

Triple brooding by the blackcap

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The blackcap *Sylvia atricapilla* is typically single-brooding species that frequently re-nests in C and N Europe. Previously, only six cases of double-brooding but none of triple-brooding have been reported from observation of individually marked birds. I recorded triple-brooding in one blackcap female, whose breeding could be followed over three years owing to easily recognizable aberrant (unpigmented) eggs. The first two of three nesting attempts in one year were successful but the third nest was depredated in late incubation. The female returned and bred successfully the next year. The low frequency of multi-brooding in this species results more likely from time (frequent re-nesting because of heavy nest predation) than from physiological constraints.

Key words: *Sylvia atricapilla*, re-nesting, egg colour.

Introduction

It has been recognized that traditional nest success (percentage of successful nests) or nesting productivity (number of fledglings per nesting attempt) are inadequate measures of seasonal fecundity (number of young raised per female per year) (e.g. THOMPSON et al., 2001). However, the critical missing parameter (number of nesting attempts per season per female) is difficult to obtain under field conditions because it requires individually marked birds and complete nest searching.

The blackcap *Sylvia atricapilla* (L., 1758) is one of the most abundant bird species in C Europe and is a dominant open-nesting passerine in many woodland habitats (HAGEMEIJER & BLAIR, 1997). Stable or increasing populations (HAGEMEIJER & BLAIR, 1997) despite a generally low nest success (25-day Mayfield estimate: 27%, $n = 2,421$ nests; K. Weidinger, unpubl. data) imply frequent re-nesting (BAIRLEIN, 1982; GNIELKA, 1987; SCHAEFER, 2002). On the other hand, recent reviews of blackcap biology (BERTHOLD et al., 1990;

GLUTZ VON BLOTZHEIM & BAUER, 1991) suggest that true double-brooding is uncommon, except possibly on Atlantic islands (BERTHOLD et al., 1990) and in the Mediterranean area (MASSA, 1997; CAFFI, 2000). Specifically, the review by GLUTZ VON BLOTZHEIM & BAUER (1991) enumerates only six proven cases of double-brooding and questioned reports of possible triple-brooding. Nevertheless, aviary studies showed that blackcap is physiologically capable of laying and successfully incubating up to seven clutches per breeding season (BERTHOLD & QUERNER, 1978). Here I report on casual observation of triple-brooding in one blackcap female, whose breeding history could be followed over three breeding seasons.

Material and methods

This work has been performed within a long-term study of breeding biology of open nesting passerines (WEIDINGER, 2001, 2002; where details of the field methods are given). The observation took place in a 4.3 ha woodlot (of which 3.3 ha were under observation) near the village of Trusnov in E Bohemia, Czech

Table 1. Breeding history of one blackcap female over three consecutive years.

Year	1998		1999			2000
	1	2	1	2	3	1
Recorded nesting attempt						
Nest-bearing substrate	<i>C. betulus</i> <i>Rubus</i> sp.	<i>S. nigra</i>	<i>P. spinosa</i> <i>U. dioica</i>	<i>S. nigra</i>	<i>P. spinosa</i> <i>U. dioica</i>	<i>P. spinosa</i> Grass
Height above ground (m)	0.29	0.78	0.42	1.05	0.55	0.5
Distance from woodlot edge (m)	9	0	1	0	0	0
Between-nest distance (m)		38	280	31	112	153
Laying date	< 23 May	28 May	1 May	28 May	6 July	16 May
Hatching date	–	–	16 May	12 June	–	31 May
Fledging date	–	–	24–27 May	23–26 June	–	9–12 June
Fledging-laying interval (days)			1–4	10–13		
Eggs laid	> 2	4	5	4	3	5
Nestlings hatched	0	0	4	3	0	5
Nestlings fledged	0	0	4	3	0	5

Republic (16° 03' E, 50° 00' N, 260 m a.s.l.), in 1998–2000. The habitat consists of managed deciduous forest (*Quercus petraea*, *Carpinus betulus*, *Prunus spinosa*, *Sambucus nigra*, *Padus avium*) surrounded by arable land. The total number of nests found in the woodlot over the three years was 9, 12 and 7; the number of breeding pairs was estimated as 6–7, 7–8 and 5–6. The blackcap breeding density thus ranged between 1.5–2.4 pairs ha⁻¹ over three years.

