

NOTES ON THE PROVISIONING RATES OF BEE-EATERS (*MEROPS APIASTER*) IN NORTH-EAST HUNGARY

Michael Dyer – András Demeter

Abstract

Older and larger broods of European bee-eaters were fed more often than younger and smaller ones. Pairs of adults provisioned less frequently than a pair with a single helper. The increased feeding rate of the trio was thought to enhance brood growth and survival.

Introduction

The general lack of data on nestling feeding rates of European bee-eaters *Merops apiaster*, may in part be due to the inherent difficulties in determining the number of young in a nest. The only detailed information available for *M. apiaster* is that of *Swift* (1959) who reported that adults fed nestlings on average between 10 and 15 times per hour, but no account was taken of the potential effects of brood size and brood age on feeding rate. Further, food delivery rates could be influenced by the contributions of birds additional to the parents, known as "helpers". Helping-at-the-nest (co-operative breeding) has been previously documented for *M. apiaster* (*Cano*, 1960), and in several African bee-eaters, co-operative breeding is of regular occurrence (*Fry*, 1972). We report here the results of a short study of nestling feeding rates of *M. apiaster* conducted in Hungary during July 1977 which takes into consideration brood size, brood age and the number of provisioning adults.

Methods

The study was conducted along the River Szamos adjacent to the Hungary-USSR border. The Hungarian section of the Szamos flows through the easternmost part of the Great Hungarian Plain (Alföld). This is a biogeographically distinct part of the country, its vegetation unique in present-day Hungary. The forest associations are characteristic of the area: oak forest, oak-ash-elm gallery forest, and alder swamp forest. The succession of vegetation along the Szamos itself has been described by *Fintha* (1975).

Provisioning data were collected at eight nests; six in a colony (of 15 nests) located in an active sand-quarry at Fülöpösdaróc (47°57'N, 22°28'E), and two solitary nests near Olcsvaapáti (48°06'N, 22°21'E). Nestlings were counted in each nest, and their ages estimated by using the following criteria: eyes open or closed; development of pteryla; comparative size and mobility.

This technique of estimating age was based on experience in handling more than 300 nestlings of known age of three species, the Red-throated bee-eater *Merops bullocki*, the Carmine bee-eater *Merops nubicus* and the Little bee-eater *Merops pusillus*, during a study of bee-eater growth rates in Nigeria (Dyer, 1979).

Observations of provisioning began on 12 July and continued for eight consecutive days. The close proximity of some nests to others in the colony at Fülöpösdaróc allowed up to three nests to be watched simultaneously. Observation periods were one hour long, beginning on the hour, and generally, several hours of observation ran consecutively. Provisioning rates (visits per hour) were calculated from single, one-hour periods.

Results

Adults began feeding nestlings shortly before 600 hr and terminated between 1800 and 1830 hr. All nests except one were attended by a pair of adults. At nest 4 a third bird was observed feeding nestlings. Sometimes when all three birds approached the nest entrance in a group, the leading bird veered away at the last moment to allow both of the following birds to enter the nest before it. The third bee-eater perched on the cliff below the nest and waited until the other two had left before it fed the nestlings; we suspected it was the helper.

Brood size, estimated brood age, and provisioning rate are given in Tab. 3. The considerable range in estimated brood age reflects the characteristic asynchronous hatching of bee-eater broods.

Table 3.

3. táblázat

Brood size, brood age and provisioning rate for eight European Bee-eater nests in north-east Hungary

A fészekalj nagysága, a fészekalj életkora és az etetési gyakoriság nyolc gyurgyalag költőüregnél észak-kelet Magyarországon

Nest	No. young	Estimated age of brood (range in days)	Total hr Observation	No. visits	Provisioning rate
Költő-üreg	A fiatalok száma	A fészekalj becsült életkora (nap)	Megfigyelés összes ideje (óra)	Látogatások száma	Etetési gyakoriság
1	4	1-4	8.0	99	12.4
2	4	3-7	14.0	437	31.2
3	4	5-8	11.0	338	30.8
4	5	11-15	13.0	663	51.0
5	5	1-5	13.0	160	12.2
6	6	1-5	18.0	304	16.8
7	6	4-10	10.0	345	34.5
8	6	7-12	12.0	531	44.3

Discussion

The data in Table. 1 suggest two trends in provisioning rate. With increased brood size and age there was higher provisioning. At nests 1, 2 and 3 containing four young each, provisioning was lower than at nests 6, 7 and 8 with six young. Among broods of six, provisioning rates were lower at nest 6 with newly-hatched young than at nest 8 in which the youngest nestling was at least a week old. The higher provisioning at nests 6, 7 and 8 probably reflects the increased energy demands of larger broods. For another hole-nesting coraciiform, similar results have been found. In the Puerto Rican Tody *Todus mexicanus* feeding rates at nests containing young fifteen days old were five times higher than at nests with newlyhatched young (Kepler, 1977). In contrast however, Parry (1973) detected no difference in feeding rate with increasing age of nestling Kookaburras *Dacelo gigas*, but the size of food items delivered to nestlings increased as they grew older. Although we did not quantify bee-eater food sizes, we did notice that older broods tended to be fed with large insects such as *Bombus* (Apidae) and *Aeschna* spp. (Odonata).

At nest 4 with the helper, the provisioning rate was the highest recorded for any nest, regardless of brood size or age. The brood of five in this nest was only about four days older than the brood of six in nest 8, and the higher provisioning rate at the former may not have been entirely due to brood age, but also to the presence of the helper. The highest number of hourly visits at any of the seven nests attended by pairs was 84, but for nest 4, the highest was 143 – almost one extra visit per minute more. What effect the presence of the helper had on brood growth and survival can only be surmised.

Elsewhere, Dyer (op. cit.) has shown that Red-throated Bee-eater helpers, by increasing the provisioning rate at a given nest, improve overall brood growth rate and decrease the incidence of brood reduction (the selective starvation of younger brood members). It is suspected that European Bee-eater helpers have a similar effect on brood growth and survival.

Acknowledgements

We are most grateful to Mr. I. Fintha for directing us to the study area and to the Reverends L. Csák and J. Kónya for providing accomodation and for their invaluable help.

Author's Address:

Michael Dyer
Dep. of Zoology, University
of Aberdeen, Aberdeen AB 9
2TN, Scotland

András Demeter
Dep. of Zoology, Hungarian
Natural History Museum
Budapest, Baross u. 13.
H – 1088

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Adatok a gyurgyalag (*Merops apiaster*) etetési üteméhez Északkelet-Magyarországon

Michael Dyer – Demeter András

A gyurgyalagok gyakrabban etetnek idősebb és nagyobb számú fészekaljakat, mint fiatalabb és kevesebb számú fiókat. Párokban levő felnőtt madarak lassúbb ütemben etettek, mint az egyetlen megfigyelt pár, amelyet egy harmadik egyed is kisegített. A trió megnövekedett etetési üteme feltehetően elősegíti a fészekalj növekedését és túlélését.