

Male Little Owl (*Athene noctua*) attempting brood care after loss of nesting female

Mocho-galego (*Athene noctua*) macho tenta cuidar da ninhada após desaparecimento da fêmea

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ABSTRACT

In 2017 a Little Owl (*Athene noctua*) breeding pair was observed through webcams within the framework of Beleef de Lente by Birdlife International partner Vogelbescherming Nederland. The monitored nestbox is located in a 6 m high 100 year old pear tree in Winterswijk (The Netherlands). Within less than four days - from 22 May 03:08 until 26 May 1:34 - an attack by a Stone Marten (*Martes foina*) occurred, the female disappears, the male attempts brood care, the nestlings die and are removed from the nest box by the male and a new female arrives. This paper describes the remarkable behavior of the male attempting brood care. This behavior has never been documented before in Little Owls, nor in any other owl species. Our results confirm webcam observations and monitoring by citizen scientists as a new and promising research method revealing new insights into owl behavior.

Keywords: *Athene noctua*, citizen science, male brood care, nest box, webcam

RESUMO

Em 2017 um casal reprodutor de mocho-galego (*Athene noctua*) foi observado através de câmaras na rede de Beleef de Lente pelo parceiro da BirdLife International Vogelbescherming Nederland. A caixa-ninho monitorizada está localizada a uma altura de 6 m numa pereira com 100 anos em Winterswijk (Holanda). Em menos de quatro dias – entre as 03h08 do dia 22 de maio e a 1h34 do dia 26 de maio – ocorreu um ataque de fuinha (*Martes foina*), a fêmea desapareceu, o macho tentou cuidar da ninhada, os juvenis morreram e foram removidos da caixa-ninho pelo macho, e chegou uma nova fêmea. Este artigo descreve o comportamento do macho na tentativa de criar a ninhada sozinho. Este comportamento nunca foi descrito antes em mocho-galego, nem em nenhuma outra espécie de rapina noturna. Os nossos resultados confirmam a observação através de câmaras e a monitorização por cientistas cidadãos como um novo e promissor método de investigação, proporcionando uma nova perceção do comportamento das rapinas noturnas.

Palavras-chave: *Athene noctua*, câmara web, caixa-ninho, ciência cidadã, cuidado da ninhada pelo macho

Introduction

Just like the other European owls (Mikola 1983, Mebs & Scherzinger 2007) and other owls with known brood care (König & Weick 2008, Del Hoyo 2015), Little Owls (*Athene noctua*) have a strict allocation of tasks during the breeding period (Schönn et al. 1991, Van Nieuwenhuysse et al. 2008). Only the female incubates and during the first part of the nestling period she stays most of the time in the nest to provide the chicks with her body warmth and food. Her contribution to the prey supply is rather limited in this period (Van Harxen & Stroeken 2011). Males are responsible for prey supply, both in the incubation and nestlings period (Schönn et al. 1986, Van Nieuwenhuysse et al. 2007). When the male enters the nest box he hands over the prey to the female. She feeds the nestlings. If the male gets lost in the first half of the nestling period, in most cases the brood will fail, because the female has to spend most of her time keeping the nestlings warm and feeding them. She cannot spend

much time hunting at the same time. However, also the disappearance of the female in this period means that the nest is doomed to fail. Although the male keeps delivering prey items to the nest, he is not capable of fragmenting the prey (Schönn et al. 1991). In most cases the outside temperature is too low to keep the body temperature of the chicks high enough without the continuous body warmth of an adult (thermal dependence). As a consequence of the loss of the female, the nestlings will have to put much effort in maintaining their body warmth by themselves. Therefore their need for food will increase. This vicious circle will ultimately be broken by the death of the chicks. Several authors have found dead nestlings among a pile of prey in several birds of prey and owls (Schmutz et al. 2014). In Little Owl we observed this several times (Picture 1).

Even in the case of sequential polyandry, which occasionally happens in Boreal Owls (*Aegolius funereus*) (Korpimäki & Hakkara-

Picture 1 - Dead nestlings amongst a pile of mice and voles.