Birds were not banded, but nests of one female could be identified owing to unpigmented (whitish-transparent) eggshells. Simultaneous occurrence of this rare deviation in more than one individual is highly improbable. Unpigmented eggs in this species have not been reported in the literature, and no such cases were found among about 2600 blackcap nests observed during the laying or incubation stage in the surrounding area of about 100 km², since 1988 (WEIDINGER 2001 and unpubl. data). The data summarized in Table 1 represent minimum estimates of individual breeding effort, because the female's breeding history before and after the three-year observation period was unknown, and nest searching during the observation period was far from complete. Nevertheless, some inferences are possible.

Results and discussion

The blackcap female bred in the same habitat patch in at least three consecutive years, each year occupying a different side of the woodlot (rectangle c 350 × 125 m), but avoiding its interior. The inter-nest distance was larger between years than within years and selection of nest substrates was not consistent (Tab. 1). Over three years the female initiated at least six nesting attempts and laid at least 23 eggs, of which 12 nestlings hatched and survived in the nest until the age of poten-

tial fledging (8 days). All parameters (laying date, clutch size, egg size) fall within the range of known local variation (WEIDINGER, 2001 and unpubl. data). Three of the six nests were lost through egg predation.

Of particular interest are three nesting attempts from 1999, of which the first two were successful. The third nest thus represents, to my knowledge, the first documented case of "true" triple brooding (not replacement nesting) in a free-living blackcap. Spatial aggregation of consecutive nestings is sometimes interpreted as repeated nesting of the same female (e.g. MASSA, 1997). In the present case, however, the third nest in 1999 was placed 112 m from the second nest of the same female, but only 1.2 m from a nest of another female, from which nestlings had fledged 30–34 days ago. This observation shows that under high breeding density the spatially clustered nests may not be safely assigned to the same female without additional cues. The period from laying of the first egg in the first nest to the failure of the third nest lasted 82–85 days (Fig. 1). Clutch size declined, while the fledging to laying interval increased over the three nesting attempts, suggesting some cost of reproduction to the female. Despite of this extra breeding effort the female returned the next year and successfully raised a complete brood of five (the modal clutch size) nestlings.

This observation does not rule out the previous conclusions about the blackcap as a generally single-brooded species. However, from this observation I speculate that the low frequency of multi-brooding in this species results more likely from time than from physiological constraints. Because of heavy nest predation, most pairs need several

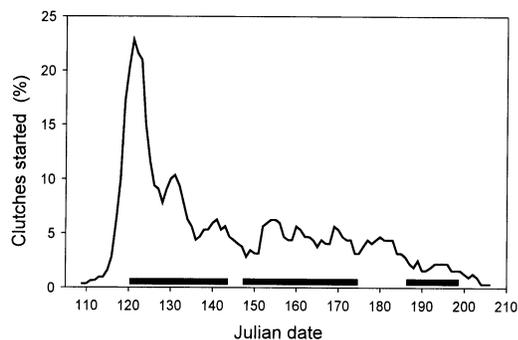


Fig. 1. Seasonal distribution of laying dates in blackcaps from the study area in 1999 (line; $n = 320$ nests) and timing of three nesting attempts of one blackcap female (horizontal bars). The distribution is shown as five-day running histogram; the five possible histograms were overlaid, the percentage of nests for each class being plotted against the mid-day of overlapping intervals.

nesting attempts to successfully raise one brood, which may left them little time to initiate multiple brood attempts.

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