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Ectrin spray in combination with ectrin eartags and the control of *Boophilus microplus* (Canestrini) in dairy cattle¹

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ABSTRACT

Field experiments on the chemical control of the tick *Boophilus microplus* (Canestrini) in dairy cattle were conducted in two locations in Puerto Rico in 1984 and 1985. Ectrin 10%, water dispersible, sprayed at 0.05% concentration every 4 weeks on dairy cows, and Ectrin eartags attached on both ears six months after the start of the experiment, were highly effective to control ticks. No secondary effects were observed in the animals after applying Ectrin.

INTRODUCTION

Milk and beef production constitute important industries in Puerto Rico, making a combined annual contribution of more than \$170 million to the local economy (7). Pastures are extensively used by dairy and beef cattle enterprises because the climate permits year-around forage production. However, climate is also favorable for the development of parasites. Adequate parasite and pest control are essential for successful livestock production in the tropics.

Boophilus microplus (Canestrini), the southern cattle tick, is the most important external parasite of cattle in Puerto Rico at present. It had been eradicated in the later forties-early fifties through systematic dipping of all animals with arsenicals (6,10). However, in January 1978, *B. microplus* was again observed on cattle here, and is now disseminated throughout the island (1,2). Cattle with heavy infestations of this tick show weakness and anemia; sometimes die. The tick is a vector of bovine piroplasmiasis and, perhaps, anaplasmosis.

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In April 1985, bovine piroplasmosis, also known as babesiosis or Texas Cattle Fever, was reported in a dairy herd in Hatillo, Puerto Rico (13). *Babesia bovis* (*B. argentina*) and *Babesia bigemina* were serologically demonstrated as the causative agents in these cases. Mortality due to bovine piroplasmosis may reach 90% in some areas. In October 1985, there were 300 premises under quarantine for piroplasmosis with a total population of about 21,044 head of cattle. A total of 118 herds located on 151 premises were positive for piroplasmosis by the Complement Fixation Test (8).

The Puerto Rico Tick Eradication Program formerly used external application of Cio-Rid (Crotoxyphos) and Co-Ral (Coumaphos) for control. However, Cio-Rid, is sometimes toxic to Zebu-type cattle even at the recommended dosage and both acaricides cause toxic reactions in the tick program personnel. Presently the program uses 0.025% solution of TakTic spray (amitraz) for cattle and 0.050% Atroban spray (Permethrin) for cattle, horses, and sheep, with re-treatment at 2 or 3 week intervals (11).

A new synthetic pyrethroid acaricide known as Ectrin [Cyano (3 phenoxyphenyl) methyl-4-chloro-alpha-(1-methylethyl) benzeneacetate] has been developed. It comes in 2 forms: Ectrin 10% water dispersible liquid and Ectrin eartags. Ectrin spray is effective at low concentration and causes no side effects to either Zebu or European type cattle, or their crosses. In Australia, Ectrin showed an effective concentration (EC 50) of 0.0030% against the susceptible strain of *Boophilus* (3). From work in the United States, Ectrin appears to be effective against *Amblyoma* also³.

The eartag is a slow-release device, impregnated with Ectrin, developed to reduce the quantity of pesticide applied and the frequency of application necessary for long term control (9). For example, Davey et al. (5) reported that under laboratory conditions, sustained release (Ectrin) eartags, also containing 8% aluminum fenvalerate, caused 87% reduction in the number of *B. microplus* engorged females developing from larvae placed on cattle at 8, 10, and 12 days after treatment. The eartags still maintained their activity against the tick after 72 to 76 days.

De León and Fernández-Van Cleve (4) reported that Ectrin spray in combination with Ectrin eartags was 100% effective against *B. microplus* during the first 4 weeks and 60% effective by the 5th week after treatment. Further testing of Ectrin was evidently worthwhile.

Therefore, the present experiment was undertaken to establish the efficacy of Ectrin spray and Ectrin eartag for long term control of *B. microplus* on dairy cattle under field conditions using the two herds; the one of the Gurabo Substation and the other of the Lajas Research and Development Center.

³ Miller, W. V., 1982. Personal communication.

MATERIALS AND METHODS

A total of 318, 6-month- to 8-year-old dairy cattle, infested with *B. microplus*, from the two herds was used in this study.

