

Breeding biology of the Tawny Owl *Strix aluco* in the forests of Burgundy

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Since 1980, the Tawny Owl has been studied in various forests of Burgundy, with particular emphasis on its breeding biology, diet, population dynamics, nest site fidelity and life expectancy. The main results concerning breeding (laying date, clutch size, breeding success) and the reasons for brood failure are briefly presented here. While breeding parameters differed considerably from year to year and from one forest to another, they were globally similar for each forest over a 20-years-period. In the study area, Tawny Owls laid on average 3 to 4 eggs between the 20th of February and the 15th of March, raised slightly over 2 young per breeding attempt and slightly over 3 young per successful brood. These results fit quite well with those of similar investigations elsewhere in Europe.

Key words: Tawny Owl *Strix aluco*, breeding biology, diet, population dynamics, nest site fidelity, Burgundy.

1. Introduction

The Tawny owl is the most abundant Owl species in Europe. It lives in woodland, farmland, villages and towns. Despite this widespread occurrence, however, it is not the best studied species, compared, for example, to Eagle Owl *Bubo bubo*, Tengmalm's *Aegolius funereus* and Long-eared Owls *Asio otus*. The Tawny Owl has been studied in Burgundy for 21 years. In this paper, some characteristics of its breeding biology in Burgundy are presented.



Fig. 1: Location of the study area. – Lage des Untersuchungsgebiets.

2. Study area

The study area is situated in Burgundy in the eastern part of France (Fig. 1). Different forests have been chosen in order to study variation of breeding parameters between habitats (Fig. 2.).



Fig. 2: Location of the different forests in the study area. – Lage der ausgewählten Wälder im Untersuchungsgebiet.

In 1979, nest-boxes were placed in:

- two oak forests:
 - Cîteaux, clay ground, altitude 200 m a.s.l., 50 km², 70 nest-boxes;
 - Buan, granite ground, altitude 400 m a.s.l., 12 km², 20 nest-boxes;
- one beech forest:
 - Jugny, limestone ground, altitude 450 m a.s.l., 25 km², 25 nest-boxes;

In 1988, nest-boxes were placed in:

- one oak forest:
 - Saint Loup, clay ground, altitude 200 m a.s.l., 25 km², 30 nest-boxes;
- one beech forest:
 - Châtillon, limestone ground, altitude 350 m a.s.l., 50 km², 50 nest-boxes.

The main purpose of investing the two last forests was to check if there were movements of owls between different forests which are only 30–40 km apart. However, such movements were never observed.

3. Methods

The nest-boxes were placed at random, one in every square kilometre. The exact place was chosen according to the forestry activity, so that the compartments with nest-boxes had not been exploited for at least 20 years. There was approximately one nest-box per 75 hectares of forest. The nest-boxes were hung up 5 to 7 metres from the ground and were visited at least twice a year:

- In winter: Between mid-December late January to note their order, to empty what has been brought inside during spring and summer by tits, squirrels or hornets and to catch some adult Tawny Owls. In the oak forests it is not rare to find male and female together in the same nest-box. On average, we caught 0.6 adult per nest-box, but in the beech forest only 0.4. We are studying this point and trying to find some explanations.
- In spring: Between mid-March and the end of April to catch the adults and to ring the young.

Sometimes a third and a fourth visit took place if the young were not old enough to be ringed during the second visit or in order for us to try to trap the males bringing prey to the young. Captured adults were measured, weighted, aged and ringed.

To estimate the laying date, we assumed 29 days of incubation, two days between laying of successive eggs and incubation starting from the first egg. The primaries begin to appear when the young are 12 days old and we estimated a growth rate of 5 mm per day, so that when the third primary is 85 mm long, the young is approximately 28–30 days old and is ready to leave the nest-box.

