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BROMADIOLONE PARAFFIN BLOCKS NOT-EXPOSED AND EXPOSED TO THE ENVIRONMENT

[1]SOLANGE PAPINI, [2]LIA E. NAKAGAWA, [2]EMERSON S. NARCISO, AND [3]MARIA INÊS M. ANDRADE

[1]Coordenação de Vigilância em Saúde, SMS/PMSP, Rua Santa Isabel, 181, São Paulo/SP
[2]Laboratório de Toxicologia, Instituto Biológico, Rua Conselheiro Rodrigues Alves, 1252, São Paulo/SP
[3]Supervisão de Vigilância em Saúde Jabaquara/Vila Mariana, SMS/PMSP, Rua Carlos Gerolomo Mônaco, 54, São Paulo/SP

Abstract This paper evaluated the attractibility, palatability and efficacy of bromadiolone paraffin block exposed for 30 days to environmental conditions. It was used four groups of white *Wistar* rats: two groups received no-exposed blocks (control group) and two groups received blocks exposed for 30 days to the environment; in both cases, one of the groups received just the block and the other group received parafin block and food. The tests were repeated after 2 months. The quantity of block consumed and the mortality of the animals were registered. Despite the changed appearance of the blocks after exposure, there was no significant difference between the consumption of the no-exposed and the exposed blocks. Blocks were consumed only in groups that received just the blocks, indicating low attractiveness of the product, although it was effective, killing 80-100% of animals. There was no change in the attractibility, palatability and efficacy of bromadiolone paraffin block after environmental exposure for 30 days.
Key Words Rodenticide, hydroxycoumarin, rodents

INTRODUCTION

One of the problems faced by health authorities is the control of urbans pests and vectors, is specially the control of rodents, as the three main species found in the Brazilian cities, *Rattus norvegicus, R rattus* e *M. musculus*, easily adapt to different environmental conditions have a high reproductive rate (Brasil, 2002) and are related to human diseases (Gaudie et al., 2008; Krøjgaard et al., 2009). The control is done through the management of environment (Papini, 2008), but also with the use of hidroxycoumarins rodenticides in the formulation pellets, powder, contact and paraffin blocked, placed on the environment (Brasil, 2002). The hidroxycoumarins acts by interfering with blood coagulation process and also exerting action vasodestrutive (Larini, 1999).

In the control of *R. norvegicus*, the formulation paraffin block containing the active ingredient bromadiolona, (3-[3-(4'-Bromobiphenyl-4-yl)-3-hydroxy-1-phenylpropyl]-4-hydroxycoumarin) is widely used due to the habitat of this species because it usually takes shelter beneath the ground or under the soil (Potenza and Zorzenon, 2006). Thus, it is often your movement by storm drains and rainwater, underground boxes and phone banks of streams, preferring locations near to the source of food and water, being favored by the urban environment without degradation and sanitation infrastructure (De Masi et al., 2009). The paraffin blocks are placed in culverts and similar sites, bound with wire so they are not permanently in contact with water while allowing the animal to have access to the bait and eat it. The blocks are in that environment until the animal to eat it, what not always occur. Sometimes, after several days or even weeks, the blocks are still in place, but its appearance, color and texture, are not the same. Agentes de Zoonoses that handle the product report that the blocks, after few days in the culverts, become brittle and they observe the presence of fungal growth on them (Souza and Costa, 2008). Products with unattractive appearance, low palatability and presence of contaminants may not effective in achieving its goal (Ginsgs, 2006). Since there is no data available in literature on effectiveness of the product when its appearance change due to climatic influence, there is concern in checking if the animals accept it when

physically different. Thus this study evaluated the attractiveness, palatability and efficacy of paraffin blocks, containing active ingredient bromadiolone exposed and exposed to environmental conditions by 30 days.

MATERIALS AND METHODS

To assess exposure to environmental conditions, the blocks were place in culverts, previously desratizated on the Vila Mariana on São Paulo city. In the tests were utilize healthy adult male rats (*Rattus norvegicus*) of *Wistar* lineage, weighing 250 g ± 30, and the procedures submitted and approved by Comitê de Ética Animal (CETEA 107/10). It was made two assays with 2 months of interval between its. The tests followed the methodology adapted of ANVISA (2004), tests being without food option and tests with option food, with blocks no-exposed and exposed for 30 days on the environment. In each assay 4 groups of 6 animals per group, and 2 groups received no-exposed blocks, 1 without food option and 1 with food option, and 2 groups received exposed blocks, also 1 without food option and 1 with food option. Each animal was kept in individual cage and on the first day received approximately 40 g of paraffin block (tests without option food) or about 40 g of paraffin block and 40 g of food (tests with option food). On the second day the blocks were removed and the amount consumed noted. The subsequent days were offered food and water without restriction, observing the animals daily. Dead animals were dissected to verification of the hemorrhagic suffusions.

