

A silent method to record nesting events in hole-breeding Owls.

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SUMMARY

Despite numerous reports on the breeding biology of Tawny Owls virtually nothing is known about breeding events and prey-provisioning (Cramp 1985). To investigate the nesting events an observation nestbox was designed, constructed and equipped for video-recording and automatic registration of nest visit activity. Whole nights could now be sampled by video-recording and the variable proportion of prey/contact visits (without prey) assessed. The automatic registration system recorded the date, time, duration and direction of nest visit activity and these data could be read directly. The event-recorder and the tunnel with two IR-sensors made it possible to distinguish between visits and incubation- or brooding breaks. The total number of nest visits and the temporal distribution of visit-activity could be accurately determined.

This silent video-recording and registration system has been applied to the Barn Owl, Little Owl and the Tawny Owl during one, two and nine successive breeding seasons respectively.

The system has proved to be a very reliable and useful method to study the species mentioned. It has several advantages over IR-photography as it is a silent method, which enables the researcher to record all the nesting events from occupation till fledging:

(1) synchronous observation by means of a video-monitor is feasible; (2) there is the possibility to choose for IR- or normal light conditions; (3) a maximum of ten hours can be recorded without interference by the researcher. The only disadvantage of the system in the field is the need for electric power (220V AC or 12V DC).

INTRODUCTION

There exist no studies about nesting behaviour and/or prey provisioning of wild owls covering the whole breeding period i.e. the (pre)oviposition, incubation and nestling periods (Cramp 1985). A few behavioural studies deal only with the nestling period with an emphasis on post brooding time (Stülcken 1961; Musarat 1980). Eppele (1979) and Bühler & Eppele (1980) studied the whole breeding process by means of IR-video-recording to investigate nesting behaviour and communication. Musarat (1980), however, habituated Barn Owls over a long period to light conditions and started visual observations. Later he documented his study with film and photography. There are few data on observed prey provisioning during incubation (Hirons 1980) and some concerning prey provisioning during post-brooding time exclusively (Juillard 1984; Baudvin & Dessolin 1987; De Boe 1991). For this reason we decided to investigate systematically the nesting behaviour and prey provisioning of Tawny Owls *Strix aluco* (1984-1992) and Little Owls *Athene noctua*

(1985-1987) in central Netherlands.

The purpose of this paper is to describe the functions of a specially designed nestbox, its equipment and reliability during a nine year study of nesting Tawny Owls.

RESULTS

In 1983 the basic design of a nestbox for direct observation and photography was made at the department of Animal Ecology (Z. Bruyn, technical assistant).

At first the nestboxes were placed at the gable end of haylofts in cowsheds in order to have a continuous backgroundnoise. During hatching the owls were habituated to light conditions. As soon as direct observation was possible we started to observe for three whole nights a week till the first nestling had fledged. During the first years we documented our observations with short video-recordings and several photographs. We used the Umatic videosystem which could not record longer than 30 min. without changing the cassette. This method was similar to that of Musarat (1980).

In 1987 the VHS-videosystem was introduced, enabling us to record nesting events for eight hours continuously. From this time on every year the owls were habituated to the light conditions at earlier stages of the incubation period. Ultimately it was possible (1990) to have the site lit when the owls reoccupied the nestbox without disturbing them.

During the past nine years the system was applied for two nestling periods to the Little Owl, for one to the Barn Owl and for nine years to the Tawny Owl (including three incubation periods). The behaviour of the adults and the behavioural development of the nestlings, including prey provisioning, were studied under naturally fluctuating food conditions. These observations will be published elsewhere, except for the study on nestling necrophagy presented during this conference.

The system now will be applied in the forest of Châtillon to compare the results of a small suburban-forest habitat with those of a mature beech/oak forest (Burgundy, France).

