

Failure of carbaryl-based products to reduce brown dog tick populations in Puerto Rico¹

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ABSTRACT

Powders containing carbaryl, and carbaryl plus pyrethrins applied once per week to a dog were ineffective against the brown dog tick, *Rhipicephalus sanguineus* Latreille. A collar impregnated with carbaryl was also ineffective. A spray containing carbaryl and pyrethrins did not reduce the number of ticks on another dog nor those in the house, when applied daily to the resting place of the dog.

INTRODUCTION

The brown dog tick, *Rhipicephalus sanguineus* Latreille, occurs throughout the West Indies (8), and is a pest all over Puerto Rico (6). Although carbaryl has been rated highly as an acaricide by veterinarians and entomologists (4, 5), its efficacy against brown dog ticks in Puerto Rico has not been documented. The label of a carbaryl powder tested here reads, "Especially designed for the control of resistant brown dog ticks, fleas, and lice." Nevertheless, we present data in this report which indicate that carbaryl is not effective against brown dog ticks in Puerto Rico.

Heretofore, no report has been published on the efficacy of the carbaryl collar against ticks (3). Miller et al. (7) found that the carbaryl collar was effective against cat fleas on dogs and cats in California. Our previous studies have shown that in Puerto Rico carbaryl powder was not effective against cat fleas (2) nor against cat fur mites (1).

MATERIALS AND METHODS

Two large dogs were used as experimental animals. One (1) was a male with a black coat, white chest, and white toes, similar to the Bernese Mountain dog, weighing about 25 kg and about 70 cm high; he slept on the porch, had free run of the patio and street, but was never allowed indoors. The other dog (2) was a male Collie weighing about 23 kg, and about 61 cm high; he slept inside the house and was never allowed off the leash, spending most of the time indoors.

A powder with carbaryl as the only active ingredient, another powder

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with carbaryl plus other active ingredients, and a collar impregnated with carbaryl obtained from a sales representative were used. The spray was purchased from a veterinary supply house. The active ingredients shown on the labels were: Carbaryl powder, 1-naphthyl N-methylcarbamate, 5.00%; carbaryl plus powder, 1-naphthyl N-methylcarbamate, 5.00%, piperonyl butoxide, 1.00%, and pyrethrins, 0.100%; carbaryl collar, 1-naphthyl N-methylcarbamate, 16%; carbaryl spray, 1-naphthyl N-methylcarbamate, 0.500%, pyrethrins, 0.050%, piperonyl butoxide, 0.100%, and N-octyl bicycloheptene dicarboximide, 0.166%.

The dogs suffered heavy infestations of naturally acquired ticks. To make the tests with the powders, about one teaspoon was dusted, mainly over the back and sides, giving a dosage of 220–300 mg/kg. The powder was applied on Saturday of each week, and the female ticks were counted daily and totaled weekly. Every day all the ticks seen on the dog were handpicked and destroyed. This procedure was followed for 5 weeks with

TABLE 1.—*Number of female brown dog ticks removed from a dog daily after applying a powder containing 5.00% carbaryl once per week*

Week	Total	Average	Range
0 ¹	50	7.14	3–13
1	48	6.86	2–10
2	48	6.86	2–10
3	173	24.71	13–36
4	79	11.28	4–18
5	108	15.42	3–27

¹ Pretreatment count (before applying acaricide).

carbaryl powder and for 8 weeks with the carbaryl plus powder. The collar was applied and remained continuously on the dog for 5 weeks; the female ticks were counted and removed daily. The spray was applied daily for 7 days on the floor and walls where the dog rested, but not on the dog. Male and female ticks were counted and removed from the dog and house every day. Dog 1 was used for the tests with carbaryl powders and collar, and Dog 2 for the experiments with the spray.

RESULTS AND DISCUSSION

The results are shown in tables 1 to 4. Despite treatments with the carbaryl powder (table 1), ticks were always present on the dog. After five applications, there were more than twice as many ticks as before the treatments. The powder containing carbaryl plus pyrethrins (table 2) did cause a temporary reduction in ticks after 5 weeks of treatments. However, when the treatments were continued for 3 more weeks, the ticks

became abundant, reaching a very high level. Table 3 shows that while the dog was wearing the carbaryl collar he was continuously infested with ticks, and had more ticks after 5 weeks than before wearing the collar. Nor did the carbaryl in a spray eliminate the ticks (table 4).

TABLE 2.—*Number of female brown dog ticks removed from a dog daily after applying a powder containing carbaryl, 5.00% piperonyl butoxide, 1.00%, and pyrethrins, 0.100%, once per week*

Week	Total	Average	Range
0 ¹	50	7.14	3-13
1	35	5.00	1-7
2	19	2.71	2-6
3	32	4.57	0-17
4	9	1.29	0-3
5	6	0.86	0-2
6	34	4.86	0-14
7	378	54.00	7-169
8	54	7.71	0-21

¹ Pretreatment count (before applying acaricide).

TABLE 3.—*Number of female brown dog ticks removed from a dog daily after applying a collar containing 16% carbaryl*

Week	Total	Average	Range
0 ¹	48	6.86	8-15
1	112	16.00	9-27
2	86	12.29	4-20
3	24	3.43	1-6
4	19	2.71	0-2
5	57	8.14	3-17

¹ Pretreatment count (before applying the collar).

TABLE 4.—*Number of brown dog ticks removed from a dog and the house after daily treatments of the dog's resting place with a spray containing carbaryl plus other active ingredients*

Day	Dog		House	
	Females	Males	Females	Males
1	49	80	0	31
2	108	109	12	20
3	70	34	7	6
4	118	38	5	5
5	55	46	11	5
6	55	44	5	9
7	46	79	18	23
Total	501	430	58	81

Despite daily treatments of the dog's resting place over a period of 7 days, more than a thousand ticks were removed from the dog and the house. The results of these practical experiments with carbaryl in powders, collar, and spray indicate that the brown dog tick, if it ever was susceptible to carbaryl in Puerto Rico, is now resistant to that acaricide.

RESUMEN

Los polvos que contenían carbaril y carbaril y piretrinas fueron ineficaces para combatir la garrapata parda del perro cuando se le aplicaron 1 vez a la semana a un perro. Un collar impregnado con carbaril también fue ineficaz. Una aspersion con carbaril y piretrinas no redujo el número de garrapatas en el perro ni en la casa cuando se aplicó diariamente al sitio de descanso del perro.

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