Imagem 1 - Juvenis mortos sobre uma pilha de micromamíferos.



inen 2012), the female does not desert the nest until the nestlings are 3 to 4 weeks old (Eldegard & Sonerud 2009), until they are thermally independent. Also in polyandrous Common Barn-owls (*Tyto alba*) the female deserts her first brood no sooner than that the male is capable of raising the nestlings by himself (Béziers & Roulin 2015).

It was therefore surprising that a male Little Owl attempted autonomous brood care in a nest box observed by three webcams. This paper describes the behavior of a male Little Owl attempting brood care after the female disappeared after a Stone Marten (*Martes foina*) attack.

Methods

Since the start in 2007 the Little Owl is one of the monitored species in Beleaf de Lente, the webcam project of Vogelbescherming Nederland. In this project several birds are observed every year by three webcams accessible for the general public on the internet. The nest box for the Little Owl is located in a 6 m high and more than 100 years old pear tree in the countryside of Winterswijk, a small town in the eastern part of the Netherlands (Fig. 1).

The nest box is equipped with 3 cameras, 1

Figure 1 - Winterswijk, in the eastern part of the Netherlands.

Figura 1 - Winterswijk, na zona este da Holanda.



on the outside and 2 on the inside and so it is possible to see the direct surroundings of the nest and also observe breeding and prey supply. The cameras are online from the beginning of March until the beginning of July, 24 hours per day, 7 days per week. They register the complete breeding season, from courtship and egg laying till hatching and fledging. The footage is not only being watched by tens of thousands enthusiastic spectators, but is also digitally stored and available to download as MP4 for the staff and a selected group of volunteers. They can watch the footage as many times as they like. Prey supply is meticulously registered by a group of experienced volun-

teers. Partly by observing live, and partly by downloading the data (especially the night scenes) afterwards (Van Harxen & Stroeken 2010). The female was unmarked and the male was banded which made distinction easy.

Results

In 2017 the first of the 4 eggs is laid on 14 April and on 16 May, at 18:26 the first young hatches. The other 3 follow within 14 hours. On 22 May at 3:08, the nestlings are

5 days old and still in their downy plumage, the female leaves the nest box quickly when hearing a sound outside, probably the climbing noise made by a Stone marten. The Stone marten makes fierce attempts to enter the nest box. Meanwhile he is attacked several times probably by both the female and the male. The female probably gets fatally injured just outside the vision of the outside camera. It is certain that she did not return to the nest box after the Stone marten retreated unsuccessfully. The male appears a little over half an hour after the Stone marten left for the first time on the branch the nest box is put on. Clearly he is hesitating to enter the nest box. A few seconds later he disappears out of sight of the camera. This recurs several times, despite the peeping of the nestlings that can clearly be heard. When he finally enters the nest box with a caterpillar in his beak he finds 3 nestlings, loudly begging for food, who nonetheless do not accept the caterpillar. With the prey still in his beak he goes outside. Shortly afterwards he comes in for the second time, this time without prey, and sits down on the nestlings obviously attempting to keep them warm. At 21:05 he gazes upon a vole (*Myodes glareolus/Microtus arvalis*) in the nearest corner of the nest box. He drags it to the nestlings, meanwhile uttering the same noises female's use to encourage their young to accept and eat the prey that is being offered to them (Schönn et al. 1991). He tries to feed them very small chunks of the vole, but does not seem very successful. Despite aiming his beak at the nestlings aim, they do not succeed in getting hold on the barely visible pieces. At 13:45 he tries it again, but this time the chunks he rips off are considerably bigger. It can clearly be seen that the nestlings really try to take the pieces. However they probably still don't swallow substantial parts of the vole. In the meantime they are so hungry that one of them tries to rip off some bits of the vole by himself. These feeding attempts recur several times in the next day.

On 23 May at 07:36, almost 30 hours

after the attack by the Stone marten, the male enters the nest box with a decapitated vole. He tries again to feed the nestlings. It is clearly seen that a large chunk is being swallowed by one of the nestlings. A piece that fell is picked up and offered again. Most of the time he stays in the nest box and every now and then he sits on the nestlings, in order to keep them warm. Sometimes he feeds them with little pieces of the rest of the vole, every nestling getting its share.