All 173 animals of the Gurabo Substation herd, mostly Holstein and a few Brown Swiss, were treated, none was used as control. The Gurabo Substation is located in the interior of the island about 12 km from the coast. It has 65 ha of adequately managed and fertilized, mixed improved tropical pastures.

In Lajas 121 Holstein and Brown Swiss animals at the main dairy farm and 24 dry cows at an auxiliary location known as Mataró farm were used. The former were treated experimentally and the latter served as control. The Mataró farm, located in hilly country about 6 km from the dairy, has 19 ha of partially improved pastures but lacks irrigation, and pasture herbage is sparse during part of the year. The Lajas Research and Development Center is located in the southern coastal plains of the island, 30.3 meters above sea level. The 43.6 ha of improved pastures are of variable quality, but supplemental forage is fed to the milking herd.

Ticks of intermediate size (4.5–8.0 mm) were counted and recorded initially from 20% or more of the cattle, using the technique described by Wharton and co-workers (12). All the animals were then sprayed thoroughly with 0.05% Ectrin spray, applying 1 to 3 liters per animal, depending on size and haircoat, especially on the dewlap, neck, axillae, and groin. The animals continued under routine herd management in the usual pastures. Weekly monitoring of 20% or more of the animals for ticks was practiced. If a tick was found on any of the animals examined, all the experimental animals were re-sprayed with 0.05% Ectrin. If no ticks were found by the fifth week, the cows, were sprayed with Ectrin solution just the same. After 6 months of spraying with Ectrin solution (December 1984), Ectrin eartags were placed in both ears of the animals and periodic spraying continued.

RESULTS AND DISCUSSION

Gurabo Substation

Table 1 shows the efficacy of Ectrin spray and the use of Ectrin eartags against *B. microplus* from July 1984 to August 1985. In July 1984, of the 173 cows in the herd, 17, or 10%, were positive for 4.5 to 8.0 mm ticks, averaging 4 ticks per head. From August to December 1984 with spraying alone, the herd was negative for ticks. From January to April 1985, Ectrin spray in combination with Ectrin eartag provided 100% control. In May 1985, 7 cows, or 8% of the animals examined, were positive for ticks; in June, 2 animals, or 2%, and in July, 3 animals, or

TABLE 1.—The efficacy of ectrin spray in combination with ectrin eartag in the control of *Boophilus microplus* (*Canestrini*) in dairy cattle of the Gurabo Substation

Month	Number of animals in herd	Number of animals positive for ticks	Average number of ticks per animal (4.5–8.0 mm)
July, 1984	173	17	4
August, 1984	186	0	0
September, 1984	185	0	0
October, 1984	188	0	0
November, 1984	191	0	0
December, 1984 ¹	191	0	0
January, 1985	186	0	0
February, 1985	199	0	0
March, 1985	193	0	0
April, 1985	193	0	0
May, 1985	192	15	1
June, 1985	185	2	1
July, 1985	173	3	1.6
August, 1985	164	0	0

¹ Ectrin eartags placed in both ears of cattle.

3%. Thereafter, from August to December 1985, the cattle were negative for ticks.

The animals were sprayed with Ectrin solution 12 times from July 1984 to August 1985 at 20- to 63-day-intervals, with an average interval of 30.3 days.

The mean daily ambient temperature at the Gurabo Substation ranged by months from July 1984 to August 1985 from 22.7° C to 26.4° C, with an over-all mean of 24.4° C. Monthly rainfall varied from 22 to 249 mm, with an over-all mean of 127 mm. The months of September to November 1984 and May 1985 had the highest rainfall.

The cost of the Ectrin spray used per animal during 12-month treatment was \$9.36; the pair of Ectrin eartags cost \$2.90, for a total expenditure of \$12.26.

Lajas Research and Development Center

Table 2 indicates the efficacy of Ectrin spray and Ectrin eartags against *B. microplus* from July 1984 to August 1985. In July 1984, of the 121 cows in the herd, 9, or 8%, were positive for 4.5 to 8.0 mm ticks, averaging one tick per head. Following two months of negative observations, in October 1984, one cow, or 3% of the animals examined, was positive with a single tick. There followed 3 months without observing ticks. However, in February 1985, 2 cows, or 3% of the animals examined, were positive with an average of one tick each. From August to December 1985, the cattle were negative for ticks.

