Bait Selection in Laminate-toothed Rats and Other Southern African Small Mammals

WYBÓR PRZYNĘTY PRZEZ GRYZONIE Z RODZAJU OTOMYS I INNE MAŁE SSAKI POŁUDNIOWEJ AFRYKI

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The herbivorous laminate-toothed rats *Otomys* spp. are reputedly trap-shy. Members of this ecologically important taxon may have been undersampled in several southern African field studies where the baits used were unsuited to attracting *Otomys*. A bait comprising rolled oats, currants and sunflower oil has proved highly effective for *O. irroratus*, but ineffective for *O. sloggetti* and *O. unisulcatus*. Insectivores respond comparatively poorly to this bait, but for omnivorous rodents it is as effective as other baits commonly used in southern African field studies.

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In terms of biomass, the African laminate-toothed rats *Otomys* spp., particularly *O. irroratus* in suitable habitats, frequently dominate small mammal communities in southern Africa (*inter alia* Perrin, 1980; Willan & Bigalke, 1982) and elsewhere (Delany & Happold, 1979). It is therefore crucial that sampling error is minimized in field studies involving this taxon.

Herbivorous rodents are typically more difficult to sample than are omnivorous ones, and *Otomys* spp., which are specialist herbivores, are commonly regarded as trap-shy. Numbers of *Otomys* may have been inaccurately estimated in several southern African field studies (*inter alia* Toes, 1972; Bond *et al.*, 1980; Perrin, 1980). A common denominator in these studies was the use of baits apparently unsuited to catching *Otomys*. Perrin (1980) used peanut butter to sample *O. irroratus*, while baits consisting of peanut butter, rolled oats, animal fat and/or candle wax were used for *Otomys* complexes comprising *O. irroratus*, *O. laminatus* and *O. saundersae* (Toes, 1972; Bond *et al.*, 1980). Davis (1973) baited with rolled oats and currants, however, and following three days of prebaiting captured 95% of *Otomys* (*O. angoniensis* and *O. irroratus*) in three-day trapping periods. Furthermore, Dippenaar's (1974) bait selection study indicated that sunflower oil is attractive to *O. irroratus*. The combined implication (Davis and Dippenaar) was that a bait com-

prising rolled oats, currants and sunflower oil might prove effective for *O. irroratus* and possibly other *Otomys* spp.

This note summarizes the results of a pilot study on bait selection undertaken with emphasis on attracting *Otomys*, prior to a study on small mammal fire ecology in S. W. Cape montane fynbos (Cape Macchia), in the Cape Province, South Africa (Willan & Bigalke, 1982). Observations are included on the trappability of *Otomys* during later field studies in the S. W. Cape, E. Cape and Ciskei (geographically part of the E. Cape).

The pilot study took place in June 1979 on a 50-station grid at Duthie Reserve, University of Stellenbosch, where the small mammal community comprised *O. irroratus* (J. Meester, in litt.) and three omnivorous rodent and two insectivore species (below). The relative efficiencies of three baits (A-C; Table 1) were ascertained in three trials (1—3), each comprising 400 trap-nights, with a period of three days between successive trials. Two baits were tested against one another in each trial:

Table 1

Bait composition and preparation.

Bait	Composition and preparation
A	Peanut butter, lard and candle wax (1:1:1 by mass) melted together and mixed with rolled oats (2 parts by mass)
B	Rolled oats and currants (4:1 by mass) blended in a food blender until currants finely (<2 mm) fragmented
C	As for B but with sunflower oil (50 ml/kg) added

1 — AB; 2 — AC; 3 — BC. Matched-pairs livetrapping was employed in which pairs of differently baited but otherwise identical traps, either Sherman 230×80×90 mm or PVC 250×65×78 mm (after Willan, 1979), were set adjoining one another and cleared morning and evening. Fouled traps were washed in cold running water during trials, and in a hot detergent solution between trials. The species and bait preference were recorded of all animals captured, and they were released at the point of capture without being marked. Data thus represent total captures rather than numbers of individuals.

Conclusions from the results of the three trials (Table 2) are largely self-evident. Baits B and C were significantly more effective than bait A for *O. irroratus*. The value of χ^2 for *O. irroratus* is markedly larger for trial 2 than for trial 1, with 6% more captures at bait C than at bait B in trial 3 (Table 2), suggesting that bait C was marginally more effective than bait B for this species. Moreover, the results of χ^2 two-

Table 2

Frequencies of capture of small mammals at different baits and χ^2 analysis for three bait trials. H — herbivore, O — omnivore, I — insectiore, p is only given where values of χ^2 exceed the 5% significance level.

