

SELECTED ELEMENTS OF CAPERCAILLIES (*TETRAO UROGALLUS* L.)  
DURING REPRODUCTION IN A CAPTIVE BREEDING\*

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**Abstract.** A noticeable decrease in the number as well as shrinking of individual areas of capercaillies (*Tetrao urogallus* L.) have been observed both in Poland and in most European countries for several dozen of years. In connection with this fact, new attempts for closed breeding of capercaillies have been made for several years, and raised individuals are settled in natural habitats. Currently, there are two volier breeding farms of this species with somewhat different specificity of bird raising. The purpose of the research was to determine the usefulness of farm birds for introduction on the basis of their behaviour in different periods of tooting. The observation of birds was made in one volier with two cocks while three hens had free access there. The research was carried out in two periods of the reproduction season by a method of daily observation (from dawn to dusk), recording the duration of different sorts of behaviour. At the beginning of the tooting, social hierarchy between the cocks was established. The older cock spent more time on the ground trying to drive the rival from his area. In the second period of the tooting, the older cock was a noticeable dominant. He spent most of his time on the ground showing tooting behaviour (singing songs), and the young cock, as a subordinated individual, was little visible, he appeared on the open ground for a while and then hid in the brush, giving the ground to the main tooter. Furthermore, the behaviour of the dominant cock in full tooting resembles the behaviour of tooters in their natural conditions – spending time on the roost (a perch above the ground), flying down and playing mating songs (tooting). There was a big diversity in hens behaviour, both at the initial stage and in full tooting. Despite the fact that the hens had free access to all of the voliers, they tended to spend most of the time with the dominant cock which was the main candidate for reproduction. Social hierarchy among hens was established and the lowest position in this hierarchy was occupied by a hen with a visible level of body asymmetry (limping). The results obtained show a similarity in birds behaviour coming from the volier breeding farm and those from the natural habitat. This suggests that the birds have not lost the natural instincts and are fully useful for reintroduction.

**Key words:** capercaillie, tooting, social hierarchy, behaviour, reproduction

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## INTRODUCTION

A steady decreasing tendency in the number as well as shrinking of individual areas of capercaillies (*Tetrao urogallus* L.) have been observed both in Poland and in most European countries for several dozen of years. [4,6,13,17]. Currently, capercaillies live in 33 countries in Europe and Asia, but at least in 19 countries the number of the birds has been decreasing each year. [18]. The European population of capercaillies (excluding Russia) is 580 thousand, 500 thousand of which live in Scandinavian countries [13,17]. In Poland, capercaillies live in 4 isolated populations with 600 birds altogether. The most numerous population lives in the Augustów Forest and in the Lublin area – in the Solski Forest [6,12,17,18].

These facts caused the undertaking of different kinds of protective measures, including the establishment of closed breeding farms. [3,8,18]. Despite making attempts at volier breeding of capercaillies in Poland, most of them have ended in failure. In 1932, prof. Marchlewski made the first attempt at raising capercaillies in captivity. Next attempts, made in 1952, 1957 and in 1962, ended in full success with keeping a cock and a hen alive for a year. The next attempt of closed breeding, carried out by prof. Graczyk from the Agricultural University in Poznań in the years 1974-1978 also ended in success with the reintroduction of 3 cocks and 3 hens having 15 chicks.

Currently, there are two volier breeding farms in Poland, differing in raising specificity and the level of natural conditions of birds raising. One has been run by the Leżajsk Forest District since 1993, the other one by the Vistula Forest District since 2000. Some of the birds raised in captivity are used for completing the basic flock and the rest of the individuals were used for reintroduction. In the case of the individuals used for introduction, most crucial elements are adaptation possibilities of the settled birds to the new habitats that determinate their further chance of survival in their natural settlements. An age structure and the fragmentation of the forest environment where the birds are settled, as well as the level of the pressure of predators in the area [2], are very significant elements affecting the survival of birds and the development of their population. [2,14].

Moreover, the quality of the material used for settling has a great influence on the success of reintroduction efforts. Liukkonen-Anttila *et al.* [7], determining morphological and physiological differences between wild and raised birds, claimed that there are significant differences of these features and they may cause a decrease in the level of the survival skills of breeding birds. Apart from these morphological and physiological features, psychic features determining the adaptation possibilities of the settled birds seem to be an extremely important element.

The purpose of the research was to get to know behavioural features of birds coming from a close breeding farm, which can be used in the improvement of volier breeding of this species.

## MATERIAL AND METHOD

In summer 2000, some research on capercaillies behaviour in volier breeding located in the Zerwanka forest in the Leżajsk Forest District was done. The breeding has revealed features of stability for a few years, and some of the raised birds have been moved to natural settlements three times [5]. The research was done through every-day observations (from dawn to dusk) writing down the duration (minutes) of particular kinds of behaviour. The first two days of those observations were the beginning of the reproduction period of the species (the beginning of tooting), and the next two-day observations were made in the full reproduction season (full tooting). In the behaviour of birds, 17 kinds of different behaviour patterns were distinguished, as well as the period when the birds were outside the sight of the observer. All of the observations were made in the same volier with two cocks permanently staying there. One of them was an adult (cock #1) and the other one was young, taking part in the tooting for the first time (cock #2). What is more, in the same volier there were permanently or periodically three hens which had a freedom of moving to all the voliers in the row. During the observations, the hens were identified by their characteristic features of the coat of feathers and one of the hens moved with a slight limp. The results obtained were put in tables including the duration of specified behaviour patterns on different days of observations.