4. Results

4.1. Laying date

The earliest mean laying date was Feb 19th 1996. In that year the mean laying date in the five study forests was in February. The latest laying date occurred in 1986 (March 26th). The difference between the five forests

Table 1: Mean laying date of Tawny Owl in different forest tracts of Burgundy in the period 1980–2000 (sd = standard deviation, n = sample size). – *Mittlerer Legebeginn des Waldkauzes in verschiedenen Waldgebieten in Burgund 1980–2000 (sd = Standardabweichung, n = Anzahl untersuchter Bruten).*

Forest Wald	date Datum	sd	n
Buan	3 March	11.7	113
Cîteaux	3 March	12.0	346
Jugny	3 March	17.4	153
Châtillon	4 March	14.4	108
Saint Loup	4 March	13.5	107
Total	3 March	13.6	827

during the same year is not important (most of the time less than three weeks).

It is interesting to note is that over the entire period of 20 years the mean laying date in all the five forests is the same (3 or 4 of March), although there are more than 100 km between the northernmost and the southernmost study area. The type of the soil, tree species and the slight difference of altitude between study areas had no effect on laying date of the Tawny Owl.

4.2. Clutch size

The overall mean clutch size varied from 2.3 to 5.2 with a mean of 3.5 eggs. We did not try to investigate the number of eggs of every clutch. In some years our visits were too late. The smallest clutch yielding a fledgling consisted of only a single egg, the largest contained nine eggs (yielding six young). We found clutches with more than 9 eggs which were deserted and had possibly been laid by two females.

There were no significant differences in the mean clutch size between the five forests. Figure 3 shows the relation between laying date and clutch size.

4.3. Brood size per laying pair

The mean brood size was between 1.0 to 3.5 young per pair with a mean value of 2.2. The number of broods

Table 2: Mean clutch size of Tawny Owl broods in five forest tracts of Burgundy (compare Table 1). – *Mittlere Gelegegröße von Waldkauzbruten in fünf Waldgebieten von Burgund (vgl. Tab. 1).*

Forest Wald	clutch size Gelegegröße	sd	n
Buan	3.73	1.7	40
Cîteaux	3.30	1.2	275
Jugny	3.95	1.5	93
Châtillon	3.44	1.2	113
Saint Loup	3.35	1.3	43
Total	3.47	1.3	564

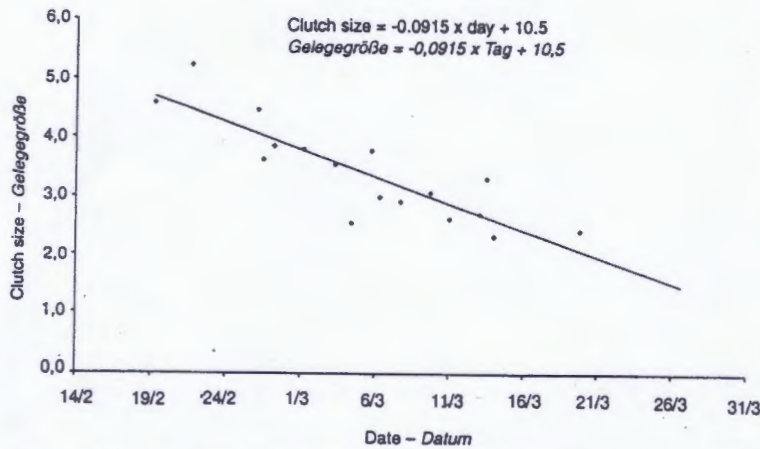


Fig. 3: Clutch size versus laying date of Tawny Owl in Burgundy. – Gelegegröße in Abhängigkeit vom Legedatum.

