

## POSSIBLE FIRST RECORD OF MULTIPLE BROODING OF THE EAGLE OWL *BUBO BUBO*

### POSIBLE PRIMERA OBSERVACIÓN DE CRIANZA MÚLTIPLE EN EL BÚHO REAL *BUBO BUBO*

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The Eagle Owl *Bubo bubo* is a generalist predator that can kill a large variety of prey (Mikkola, 1983). However, in south-west Europe it preys heavily on rabbits *Oryctolagus cuniculus* and its trophic diversity is low (Donázar, 1989; Martínez & Calvo, 2001; Martínez & Zuberogoitia, 2001). Food availability affects the number of pairs that attempt to breed rather than clutch size (Donázar, 1990). Eagle Owls reach sexual maturity in their second or third calendar year and are considered as monogamous with a life-long pair bond (Mikkola, 1983; Cramp & Simmons, 1985). Second broods have not been reported, only replacement clutches if the first clutches fail early during incubation (Mikkola, 1983; Cramp & Simmons, 1985; Olsson, 1997).

Since 1989, we have monitored the Eagle Owl population of the provinces of Alicante and Murcia in south-eastern Spain. Climate varies from arid meso-mediterranean in the south to sub-humid Mediterranean in the north. Average temperature is 19°C and rainfall is about 400 mm. Relief is moderate, with elevations ranging from 0 to 646 m.a.s.l.

On 18 April 2000, we located a nest in a small cliff at the bank of a rambla located on a hunting estate where releases of rabbits to increase hunting stocks have yielded very high prey densities. Accordingly, Eagle Owl density was high (9 territories/100 km<sup>2</sup>). On that day the nest contained two owlets, the younger being 45 days old. A second visit on 29 April yielded

an empty nest, with no noticeable signs of predation. On the next visit, conducted at 10 July, we found two nestlings of about 30 days of age in the same nest. Assuming an incubation period of 33 days (Olsson, 1979; Mikkola, 1983), the estimated laying date for the first clutch was 29 January, and 8 May for the second clutch. The average laying date in our study population was 23 January (SD = 8.5,  $n = 49$  nests, 95% CI = 16 January-5 February).

Rearing second broods is unlikely for large birds of prey because they lay few eggs, have low feeding rates and nestlings have a slow growth (Klomp, 1970; Newton, 1979). All of this accounts for long, energetically demanding breeding seasons. Accordingly, the period between laying and independence of the young for the Eagle Owl spans over four months (Mikkola, 1983). Although their most frequent brood size is high as compared with other large birds of prey (Cramp & Simmons, 1985), Eagle Owls could still maintain low feeding rates by bringing prey of high energetic value to the nest, such as rabbits (see Donázar, 1989).

The hypothesis of the cost of reproduction suggests a trade-off between present and future reproductive success, because a large investment in the present breeding attempt may reduce future survival and/or reproductive output of the parents (Stearns, 1976). Accordingly, producing more than one clutch may be costly for the parents. Small and medium-sized owls produce second clutches only when food avail-

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lability is high (Mikkola, 1983; Korpimäki, 1988a; Marti, 1994; Taylor, 1994; Martínez & López, 1999; Zuberogiotia, 2000). The fact that no second broods have been reported for the Eagle Owl in spite of extensive research (see Olsson, 1997) could indicate that laying more than one clutch might entail substantial costs to the parents. However, since several studies have failed to support the cost of reproduction hypothesis (Alertsam & Högstedt, 1984; Korpimäki, 1988a; Martínez & López, 1999), it cannot be ruled out that the multiple brood reported here was a second clutch laid by the same pair.

The food limitation hypothesis states that laying begins as soon as the female accumulates sufficient nutrients to form eggs, and predicts that provision of extra food to breeding females should advance laying date and increase clutch size (Perrins, 1970; Newton & Marquis, 1981; Dijkstra *et al.*, 1982; Korpimäki, 1989; Taylor, 1994). For the Eagle Owl, however, food supply seems to affect primarily the number of pairs breeding each year rather than clutch size (Donázar, 1990). Food availability was high in our study area, and the first clutch was laid about 6 days after the mean laying date of the population. Thus, we may rule out the effect of early laying as a factor promoting rearing a second brood, contrary to the prediction of the food limitation hypothesis (see Martínez & López, 1999). Nevertheless, high densities of preys could have favoured that Owls kept on breeding as it occurs with other species (Martínez & López, 1999; Zuberogiotia, 2000).

There are two alternative explanations to a double brood by the same pair of the observation reported here. First, it could be suggested that the double brood was the result of a polygynous mating. A recent telemetry study by Dalberck *et al.* (1998) suggested that polygamy might be part of the normal mating system of the Eagle Owl. Polygyny occurs in other owls as a response to good food supply (Korpimäki, 1988b; Marti, 1992; Martínez & López, 1999). It can be simultaneous (i.e. the male has two females nesting at the same time) or successive (the nesting attempts occur one after the other), and the  $\beta$  nest can occur in the  $\alpha$  territory (Von Haartman, 1969; Korpimäki, 1988b; Marti, 1992). Secondly, it is possible that the female died later in the first brood and that other female occupied the territory. This

is possible in high-density conditions such as ours. In this way, the second female, which should have belonged to the floater population, could have started breeding as soon as it obtained the adequate resources, a good territory and a territorial male. Since the owls were not tagged it is not possible to decide which of these explanations would apply to our case. However, this note enables further advance in the knowledge of the breeding behaviour of Eagle Owl.

