Rodent bait preferences in non-target birds

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CONTENTS

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ABSTRACT

Rodent control operations are being done, using new bait formulations, in native forest remnant areas of the Pureora Conservation Park. To assess potential risk to non-target species, feeding trials were carried out on North Island robins (*Petroica australis longipes*), which are common in the treated areas. Three formulations of a toxin-free rice-based gel bait, developed by Feral Control®, were compared with a standard toxin-free, cinnamon-lured cereal bait. The robins showed little interest in either bait, with only three out of 40 pecking at the gel and only one at the cereal pellets, and the slight amount ingested would have been well below that for a lethal dose if it had contained toxin. It was concluded that rodent control using warfarin-laced baits of the standard cereal formulation or the aniseed-lured gel formulation presented very low risk to non-target species, although trials to determine risks of long-term exposure to these baits was recommended.

Keywords: rodent control, bait formulations, gel bait, Feral Control®, non-target impact, North Island robin, *Petroica australis longipes*, native forest, Pureora Conservation Park, New Zealand

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1. Introduction

The main toxins used for pest control in New Zealand are 1080 and until recently the second-generation anticoagulant brodifacoum (Eason & Wickstrom 2001). Concern about the persistence of brodifacoum, resulting in secondary and potentially tertiary poisoning (Eason et al. 1999), has led to a greatly decreased use of this toxin by the Department of Conservation and an increased use of alternative toxins, such as cholecalciferol, and the first-generation anticoagulants warfarin and coumatetralyl.

With the greater use of these alternative toxins has come a greater variety of delivery systems, replacing predominantly cereal pellets (in which brodifacoum was delivered, for example) by peanut butter, pastes and gels. As a result of variable quality and decreasing availability of locally produced peanut butter (Jeremy Kerr, Feral Control®, pers. comm.), a popular base for cholecalciferol and warfarin, Feral Control (Auckland) have developed a rice-based gel to deliver toxins. The palatability of this gel has been tested on populations of pest species (possums *Trichosurus vulpecula*, Norway rats *Rattus norvegicus* and house mouse *Mus musculus*; D.R. Morgan 2001, unpublished data), but has not been tested on non-target species, such as birds.

To control rodent populations in the Waipapa and Mapara Management Areas during the summer of 2001/02, DOC proposed to use a warfarin-laced Feral Control® gel bait to control rodents. Prior to selecting this bait, an assessment of the potential risk to non-target species present in these management areas was requested. We tested three variations of the gel bait (all non-toxic) on North Island robins *(Petroica australis longipes)* in the Waipapa Ecological Area, Pureora Conservation Park. This species was chosen because it is common in native forest remnants where rodents are being controlled, and because the birds are inquisitive and feed on the ground, making them particularly vulnerable to poisoning.

1.1 OBJECTIVES

- To test whether free-living robins would feed on freely available gel baits; and
- To determine the order of preference between the gel bait and a standard bait (green-dyed, cinnamon-lured RS 5 cereal pellets).

2. Methods

2.1 NORTH ISLAND ROBINS

The North Island robin is a small (35 g) passerine that frequently feeds on or near the ground (Heather & Robertson 1996). The birds' diet consists predominantly of invertebrates, though they do eat small fruits in summer and autumn (Heather & Robertson 1996). Robins are known to try novel foods and have been found dead after poison operations (Spurr & Powlesland 1997; Powlesland et al. 1999; Hartley et al. 1999). South Island robins *(P. australis australis)* have been observed feeding on Kiwicare® gel baits (Morgan 1999).

2.2 STUDY AREA

The study site is in the Waipapa Ecological Area, Pureora Conservation Park (DOC 1996), in the central North Island. The vegetation is mixed forest with emergent podocarps over a mainly tawa *(Beilschmiedia tawa)* canopy. This forest has received intensive annual control of predators since 1996, mostly using brodifacoum in cereal baits in bait stations set out in a grid with 150 m spacing. In 2001 predator control around the study population of robins was undertaken using 1080 in cereal baits in bait stations followed by trapping (using break-back snap traps), with traps at 50 m intervals along lines 150 m apart.

Nesting and/or fledging success of robins is monitored each summer as a measure of the success of predator control. Territory-holding robins along the start of the Southern Hunters Access walking track have been trained to approach researchers for a food reward (mealworms *Tenebrio* sp.). Most of these birds have been banded, each with a numbered metal band and an individual combination of colour bands. As part of monitoring, their territories have been mapped; most territories were occupied by a pair of robins, although a few were occupied by single males, and there is some overlap in territories, particularly along the borders. The robins in the current trials were wild birds that had previously been exposed to cereal pellet baits contained in bait stations (with the exception of four young birds from the previous breeding season), but the gel baits were completely novel to them.