TABLE 2.—The efficacy of ectrin spray in combination with ectrin eartag in the control of *Boophilus microplus* (*Canestrini*) in dairy cattle of the Lajas Research and Development Center

Month	Number of animals in herd	Number of animals positive for ticks	Average number of ticks per animal (4.5–8.0 mm)
July, 1984	121	9	1
August, 1984	133	0	0
September, 1984	126	0	0
October, 1984	139	1	1
November, 1984	139	0	0
December, 1984 ¹	140	0	0
January, 1985	127	0	0
February, 1985	131	2	1.5
March, 1985	135	1	1
April, 1985	135	0	0
May, 1985	145	3	1.7
June, 1985	165	0	0
July, 1985	141	4	1
August, 1985	142	0	0

¹ Ectrin eartags placed in both ears of cattle.

The cattle were sprayed with Ectrin solution 10 times from July 1984 to August 1985, at 26- to 86-day intervals, with an average interval of 41.45 days.

The mean daily temperatures at the Lajas Research and Development Center from July 1984 to August 1985 ranged per month from 21° to 26.6° C, with an over-all mean of 24.03° C. Monthly rainfall ranged from 7 to 264 mm, averaging 109 mm. Highest rainfalls were recorded from September to November 1984 and March and May 1985.

The cost of Ectrin spray used per animal in 12 months was \$8.28; the pair of Ectrin eartags cost \$2.90, thus the total cost was \$11.18.

The two additional sprayings applied at Gurabo relative to Lajas were needed perhaps because of the more frequent rain at Gurabo.

The combined use of Ectrin spray and Ectrin eartags is highly effective in control of the tick, *B. microplus*.

Table 3 shows the tick infestation of the control group at the Mataró farm of the Lajas Research and Development Center. From July 1984 to August 1985, the tick population in these animals increased from an average of 28 to 119 ticks per head.

The acaricide, Ectrin, also showed the beneficial secondary effect of reducing the population of the hornfly, *Lyperosia* sp., at both Gurabo and Lajas. No undesirable side effects such as salivation or incoordination were observed in the animals after application of Ectrin. Ectrin appears to be a better alternative than the acaricides presently used by the PR

TABLE 3.—The efficacy of ectrin spray in combination with ectrin eartag in the control of *Boophilus microplus* (Canestrini) in the Mataró Farm (Control) of the Lajas Research and Development Center

Month	Number of animals in herd	Number of animals positive for ticks	Average number of ticks per animal (4.5–8.0 mm)
July, 1984	24	24	28
August, 1984	24	24	47
September, 1984	24	24	30
October, 1984	23	23	9
November, 1984	23	23	45
December, 1984	20	20	79
January, 1985	20	20	99
February, 1985	18	18	102
March, 1985	21	21	45
April, 1985	21	21	99
May, 1985	17	17	151
June, 1985	17	17	119
July, 1985	17	17	176
August, 1985	18	18	119

Tick Eradication Program, Atroban and TakTic, which must be applied at 2- to 3-week intervals for effective control.

Ectrin spray may be recommended for tick control in dairy cattle, either applied monthly by spraying alone or in combination with two Ectrin eartags attached to both ears for additional protection. The required corraling of cows less frequently for treatment means less stress and less loss of liveweight and milk production, in addition to savings in time and labor.

RESUMEN

Ectrin en aspersiones y aretes para erradicar la garrapata *Boophilus microplus* en el ganado lechero

Se establecieron experimentos de campo en dos localidades de Puerto Rico en 1984 y 1985 para investigar el control químico de la garrapata, *Boophilus microplus* (Canestrini), en el ganado lechero. Ectrin al 10%, mezclado con agua y asperjado a una concentración de 0.05% cada 4 semanas solo o en combinación con dos aretes impregnados de Ectrin en ambas orejas de los animales al sexto mes después de haber comenzado el experimento controló las garrapatas en forma altamente eficaz. No se observaron efectos secundarios adversos en los animales después de aplicar el Ectrin.

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