PARASITIC DISEASES

Enzootic stability of tick fever in dairy calves submitted to strategic cattle tick control with fluralaner in Brazil

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INTRODUCTION

Rhipicephalus microplus is closely associated with the causative agents of cattle tick fever (TFAs) in the tropical and subtropical regions of Brazil, where this ectoparasite occurs. These tick-borne pathogens cause significant production losses, and depending on animal age, these three causative agents are among the greatest challenges (if not the greatest) in productive cattle breeding, causing considerable morbidity and mortality.

OBJECTIVE

The objective of this study was to determine the strategic control of *Rhipicephalus microplus* with fluralaner (Exzolt 5% pour-on for cattle), and the resultant effect on the enzootic stability status of two important tick-borne diseases in Brazil i.e. babesiosis and anaplasmosis.

MATERIALS AND METHODS

- In this 550-days long study, 60 calves between the age of 4 to 10 months and naturally infested with *R. microplus* were randomly distributed in two treatment groups: The animals from Group T1 was treated with Exzolt® 5% (fluralaner) at a dose rate of 2.5 mg/kg body weight while the calves in Group T2 were treated with a fipronil + fluazuron pour-on formulation at a dose rate of 1 ml /10 kg body weight.
- During this period, the animals were subjected to tick counts, individual body weights measurements, fecal sample collection for nematode egg and oocyst detection, monitoring for signs of cattle tick fever (TFA) caused by babesiosis (*Babesia bovis and Babesia bigemina*) and anaplasmosis (*Anaplasma marginale*), and collection of blood smears for detection of tick-borne parasites. In addition, DNA analysis and serology (ELISA) were performed on blood samples for detection of the agents of cattle tick fever. Throughout the study, calves were only observed for signs of tick fever.

In addition to its significant efficacy in controlling *R. microplus,* fluralaner did not affect the enzootic stability status of *A. marginale* and *B. bigemina* in the herd in this study. The stability status of *B. bovis* was inconclusive because few animals of both groups tested positive for this protozoan species possibly due to a lower infection rate of ticks on the farm. However, further studies will have to be conducted to show the longterm effect of successful tick control with fluralaner on enzootic stability of babesiosis in cattle in Brazil.

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RESULTS

- In this study, three acaricidal treatments were performed in Group T1 with Exzolt 5% and four treatments were performed in Group T2 with a combination formulation of fipronil and fluazuron.
- After the first treatment of Exzolt® 5% , re-treatments with Exzolt® 5% was done on days 49 and 70. In T2, after the first treatment, three re-treatments occurred on days 28, 42 and 42.
- Engorged female *R. microplus* ticks of < 4 mm in length were counted between the legs and on the dewlap of all animals between 4 and 10 months of age from both groups. Engorged female ticks of ≥ 4.5 mm were counted on the left side of each animal. Of the 23 tick count dates, on 12 days (49, 56, 70, 84, 91, 98, 105, 112, 119, 126, 154 and 175) the mean counts were lower in Group T1 than in Group T2.

RESULTS

- Regarding treatments against TFA (treatment of *B. bigemina, B. bovis* and *A. marginale*), the average number of treatments was similar for both treatment groups.
- Antibody titers against *B. bovis* were detected in 40% of blood samples while parasites were detected on blood smears in 3.3% for both treatment groups. More than 86% of the samples in both groups were positive for *B. bigemina* infection on cPCR and iELISA testing, for DNA and antibody titers. There was no significant difference in the antibody titers between the two groups throughout the study for the three TFAs evaluated (*B. bovis, B. bigemina* and *A. marginale).* During the study, no clinical signs of cattle tick fever were detected in calves from both treatment groups. **(Fig 2)**

RESULTS

- The average weight gain in Group T1 at 9 months was 9.92 kg with a statistical difference between the groups. Regarding weight gain, the increase at 9 months of age was 9.92 kg, with a statistical difference between the groups. In addition, there was a trend towards greater weight gain by the animals in Group T1 (Exzolt® 5%) at 8 months of age, but this difference was not statistically significant to that of Group T2 (P = 0.0655) (D+126) **(Fig 3)**

FIGURE 1. Number of animals infested with ticks < 4 mm in length between the legs of the animal or in the dewlap region and average counts of female *Rhipicephalus microplus* (≥ 4.5 mm in length) present on the left side of the body of animals subjected to different control schemes against *R. microplus*

