Rodent management in urban and rural ecosystems: experiences from central Argentina

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Abstract

Rodent control based only on the use of rodenticides is known to be ineffective over the long-term, although it is the main method applied by farmers and public authorities in central Argentina. This paper presents field results and then discusses the successes and failures of three rodent control experiences based on ecological knowledge. The rodent control experiences discussed here are the following: 1) chemical control combined with environmental management in a shantytown, 2) reduction of vegetation height along farm perimeters and chemical control in poultry sheds, and 3) prevention of rodent reinfestation using physical barriers in poultry sheds. In the first two experiments rodent infestation decreased in the treated areas, althought in the shantytown infestations levels increased 90 days after the last application of rodenticide. In the third experiment the variation in rodent infestation was similar in sheds with and without physical barriers. A combination of rodenticide application and environmental management reduced rodent abundance.

Keywords: environmental management, habitat manipulation, physical, rodent control exclusion

Introduction

Historically, the control of rodents has largely relied on the use of rodenticides, being sometimes a palliative measure applied when the problem is already well established (Colvin and Jackson, 1999). Rodent control using poison alone is not an effective long-term solution (Singleton et al., 1999), however, farmers and public authorities choose to rely solely on rodenticides to control rodents in rural and urban ecosystems in Argentina. This study shows and discusses the successes and failures of rodent control experiences carried out in these ecosystems where chemical control was combined with environmental management measures, habitat manipulation, or exclusion by physical barriers.

Methods and results

1) 'Implementation and Evaluation of an Integrated Program for Rodent Control in a Shantytown.' The efficiency of an integrated program for the control of rodents in a shantytown of Buenos Aires City, Argentina was evaluated. This program lasted one year and was divided in a preparatory phase, an execution phase and a monitoring phase. During the preparatory phase, an environmental survey of public spaces and dwellings was conducted in the test area to identify factors favoring the presence of rodents and to determine strategies and management measures to be implemented in the execution phase. Rodent abundance was monitored using nontoxic bait stations during four periods: the preparation phase, the execution phase, immediately after the execution phase, and 90 days after the end of the execution phase. According to the results of the preparatory phase, control measures proposed for the execution phase were as follows: (1) to carry out poisoning campaigns in dwellings and public spaces, (2) to remove weeds and pave vacant lots within and around the neighborhood, (3) to increase the frequency of garbage collection and use rodent-proof garbage containers, and (4) to conduct a health education campaign on sanitation improvement. The last two control measures failed. The garbage collection frequency did not increase and containers were not changed. The education campaign consisted in awareness meetings for neighbors and the distribution of flyers by community leaders to householders which provided sanitation measures to maintain rodent abundance at low levels, however only in 6.2% of the dwellings (n=104) neighbors implemented at least one of the proposed activities. In the experimental area, the proportion of dwellings and public spaces with signs of rodent activity decreased significantly from the beginning of the trial to immediately after the end of the execution phase, but rodent activity increased 90 days after the execution phase. No differences were found when comparisons were made for the control area.

2) 'Experimental assessment of rodent control on two poultry farms of central Argentina.' Previous studies carried out on poultry farms in this region revealed that rodent infestation is positively

associated with the percentage of the perimeter of the farm covered with vegetation (Gómez Villafañe et al., 2001), the amount of plant cover above 20 cm in height, and the fact that sheds located at the perimeter of the farm show higher rodent abundance than those located between other sheds on the same farm (Gómez Villafañe et al., 2003). We experimentally assessed the effect of controlling vegetation height along farm perimeters on the abundance of rodents in 2 broiler poultry farms in central Argentina. We carried out an experimental design based on the before-after–control-impact method. After vegetation treatments, there was a significant decrease in rodent abundance at the perimeter of the farm, particularly of the Pampean grassland mouse, *Akodon azarae*. In poultry sheds, there was a significant decrease in rodent abundance on non affected farms due to the reductions in abundance of the house mouse *Mus musculus*, possibly because of a major application of rodenticide.

3) 'Rodent experimental exclusion from breeding sheds in poultry farms.' In order to evaluate the effect of exclusion by physical barriers on rodent re-infestation in poultry sheds, two sheds of 60 m x 12 m (one in each of two different farms) were enclosed with sheets of zinc 80 cm above ground and 40 cm below ground. The remaining sheds in each farm were used as experimental controls. After building the enclosure and during the five following weeks we conducted an intensive removal of rodents by trapping and poisoning in all sheds of both farms. The cost of the enclosures included 496 man/hours, USD 3,115 in materials and USD 1,200 in fuel. A total of 264 rodents were removed on both farms with an effort of 992 cage trap-nights, 2063 Sherman trap-nights and 2118 snap trap-nights. *M. musculus* was the dominant species followed by *Rattus norvegicus* and *A. azarae*. Relative abundances of mice and rats were estimated in all sheds on five occasions over eight months using a tunnel track index calibrated with rodent capture data. The variation in rodent relative abundance was similar in enclosured and not enclosured sheds. The relative abundance of mice and rats decreased from the beginning of the experiment towards the end of the rodent removal period, when it reached values of zero or close to zero. After this period, mice relative abundances increased to the initial values, while rat abundance remained low in both enclosured and not enclosured sheds.

Discussion

The combination of rodenticide application and environmental sanitation reduced rodent abundances in both dwellings and public spaces of the shantytown. However, the fact that the rodent population increased when control measures were discontinued suggests that food and shelter for rodents were still available. In broiler poultry farms, the control of vegetation growth at the perimeters and the appropriate timing of rodenticide applications are more effective if both control measures are applied simultaneously, preventing re-infestation from perimeters. Finally, the application of physical barriers was ineffective to prevent rodent re-infestation of the breeding poultry sheds. Although this could have been due to the failure of the farmers to keep the doors of the sheds closed, this method may be inappropriate for places where laborers have to go in and out many times a day as in breeding poultry sheds.

References

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