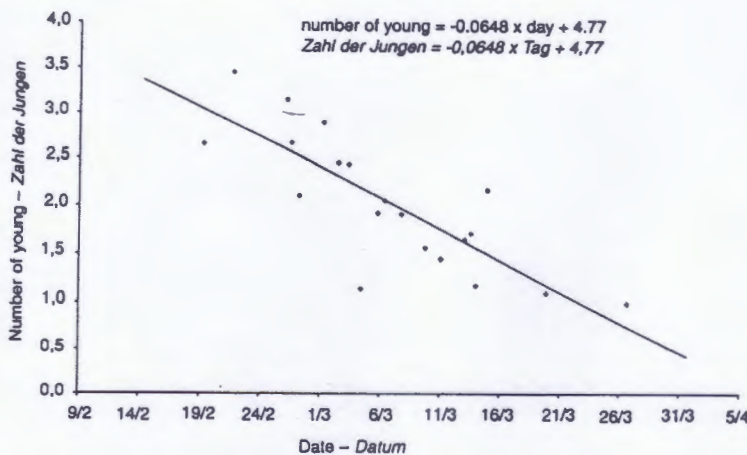


Fig. 4: Number of young per breeding pair versus laying date of Tawny Owl in Burgundy. – Zahl der Jungen pro Brutpaar in Abhängigkeit vom Legedatum.

found per year in each of the study plots varied considerably. For example:

- Cîteaux forest: 32 in 1985, 1 in 1986, 29 in 1987
- Jugny forest: 14 in 1988, 0 in 1989, 20 in 1990
- Jugny forest: 20 in 1996, 0 in 1997, 18 in 1998
- Châtillon forest: 24 in 1996, 0 in 1997, 25 in 1998

Table 3: Mean brood size (number of young, a) of breeding pairs of Tawny Owls in Burgundy which laid at least one egg. – Mittlere Brutgröße (a) des Waldkauzes in Burgund von Brutpaaren mit mindestens einem Ei.

Forest – Wald	a	sd	n
Buan	2.51	1.9	145
Cîteaux	2.08	1.8	485
Jugny	2.38	2.0	203
Châtillon	2.00	1.9	149
Saint Loup	2.31	1.7	127
Total	2.21	1.9	1109

5. Discussion

In Burgundy laying dates average slightly later than in Switzerland (February 27th, n = 620, HENRIOUX 2000), but definitely earlier than in northern England (March 26th, n = 354) and in western Scotland (April 2nd, n = 190; PETTY 1992).

Table 4: Mean brood size (number of young, a) of successful breeding pairs of Tawny Owls in Burgund. – Mittlere Brutgröße (Anzahl Jungvögel, Spalte a) erfolgreicher Waldkauz-Brutpaare in Burgund.

Forest – Wald	a	sd	n
Buan	3.47	1.4	105
Cîteaux	3.19	1.3	317
Jugny	3.50	1.4	138
Châtillon	3.10	1.4	96
Saint Loup	3.00	1.3	98
Total	3.25	1.3	754

Although there was a lot of variation between successive years and between the five study forests during the same year, the 20-year means did not differ statistically between study areas. Fig. 4 shows the relationship between laying date and the number of young per laying pair.

4.4. Brood size per successful pair

The number of young produced in one forest presents approximately the same picture as before: important differences occur from one year to another and between one forest and the other, but altogether after 20 years there are no statistical differences between the five forests. Each forest on average produced between 2.0 and 4.3 young with a mean value of 3.2 per successful pair.

The maximum number of young per brood was 7, which was recorded 4 times. Fig. 5 shows the relationship between laying date and the number of young per successful pair.

4.5. Breeding success

About 25% of the eggs laid did not produce fledglings for various reasons. Interestingly, cannibalism by siblings and by female (mother) was the most important cause of failure.