Observation nestbox

The nestbox was made of 3 cm thick softwood and consists of: (1) a tunnel with the two IR-sensors/reflectors connected with the event-recorder/printer (Fig. 1),

(2) the nest compartment (Fig. 1.) and neighbouring board (platform) for the male to transfer prey to the incubating/brooding female or for one of the parents to transfer prey to a nestling (Fig. 1.),

(3) a device (a wooden adaptor to connect the camera to the nestbox, Fig. 1) for the video-camera, which is connected to a video-recorder and a TV-monitor.

The dimensions of the nestbox are appr. 70x70 cm floor space and 65 cm height for the Tawny Owl and Barn Owl with a nest compartment itself of 30x30 cm. For a smaller owl, as for instance the Little Owl, a nest compartment itself of 23x23 cm is sufficient.

Videocamera-recording system

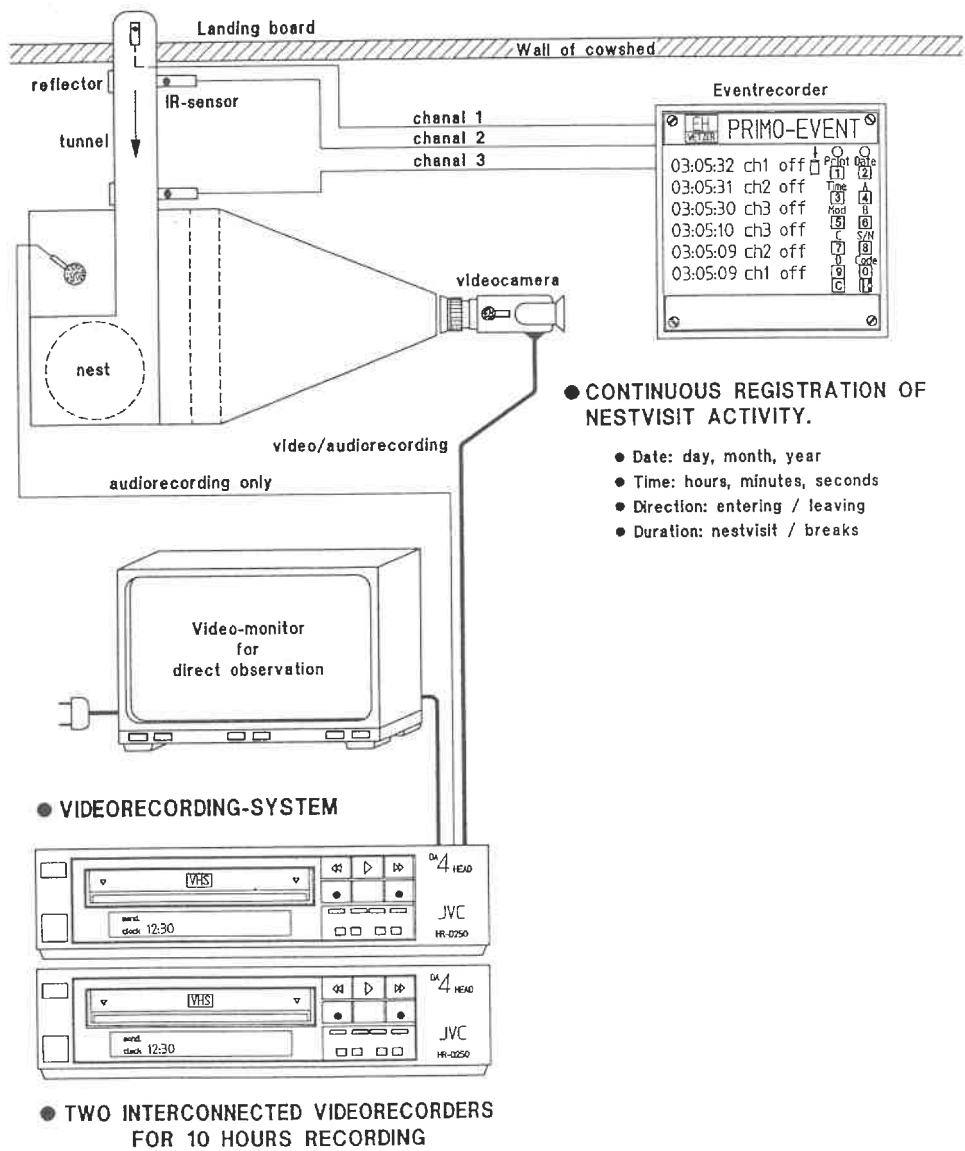
The nestbox has a wooden adaptor with a window for the video-or photo-camera. Through this opening the camera can monitor the nestcompartment as well as the platform where the prey is transferred. The lights necessary for video-monitoring are on the top of the nestbox; the intensity can be regulated with a dimmer (variable transformer).

