ANALYSIS OF A COLLECTION OF BARN OWL *TYTO ALBA* PELLETS FROM WARMBATHS, TRANSVAAL

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INTRODUCTION

Barn owl *Tyto alba* pellets were collected regularly at a roost in a maize loft on the farm "Sandfontein", 8 km east of Warmbaths, Transvaal. The farm embraces a mosaic of *Acacia* and *Combretum* woodland. The roosting site was not used for nesting during the time that pellets were collected, though it has been used for breeding in the past (P. Rissik: pers. comm.). The loft is situated near the homestead bordering open cattle paddocks with some big trees, mostly *Sclerocarya birrea* and *Acacia tortilis*.

METHODS AND MATERIAL

An initial and complete collection of 622 pellets was made on 29 January 1971. Thereafter pellets were collected at approximately monthly intervals. Pellets were softened in water and carefully taken apart. All skulls and their lower jaws, were retained. Mammal and bird skulls were identified using museum and other reference collections.

Medium-sized *Crocidura*, viz., *C. cyanea*, *C. silacea* and possibly *C. pilosa* were not separated due to the difficulty of identifying these species on cranial characteristics alone. The *Tatera* material was all identified as *T. leucogaster*; no colony of *T. brantsii* was found on the farm. Measurements of the first upper molar of the *Tatera* skulls ranged from 2,15 to 2,5 mm, i.e., within the extremes of 1,9–2,6 mm given by Davis (1966). One other skull had a M1 width of 2,7 mm, but I consider this to be an extra large specimen of *T. leucogaster*. The *Otomys* material was all identified as *O. angoniensis* using the character in the bulla described by Davis (1965).

Arthropoda were identified by G. James of the University of the Witwatersrand.

ANALYSIS

Species composition

The data are summarised in Tables 1 and 2. Table 1 presents an analysis of the 622 pellets obtained initially (referred to here as the 1969/70 collection) and Table 2 the subsequent collections. The species composition is similar in both collections with the main prey item *Praomys natalensis* accounting for 71,27% by weight of the total prey in 1969/70 and 72,02% in 1971. Relatively fewer *Tatera* and *Otomys* were taken in 1971 when more bird prey was taken. In 1969/70, birds made up 1,13% of the total biomass, and in 1971, 4,75%. Two birds, *Ploceus velatus* and *Quelea quelea* made up 4,55% of the total biomass. *Ploceus velatus* roosted and nested near the owl roost, and of 17 *P. velatus* skulls examined for pneumatization 12 were wholly pneumatized and five were indeterminate; this indicates that mainly adult *P. velatus*

TABLE 1

ANALYSIS OF 622 PELLETS FOR 1969/70 ACCORDING TO NUMBER AND PER CENT BY APPROXIMATE LIVE WEIGHT OF TOTAL ANIMALS IN THE PREY SAMPLE

Species	*No.*	*Percentage by weight*
Mammals		
Elephantulus brachyrhynchus	7	1,26
Suncus lixus	6	0,14
Crocidura hirta	7	0,38
C. cyanea/silacea/pilosa	9	0,29
C. bicolor	3	0,07
Graphiurus murinus	1	0,01
Tatera leucogaster	35	7,03
Otomys angoniensis	30	11,64
Saccostomus campestris	6	0,97
Steatomys pratensis	23	2,31
Mus minutoides	23	0,52
Praomys natalensis	476	71,27
Aethomys chrysophilos	5	1,57
Lemniscomys griselda	6	1,38
Birds		
Lybius leucomelas	2	0,30
Cisticola chiniana	1	0,01
Anthus sp.	1	0,01
Passer domesticus	1	0,08
P. griseus	1	0,08
Sporopipes squamifrons	8	0,34
Ploceus velatus	1	0,09
Euplectes orix	1	0,09
Uraeginthus angolensis	1	0,04
Indet. (size as *P. velatus*)	1	0,09
Total prey animals	655	99,97

were taken. *Quelea quelea* was not taken in 1969/70. The number taken in 1971 reflects some exploitation of roosting and later nesting *Quelea*. A colony of *Q. quelea* was found on 8 May 1971 about 2 km from the owl roost. The colony when found, had mostly well-set eggs. Three pellets obtained in April had oviducal eggs in addition to *Quelea* skeletons. Egg yolks are not digested by *Tyto alba*, as noted by Banks (1965). It is interesting that the owls did not take *Quelea* after April when the young fledglings would have been a facile food item. Only five *Quelea* skulls were not crushed and these were all wholly pneumatized. The skull of the *Lanius collaris* from the 1971 collection was unpneumatized.