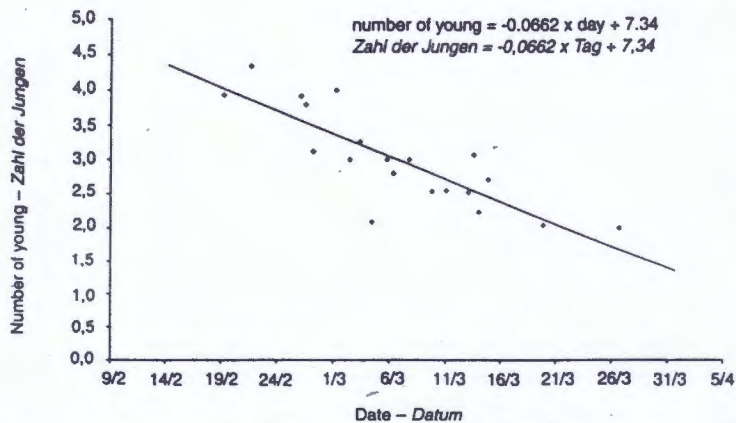


Fig. 5: Number of young per successful pair versus laying date of Tawny Owl in Burgundy. – Zahl der Jungen pro erfolgreichem Paar in Abhängigkeit vom Legedatum.

Table 5: Breeding success and causes of brood losses in Tawny Owl in five different forests of Burgundy (percentage in brackets). – Bruterfolg und Gründe für Brutverluste des Waldkauzes in fünf Waldgebieten in Burgund (prozentuale Anteile in Klammern).

Forest Wald	Number of eggs Eizahl	abandoned verlassen	clear taub	unhatched nicht geschlüpft	dead young tote Junge	predation Prädation	supposed cannibalism – Kannibalismus vermutet	sure cannibalism Kannibalismus gesichert	unknown unbekannt	fledged young geschlüpfte Junge
Buan	152 (100)	0 (0.0)	3 (2.0)	1 (0.7)	3 (2.0)	0 (0.0)	12 (7.9)	6 (3.9)	4 (2.6)	123 (80.9)
Cîteaux	694 (100)	7 (1.0)	18 (2.6)	19 (2.7)	7 (1.0)	20 (2.9)	37 (5.3)	23 (3.3)	47 (6.8)	516 (74.4)
Jugny	338 (100)	10 (3.0)	13 (3.8)	6 (1.8)	0 (0.0)	13 (3.8)	27 (8.0)	8 (2.4)	9 (2.7)	252 (74.6)
Châtillon	279 (100)	12 (4.3)	14 (5.0)	5 (1.8)	1 (0.4)	0 (0.0)	36 (12.9)	2 (0.7)	15 (5.4)	194 (69.5)
Saint Loup	131 (100)	2 (1.5)	10 (7.6)	2 (1.5)	0 (0.0)	0 (0.0)	18 (13.7)	1 (0.8)	8 (6.1)	90 (68.7)
All forests	1594 (100)	31 (1.9)	58 (3.6)	33 (2.1)	11 (0.7)	33 (2.1)	130 (8.2)	40 (2.5)	83 (5.2)	1175 (73.7)

Table 6: Mean clutch sizes in Tawny Owl in various central and western European study sites. – Mittlere Gelegegrößen des Waldkauzes in verschiedenen mittel- und westeuropäischen Untersuchungsgebieten.

Mean clutch size Mittl. Gelegegröße	n	Country Land	Author(s) Quellen
2.48	–	England – England	SOUTHERN 1970
2.55	191	western Scotland – westl. Schottland	PETTY 1992
2.81	176	Czech Republic – Tschechische Republik	PLESNIK & DUSIK 1994
2.99	106	Netherlands – Niederlande	KONING in GLUTZ 1980
3.01	72	Belgium – Belgien	DELMÉE <i>et al.</i> 1978
3.06	357	northern England – nördl. England	PETTY 1992
3.3	207	Switzerland – Schweiz	GLUTZ 1980
3.47	564	France – Frankreich	present study – diese Studie
3.71	3051	Finland – Finnland	SAUROLA 2000
3.78	620	Switzerland – Schweiz	HENRIOUX 2000, in prep.
3.8	49	Germany – Deutschland	ROCKENBAUCH 1978

The clutch sizes in Burgundy are among the largest in central and Western Europe (Table 6). Various studies give a mean brood size per laying pair between 1.5 and 2.8 (Table 7). Our results fit perfectly in this range. Mean brood sizes of successful pairs are extraordinarily large in Burgundy (Table 8), the overall breeding success is in the medium range compared with results of other central and western European studies (Table 9).

