

Analysis of Mammal Remains from Owl Pellets (*Asio Otus*), in A Suburban Area in Beytepe, Ankara

Ankara, Beytepe'de Suburban Bir Bölgede Baykuş Peletlerinden (*Asio Otus*) Memeli Kalıntılarının Analizi

Research Article

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ABSTRACT

138 owl pellets of long-eared owl, *Asio otus* were analyzed in the suburban area in Beytepe, Ankara. The results showed the preferred diet of long-eared owl in summer time and evaluated owl preference for small mammals in suburban areas. Mammals constituted all preys of the owl. The Günther's vole, *Microtus guentheri*, was the main food of the long-eared owl, *Microtus guentheri* constituted 43.7% of the prey items, *Microtus* sp., can not identified, 17.4%, *Apodemus flavicollis* 11.3%, *Mus macedonicus* 10.8%, *Microtus levis* 7.5%, *Rattus norvegicus* 4.2%, *Crocidura suavolens* 2.8%, *Nannospalax nehringi* 1.4%, *Cricetulus migratorius* 0.9%. Pellets' content indicated that the long-eared owl consumes 1 to 5 preys per pellet which depends on the size of prey species. Average prey per pellet was found to be 1.72. A total of 9 species contributed to diet, 213 prey individuals with a total amount of 8383.5 g in biomass were found.

Key Words

Long-eared owl, pellets, rodents, small mammals, biomass, Turkey

ÖZET

Beytepe, Ankara'da suburban bir bölgede kulaklı orman baykuşu *Asio otus*'a ait 138 pelet analiz edildi. Sonuçlar, yaz aylarında kulaklı orman baykuşunun beslenme tercihinin ve hangi küçük memelileri tercih ettiğini değerlendirmemizi sağladı. Memeli kalıntıları baykuşun tüm avlarında bulundu. Günther tarlafaresi, *Microtus guentheri*, kulaklı orman baykuşunun ana besinidir, *Microtus guentheri* avların %43,7'sini, tanımlanamayan *Microtus* sp. türü %17,4'ünü, *Apodemus flavicollis* %11,3'ünü, *Mus macedonicus* %10,8'ini, *Microtus levis* %7,5'ini, *Rattus norvegicus* %4,2'sini, *Crocidura suavolens* %2,8'ini, *Nannospalax nehringi* %1,4'ünü, *Cricetulus migratorius* %0,9'unu içermektedir. Pelet içerikleri kulaklı orman baykuşunun avın büyüklüğüne göre her pelette 1 ile 5 arası ava rastlanmıştır. Her peletin ortalama avı 1,72 bulunmuştur. Toplamda 9 tür baykuşun besinine katılmıştır, 213 avlanmış örnek toplamda biyomas olarak 8383,5 g bulunmuştur.

Anahtar Kelimeler

Kulaklı orman baykuşu, pelet, rodent, küçük memeli, biyomas, Türkiye

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INTRODUCTION

The Long-eared owl (*Asio otus*) is a middle-sized owl which is found in Eurasia, Northern Africa and North America [1-3]. In Turkey, the long-eared owl is one of the ten owl species which was recorded as belonging to Strigidae and Tytonidae families [4]. Diet of the long-eared owl generally consists of insects and rodents, in small quantities of birds [5]. The long-eared owl's breeding season is between February-July. The bird is partially migratory, moving from northern parts to south in winter depending on its temperature range. Its habitat is forest close to open country. The studies about diet of owls are insufficient; although many new records are determined by pellets in Turkey. There are only a few studies up to date regarding the feeding of long-eared owl which were carried out in Turkey [6-9]. However, the diet of long-eared owls in suburban habitat is poorly known. The present study focused on the diet of long-eared owl from a suburban habitat in Turkey due to the rare number of records and aimed to reveal the small mammal contents in pellets and the diet of long-eared owl by frequency and biomass. This paper is to present the first biomass and quantitative information on the diets of long-eared owls from suburban habitat in Turkey.

MATERIALS AND METHODS

Pellets of the long-eared owl *Asio otus* accumulated under black pine (*Pinus nigra*) were collected between March 2011 to July 2011 from Hacettepe University, Beytepe Campus in a plantation forest area (36S 447498 E and 4413888 N). Skulls, maxillas and mandibles were removed and kept in labeled containers. The remains were identified based on Yiğit et al. and reference skulls were prepared from live specimens which were also collected from Beytepe Campus as comparative material [10]. Computation of biomass was performed by the species which were caught from the same locality. We calculated the biomass of unidentified *Microtus* specimens by the average weight of *M. guentheri* and *M. levis*. The materials of the present study were deposited in the collection of the Hacettepe University, Faculty of Science, Department of Biology, Zoology Section, Ornithology Laboratory, Turkey.

