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Short Communication

Diet of the Desert Eagle Owl, *Bubo ascalaphus*, in Eastern Saudi Arabia

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ABSTRACT

The diet composition of the Desert or Pharaoh Eagle Owl *Bubo ascalaphus*, was investigated in Eastern Saudi Arabia. 112 regurgitated pellets yielded 203 individual prey items representing at least eleven rodent species, unidentified bird(s), at least one scorpion, and other unidentified insects. Prey items were dominated by rodents (91%) which were found in 96.4% of the pellets. Birds, scorpions, and other insects constituted 2.46, 5.91, and 2.96% of the diet, respectively. Rodents contributed the most in terms of biomass, with the black rat, *Rattus rattus*, and desert jirds dominating the remains. The results suggested that the Desert Eagle Owl in the arid ecosystem in eastern Saudi Arabia is a highly selective feeder, hunting 1–5 prey items per day (mean±SD 1.77±0.96) mostly from ground-dwelling native and invasive rodents. Prey selection within this human-influenced area likely influenced by the availability and abundance of species and shifting to urban rodents.

In the Arabian Peninsula, the Desert Eagle Owl *Bubo ascalaphus* is a wide-spread resident, with confirmed breeding particularly in eastern Saudi Arabia (Cramp, 1985; Jennings, 2010), yet, little is known on the diet of owls in Saudi Arabia. Evans and Bates (1993) studied the diet composition of the Eagle Owl in Harrat al Harrah reserve and Jennings (2010) indicated several species of rodents, birds, the Arabian hare and invertebrates. Elsewhere, the diet of Eagle Owl was investigated in Egypt (Goodman, 1990; Sándor and Orbán, 2008), Jordan (Amr *et al*., 1997; Rifai *et al*., 2000; Shehab and Ciach, 2008), the Palestinian Territories (Amr *et al*., 2016), Qatar (Mohedano *et al*., 2014), Syria (Shehab, 2004), and UAE (Cunningham and Aspinall, 2001). This study reports on the diet composition of the desert Eagle Owl in eastern Saudi Arabia based on recent pellet collection.

Materials and methods

A large pile of pellets consisting of about 94 intact pellets and 18 fragmented ones were found near a daytime roosting site of Eagle Owl. The site lies in a rocky area in Wadi As Sulai (N 25° 00 11.4 E 46° 37 08.6 altitude 652 m asl) near Riyadh. The area is rocky overlooking a wadi system and with different types of vegetation including gravel plain ecosystems interspersed with seasonal riverbeds (run-off wadis), lowland areas and sand dunes. The majority of the area is barren stone desert rarely covered by vegetation; the wadis provide scattered vegetated bush/shrubby microsystems mainly of *Acacia tortilis*. Bandan Park and other recreational areas surround the site from the north and west while open desert plains are located in the east.

Pellets were soaked in warm water until disaggregation; bones and other hard remains were removed and placed in separate Petri dishes. Skulls, mandibles, and other easily recognizable elements were selected as the basis for species identification. The total number of prey individuals in a pellet was determined using the total number of mandibles and/or skulls found (Yalden and Morris, 1990). Animal identification was based on Osborn and Helmy (1980), Harrison and Bates (1991) and Amr (2012). Rodent body weights were based on Abu Baker and Amr (2003), Osborn and Helmy (1980), and Scott and Dunstone (2000). Diet composition was expressed by the number of individuals, percentage (number of individuals divided by the total number of prey individuals), frequency of occurrence of each prey item in the pellets (number of pellets in which a

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prey item occurred), and percentage of mass taken.

Results

Pellets were cylindrical in shape with an average length of 52.2 ± 6.8 mm (mean ± standard deviation) and 22.84 ± 3.5 mm in width. The sample of 112 pellets contained prey items that belonged to a total of 203 prey individuals including at least eleven mammal species (Rodentia: Dipodidae, Muridae), and several unidentified species of birds, scorpions, and other insects (Table I).

The pellets contained 1–5 prey items per day (1.77 ± 0.96, average ± standard deviation). Most pellets (79%) contained ≤ 2 prey items; the rest contained 3–5 prey items (Fig. 1). Out of the total 112 pellets, 108 contained rodents, of which 87 contained only rodents, 4 contained remains of a bird and 2-3 rodents and 16 contained remains of an arthropod and 1-4 rodents. Only one pellet contained only remains of insects. Pellets with 3, 4, or 5 prey items contained an arthropod and 2 rodents or 3 rodents, an arthropod and 3 rodents or 4 rodents, and an arthropod and 4 rodents, respectively. The 11 rodent species included mostly *Jaculus jaculus* and *Meriones crassus* at 41% each, followed by *Meriones libycus* and *Rattus rattus* at 24% each (Table I). *Acomys russatus*, *Sekeetamys calurus*, and *Mus musculus* were the least represented in the diet composition (Table I). However, in terms of body mass intake, *R. rattus*, *M. crassus*, *M. libycus*, and *J. jaculus* contributed the most at 22.77, 20.96, 20.03, and 19.21%, respectively (Table I). Arthropod prey items were represented mainly by scorpions (Table I).

