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USE OF ALTERNATIVE NESTS FOR CLUTCH REPLACEMENT IN THE EGYPTIAN VULTURE *NEOPHRON PERCNOPTERUS*

USO DE NIDOS ALTERNATIVOS PARA PUESTAS DE REEMPLAZAMIENTO EN EL ALIMOCHE COMÚN *NEOPHRON PERCNOPTERUS*

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Many single-brooded bird species may raise young from replacement clutches after failing in an initial attempt. The rate of clutch replacement among raptors varies depending on their size, latitude and food abundance. In temperate regions it seems to be usual in small accipitrids and falcons and less frequent in larger species because of food and time constraints (Newton, 1979). In large, long-lived species with protracted breeding periods such as vultures, the cost of relaying after breeding failure and the cost of rearing young from a replacement clutch may not be compensated by the benefits in terms of production and survival prospects of young (Lindén & Møller, 1989; Martínez *et al*., 1998). However, although replacement clutches have been occasionally recorded in most vulture species (Mundy *et al*., 1992), almost nothing is known about its frequency, timing and success, except for the Griffon Vulture *Gyps fulvus* (Martínez *et al*., 1998). Here we present data on clutch replacements by Egyptian Vultures *Neophron percnopterus* in Spain, that suggest a potential value for maintaining several nests in the territory. According to Mundy *et al*. (1992), confirmed renesting has been cited only once for Egyptian Vultures in Morocco but no details were offered (Brosset, 1961). Therefore, the clutch replacemet attempts described here provided the first documented data for this species.

Observations took place in the gorges of the Riaza River (41º 31'N, 3º 36'W), north of Segovia Province, central Spain. The area includes a complex of cliffs and canyons described elsewhere (Martínez & Cobo, 1993; Martínez *et al*., 1997), where 13-19 pairs of Egyptian Vulture breed each year, constituting one of the largest breeding aggregations ever reported for this species in Europe (Donázar, 1993; Fernández, 1994).

The first replacement clutch was recorded in mid-April 1985 when we found an Egyptian Vulture nest preyed upon by a Stone Marten *Martes foina*, as determined by the marks found on the eggs. Afterwards, a replacement clutch of three eggs was discovered and observed by telescope on May 18 in another nest located 40 m away in the same cliff, most likely attended by the same pair. Subsequent monitoring proved that no young fledged from this nest. In 1985 there were 10 Egyptian Vulture pairs in the area (Fernández, 1994) but only one pair in the cliff mentioned above and their adjacent surroundings. Egyptian Vultures maintain territories and usually build several nests each breeding season (Donázar, 1993; Fernández, 1994). Although minimum distances of about 50-200 m between occupied nests belonging to different pairs have been reported (Donázar, 1993; Fernández, 1994), the average distance between nearest neighbour pairs in areas of high breeding density in Spain is much greater (Perea *et al*., 1990; Donázar, 1993). In the study area, nests of neighbour pairs were generally more than 400 m apart (Fernández, 1994; pers. obs.) with mean densities of about one pair per 1200 m of linear cliffs (Fernández, 1994; pers. obs.). In the study area, the hatching period takes place in the second half of May (Fernández, 1994), when the renesting pair was incubating the replacement clutch, which, given the period presumably devoted to arrange the second nest, the time between ini-

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tial failure and relaying, and the period of laying a clutch of three eggs with an interval of 3-8 days between eggs (Mendelssohn & Leshem, 1983), suggest an early initial laying date, probably at the end of April or early May.

The second replacement clutch was recorded in 1995. Until early May, a pair of Egyptian Vultures was observed incubating at the nest. Then the pair lost its clutch for unknown causes and another clutch was laid between the second half of May and early June at another nest located 40 m away in the same cliff. One young fledged from this nest in mid-September. The proximity between both nests, the late laying dates of the second attempt (Fernández, 1994), and the time sequence and synchronisation between failing in the first nest and laying in the second one suggest a clutch replacement attempt by the same pair. Furthermore, only one pair was observed in the territory throughout the breeding season during daily observations on this cliff.

In spite of the variable breeding success documented for Egyptian Vultures in the study area (40.0-84.6%; Fernández, 1994), only the two clutch replacements reported here have been recorded during monitoring of more than 150 breeding attempts from 1985 to 1995 (Fernández, 1994 and unpubl. data). However, it is likely that the monitoring effort was insufficient to detect every new breeding attempt after breeding failure, given the short time between failure and relaying in the only case that we were able to estimate it. Nevertheless, the frequency of clutch replacements after initial failure in Egyptian Vultures must be low as in other vulture species (Mundy, 1982; Hiraldo 1983; Martínez *et al*., 1998; Margalida *et al.,* 2001; Margalida & Bertran 2002), according to their large size and long breeding period (Elosegi, 1989; Donázar & Ceballos, 1989). It is surprising that one of the replacement clutches was composed of three eggs, which is an exceptional size even for the earliest clutches (Elosegi, 1989).

The observations reported concern Egyptian Vultures that used an alternative nest to relay after breeding failure at the original nest-site, as reported in other large raptors that usually maintain several nests in the territory (Cabeza & de la Cruz, 2001). Therefore, holding several nests in the territory may facilitate a fast clutch replacement, at least when breeding failure is caused by predation. Several cases of predation on eggs and nestlings by Stone Martens, Eagle Owls *Bubo bubo* and Ravens *Corvus corax* recorded in the study area (Fernández 1994), together with observations in other regions (Donázar & Ceballos, 1988; Tella & Mañosa, 1993; Stoyanova & Stefanov, 1993), suggest that nest predation may be an important cause of breeding failure in the Egyptian Vulture. Our observations confirm that renesting in the Egyptian Vulture can be successful even under conditions of high population density. An early initial laying date seems essential for a replacement clutch to be laid, and may increase the probability of fledging success and survival prospects of fledglings (Martínez *et al.,* 1998). In fact, in bird species with long breeding periods, the late fledging dates of young raised from replacement clutches may negatively affect their survival, as occurs for late initial attempts (Harris *et al*., 1994; Brouwer *et al*., 1995). This is especially important for Egyptian Vultures because of their migratory status in the Iberian Peninsula (Donázar, 1993). The only young raised from a replacement clutch fledged when the bulk of the population inhabiting the gorges of the Riaza river had left the area (Fernández, 1994).

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