2.3 FEEDING TRIALS

Robins were presented individually with a choice of two baits on 75 mm diameter clear plastic trays. The baits were: (1) green-dyed, cinnamon-lured, non-toxic RS 5 cereal pellets, and (2) a rice-based vegetable paste with a high oil and sugar content (Feral Control® gel) in three different formulations (neutral/ no lure, cinnamon-lured and aniseed-lured). Cereal pellets were not dyed to the specifications required for poisonous baits in New Zealand (Caithness &

Williams 1971), but were coated in Hansell's® green food colouring until they were visually similar to the standard green-dyed baits.

Test sites were an area 0.5 m × 0.5 m scraped clear of leaf litter set up in the robins' territory. Robins were offered two samples of trial baits (cereal pellets and/or gel), each 100 mm apart, each trial involving a comparison of the standard with one of the formulations of the gel bait. For every trial, allocation of one of three treatment groups was randomly selected for each territory (rather than for each bird). Individuals in Group 1 received two lots of three cereal pellets, Group 2 received one lot of pellets and one 30 g scoop of gel, and Group 3 received two lots of gel. Robins could belong to any given treatment group during any trial. Because treatments were randomly allocated, some robins were presented with different combinations and flavours of baits during the three days of testing, while others received the same treatment on each occasion.

A total of 40 robins (30 male, six female and four indeterminate sex) were used in these trials (see Table 1). On the first day (21 June 2001), neutral gel was trialled with 31 of these robins (nine in Group 1, 12 in Group 2, and 10 in Group 3). On 23 July, cinnamon-lured gel was trialled on 35 robins (11 in Group 1, 12 in Group 2, and 12 in Group 3). On 25 July, aniseed–lured gel was trialled on 32 robins (11 in Group 1, 12 in Group 2, and nine in Group 3). Tests were carried out by two researchers doing alternate territories in an attempt to minimise interference between neighbouring territory holders. Birds occupying the same territory were given the same treatment.

Robins were attracted into the test area, firstly by tapping the jar to bring them close, then by throwing down short lengths of stick to get them to approach the cleared site containing the trays of test products. Interest in the baits was measured by the number of pecks directed at each bait during five minutes of observation, starting once the robin approached within 1 m of the cleared site. Activity was recorded by observers standing or sitting stationary approximately 3 m from the test site. After five minutes of observation, each robin was fed live mealworms.

3. Results

3.1 COMPARISON OF CEREAL PELLETS AND GEL BAIT

Neutral gel

One robin from Group 1 (Perrin) pecked once at a cereal pellet (after 2.5 minutes) and two robins (Gorgeous from Group 2 and Log Robin from Group 3) pecked one time each at the gel bait (after 3.4 and 4.15 minutes respectively) (Table 1). All birds that pecked at baits were male.

TABLE 1. ROBINS USED IN WAIPAPA GEL BAIT TRIALS AND THEIR RESPONSE TO PROFFERED BAITS.

ROBIN		SEX	TRIAL 1		TRIAL 2		TRIAL 3	
			Grp	Neutral	Grp	Cinnamon	Grp	Aniseed
Simsoc	DgY-MW	M	1	Ignored	3		2	
Yaggi	YG-MW	M	1	Ignored	1		3	
Syl	BG-MW	F	1	Ignored				
Phoenix	RW-M	M	1	Inspected	3	3 pecks, gel	1	
Hohepa	YG-MR	M	1	Inspected	1		2	
Robin Robin	MR-RB	M	1	Ignored	1		2	
Hotlips	RB-MW	M	1	Ignored	2		2	
Perrin	MY-GG	M	1	1 peck, pellet	1	1 peck, pellet	1	
Flutter	R-MDg	M	1	Ignored	3		3	
Gorgeous	MR-GG	M	2	1 peck, gel	1		1	
Dither	MW-DgDg	M	2	Ignored	3		1	
Tin Tin	MY-YB	M	2	Ignored				
Buts	RDg-MW	M	2	Ignored	2		1	
Bongo	DgG-MW	F	2	Ignored	2			
young of year	Unbanded	?	2	Ignored	3		2	
Mustela	DgB-MW	M	2	Ignored	3		2	
Bludge	MY-BDg	M	2	Ignored	2		1	
Solo	GR-MR	M	2	Ignored	3		1	
Rox	YM-G	M	2	Inspected	2		3	
Zed	GR-MW	M	2	Inspected	2		2	
Farthing	MR-RYDb	M	2	Ignored	1		3	
Raphael	MR-RYDb	?	3	Inspected	1			
Zed	GR-MW	M	3	Ignored				
Pottsi	RY-MR	M	3	Ignored	2		3	
Gump	BM-GDg	M	3	Inspected	2		3	
Stolley	BW-MW	M	3	Inspected	2		2	
Log Robin	RM-Dg	M	3	1 peck, gel	1		1	
Petroica	RG-MW	F	3	Ignored	1		1	
Rogue	BY-MR	M	3	Ignored	1		2	
young of year	Unbanded	?			3		1	
Gump	BM-GDg	M	3	Ignored				
Waddya	WDg-MW	M	3	Ignored	3		3	
Womble	W-MB	F			2		1	
young of year	Unbanded	?			2			
Bowie	MY-BW	M			1		2	
Theo	YM-B	M			3		2	
Hoppy	MW-RDg	M			3		3	
Fiddle	MW-DbR	F			3			
Oberon	RM-GY	M			2		2	
Merryl	MR-RY	F					3	