Discussion

The Eagle Owl's diet contained a wide variety of prey items that comprised mainly of small mammals. Larger species of rodents made the highest frequencies (11.82-20.20%). The presence of higher frequencies of rodent remains suggests that hunting for food was mostly done at night for species of greater biomass and energetic yield, yet, the presence of *Psammomys obesus* and *Meriones libycus* at 5.91 and 11.82%, respectively, suggests crepuscular and/or diurnal hunting activity (Rifai *et al*., 2000). Although the largest species in the diet remains, *Rattus rattus* (average body weight 137.3 g) occurred only at 11.82% in the diet though it contributed the highest in

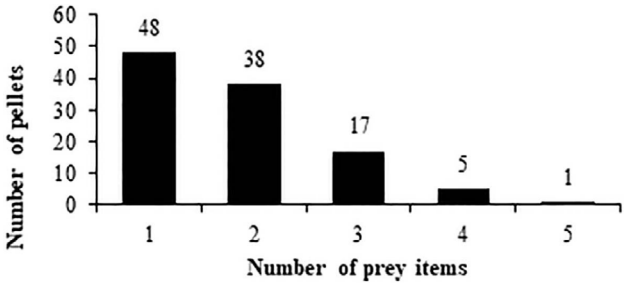

Fig. 1. Number of prey items per pellet.

Table I.- Food composition of the desert eagle owl in Eastern Saudi Arabia.

Prey item	Total No.	Percentage in diet (%)	Frequency of occurrence	Average body mass (g)	Total mass taken	Percentage mass taken
Mammals: Rodents						
Jaculus jaculus	41	20.20	36	67.8	2779.8	19.21
Gerbillus cheesemani	7	3.45	7	24	168	1.16
Gerbilus sp.	14	6.90	14	21	294	2.03
Meriones crasus	41	20.20	32	74	3034	20.96
Meriones libycus	24	11.82	21	120.8	2899.2	20.03
Psammomys obesus	12	5.91	11	128.7	1544.4	10.67
Sekeetamys calurus	3	1.48	3	41.4	124.2	0.86
Acomys dimidiatus	6	2.96	6	39.7	238.2	1.65
Acomys rassatus	1	0.49	1	50.7	50.7	0.35
Mus musculus	3	1.48	3	15	45	0.31
Rattus rattus	24	11.82	16	137.3	3295.2	22.77
Unidentified rodent (fur only)	4	1.97	4			
Unidentified birds	5	2.46	5			
Arthropods						
Scorpions	12	5.91	12			
Insects	6	2.96	7		14472.7	
Total	203	100	174			

terms of body mass intake (22.77%). It also occurred at frequencies of 1-3 individuals in a single pellet, suggesting their high abundance in the area and/or that the owl may have been taking only the parts with high energy gains such as the heads. Smaller-sized rodents (*Gerbillus* sp. average body weight 21 g) occurred at 10.35% in the diet and contributed only 3.19% in biomass, however, all occurred as single individuals in the pellets with one or two individuals of the larger species. Similar to previous findings (Amr *et al*., 1997), broken skulls and jaw remains in the pellets suggest that the owl may have torn its prey into small pieces or crushed them before consumption.

Previous studies from arid and semi-arid environments have shown that the diet of the Eagle Owl is dominated by mammalian prey items in terms of frequency and biomass, with rodents (*Jaculus jaculus*, *Meriones* sp. and *Gerbillus* sp.) making up the most of its intake (Bates and Harrison, 1989; Amr *et al*., 1997; Jennings, 2010). However, the present study did not record any insectivores (hedgehogs and shrews) in the diet. Studies from Eastern Saudi Arabia have recorded a diverse mammalian fauna (Bauer, 1988; Harrison and Bates, 1991). The fauna is associated with diverse habitat types from dry rocky areas with wadi systems, to open hammada habitat type with scarce vegetation cover and sand dune habitats. Feeding and prey selection within this heterogenous human-influenced area was likely influenced by the availability and abundance of prey species (Amr *et al*., 1997).

Our results suggest that Eagle Owl relies on mammalian prey with opportunistic feeding habits. While most higher-energy-yielding prey were nocturnal (*e.g. Jaculus jaculus* and *Meriones crassus*), smaller (*Gerbillus* sp.) and even large diurnal prey (*M. libycus* and *P. obesus*) were also hunted. Urban expansion in the area in the form of urban settlements, desert parks, farms and recreational sites may be shifting the Eagle Owl's diet into urban rodents (*Mus musculus* and *Rattus rattus*). Similar observations have been reported for an urban pair of Desert Eagle Owls from Hurghada on the Red Sea coast in Egypt where the diet consisted primarily of the Brown Rat *Rattus norvegicus* and the House Mouse *Mus musculus* (Moldován and Sándor, 2009) and Near Azraq Wetland Reserve where *Mus musculus* dominated the rodent remains (Amr *et al*., 1997; Shehab and Ciach, 2008). It is likely that regional biodiversity in these areas is declining as a result of infrastructure development such as road networks and human settlements (Amr *et al*., 2016). As one of the greatest threats to terrestrial biodiversity, understanding behavioral and ecological responses of organisms to land use changes due to anthropogenic practices is key for wildlife conservation (Didham *et al*., 2007). This knowledge is lacking in arid environments, which occupy approximately one third of the world's terrestrial area, yet, have been neglected in terms of ecological and conservation studies of land use and its influence on local wildlife (Durant *et al*., 2014). Analysis of owl pellets for prey remains provides a useful tool for gaining insight into the abundance and distribution of small vertebrates as they often contain a high overall richness and provide complementary information for small mammal inventories on a landscape scale (Torre *et al*., 2004; Heisler *et al*., 2016).

Statement of conflict of interest

Authors have declared no conflict of interest.

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