At 20:00 he tries to feed an earthworm he just caught. The chicks are very hungry and beg loudly. The clumsy size of the worm makes it difficult for him. While holding the worm with one paw, he tries to cut off little parts with his beak, which he then tries to feed to the nestlings. In most cases he fails and the piece of worm falls at the bottom of the nest box, or he eats it himself. Once in a while a piece of the worm disappears in the stomach of the chick that calls the most. A May Beetle (*Melolontha melolontha*), caught a bit later, is not even offered to the chicks, but is being swallowed by the male in one piece.

During the whole period, but especially in the night from 23 to 24 May, the male is often outside to hunt. In total he brings 43 prey items to the nest box, comparable with the supply in the days before the attack (black bars in Fig. 2).

On 23 May at 13:50 the last chunk of mouse is being fed and the stock is depleted. Almost 16 hours later the first new mouse is supplied, before that it was mainly small prey like caterpillars and larvae (Tab. 1).

When he returns with a Wood Mouse (*Apodemus sylvaticus*), the chicks lay stretched out at the bottom, almost motionless. They do not react to his encouraging sounds, also not when sometime later he enters with a larva. The exact moment of time cannot be determined, but in the course of that day all three young die.

The very same day, at 17:12, the first of the three dead nestlings is being taken out of the nest box by the male and is probably

Figure 2 - Prey supply by male and female to the nestlings in 2017. On the x-axis the age of the young in days and on the y-axis the number of prey items. From day 6 onwards (shaded) the male is alone.

Figura 2 - Presas fornecidas pelo macho aos juvenis em 2017. O eixo horizontal representa a idade dos juvenis em dias e o eixo vertical o número de presas. A partir do dia 6 (sombreado) o macho está sozinho.

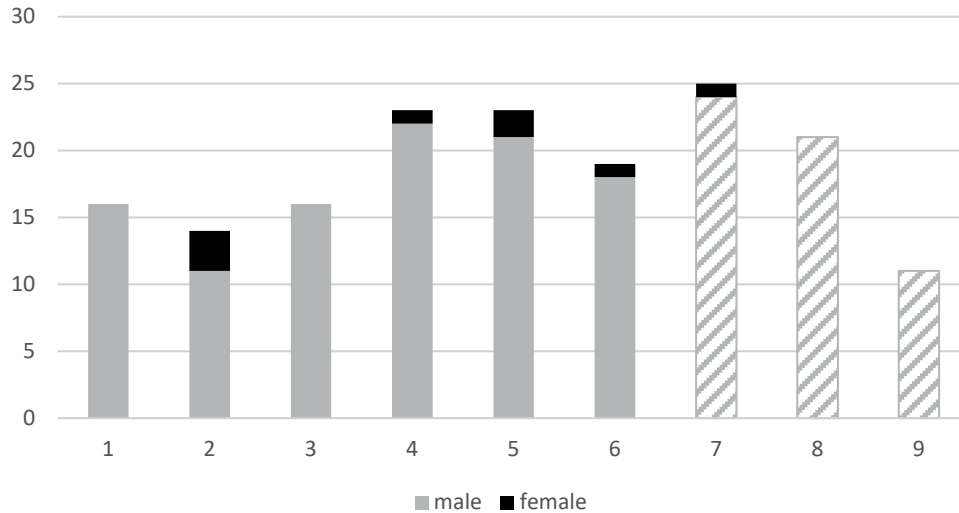


Table 1 - Prey supply by the male after the attack by the Stone Marten. The first prey item was delivered on 22 May at 04:07 (well over an hour after the attack) and the last (a vole) on 24 May at 05:42. At that time the young already didn't take the prey any more.

Tabela 1 - Presas fornecidas pelo macho após o ataque de fuinha. A primeira presa foi entregue às 4h07 do dia 22 de maio (mais de uma hora após o ataque) e a última às 5h42 do dia 24 de maio. Nessa altura os juvenis já não se encontravam a aceitar as presas.

Date	Insect	Larvae	May beetle	Small item	Earthworm	Caterpillar	Mouse (Sp.)	Vole (Sp.)	Total
22-5-2017		1	2	3		5			11
23-5-2017	1	1		2	3	13	1		21
24-5-2017	1	3				4	1	2	11
Total	2	4	2	5	3	22	2	2	43

dropped somewhere. Number two shares the same fate some time later. The third one lays in the nest box for some time, but ultimately - at 25 May at 17:19 - it is being brought outside too. The nest box is then completely empty.

