

## Barn owl *Tyto alba*: brood desertion or female fitness strategy?

### Summary

In good vole years some female barn owls desert their first brood to make a new brood attempt with a new partner. This desertion is interpreted as a special fitness strategy. The succession of decisions of the female are described in detail.

### Introduction

Barn owls often make second broods when prey is abundant (SCHNEIDER & SCHNEIDER 1928, SCHÖNFELD ET AL. 1977, MULLER 1991). Many of these couples do not wait until fledging of the young of their first brood but begin earlier with the production of the new clutch: the two broods overlap (SCHUBERT 1959, AMES 1967). Obviously this strategy leads to more offspring in a shorter time and it may prevent an eventual prey shortage later in the year.

### The phenomenon

As already described by ALTMÜLLER (1976), in good years • barn owls occasionally desert their half-grown brood to begin a new brood with a second • . The first • then alone rears the first brood. ROULIN (2002) found that 18 of 42 second broods were of this kind. He additionally found one case in which the • was the deserting bird. EPPLE (1994) named this strategy "serial biandry", GLUTZ VON BLOTZHEIM & BAUER (1994) called it "successive biandry". KNIPRATH et al. (2003), describing 20 more cases, refuse both terms as the • at no time is involved in two broods simultaneously. Following MILNE & MILNE (1978), GOULD & GOULD (1989) and BAEYENS (1981), all dealing with not related animal species, we prefer to call it (inner-seasonal) successive monogamy. In the barn owl a second brood of that kind could be called a "divorce second brood".

To understand the phenomenon the circumstances leading to a divorce second brood and the role of the birds will be described. First, a female owl intending to desert her first brood should be sure to find a new mate. Non-breeding birds, called brood reserve, are postulated (SCHÖNFELD et al. 1977). Certainly owls dye all over the year thus leaving widows and also widowers. There could also exist a male surplus in all ore in some years. Data are not available. Only ROULIN (pers. comm.) sexed a greater number of young barn owls and did not find a sex ratio different from 1:1.

Nevertheless there exist indications that the sex ratio in adult barn owls in some years may be male biased. In 1998 in the study area of the second author in an early control of the nesting boxes all roosting barn owls were controlled. Besides many of the pairs later breeding in these boxes, 16 not married • were caught. Seven of these males later belonged to divorce second broods. They all occupied the boxes of their future broods. There was not a single unmarried female. None of the males of the divorce second broods had a first brood that year. Accordingly ROULIN (2002) mentions: "In most cases, the new mate of the deserting females had not been

previously captured in the study area, and hence had probably not previously bred that season."

As it is generally the female deserting the first brood (we tend to interpret the above mentioned case of a deserting male (ROULIN 2002) as bigyny) she has to decide. When and how can pass this decision? Certainly desertion without endangering the young is not possible as long as the youngest pullus cannot maintain body temperature. Homoeostasis is reached at an age of about 20 days (DURANT 2002). Furthermore it is necessary that the young are able to swallow the undivided prey as the male is not capable to feed them with parcels. This ability too is reached at about 20 days.

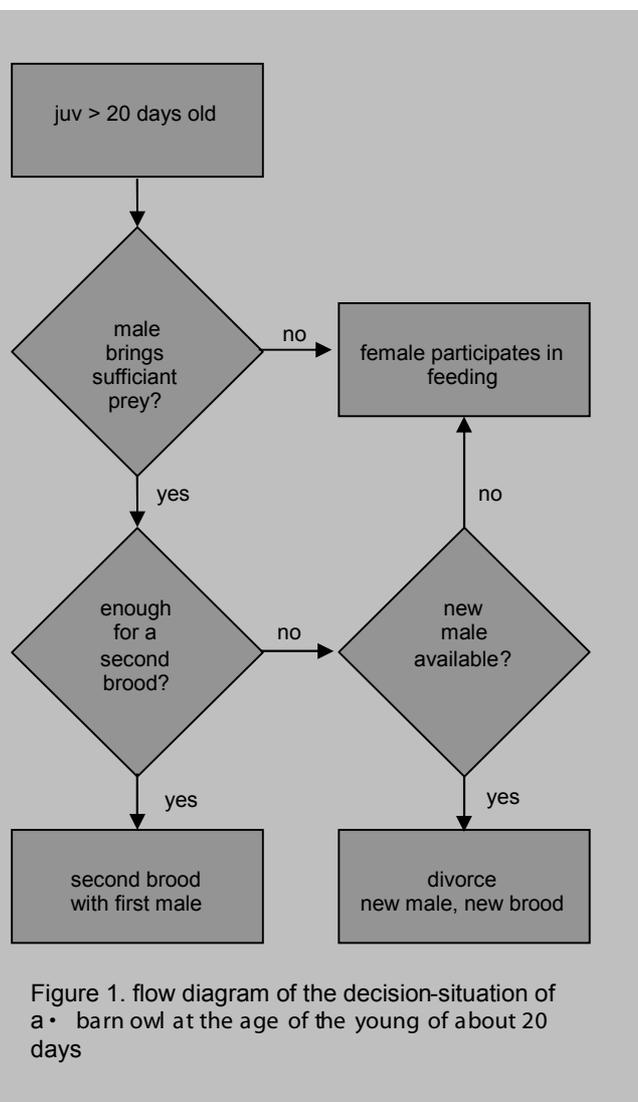


Figure 1. flow diagram of the decision-situation of a • barn owl at the age of the young of about 20 days

At that age of the young the female for the first time may leave here brood for more than 24 h. She may begin to participate in hunting for prey. This participation is not necessary if the male hitherto had delivered such a quantity of prey that neither the • nor the young except in a night of intense rain ever had been really hungry. She

can without further control of the real prey situation in the vicinity decide to begin a second brood. Normally this means a brood together with her mate of the first brood. The higher the prey abundance and / or the hunting quality of her mate is, the more the two broods can overlap. That means for the female, that she has to nourish the young of the first brood and simultaneously his egg-laying mate.

Even if this threshold is not reached, the female has an option for a second brood. At her flights to the hunting grounds she might realise, that prey is abundant, and that her mate could raise the young alone. She then looks for an unmarried male to start a new brood. After finding one, she leaves her first brood and her first mate.

If prey is not too abundant or if she doesn't find a new mate, she participates in hunting for her first brood. Fig. 1 demonstrates these decisions of the female.

This sequence of decisions illustrates, that not all decisions of the female are decisions for a better mate. The decision for a second brood first doesn't mean more than that there is a sufficiently good partner. The decision for a second brood with the partner of the first brood may depend on two different judgments: there is no other prospective partner, or, if he exists, the first mate is not good enough to guarantee the success of the first brood. If the female deserts her first brood (and so the mate), she doesn't decide for the better mate anyway. Indeed, she is convinced, that her first mate alone is able to make the first brood successful. For the new mate she regards him as appropriate for a new attempt. Her first brood is successful anyway. So she can gain fitness by this new brood, even if the new mate is of lesser quality.

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