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Table 7: Mean brood sizes per laying pair in Tawny Owl in various central and western European study sites. – *Mittlere Brutgrößen des Waldkauzes in verschiedenen mittel- und westeuropäischen Untersuchungsgebieten.*

mean brood size mittl. Brutgröße	n	Country Land	Author(s) Quellen
1.50	176	western Scotland – westl. Schottland	PETTY 1992
1.79	–	Netherlands – Niederlande	KONING in GLUTZ 1980
2.0	107	Germany – Deutschland	WENDLAND 1963,1972
2.06	95	Belgium – Belgien	DELMÉE <i>et al.</i> 1978
2.18	–	Czech Republic – Tschechische Republik	PLESNIK & DUSIK 1994
2.21	1109	France – Frankreich	present study – diese Studie
2.22	672	Switzerland – Schweiz	HENRIOUX 2000
2.38	341	northern England – nördl. England	PETTY 1992
2.43	108	Germany – Deutschland	ROCKENBAUCH 1978
2.75	4865	Finland – Finnland	SAUROLA 2000

Table 8: Mean brood sizes of successful breeding-pairs of Tawny Owl in various central and western European study sites. – *Mittlere Brutgrößen erfolgreich brütender Waldkauz-Paare in verschiedenen mittel- und westeuropäischen Untersuchungsgebieten.*

mean brood size mittl. Brutgröße	n	Country Land	Author(s) Quellen
1.93	137	western Scotland – westl. Schottland	PETTY 1992
2.32	–	Netherlands – Niederlande	KONING in GLUTZ 1980
2.59	–	Czech Republic – Tschechische Republik	PLESNIK & DUSIK 1994
2.59	313	northern England – nördl. England	PETTY 1992
2.79	94	Germany – Deutschland	ROCKENBAUCH 1978
3.12	480	Switzerland – Schweiz	HENRIOUX 2000
3.25	754	France – Frankreich	present study – diese Studie
3.29	4040	Finland – Finnland	SAUROLA 2000

Table 9: Breeding success in Tawny Owl in four central- and western-European study sites. – *Bruterfolg des Waldkauzes in vier mittel- und westeuropäischen Untersuchungsgebieten.*

percentage of fledged youngs Bruterfolg in %	Country Land	Author(s) Quellen
71	Switzerland – Schweiz	HENRIOUX 2000
71	Belgium – Belgien	DELMÉE <i>et al.</i> 1978
73.7	France – Frankreich	present study – diese Studie
77.6	Czech Republic – Tschechische Republik	PLESNIK & DUSIK 1994

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6. Zusammenfassung

Baudvin, H. & S. Jouaire 2003: Brutbiologie und Populationsdynamik des Waldkauzes *Strix aluco* in den Wäldern von Burgund. Vogelwelt 124: 289 – 294.

Seit 1980 wurden Untersuchungen am Waldkauz in verschiedenen Waldgebieten Burgunds durchgeführt. Besonders Interesse bestand an der Untersuchung von Brutbiologie, Nahrung, Populationsdynamik, Brutplatztreue und Lebenserwartung. Die wichtigsten Ergebnisse zur Brutbiologie (Legedatum, Gelegegröße, Bruterfolg) sowie zu den Ursachen von Brutverlusten sind hier knapp zusammengefasst. Während die jeweiligen Werte z. T. erheblich zwischen den Jahren und zwischen verschiedenen Waldgebieten differieren,

sind sie über 20 Jahre hinweg betrachtet insgesamt zwischen den Waldgebieten sehr ähnlich. Im Untersuchungsgebiet legen die Waldkäuse im Durchschnitt 3-4 Eier im Zeitraum vom 20. Februar bis zum 15. März und ziehen etwas mehr als zwei Jungvögel pro Brutversuch bzw. etwas über drei Jungvögel pro erfolgreicher Brut auf. Diese Werte passen sich gut in die Ergebnisse anderer, ähnlich gelagerter Studien in verschiedenen mittel- und westeuropäischen Ländern ein.

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