In the beginning light was provided from inside the wooden camera-adaptor and from above through a small slit (10 cm wide). This soon appeared insufficient for both photography and video-recording. Illumination from above but oblique through a complete open top of the nestbox gave the best results.

For photography it appeared that in particular the eyes of the owls were distorted by frontal illumination. Two flashes that gave a diffuse illumination from above produced the most natural photographs.

We made the observations with a common VHS video-camera, JVC GX-N7E, and two interconnected VHS recorders, JVC HR-D250. This combination enabled us to record for eight

Figure. 1. The observation nestbox, video equipment and automatic registration system.



hours continuously (two times 4 hr video-cassette, JVC EHG-240).

From 1990 on we also used a Super VHS recorder, JVC HR-S5000E that can record for eight hours on long play mode with a common video-cassette of four hours. In 1991 the first 5 hr video-cassettes became available and ten hours continuous recording is now possible.

Nest visit registration system

At first the system was equipped with a single mechanical device triggering a pocket-calculator/printer (Casio CP-10) to register date and time of nest visit activity. This system was improved in the following years. Later a tunnel was constructed between the nestbox and the outside of about 60 cm in length. Two IR-slucies were built in the tunnel (each with an IR-sensor, Sunx beamsensor NX-22M and a reflector, Fig. 1) and connected with an event-recorder/printer. In the beginning we used a Meldedrukker (VP9250; a 7-channel recorder/printer)

and later an improved model Primo-Event (a 4 channel recorder/printer). Both instruments can be used with 220V/AC or 24V/DC power.

When an owl is visiting the nest, it passes the two IR-slucies when entering: sluice 1 is followed by sluice 2, and when leaving the slucies are passed in the reverse order. Date and time of the passages are printed. From these prints direction (entering, leaving), duration of passage and visit as well as date and time can be read directly.

DISCUSSION

Advantages video system.

There exist two types of photographic registration systems for prey provisioning. One type was applied for the first time by Southern (1971) but he did not publish any systematic study thereafter. Later Hirons (1980) applied the system to study the cause of incubation failures in Tawny Owls in the same area where Southern worked. It consists of a camera with a 400 mm telelens and a flash at a distance between 10 to 15m from the nestbox. The owls usually soon got habituated to the noise of the photographic registration system.

The other method was first applied by Juillard (1983) with the Little Owl and later by Baudvin and Dessolin (1987) and De Boe (1991) with Tawny Owls. It consists of a camera/flash system that is part of the nestbox with a wide-angle lens of usually 35 mm. This system is too noisy for adult owls and can only be applied exclusively during post-brooding time. This implies that this system cannot sample at random or at regular intervals during the whole nestling period. This is a disadvantage because during the nestling period food demand increases tremendously and often, if possible, the owls switch to larger prey.

The VHS-videosystem has several advantages over the photographic system:

- (1) It is an absolutely silent method (no noises of shutters, winders and flash).
- (2) Direct observation from a TV monitor in a nearby hide is feasible.
- (3) It provides more information than photographic registration. Responses to calls/noises and behaviour of other individuals can be directly recorded. Besides, periods of rest and activity can be rather accurately assessed.
- (4) A minimal level of light is needed for video-recording as compared to the sudden bright light of a flash.