Abbreviations

CbL = Condylbasal length;
 ZB = Zygomatic breadth;
 IC = Interorbital constriction;
 NL = Nasal length;
 DL = Diastema length;
 FI = Foramen incisiva;
 TB = Tympanic Bulla (length);
 ML = Mandible length (incisor included);
 MB = Mandible body (incisor not included);
 UML = Upper molar length;
 LML = Lower molar length, ZI (width of malar process anterior part/width of upper part of zygomatic arch).

RESULT AND DISCUSSION

138 owl pellets collected between March 2011 to June 2011 were examined. Statistical averages were: dry weight, 4.7 ± 1.4 g with coefficient of variation (c.v.) 0.34; greatest length, 52.4 ± 11.3 mm, c.v. 0.31; greatest width, 28.4 ± 4.1 mm, c.v. 0.17; smallest width, 22.3 ± 3.1 mm, c.v. 0.17. One prey was found in 57 pellets (45.97%), two were found in 44 (35.48%), three prey in 14 (11.29%), four in 4 (3.23%) and five in 2 (1.62%). Average number of prey per pellet was found to be 1.72.

Most pellets contained cranial bones only, without the rest of the skeletal remains. This may be due to the fact that the owls' behavior in eating the heads of rodents only, particularly when the latter are very abundant, as mentioned by Raczynski and Ruprecht [11]. Mammal remains were found in all pellets (213 prey from 2 different ordo and 3 different families): Muridae in 95.8% of the pellets, Spalacidae in 1.4%, and Soricidae in 2.8%.

Rodents belonging to genus *Microtus* are significantly common prey and the most important in terms of biomass, with 5168.5 g (61.6%). No significant difference was found between *Crocicidura suavolens* and *Cricetulus migratorius* species in the frequency of predation and biomass. *Rattus norvegicus* is the second biggest group of the prey, accounted for 20.4% of the biomass (Table 1).

Order Rodentia

Seven rodent species belonging to two families (Muridae: *Microtus guentheri*, *Apodemus*

flavicollis, *Mus macedonicus*, *Microtus levis*, *Rattus norvegicus*, *Cricetulus migratorius*; Spalacidae: *Nannospalax nehringi*) were identified. Table 2 shows the cranial and dental measurements of the rodent species.

***Microtus guentheri* (Danford and Alston, 1880)**

Remains of 93 individuals of the Günther's vole constituting 43.7% of the diet were recovered. This suggests that this species is common in suburban areas in Middle Anatolia (around the city of Ankara). Cranial and dental measurements are slightly consistent with those given by Yiğit and Çolak for *M. lydius* from Ankara [12].

***Apodemus flavicollis* (Melchior, 1834)**

Remains of 24 individuals of the yellow-necked mouse constituting 11.3% of the diet were recovered.

***Mus macedonicus* Petrov and Ružić, 1982**

According to Orsini et al., Auffray et al. and Cucchi et al., ZI value is a distinguishing characteristic among *Mus* species (13-15). ZI (0.25 to 0.46) and $T \times 100 / HB$ (0.73 to 1.0) were reported in the Ankara, Bolu and Zonguldak population of *Mus domesticus* in Turkey [16]. The *Mus* specimens from owls' pellets were assigned to *M. domesticus* by means of the value of ZI (1.2 from two skulls). The Macedonian mouse constituted 10.8% of the prey items. The number of skulls per pellet was 0-3. In the study of diet of long-eared owl, the

Mus species was the moderate level prey species in pellets.

***Microtus levis* Miller, 1908**

The sibling vole lives in watery steppes and grasslands at the edge of brooks and lakes [10]. In our study area there is a dam lake and we caught these species near the lake. It shows that long-eared owl also prefers these habitats for hunting. It is 7.5% of the total number of prey items (Table 1). Remains ranging from 1 to 4 voles per pellet were found, indicating that the voles are the most abundant species within the hunting territory of the long-eared owl in suburban areas. Similar results were obtained in many diet studies [5, 8].

