing from the results found in this research, as there was no infestation during the trial period (CRUZ et al., 2020).

At counts 5, 7 and 14 DPT, the number of ticks was zero in both groups, which can be explained by the effect of conventional treatment performed on D0, and from 21 DPT, the average tick count increased in the two groups.

Due to the fact that the conventional antiparasitic has a contact action, that is, it eliminates all the ticks that were under the animal at the time and the period of the biological cycle of *R. microplus* is approximately 21 days, it is believed that the count did not suffer interference from the drug from 28 DPT onwards, since after this period the counts were performed every 28 days until the end of the experiment.

It is observed that the highest mean infestation peak in the number of telegynes occurred at the 227th DPT (34.80) presented by the CG and at the 86th DPT (26.70) at the TG, and that there was a statistical difference on days 86 ($P < 0.05$), 115 ($P < 0.01$), 172 ($P < 0.05$), 200 ($P < 0.05$), 227 ($P < 0.001$) and 254 ($P < 0.05$).

Figure 1 shows that support treatments with conventional antiparasitic started to occur from 86DPT, with a total of 38 applications, 28 applications in the CG and 10 in the TG. Thus, the Treated Group promoted a percentage reduction of 64.28% in the number of treatments with a conventional acaricide product.

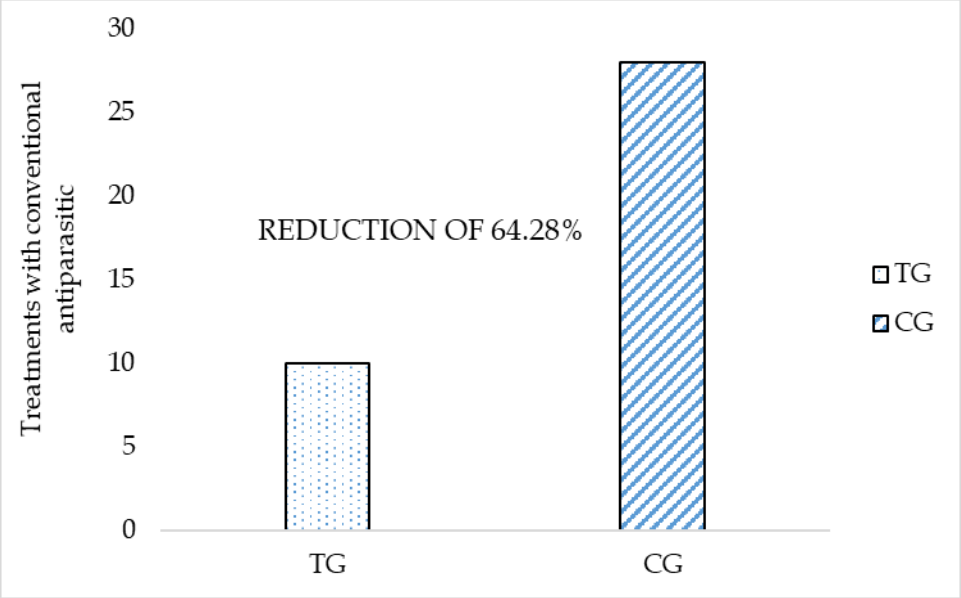

Figure 1. Comparison between the number of conventional treatments performed and the reduction in the number of conventional treatments applied topically (spray) in cattle performed on the predestined experimental days of the experimental groups (CG and TG). Patrocínio Paulista, SP. Brazil 2019.

It has been described in the literature that food supplementation is one of the determining factors for improving the production of cells and complexes that are decisive from an immunological point of view, exerting an increased response against parasitic infections, corroborating the results found in this study (SAAD et al., 2015; WU et al., 2019). Such data are reaffirmed by Vona et al., 2021, in which they were able to determine that parasitism controls with alternative methods that promote immunological improvement must be carried out with the association of traditional control methods, performed correctly, and the host must have contact with the parasite, for an immune response to occur, which was applied in this study.

Son, et al., (2023) discuss the effect of organic mineral supplementation, suggesting its importance for animal immunity. Another contributor to bovine immunity is Pre- and Probiotic, confirmed by Burdick Sanchez et al., (2022). In this context, Factor P is composed of non-GMO raw materials, originating from national technologies, such as organic minerals, amino acids, probiotics, prebiotics, and essential fatty acids (omega 3 and omega 6), with no restrictions on use in any animal species.

The use of additives as a form of supplementation is a viable method of controlling ectoparasites (arachnids), being promising from the perspective of treatments with pharmaceutical antiparasitic, causing the production animal to have

less contact with chemicals and better quality to the final consumer (HENRIQUES et al., 2021).

Getahun Asebe (2016), reported that the process of primary infestation of ticks takes time, which can lead to the conclusion that the immune response has adapted throughout the experiment, from the implantation of the tested additive in the diet. In this way, we can explain the significant distance between the CG and TG means only after 86 DPT.

When it comes to reducing treatment costs and reducing production loss, Fator P® proved to be very effective, reflecting the decrease in tick infestation (Figure 1), ensuring the quality of the product of bovine origin, which is a constant issue and producers need to deal with, relating environmental issues, temperature, intrinsic and acquired pathologies that affect not only the animal's well-being, but also the product's profile. Contrary to reports by Grisi et al. (2014), where ectoparasite proliferation fluctuates greatly due to the degree of humidity and tropical temperature, leading to considerable economic loss (GRISI et al., 2014).

The natural additive Factor P, in addition to helping combat ticks, also brings other benefits, such as reducing methane gas emissions and significantly improving animal performance, making it more financially attractive. And when we talk about the use of medications that combat ticks, these generally require a withdrawal period (where, for example, the milk becomes unfit for consumption and must be discarded), something that does not occur when we use the natural additive Factor P (LEITE et al., 2019).

The main complications of injury can be described as inoculation of toxins, transmission of infectious agents, dissemination of diseases, severe anemia, weight loss, disposal of milk with residues and low production, as well as excessive expenses related to prophylaxis and treatment with use of antiparasitic drugs (ALMEIDA JUNIOR and OZELIN, 2017; BECK et al., 2021).

CONCLUSION

It is possible to conclude from the results obtained in this study that the use of Factor P® in the supplementation of crossbred cattle (Bos taurus x Bos indicus) helps in the control of *R. microplus*, reducing the number of treatments with conventional antiparasitic. Consequently, improving animal performance and reducing the waste of

milk unfit for consumption.

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