Interesting behaviour can be analysed and kept on one videotape for comparison with similar behaviour in previous years or years to come. Cleaned videotapes can be re-used.

Usually for three whole nights a week the nesting events were video-recorded. Analysis of the video-recordings gives information about the diet, the size of the prey (juv., adult, heavy or light, decapitated or not, etc.), and the ratio of contact visits to visits with prey.

Nest visit registration system.

This automatic system can print out all nest visit activity from the first visit of the breeding season till the fledging of the last owlet. In feeding experiments adult owls even came back for laboratory mice after the fledging of their young.

In combination with whole nights, video-recording, a complete interpretation of nest visit activity can usually be given, even when both male and female visit the nestbox immediately after each other.

To quantify prey provisioning in order to assess the diet and rations of food during incubation and nestling periods separately, the total number of prey visits had to be known for any one period of time. It has appeared that Tawny Owls, like other birds, have two kinds of visits: with prey and contact visits without prey. In addition the female showed incubation and brooding breaks, which could easily be distinguished from nest visits with this method.

The duration of prey visits of the male was always shorter than his contact visits. The mean visit time of the male is shorter than that of the female. The incubation breaks last a long time at the beginning of incubation (some hours) with irregular intervals, but are scarce in the end of incubation and of a short duration (some minutes). During the nestling period brooding breaks gradually increase in duration.

With the available data printed out by the event-recorder one can easily show the temporal distribution of nest visits and breaks during incubation and nestling periods.

During the past nine years it was possible to describe the behaviour of the adults, the interactions of the adults with their offspring and the development of the nestlings under a variety of food conditions ranging from very poor years with brood reduction to peak years with maximum fledging weights. Two times the feeding of a dead nestling (nestling necrophagy) and once the handling of a dead hatchling were observed. These results were only possible thanks to this silent method.

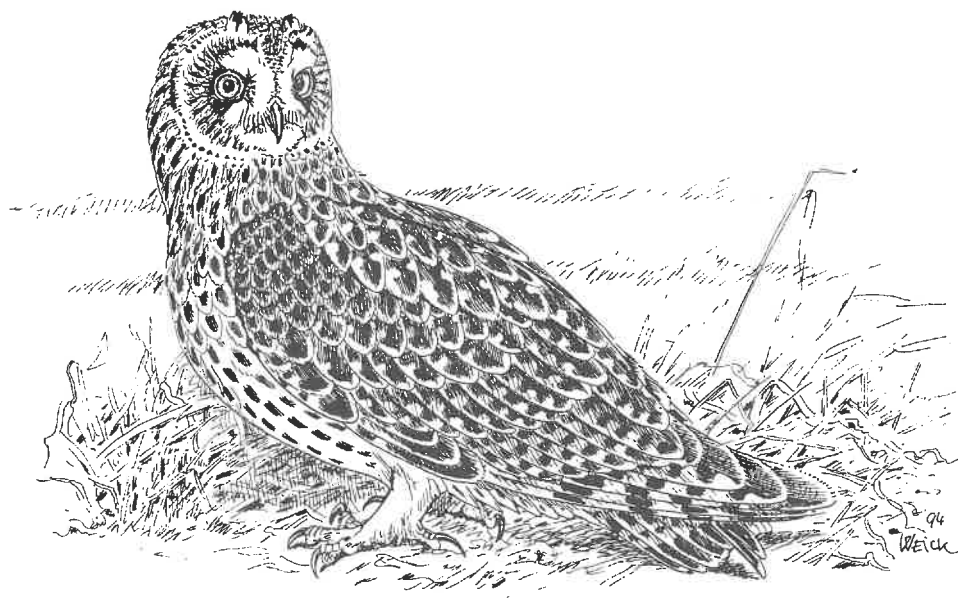
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Short-eared Owl *Asio flammeus*