EVALUATION OF BRODIFACOUM BAITS FOR MAINTENANCE CONTROL OF POSSUMS IN SMALL FOREST RESERVES

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ABSTRACT

Effective possum control is needed in small forested areas where native plant and bird species with high conservation values are susceptible to possum browse and predation. We found that continual use of baits containing the anticoagulant brodifacoum at 0.002% w/w (Talon Possum Bait) in bait stations kept possum populations in small reserves low and was cheaper than annual maintenance control using leg-hold trapping. However, increased risks to non-target species need to be weighed against the cost benefits of these baits.

Keywords: brushtail possum, baits, brodifacoum, trapping, pesticides

INTRODUCTION

The brushtail possum (*Trichosurus vulpecula*) is a major threat to the conservation of native flora and fauna in New Zealand. Not only are possums voracious herbivores (Cowan 1991) but they also eat the eggs and chicks of native birds, some species of which are endangered (Brown *et al.* 1993). It is therefore necessary to control possums in areas where rare native bird species such as the kokako (*Callaeas cinerea*) and plants such as the wood rose (*Dactylanthus taylori*) are particularly susceptible to possum predation or browsing.

Pest managers divide possum control into two phases; the initial phase is "knockdown control", where generally high population levels are reduced to 5 - 20% of their original levels, and the second phase is "maintenance control", where control is sustained to keep levels low. A common method of maintenance control in forest reserves is the use of leg-hold traps, but this is labour-intensive because a large proportion of the controlled area needs to be covered by foot and traps must, by law, be checked daily. Consequently more cost-effective methods are sought by the Department of Conservation (DoC), which is responsible for a large proportion of possum control in small forest reserves.

Brodifacoum baits (Talon Possum Bait, ICI New Zealand Ltd) used in bait stations has the potential to be an alternative method to leg-hold traps for maintenance control. The baits are 1-2 g compressed cereal pellets containing the anticoagulant brodifacoum at a concentration of 0.002% w/w. Brodifacoum is an effective poison for killing possums (Eason *et al.* 1993), but it is persistent in animal tissue and if accidentally eaten by sheep can remain in the liver for more than 4 months (Lass *et al.* 1985). The baits containing this poison have not therefore been registered for aerial or ground application and can be used only in bait stations.

This paper evaluates brodifacoum baits for maintaining possums at low levels in small forest reserves and compares costs of using baits with the cost of annual control using leg-hold trapping.

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MATERIALS AND METHODS

In summer (Dec-Feb) 1990/91, DoC (Hawke's Bay) contracted private hunters to use leg-hold traps for initial knockdown control of possums in five forest reserves. They were Mohi Bush (50 ha), Balls Clearing (135 ha), Hutchinsons Reserve (45 ha), William Hartree Reserve (14 ha), and Maraetotara Reserve (31 ha). These reserves contain mature native forest and are surrounded by either farmland or scrub. Possum densities in the reserves before the study were considered to be medium to high (ie. approximately 5-10/ha). Leg-hold trapping control was repeated by DoC staff in the summer of 1991/92.

In summer 1992/93 leg-hold trapping was replaced with poisoning by brodifacoum baits in all the reserves except Maraetotara, which was left untreated as a control until winter 1993 when alternative control was undertaken. Bait stations were spaced approximately 100 m apart around the perimeter of the reserves or on access tracks running through them, giving an average bait station density of approximately one per 2 ha (Thomas 1994). Each bait station was initially filled twice with 1 kg of baits in the first week of use and then once every month thereafter for 12 months (1993 - 1994). During 1994 - 1995, bait consumption decreased and the amount of bait per station was reduced to 300 g every 8 weeks.

Trends in possum numbers were monitored in each reserve using the frequency of possum kills from about 60 leg-hold traps set at 20-m spacings for three nights on trap-lines randomly located throughout the reserves. During the knock-down control period trends were monitored in spring and summer (Sept-Feb) whereas, during bait poisoning, trends were monitored in winter (June-Aug) 1993, summer 1993/94, and summer 1994/95.

The costs of leg-hold trapping and baits were compared using recent cost estimates gathered from the Bay of Plenty, Waikato, and Tongariro/Taupo DoC Conservancies. Estimates were obtained for using contract hunters to reduce possum populations by leg-hold trapping down to three levels viz. 10%, 5%, and 2% catch frequencies from 60 leg-hold traps set at 20-m intervals for three nights. Cost estimates (bait, bait stations, and labour) for bait poisoning were gathered from the last year of this study.