Day	Animal age in months	Number of animals with ticks < 4 mm in lenght (9%)		Tick counts (females (24.5 mm in lenght)										Value of *P*
				T1					T2					
		T1	T2	Mean*		Range			Mean*		Range			
0	4	6/30 (20)	6/30 (20)	0.03	A	0	-	1	0.23	A	0	-	2	0.0761
7		7/30 (23.3)	6/30 (20)	0.19	A	0	-	2	0.20	A	0	-	4	0.7248
14[ab]		13/30 (43.3)	14/30 (46.6)	0.00	A	0	-	0	0.03	A	0	-	1	0.3094
21		0/30 (0)	1/30 (3.3)	0.00	A	0	-	0	0.03	A	0	-	1	0.3094
28		5/30 (16.6)	6/30 (20)	0.00	A	0	-	0	0.00	A	0	-	0	1.0000
35	5	0/30 (0)	2/30 (6.6)	0.00	A	0	-	0	0.10	A	0	-	1	0.0733
42[b]		0/30 (0)	28/30 (93.3)	0.00	A	0	-	0	0.07	A	0	-	2	0.3094
49		2/30 (6.6)	21/30 (70)	0.00	B	0	-	0	0.83	A	0	-	7	0.0011
56		7/30 (23.3)	20/30 (66.6)	0.00	B	0	-	0	0.87	A	0	-	5	< 0.0001
63[a]	6	20/30 (66.6)	21/30 (70)	0.65	A	0	-	8	0.73	A	0	-	5	0.3237
70		0/30 (0)	18/30 (60)	0.03	B	0	-	1	1.00	A	0	-	6	0.0009
77		1/30 (3.3)	12/30 (40)	0.00	A	0	-	0	0.00	A	0	-	0	1.0000
84[b]		0/30 (0)	26/30 (86.6)	0.00	B	0	-	0	0.20	A	0	-	2	0.0187
91	7	0/30 (0)	19/30 (63.3)	0.00	B	0	-	0	0.97	A	0	-	8	0.0023
98		0/30 (0)	24/30 (80)	0.00	B	0	-	0	0.67	A	0	-	5	0.0002
105		0/30 (0)	30/30 (100)	0.00	B	0	-	0	1.93	A	0	-	8	< 0.0001
112		0/30 (0)	22/30 (73.3)	0.00	B	0	-	0	0.43	A	0	-	6	0.0188
119	8	0/30 (0)	23/30 (76.6)	0.03	B	0	-	1	0.60	A	0	-	3	0.0010
126[b]		8/30 (26.6)	29/30 (96.6)	0.03	B	0	-	1	0.70	A	0	-	5	0.0010
133[a]		29/30 (96.6)	22/30 (73.3)	0.39	A	0	-	4	1.00	A	0	-	9	0.4115
140		0/30 (0)	30/30 (100)	1.29	A	0	-	5	0.90	A	0	-	4	0.3342
154	9	0/30 (0)	24/30 (80)	0.00	B	0	-	0	0.70	A	0	-	6	< 0.0001
175	10	5/30 (16.6)	27/30 (90)	0.00	B	0	-	0	0.90	A	0	-	11	< 0.0001

FIGURE 2. Analysis of covariance of body weight and live weight gain of cattle subjected to different control schemes against *Rhipicephalus microplus* for 175 days

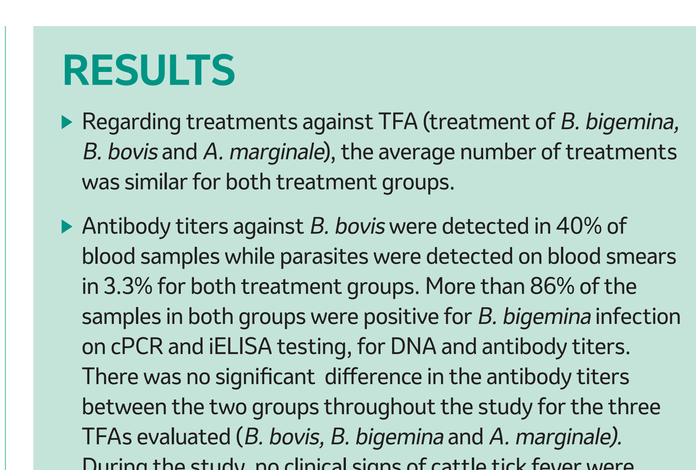

FIGURE 3. Analysis of covariance of body weight and live weight gain of cattle subjected to different control schemes against *Rhipicephalus microplus* for 175 days

Study Day	Animal age (months)	Variable	Experimental groups		Covariance analysis	
			T1 (Exzolt® 5%)	T2 (fipronil and Fluazuron)	Pr > F	Pr > Covariate
0	4	Weight	137.26 ± 18.65	137.28 ± 17.95	Covariate	
35	5		150.85 ± 20.87 a	148.83 ± 30.72 a	0.5147	<0.0001
70	6		189.42 ± 25.27 a	187.45 ± 39.72 a	0.6692	<0.0001
98	7		213.05 ± 25.33 a	211.26 ± 43.32 a	0.7037	<0.0001
126	8		242.02 ± 27.81 a	233.00 ± 48.79 a	0.1103	<0.0001
154	9		276.13 ± 21.62 a	266.16 ± 53.84 b	0.0307	<0.0001
175	10		299.85 ± 21.40 a	292.93 ± 59.06 a	0.2258	<0.0001
0-35	5	Weight gain	13.60 ± 11.68	11.56 ± 11.51	Covariate	
0-74	6		52.16 ± 17.05 a	50.18 ± 17.59 a	0.8032	<0.0001
0-98	7		75.79 ± 15.66 a	73.98 ± 21.32 a	0.8842	<0.0001
0-126	8		104.76 ± 18.28 a	95.72 ± 27.56 a	0.0655	<0.0001
0-154	9		138.80 ± 15.07 a	128.88 ± 29.63 b	0.0330	<0.0001
0-175	10		162.60 ± 17.06 a	155.66 ± 34.90 a	0.2195	<0.0001

Values in table are presented as the mean ± standard deviation. Means followed by the same letter in the same row do not differ significantly at a 95% reliability level (F-test)

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Abstract number: 1375.