Species/feeding category	Capture frequencies										
	Trial 1				Trial 2				Trial 3		
	Bait A	Bait B	χ^2 (df=1)	p	Bait A	Bait C	χ^2 (df=1)	p	Bait B	Bait C	χ^2 (df=1)
Otomys irroratus (H)	7	37	20.45	<.001	4	48	37.23	<.001	33	35	0.06
Dendromus melanotis (O)	1	0	1.00		3	3	—		1	1	—
Mus minutoides (O)	6	3	1.00		12	9	0.43		7	7	—
Rhabdomys pumilio (O)	13	15	0.14		31	26	0.44		22	24	0.09
Crocidura flavescens (I)	3	1	1.00		6	3	1.00		2	3	0.20
Myosorex varius (I)	5	1	2.67		0	0	—		1	0	1.00
Total captures	35	57	5.26	<.05	56	89	7.51	<.01	66	70	0.12
Total herbivores	7	37	20.45	<.001	4	48	37.23	<.001	33	35	0.06
Total omnivores	20	18	0.11		46	38	0.76		30	32	0.06
Total insectivores	8	2	3.60		6	3	1.00		3	3	—
χ^2	20.05				33.20				0.01		
p	<.001				<.001						

-way analysis of independence by feeding categories to the pairs of baits tested (Table 2) indicate that sampling the community in question (and probably similar communities elsewhere) would be best achieved using two differently baited (baits A and C) traps at every station.

During November 1979 the opportunity occurred to informally test the efficiency of bait C against a rolled oats and peanut butter bait (1:1 by mass; bait D). (Rolled oats/peanut butter has been used in numerous southern African small mammal field studies). Trapping took place in montane fynbos vegetation at Jonkershoek State Forest, Stellenbosch, on two 25-station traplines with two PVC traps set at random within 1 m of each station marker, one baited with bait C and the other with bait D, and totalled 400 trap-nights. Other methods were as outlined above. Only *O. irroratus* was represented in an *Otomys* voucher series identified by J. Meester (in litt.). Bait C was generally more effective than bait D, although catches of species other than *O. irroratus* and *Rhabdomys pumilio* were too small for meaningful comparison. Significantly more captures of *O. irroratus* were made at bait C (15) than at bait D (1) ($\chi^2=12.25$; $p<0.001$). Similarly, *R. pumilio* responded significantly better to bait C (15 captures) than to bait D (1 capture) $\chi^2=6.37$; $p<0.05$). It is noteworthy that of the 15 captures of *R. pumilio* at bait C, six were of juveniles (10—20 g approximately), but no juveniles were taken at bait D. The difference in juvenile response significantly favoured bait C ($\chi^2=6.00$; $p<0.05$), while adults did not discriminate significantly between baits ($\chi^2=1.92$). Intraspecific variation in trappability is well documented in Europe and North America (see Flowerdew, 1976).

The greater effectiveness for *O. irroratus* of bait C compared to bait D has been confirmed during trapping studies near Alice, Ciskei. Using bait D, Nkoane, E. N. (unpubl.) collected no *O. irroratus* in 2160 trap-nights during 1984 (April — September), although numerous omnivorous rodents and insectivores were trapped. During a currently ongoing study at the same site, Willan, Baxter, R. M. & Nkoane (unpubl.), using bait C, trapped four individual *O. irroratus* in 864 trap-nights during their first month's sampling (March 1985). A possibly important technique used in this study, as in those cited below, is that in addition to baiting the traps, a small quantity of bait (approximately 5 g) is sprinkled over an area of 2—3 m^2 surrounding the traps at the first setting and each time they are cleared. This practice may have the effect of overcoming neophobia and preclude the need for prebaiting.

Further evidence of the effectiveness of bait C for *O. irroratus*, relating to the length of the trapping period necessary to effectively census a population, has been obtained during capture-mark-recapture studies

in two different habitats. Trapping a 100-station grid at Jonkershoek for four days in December 1979, Willan (unpubl.) caught approximately 90% of the *O. irroratus* population in the first three days. Similarly, Brown (in prep.) caught 88% of the *O. irroratus* population in the first three days of trapping a 100-station grid a Hogsback, E. Cape, during a 13-month period (March 1984 — April 1985). Using peanut butter and trapping for four days monthly, Perrin (1980) trapped an estimated 68% of the *O. irroratus* population, while Bond *et al.* (1980), using rolled oats/peanut butter/candle wax for *Otomys*, found inadequate a sampling regime comprising one day's prebaiting and a four-day trapping period.

Despite its success for *O. irroratus*, bait C has proved comparatively unsuccessful for *O. sloggetti* (Willan, unpubl.) and *O. unisulcatus* (Brown, in prep.). Coupled with these failures, the data presented here demonstrate a need for improved bait formulations for African small mammals. Species-specific preferences as well as intraspecific seasonal and regional variation in bait acceptability require study, while the need for further information extends to other aspects of sampling technique such as trap efficiency, trap odour and grid layout.

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