RESULTS

The initial control using leg-hold trapping in summer 1990/91 reduced catch frequencies from a mean of 30% to 3% but after 1 year catch frequencies had increased to a mean of 24%. After the leg-hold trapping was repeated in summer 1991/92, catch frequencies were again reduced to a mean of 3% (Table 1).

TABLE 1: Percent catch rates before and after leg-hold trapping in summer 1990/91 and summer 1991/92 in five forest reserves in Hawke's Bay.

Reserve	1990/91		1991/92	
	Before	After	Before	After
William Hartree	42	7	27	5
Mohi Bush	22	3	23	3
Balls Clearing	24	1	26	3
Hutchinsons	47	1	22	3
Maraetotara	15	1	23	2

After repeated bait applications beginning in summer 1992/93, catch frequencies remained low in the treated reserves, with means of 2% for winter 1993, 0% for summer 1994, and 1% for summer 1995. In Maraetotara, where no bait was applied, catch frequencies increased from 2% to 16% after the 1991/92 trapping (Table 2). This increase was consistent with the increases seen in all five reserves over the 12 months between the 1990/91 and 1991/92 trapping (see Table 1).

TABLE 2: Percent catch rates recorded during possum control using brodifacoum baits in four Hawkes Bay reserves. Maraetotara was not treated before or after baiting began.

Reserve	Winter 1993	Summer 1993/94	Summer 1994/95
William Hartree	1	0	1
Mohi Bush	2	0	1
Balls Clearing	3	0	1
Hutchinsons	3	N.T.	2
Maraetotara	16	-	-

(N.T. = not trapped)

The mean costs for private hunters contracted to use leg-hold traps increased markedly for each level of reduction imposed: reduction to a 10% catch cost \$20/ha, 5% cost \$40 - 60/ha, and 2% cost \$60 - 80/ha. In comparison, the costs for using brodifacoum baits were \$15-\$28/ha/yr.

DISCUSSION

Although leg-hold traps are effective at reducing possum populations to low levels, a once-yearly trapping frequency is insufficient to maintain the low levels. The population increases recorded in the small forest reserves after the annual trapping were faster than those in a large area of forest after aerial application of 1080 baits, where it took more than 10 years for the population to increase to pre-control numbers (Hickling and Pekelharing 1989). We attribute the faster rate of increase to the small size of the reserves and the favourable possum habitat surrounding them, which would have facilitated rapid recolonisation by possums.

Continual application of brodifacoum baits was more cost-effective than annual trapping and maintained possum numbers at low levels. These cost efficiencies can be partly attributed to lower labour costs. The small number of bait stations required to achieve effective control meant smaller parts of the controlled area needed to be visited than for leg-hold trapping. However, to remain cost-effective these baits should be used only where possum densities are low, as recommended by the manufacturer. Because brodifacoum is slow-acting, possums can eat large amounts of bait before they die (Henderson *et al.* 1994) so it becomes expensive if used to control medium- to high-density possum populations.

If large numbers of possums in high-density populations are fed the bait, risk of secondary poisoning and environmental contamination increases as brodifacoum is a persistent poison and can remain in possum tissue for several months (C. Eason pers. comm.). Species particularly susceptible to secondary poisoning from brodifacoum after eating dead possums are the Australasian harrier (*Circus approximans*) (Godfrey 1985) and the weka (*Gallirallus australis*) (C. Eason and E. Spurr unpubl. data). Feral pigs (*Sus scrofa*) also scavenge possum carcasses and traces of brodifacoum have been found in feral pig tissue (G. Wright pers. comm.), which could result in tertiary poisoning of humans if contaminated pig meat was eaten. Rats (*Rattus exulans*, *R. norvegicus*, *R. rattus*) and mice (*Mus musculus*) will also eat brodifacoum baits, so that native birds of prey such as the morepork (*Ninox novaeseelandiae*) and falcon (*Falco novaeseelandiae*) could be poisoned after eating dying rats or mice. Although leg-hold trapping has an impact on native birds (see Spurr 1991) this risk occurs only when the traps are set. Continual application of baits will impose risks to non-target species for longer periods. These risks need to be carefully evaluated by forest managers before these baits are used for possum control.

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