Fragments of *Tyto alba* egg-shell were recovered from one pellet and guineafowl, *Numida*

TABLE 2

ANALYSIS OF 448 PELLETS COLLECTED DURING 1971 (FOR INTERVALS BETWEEN COLLECTIONS SEE TABLE 3) ACCORDING TO PER CENT BY APPROXIMATE LIVE WEIGHT AND MEAN DAILY PREY ANIMALS CONSUMED FOR EACH MONTH AND FOR THE YEAR

Species	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July/Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*	*Jan.*	*Total*	*Per cent by weight*
Mammals													
Elephantulus brachyrhynchus										1		1	0,02
Suncus lixus							1					1	0,001
Crocidura hirta			2	1	1		2					6	0,037
C. cyaneas/silacea/pilosa ..			1	1	1					2		5	0,018
C. bicolor	1	1	4	1			1	1				9	0,022
Tatera leucogaster	1		4	8	3	2				2	2	22	4,92
Otomys angoniensis ..	3	1	2	1	1		3	2	1	2	1	17	7,34
Saccostomus campestris ..	3		2	4		2	2	1				14	2,51
Steatomys pratensis ..			5	14	12	5	1	6		3	2	48	5,37
Mus minutoides			1	3	3	2	1	1	1			12	0,13
Praomys natalensis ..	10	18	67	55	34	48	71	44	31	26	27	431	72,02
Aethomys chrysophilos ..		1				1						2	0,07
Lemniscomys griselda ..					2		1				2	5	1,28
Rhabdomys pumilio ..			1									1	0,106
Birds													
Streptopelia capicola ..	1											1	0,056
Cisticola chiniana			1	1	1							3	0,02
Prinia flavicans			1									1	0,005
Lanius colaris	1											1	0,020
Passer domesticus			1									1	0,009
P. griseus			1									1	0,009
P. melanurus			1									1	0,008
Sporopipes squamifrons ..			3			1						4	0,019
Ploceus velatus	14	1	1								1	17	1,71
Quelea quelea		27	7									34	2,84
Euplectes orix		2	1									3	0,03
E. afer								1				1	0,007
Uraeginthus angolensis ..				2	1	1						4	0,017
Total	35	51	106	91	58	62	83	56	33	36	35	647	98,40
X/day prey animals	1,06	1,92	1,25	1,50	2,14	2,20	1,30	1,55	1,27	1,24	1,25	1,77	—

meleagris, from another in the 1969/70 collection. The shell and embryonic sac of their own eggs is eaten by *Tyto alba* while assisting the young to hatch (Buhler 1970). The guineafowl egg-shell may have been ingested fortuitously by the owl.

Arthropoda of the following orders were taken: Solfugida and Coleoptera. A frequent

prey item was the monstrous cricket (Gryllacridae). The arthropod prey was not quantified and is not included in the prey and biomass analyses.

Rate of pellet casting

Table 3 gives the number of pellets collected at the roost and the number of owls present at the roost.

TABLE 3

MEAN NUMBER OF PELLETS PER DAY ACCORDING TO MONTHS

Month	*Owls present at roost A*	*Pellets B*	*Days between collections C*	*Pellets/Day B/C*
Feb.	1	33	30	1,1
Mar.	1	42	27	1,5
Apr.	2	74	42	0,6*
May	2	56	29	0,6*
Jun.	1	32	27	1,2
Jul.	1	38	28	1,35
Aug./Sept.	1	58	63	0,9
Oct.	1	36	36	1,0
Nov.	1	25	26	0,96
Dec.	1	23	29	0,8
Jan.	1	31	28	1,1
Year	—	448	365	1,1

* The April and May values were computed ½(B/C) because there were two owls present at the roost.

