

Rhipicephalus microplus resistance to acaricides in Brazil.

Zelina Dos Santos Freire¹, Juliane Francielle Tutija¹, Guilherme Henrique Reckziegel¹, Tom Strydom², Daniel Rodrigues³, Fernando de Almeida Borges¹.

INTRODUCTION

Rhipicephalus microplus ticks have developed resistance to the majority of acaricides available on the market in Brazil over time.

OBJECTIVE

- ▶ To determine the resistance levels of *R. microplus* against commercially available acaricides at randomly selected commercial farms in Brazil.
- ▶ To calculate the percentage of samples with resistance for each acaricide (confidence interval (CI95) of 95%).

MATERIALS AND METHODS

Forty-two commercial farms were selected from seven states in Brazil for tick collection for the study. The Porto Alegre strain (POA) of *R. microplus*, characterized as susceptible to all acaricides, was used as a reference strain. Several assays were performed using acaricides in serial concentrations to determine the tick susceptibility/resistance to different chemical classes:

- ▶ Adult Immersion Test (AIT) with fluzaron (FLZ; benzylurea).
- ▶ Larval Packet Test (LPT) on papers impregnated with:
 - Alpha-cypermethrin (A-CYP; synthetic pyrethroids).
 - Chlorfenvinphos (CFVP; organophosphates).
 - Amitraz (AMIT; formamidines).
- ▶ Larval Immersion Test (LIT) with moxidectin (MOX; macrocyclic lactones) and fipronil (FIP; pyrazoles).

For the AIT, resistance was considered when there was significant difference in index of fecundity between the field isolate and the susceptible reference strain.

For the LPT, the criteria for classifying a sample as resistant was effectiveness below 95% at the discriminating dose.

For the LIT, the criteria for the diagnosis of resistance was

- (a) Susceptible - half maximal effective concentration (EC50) of the field isolate was not statistically different from the reference strain.
- (b) Incipient - EC50 of the field isolate was statistically different from the reference strain and resistance ratio (RR) < 2.
- (c) Resistant - EC50 of the field isolate was statistically different from the POA strain and RR > 2.

The results demonstrated that there is resistance to acaricides of several chemical classes available on the Brazilian market for the control of *Rhipicephalus microplus*.



To download this paper, scan the QR code!

RESULTS

- ▶ 100% of the evaluated *R. microplus* samples were resistant to alpha-cypermethrin (CI95: 88.97 to 100), demonstrating the high resistance of *R. microplus* to synthetic pyrethroids.
- ▶ Amitraz was the acaricide with the second largest number of resistant tick samples with 87.5% (CI95: 71.93 to 95.03).
- ▶ Critical fipronil resistance status was observed in 75.75% of tick samples (CI95: 58.98 to 87.17).
- ▶ Sixty percent (CI95: 23.07 to 88.24) of the samples were resistant to fluzaron. However, only samples from five farms were evaluated for fluzaron resistance.
- ▶ Resistance to moxidectin and chlorfenvinphos was observed in 33.33% (CI95: 18.64 to 52.18) and 24.32% (CI95: 13.36 to 40.12) of the samples, respectively.

AUTHORS' AFFILIATION

1. School of Veterinary Medicine and Animal Science, Federal University of Mato Grosso do Sul, Campo Grande, Mato Grosso do Sul, Brazil.
2. Merck Animal Health, Madison, NJ, USA.
3. MSD Saúde Animal, Brazil.

TABLE 1. Resistance status of *Rhipicephalus microplus* to acaricides in cattle in Brazil.

Sample	County	State	FLZ	FIP	MOX	A-CYP	AMIT	CFVP
1	Goiânia	GO	-	-	-	-	S	S
2	Campo Grande	MS	S	S	-	-	S	S
3	Coromandel	MG	-	S	-	-	S	R
4	Cachoeira do Sul	RS	R	-	-	-	R	S
5	Pedro Gomes	MS	S	-	-	-	-	-
6	Rio Brilhante	MS	R	R	S	R	R	R
7	Sto Antonio do Itambé	MG	-	-	-	-	S	S
8	Teófilo Otoni	MG	S	R	S	R	R	R
9	Água Clara	MS	-	S	S	R	R	S
10	Água Clara	MS	-	-	S	R	-	S
11	Martinópolis	SP	-	R	S	R	R	S
12	Papapaio	MG	-	S	S	R	R	R
13	Pompéu	MG	-	S	S	R	R	S
14	Cuiabá	MT	-	-	-	-	-	-
15	Mirassol D oeste	MT	-	-	-	-	-	-
16	Campo Grande	MS	-	S	-	R	R	S
17	Caçu	GO	-	R	R	R	R	S
18	Caçu	GO	-	R	S	R	R	S
19	Brasília	MS	-	R	R	R	R	S
20	Teresópolis	GO	-	S	R	R	R	S
21	Carmópolis de Minas	MG	-	S	R	R	LR	S
22	Antibaia	SP	-	R	-	R	LR	S
23	Camapuã	MS	-	R	R	R	R	S
24	Camapuã	MS	-	R	R	R	R	LR
25	Bodoquena	MS	R	R	S	R	LR	S
26	Pompéu	MG	-	R	-	R	R	S
27	Carmópolis de Minas	MG	-	R	-	R	-	S
28	Alegrete	RS	-	-	-	-	-	-
29	Alegrete	RS	-	R	S	R	R	S
30	Bandeirantes	MS	-	R	S	R	R	S
31	Caçador	SC	-	R	S	R	R	LR
32	Campo Grande	MS	-	R	R	R	R	R
33	Mineiros	GO	-	R	R	R	R	S
34	Tatuí	SP	-	R	S	R	R	R
35	Portelandia	GO	-	R	S	R	R	S
36	São Lourenço do Sul	RS	-	R	S	R	-	S
37	Nova Mutum	MT	-	-	-	-	-	-
38	Alegrete	RS	-	R	S	R	LR	S
39	Muzambinho	MG	-	R	R	R	R	S
40	Maçambará	RS	-	-	-	R	-	LR
41	Alegrete	RS	-	R	S	R	R	S
42	Cristalina	GO	-	R	-	-	-	-

State: Go=Goiás, MG=Minas Gerais, MS= Mato Grosso do Sul, MT= Mato Grosso, RS= Rio Grande do Sul, SP= São Paulo.

Acaricide: FLZ: Fluzaron, FIP: Fipronil, MOX: Moxidectin, A-CYP: Alpha-cypermethrin, AMIT: Amitraz, CFVP: Chlorfenvinphos.

Status: LR: Low resistant, R: Resistant, S: Susceptible, - no sample collected/tested.