Cinnamon gel

One robin from Group 1 (Perrin) pecked once at a cereal pellet (after 44 seconds) and one from Group 3 (Phoenix) pecked three times at a gel bait (after 2.4 minutes) (Table 1). Again all birds that pecked at baits were male.

Aniseed gel

No robins pecked at either pellets or gel bait (Table 1).

All robins that pecked at baits (whether cereal pellet or gel) were involved in all of the trials. Perrin was presented with only cereal pellets on all three occasions, but did not peck at the pellets when presented for the third time. Gorgeous, Log Robin, and Phoenix pecked at gel baits on the only occasions they were presented with these baits, whether as the sole alternative or when presented together with pellets. On the other occasions, these robins were only presented with cereal pellets.

3.2 BEHAVIOUR OF THE ROBINS

Robins spent long periods of time foraging on the test sites. Despite this, only four robins (10%) tried either cereal pellets or gel bait. Most birds ate only natural food items revealed by disturbing leaf litter within the test area. Very little bait was consumed by those robins that pecked at the baits. No fragments of the cereal pellets were seen to break off and be eaten by Perrin. The robins that pecked the gel bait showed apparent dislike for it, flicking off bits that attached to their beaks with vigorous head shaking, without appearing to take any fragments into their mouths.

During the trial of the neutral gel, interest in the baits was recorded. Though few birds pecked at any of the baits offered, some robins closely inspected (stood close, looking directly) the baits. Of the robins in Group 1, six completely ignored the pellets, two inspected, and one pecked at a pellet. In Group 2, nine birds ignored the baits, two inspected (could not determine if inspecting gel or pellets), and one pecked at the gel. In Group 3, six birds ignored the baits, three inspected, and one pecked at the gel.

All robins consumed mealworms when fed them after the five minutes of observations had ended.

4. Discussion and conclusions

North Island robins at Waipapa showed little interest in freely available cereal pellets or Feral Control® gel baits. Three of 40 robins pecked at the gel baits and one robin at the cereal pellets offered. More robins pecked at neutral (unflavoured) gel than at cereal pellets, cinnamon-lured or aniseed-lured gel. The most pecks directed at any of the baits was made by a single bird at cinnamon-lured gel. Least interest was shown in the aniseed-lured gel.

Only adult male robins pecked at cereal pellets and gel baits. However, adult males dominated the samples (75%), and male robins tend to be more aggressive than adult females (Andrew Styche, pers. obs.).

Known acute oral toxicity (LD_{50}) for warfarin in mammals ranges from 3 to100 mg/kg (Eason & Wickstrom 2001). No similar data exist for birds, although the

acute oral toxicity (LD_{50}) for coumatetralyl (a similar coumarin-family anticoagulant) in hens is 50 mg/kg (Eason & Wickstrom 2001). If toxicity to birds is similar for warfarin, at a concentration of 0.05% (concentration of the toxin to be used), robins would need to consume 3.5 g of the gel to receive a lethal dose.

Lack of interest in the proffered baits was not an indication of lack of hunger. All of the robins tested consumed natural food items obtained from the leaf litter and mealworms.

The trials were not independent, as the same population of robins was used throughout the study. Consequently, caution must be taken in comparing the attractiveness of the formulations of gel baits that were tested on separate days. For example, the order (day) when baits were offered may have affected the response of robins to the baits.

Despite the caution mentioned above, aniseed-lured gel appears to be as attractive or less attractive to robins than the standard bait, and less attractive to robins than the neutral and cinnamon-lured formulations.

It is recommended that robins in Waipapa in areas where the Feral Control gel baits are to be used be monitored to determine any risks of long-term exposure to this bait.

5. Acknowledgements

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