Earlier that day, at 5:00 for the first time the male utters his mating call, sitting on the branch on which the nest box is put. He probably intends to interest a new female for the vacancy. Nearly 20 hours later, on 26

May at 1:34, a new female arrives. After a few unsuccessful attempts to pair, she follows him at 16:30 into the nest box for the first time. During the next days and weeks the newly formed couple visits the tree and the nest box regularly, cuddles each other, and mate several times, but they do not start a new clutch. It is probably already too late in the season. The major events are summarized in Tab. 2.

Table 2 - Events between 22 May and 26 May 2017.

Tabela 2 - Eventos entre 22 de maio e 26 de maio de 2017.

DATE	TIME	EVENT
Prior to the attack by the Stone Marten (<i>Martes foina</i>)		
14-4-2017	19:21	first egg
22-4-2017	02:00	fourth and last egg
16-5-2017	18:26	first young hatches
17-7-2017	09:11	fourth and last young hatches
After the attack by the Stone Marten		
22-5-2017	03:08	attack by a Stone marten, female leaves the nest box
22-5-2017	03:14	female possibly hurt
22-5-2017	03:15	Stone marten leaves
22-5-2017	03:55	female arrives for the first time
22-5-2017	04:27	male tries to feed a larvae, the young don't take it
22-5-2017	09:05	male tries to fees a vole, the young don't take it
22-5-2017	09:06	male sits on the young in order to keep them warm
22-5-2017	13:45	male feeds little chunks of a vole
23-5-2017	07:40	male arrives with a fresh vole and feeds little chunks to the young
24-5-2017	06:05	male arrives with a fresh vole; the young are dying
24-5-2017	00:00	first young dead, the other 2 follow later that day
24-5-2017	12:29	for sure all 3 young dead
24-5-2017	17:12	the male removes the first young out of the nest box
25-5-2017	05:00	male utters mating call for the first time
25-5-2017	17:19	last dead young is being removed from the nest box
26-5-2017	01:34	new female arrives for the first time
26-5-2017	04:30	new female enters the nest box for the first time

Discussion

Within less than four days - from 22 May 03:08 until 26 May 01:34 - an attack by a Stone Marten occurs, the female disappears, the male attempts brood care, the nestlings die and are removed from the nest box by the male and a new female arrives. Especially the male attempting brood care is interesting from a biological point of view. Particularly

remarkable - and as far as we know not previously described - was that he actually ripped off pieces of a vole and tried to feed little chunks to the nestlings. This behavior has never been registered before in Little Owls, nor in any other owl.

The disappearance of the female prompted the male to take responsibility for feeding the nestlings and keeping them warm. Because hunting costs a lot of time, and taking place in the coldest hours of the day, it was inevi-

Figure 3 - Length of stay (in hours per day) in the nest box by the female from day 1 (hatching day not included) until day 11 in 4 nests, in 2015-2017. On the x-axis the age of the young in days and on the y-axis the hours. W2017 is the nest referred to in this study. W = Winterswijk, D = Dongen

Figura 3 - Período de permanência (em horas por dia) da fêmea na caixa-ninho desde o dia 1 (dia da eclosão não incluído) até ao dia 11 em 4 ninhos, em 2015-2017. O eixo horizontal representa a idade dos juvenis em dias e o eixo vertical a hora. W = Winterswijk, D = Dongen).