***Cricetulus migratorius* (Pallas, 1773)**

The gray hamster constituted 0.9% of the diet. Two prey remains belonging to this species were found. One had some skull pieces and the other had just mandibular. Both specimens were subadult according to tooth surface and measurements (Table 2). This species was not found in this area before. The distinguishing feature of owls' pellet's surface is the presence of pieces of grasses and seeds helps in predicting the presence of hamsters in pellets. This shows that they have still nutrient when they were hunting.

***Rattus norvegicus* (Berkenhout, 1769)**

The presence of this species in the pellets is 4.2%. In comparison with Harrison and Bates, measurements of the recent cranial remains of

Table 1. Diet of the Long-eared Owl and the biomass calculating.

Species	N	Abundance (%)	Approximate wt. of prey (g)	Total biomass (g)	Total biomass (%)
<i>Microtus guentheri</i>	93	43.7	38	3534	42.4
<i>Microtus</i> sp.	37	17.4	32.5	1202.5	14.4
<i>Apodemus flavicollis</i>	24	11.3	21	504	6.1
<i>Mus macedonicus</i>	23	10.8	15	345	4.2
<i>Microtus levis</i>	16	7.5	27	432	5.3
<i>Rattus norvegicus</i>	9	4.2	190	1710	20.5
<i>Crocidura suaveolens</i>	6	2.8	8	48	0.7
<i>Nannospalax nehringi</i>	3	1.4	155	465	5.7
<i>Cricetulus migratorius</i>	2	0.9	26	52	0.7
Total	213	100		8383.5	100

Table 2. Cranial and dental measurements (mm) species recovered from pellets of the long-eared owl, *Asio otus*.

	M. guentheri N=93	Apodemus flavicollis N=24	Mus macedonicus N=23	M. levis N=16	Rattus norvegicus N=9	Crocidura suaveolens N=6	Nannospalax nehringi N=3	Cricetulus migratorius N=2
CbL	28.7±1.6 (12)	23.2±2.4 (3)	19.1±4 (2)	24.2±2.4 (3)	39(1)	-	-	-
ZB	13.7±6.9 (7)	13.7(1)	-	15.1 (1)	-	-	-	-
IC	3.9±0.2 (27)	4.3±0.3(7)	3.7+0.3(4)	3.7±0.21 (13)	5.1±0.4(2)	-	-	3.57 (1)
NL	7.4±0.5(35)	10.3±1.7 (3)	7.6±1.6(2)	7.8±0.7 (7)	-	-	22.8 (1)	8.63 (1)
DL	8.1±0.4 (14)	7.2±1(4)	5(1)	7.8±0.4(6)	-	-	-	-
FI	4.7±0.4(18)	5.5±0.4(4)	4.7±0.5(3)	4.3±0.3(3)	-	-	-	-
TB	8.4±0.5(13)	-	-	7.9 (1)	-	-	12,2 (1)	-
ML	17.1±0.9 (53)	15.8±0.7(9)	11.1±1(4)	14.5±0.9(9)	24.3±1.6(3)	9.6±0.9(3)	33.5 (1)	14.89 ± 0.8 (2)
MB	9.2±0.6 (44)	8.3±0.6(7)	5.1±0.5(3)	8.4±0.6(7)	13.7±2(2)	6.3(1)	-	-
UML	6.8±0.3(37)	4.2±0.5(8)	3.1±0.2(7)	6.2±0.4(6)	6.8±0.2(2)	-	7.6 ±1.1 (3)	3.37 (1)
LML	6.7±0.3(58)	4.3±0.4(13)	3.2±0.2(9)	6.3±0.4(9)	6.9±0.2(4)	4.1±0.2(3)	7,94 ±1.3 (3)	3.45 ± 0.2 (2)

this species indicated that they were subadults [17].

***Nannospalax nehringi* (Satunin, 1898)**

Mole rats have adapted subterranean life and are not seen above soil surface frequently, where owls prey them [17]. Three skulls of a subadult and two adults were found in the pellets. They represented 1.4% of all prey.

Order Insectivora

Remains of 6 individuals of the order Insectivora belonging to the family Soricidae were recovered. Table 2 shows measurements for 1 species of shrews recovered from the recent material.

***Crocidura suavolens* (Pallas, 1811)**

Only the species belonging to order Insectivora. 6 individuals were found in the pellets with the rate of 2.8%.

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