Data Analysis

The quantity consumed of block was compared with respect to the difference between the tests with no-exposed and exposed blocks by test non-parametric Mann Whitney. It was also use to test non-parametric Mann Whitney for statistic evaluation of the difference in the amounts block consumed between tests without and with option food. To verify the correlation between consumption have the block and number of days to occur the death was use test non-parametric Spearman. All tests were performed using the software PRIMER (Glantz, 1992).

RESULTS AND DISCUSSION

The average amount consumed in testing of the blocks no-exposed without option food was 18.0 g and in tests with option food of 2.3 g (Table 1). The time to occurrence of death in the tests without option food was from 4 to 9 days after ingestion of the product. In the tests with option food the animal did not die. The blocks no-exposed without any physical change, only been consumed in sufficient quantity to cause death, by animals submitted to the tests without option food.

Table 1. Average consumption, in grams, of no-exposed paraffin block and exposed paraffin block, in both assays.

	Non-exposed block		**Exposed block**	
Assay	Ts*	Tc**	Ts*	Tc**
1	18.0	1.9	18.9	3.1
2	14.9	2.8	11.2	1.6
Mean	16.4	2.3	15.0	2.3

* Ts=tests without option food**Tc=tests with option food

With respect to the exposed blocks to ambient conditions for 30 days, the average amount consumed by animals was 15.0 g in the tests without option food and 2.3 g in the tests with option food (Table 1). In the tests without option food the animals died between 5 and 9 days after ingestion of the product. As the occurred with the no-exposed blocks, there was not mortality in the tests with option food, although the block exposed had show altered appearance. These results seen to indicate the low the attractiveness of the product, since there is availability of food in the tests with option food, the animals did not eat the block in sufficient quantity for it to be effective. Importantly, the effectiveness is directly to the attractiveness and to the palatability of the

product. The formulated product can be effective maintain the concentration of the active ingredient to take the animal to ingest adequate amounts to death, but not be attractive or palatable. Study by Papini et al. (2009) to assess the concentration of active ingredient brodifacoum showed no decrease in the concentration of active ingredient in paraffin blocks maintained in culverts during 10 weeks, although the physical appearance of the paraffin blocks was highly modified. This means that if animal had ingested a quantity of these products would be take to death. But that the block could be considered effective should be able of to attract the animal, besides being palatable.

It is interesting to note that both tests with option food, with no-exposed blocks and exposed blocks, some animals "tasted" the paraffin block, biting him partially. But, as already shown, the amount ingested in these case was not enough to get the animals to death. None of the rats consuming block no exposed or exposed in these tests has died or showed signs of hemorrhages. In these animals did not observe hemorrhagic lesions after they were dying and necropsied, other than that noted in the necropsy of the animals that ate the paraffin block in sufficient quantity to lead them to death. These results seen to indicate that the paraffin block utilized in this experiment has low palatability, since that the animal "tasted" the block, but it did not eat.

Despite the exposed block presented altered appearance (Figure 2) no significant difference between the consumption of the blocks no-exposed and exposed in the tests without option food ($p>0.06$), as well as no significant difference between the consumption of the blocks no-exposed and exposed in the tests with option food ($p>0.06$). But, it was observe significant difference in the consumption of block no-exposed between the tests without option food and with option food ($p<0.06$). Too it was observe significant difference in the consumption of block exposed between the tests without option food and with option food ($p<0.06$). These results support the hypothesis that the paraffin block used in this experiment was consumed in quantities sufficient to cause the animal to death only when there was not food disposable.

Although it has verify the effectiveness of the paraffin block, since ingestion of the product in tests without option food, as no-exposed block as exposed block, led to the deaths about 80% of the animals on average 5 days after ingestion, not correlation was found between the amount of paraffin block consumed and the number of days that the animal died after its consume ($p>0.05$). The results seen to indicate that the number of days that the animal takes to die has strong individual component on the basis of physiological and genetics characteristics of each rodent, it is most difficult to generalize.

The reproduction of the tests, no-exposed and exposed blocks, without and with option food, presented similar results, as referent to quantity of the block consumed as correlation between consume as mortality. So, it is been demonstrated that results observed are valid and can used how indicators to improve the effectiveness in the control of the rodents. .

CONCLUSIONS

In this study there was not difference in the attractiveness, palatability and efficacy between the consumption of the paraffin block, with active ingredient bromadiolone, not-exposed and exposed to environmental conditions for 30 days.

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