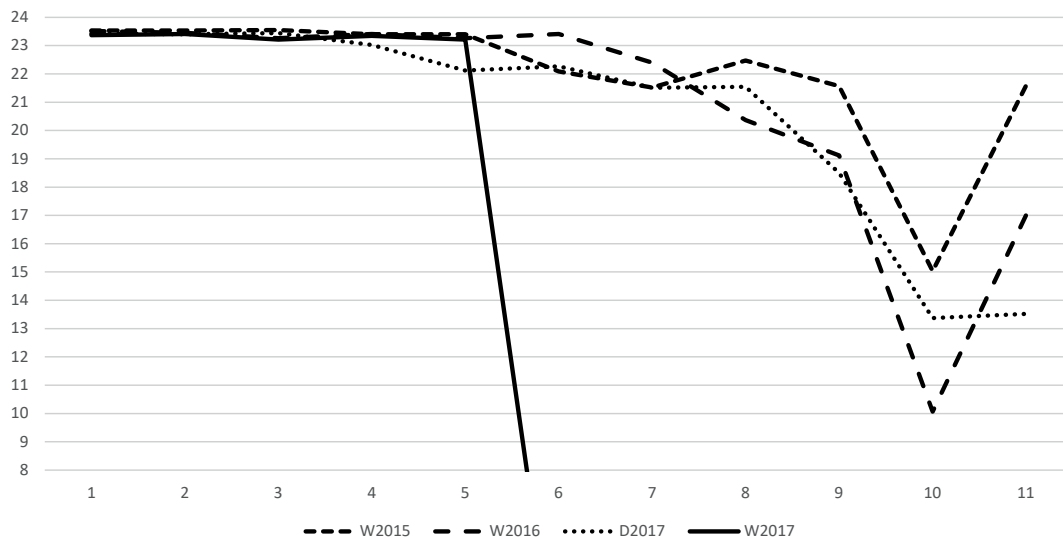


table that he failed in keeping his offspring warm during this period which is essential. Normally the female stays in the nest most of the time, at least during the first two weeks (Fig. 2).

The length of stay in previous years (W2015, W2016 and D2017) clearly illustrates (Fig. 3) that the female normally still spends a lot of time in the nest box after day 5. Only from day 10 onwards the length of stay decreases strongly. The male of W2017 should have spent almost the complete day in the nest box during 5 days to compensate for the time the female would have spent with her offspring. In reality he stayed in the nest box only 20 hours and 21 minutes from the more than 58 hours that elapsed between the disappearance of the female and the death of the last nestling (35,5%). Thereof he spends somewhere between 5 and 9 hours actually sitting on the nestlings. Compared with the time females usually spend in the nest box (93%) during that period, it was significantly less and hence insufficient to keep the

body temperature of the nestlings at the level needed.

The inadequate prey supply is also important. After the disappearance of the female the male continued hunting and delivering prey. Though he brings in 43 prey items in total (Fig. 1 & Tab. 1), the biomass of these items is little compared to the mean in 14 other nest in the period 2002-2017; 136 opposed to 381 g (35,7%, range 183-546 g) (Van Harxen & Stroeken in prep). Even if he would have been able to feed all the prey to the nestlings, an average of 15 g per day per young still would have been relatively modest. The nestlings in the 14 nests mentioned before received on average 43 g per day (range 27-88 g), almost 287% more. The greater part of the prey however is eaten by the male himself, so actually they will have received significantly less than 15 g.

The combination of food shortage, too irregular feeding and cooling down probably was fatal to the nestlings. Similar cases are known from other owls e.g. the Burrowing

Owl (*Athene cunicularia*) (pers. comm. D. Johnson) and the Eurasian Eagle-owl (*Bubo bubo*) (pers. comm. H. Frey). In all these situations the young were too small to be left alone for a longer period of time. Overskaug & Øien (2002) describe a study where two female Tawny Owls (*Strix aluco*) were predated, but in this study the young Tawny Owls had deserted the nest before.

The remarkable thing in this case is that the male actually did try to raise the nestlings all by himself. This calls for the question whether breeding and feeding by male Little Owls somewhere in evolution was still present and disappeared from the behavior repertoire later on. Schmutz et al. (2012) suggest that possibly the dominant behavior of the female might prevent the male from doing his share of the brood care. In this respect it is remarkable that the same male tried to incubate the eggs during a short absence of the female on 11 and 13 May. Behavior like that has not been described before. He only ceased to do so until the female entered the nest box and pushed him away gently. Occasionally this kind of behavior seems to occur in other owls too. David Ramsden (pers. comm.) mentions a captive male Common Barn-owl (*Tyto alba*) that tried to incubate. In previous years we observed several times male Little Owls that tried to feed downy young, especially when the female was not present. This was not always successful, but when the prey was a caterpillar or a similar small item at least one of the nestlings would eventually take the prey.

The question whether this kind of behavior was specific for this male or occurs more frequently, will probably be difficult to answer. Standard controls of nest boxes during the breeding season will not be able to reveal this. Hence the chances in observing similar behavior with a different male in another situation are small. Only experimental research could provide an answer or perhaps more camera research like Beleef de Lente.

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