If the barn owl maintained a rate of one meal a day and assuming that one meal equals one pellet, then the relatively low rate for April, May, August/September and December suggests that not all pellets are dropped at the diurnal roost. Honer (1963) found that *Tyto alba* in the Netherlands hunted over fixed routes and used high points in the hunting territory as lookouts as well as pellet-casting posts. Some work has been done on rates of pellet-casting by captive *Tyto alba* (Wallace 1948) but it is not known how well these studies compare with birds in the wild. Wallace tentatively concluded that if a *Tyto alba* feeds at intervals during the night, a single pellet will be produced next day. If the owl feeds in the early evening and does not feed again until the early morning, two pellets are likely to be ejected. It appears, then, that at least one pellet a day can be expected and possibly two, and that the Sandfontein owls occasionally dropped pellets away from the roost.

BIOMASS CONSUMED

Table 4 gives prey animals and weights of each used in the following calculations of biomass consumption.

TABLE 4

MEAN WEIGHTS OF PREY ANIMALS USED IN THE BIOMASS CONSUMPTION CALCULATIONS

	*Mean weight in grams**
Mammals	
Elephantulus brachyrhynchus	46,5
Suncus lixus	6,0
Crocidura hirta	14,1
C. cyanea/silacea/pilosa	8,1
C. bicolor	5,7
Tatera leucogaster	52,0
Otomys angoniensis	100,5
Saccostomus campestris	41,7
Steatomys pratensis	26,0
Mus minutoides	5,8
Praomys natalensis	38,8
Aethomys chrysophilos	81,3
Lemniscomys griselda	59,3
Rhabdomys pumilio	35,2
Birds	
Streptopelia capicola	130,0
Cisticola chiniana	13,0
Prinia flavicans	9,9
Lanius collaris	44,6
Passer domesticus	20,5
P. griseus	20,8
P. melanurus	18,6
Sporopipes squamifrons	10,9
Ploceus velatus	23,3
Quelea quelea	19,4
Euplectes orix	23,0
E. afer	15,4
Uraeginthus angolensis	9,7

* Mammal weights taken from Smithers (1971) and Transvaal Museum. Bird weights from Britton and Dowset (1969) and Liversidge (1968).

The mean daily consumption of vertebrate biomass per owl ranged from 41,7 to 81,9 gram/day. This is shown in Table 5. It is significant that the mean daily biomass consumed is highest in May, June and July, i.e., those months in which the local owls normally have young. The estimated biomass for April and May has been halved because there were two owls present at the roost.

TABLE 5

MEAN DAILY CONSUMPTION OF VERTEBRATE BIOMASS

Month	*Total Biomass A*	*Days B*	*A/B*
Feb.	1373,1	30	45,7
Mar.	1479,0	27	54,7
Apr...	1754,3	42	41,7
May..	1629,5	29	56,1
Jun.	2068,6	27	76,6
Jul.	2293,5	28	81,9
Aug./Sept. ..	3270,7	63	51,9
Oct.	2132,8	36	59,2
Nov.	1250,3	26	48,0
Dec...	1253,5	29	43,2
Jan.	1387,2	28	49,5
Year	23276,2	365	55,3

SUMMARY

Pellets taken from a barn owl *Tyto alba* roost near Warmbaths, Transvaal were analysed according to species composition and estimates were made of the mean daily biomass consumed by the owl and the rate at which the owl cast pellets.

Praomys natalensis was found to be the staple item in the diet of the barn owls. The owls took fewer birds in 1969/70 than in 1971 when they exploited a *Quelea quelea* colony.

The rate at which pellets were cast varied from 0,6 to 1,5 pellets/day with a mean of 1,10/day per owl.

Mean daily consumption of vertebrate biomass ranged from 41,7 to 81,9 gram/day with a mean of 55,3 gram/day per owl. Daily consumption of food was highest in the late autumn and winter.

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