RESUMEN.—*En este estudio se aportan datos sobre la posible realización de una segunda puesta por parte del Búho Real (Bubo bubo) en una población bajo estudio en las provincias de Alicante y Murcia. Las visitas a un nido de esta especie nos mostraron que dos puestas fueron realizadas en el mismo lugar en un amplio intervalo de tiempo. Podría tratarse de una segunda puesta de la misma pareja o una puesta de dos hembras diferentes en el mismo nido. No es posible distinguir entre estas dos alternativas, pues los adultos no estaban marcados.*

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#### BIBLIOGRAPHY

- ALESTARM, T. & HÖGSTEDT, G. 1984. How important is clutch size dependent adult mortality? *Oikos*, 43: 253-254.
- CRAMP, S. & SIMMONS, K. (Eds.). 1985. *The Birds of the Western Palearctic. Vol. II*. Oxford University Press. Oxford.
- DALBECK, L., BERGERHAUSEN, W. & KRISHNER, O. 1998. Telemetriestudie sur Orts- und Partnertreue beim Uhu *Bubo bubo*. *Vogelwelt*, 119: 337-344.
- DONÁZAR, J. A. 1989. Variaciones en la alimentación entre pollos y adultos reproductores en el Búho Real (*Bubo bubo*). *Ardeola*, 35: 278-284.
- DONÁZAR, J. A. 1990. Geographic variation in clutch and brood size of the Eagle Owl *Bubo bubo* in the Western Palearctic. *Journal für Ornithology*, 131: 439-443.
- DIJKSTRA, C., VUURSTEEN, L., DAAN, S. & MASMAN, D. 1982. Clutch size and laying date in the Kestrel *Falcon tinnunculus*: effect of supplementary food. *Ibis*, 124: 210-213.
- KORPIMÄKI, E. 1988a. Costs of reproduction and success of manipulated broods under varying food conditions in Tengmalm's owl. *Journal of Animal Ecology*, 57: 1027-1039.

- KORPIMÄKI, E. 1988b. Factors promoting polygyby in European birds of prey —an hypothesis. *Oecologia*, 77: 278-285.
- KORPIMÄKI, E. 1989. Breeding performance of Tengmalm's owl: effects of supplementary feeding in a peak vole year. *Ibis*, 131: 51-56.
- KLOMP, H. 1970. The determination of clutch-size in birds: a review. *Ardea*, 58: 1-123.
- MARTI, C. D. 1992. Same-nest polygyny in the Barn Owl. *Condor*, 94: 261-263.
- MARTI, C. D. 1994. Barn Owl reproduction: patterns and variation near the limit of the species distribution. *Condor*, 96: 468-484.
- MARTÍNEZ, J. A. & LÓPEZ, G. 1999. Breeding ecology of the Barn Owl (*Tyto alba*) in Valencia (SE of Spain). *Journal für Ornithologie*, 140: 93-99.
- MARTÍNEZ, J. A. & ZUBEROGOITIA, I. 2001. The response of the Eagle Owl (*Bubo bubo*) to an outbreak of the rabbit haemorrhagic disease. *Journal für Ornithologie*, 142: 204-211.
- MARTÍNEZ, J. E. & CALVO, J. F. 2001. Diet and breeding success of the Eagle Owl in southwestern Spain: effect of rabbit haemorrhagic disease. *Journal of Raptor Research*, 35: 259-262.
- MIKKOLA, H. 1983. *Owls of Europe*. Poyser. Carlton, London.
- NEWTON, I. 1979. *Population Ecology of Raptors*. Poyser. Carlton, London.
- NEWTON, I. & MARQUIS, M. 1981. Effect of additional food on laying dates and clutch sizes of sparrowhawks. *Ornis Scandinavica*, 12: 224-229.
- OLSSON, V. 1979. Studies on a population of Eagle Owls. *Viltrevy*, 11: 1-99.
- OLSSON, V. 1997. Breeding success, dispersal, and long-term changes in a population of Eagle Owl *Bubo bubo* in southeastern Sweden 1952-1996. *Ornis Svecica*, 7: 49-60.
- PERRINS, C. M. 1970. The timing of bird's breeding season. *Ibis*, 112: 242-255.
- STEARNS, S. C. 1976. Life history tactics, a review of the ideas. *Quarterly Review of Biology*, 51: 3-47.
- TAYLOR, I. 1994. *Barn Owls. Predator-prey relationships and conservation*. Cambridge University Press. Cambridge.
- VON HAARTMAN, L. 1969. Nest-site evolution of polygamy in European passerine birds. *Ornis Fennica*, 46: 1-12.
- ZUBEROGOITIA, I. 2000. La influencia de los factores meteorológicos sobre el éxito reproductor de la Lechuza Común (*Tyto alba*). *Ardeola*, 47: 49-56.

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