## RESULTS AND DISCUSSION

The behaviour patterns of the cocks at the beginning of the reproduction period (March) are presented in Table 1. On the first day of observations, the adult cock (No. 1) spent most of the time in the brush ( $n = 122$  min), but simultaneously, the tooting occupied most of the time – 99 min, which was over 4 times more than in the case of the young cock. Moreover, the young cock used to spend being hidden (out of the sight of the observer) more than twice as much time as the adult one. The behaviour patterns were quite different during the second day of the observation. The adult cock spent more than twice as long in the thickets, but simultaneously, over five times longer on the open ground – walking along the volier. Both cocks spent similar time on the roost observing, and the young cock tooted 4 min longer than the adult one.

During the first day of the observation in the full reproduction season (April), both cocks were absorbed by the tooting behaviour (Tab. 2). The adult cock tooted for 251 min, while the young one was involved in that activity for 230 min. Furthermore, the adult cock sat on the roost for 157 min and then flew down and played the tooting song, while the young cock did not spend any time on the roost. The young cock walked along the fence for 148 min, which might mean that he wanted to get out of the cage. As for the adult one, 12 kinds of behaviour patterns

were observed, while for the young cock – only 6. The young cock stayed for 321 min out of observation, and the adult one only for 68 min. During the second day, the adult bird tooted for 145 min, while the young one only for 97 min. On that day, the older cock spent 140 min on the roost from which he flew down and tooted, and the young bird spent 10 hours (609 min) being hidden. During that day the young cock did not spend any time on the roost.

**Table 1.** The behaviour of the capercaillie cock during the first days of the tooting period\*

Kind of behaviour	Term of the observation			
	08.03.2000		09.03.2000	
	Cock 1	Cock 2	Cock 1	Cock 2
Eating from a litter tray	34	0	0	0
Pecking branches	0	0	1	0
Cleaning feathers	28	1	14	0
Walking along the volier	93	9	36	7
Sitting on the perch	5	10	0	0
Walking along the fence	3	152	0	22
Flying up to the fence	1	0	0	0
Sitting in the brush	122	61	72	39
Running through the volier	2	1	1	0
Observing the area from the ground	105	64	45	44
Observing the area from the roost	10	1	0	0
Flying up the roost	0	2	0	0
Flying down	0	0	0	0
Giving off sounds	11	10	1	6
Pecking from the ground	16	1	0	0
Tooting	99	24	16	20
Copulation	0	0	0	0
Individual outside observation area	192	385	415	463

\* time of particular kinds of behaviour in minutes.

These results show that in the volier breeding conditions, when two males stay in one volier, a social hierarchy establishes at the beginning of March. Cock No. 1 achieved a higher position in this hierarchy. This cock was older and he treated the volier in which he lived as an individual area and his own tooting arena (tooting-ground) trying to get rid of a potential rival. Such kinds of behaviour are typical for birds in natural conditions. In the forests in the south-east of Norway, an individual area of a single adult cock is 48 ha, and all the sanctuaries of capercaillies of the area over 1 km<sup>2</sup> had tooting-grounds and the number of cocks on the tooting-grounds was increasing along with the increase of the sanctuary. [11,16]. Storch [15] reported that in the German Alps adult males are more attached to their individual areas and in case of strong competition they limit the areas only to their tooting-grounds showing much more resistance and inflexibility from those places. Research [16] done in the north-west of Russia shows that

adult males come back to the same tooting-grounds every year, and young males, occupying a lower position in the social hierarchy and not having their own individual areas, move from one tooting-ground to another giving in to the adults.

**Table 2.** The behaviour of the capercaillie cock during the full tooting period\*

Kind of behaviour	Term of the observation			
	07.04.2000		08.04.2000	
	Cock 1	Cock 2	Cock 1	Cock 2
Eating from a litter tray	59	1	11	0
Pecking branches	0	0	0	0
Cleaning feathers	16	0	5	0
Walking along the volier	58	28	24	0
Sitting on the perch	157	0	140	0
Walking along the fence	28	148	2	10
Flying up to the fence	0	0	0	0
Sitting in the brush	33	0	12	0
Running through the volier	0	0	3	0
Observing the area from the ground	83	32	5	5
Observing the area from the roost	19	0	0	0
Flying up the roost	5	0	1	0
Flying down	7	0	2	0
Giving off sounds	2	26	0	0
Pecking from the ground	0	0	0	0
Tooting	251	230	145	97
Copulation	0	0	0	0
Individual outside observation area	68	321	371	609

\* time of particular kinds of behaviour in minutes

On the first and the second day of the March observations (Tab. 3) (the beginning of reproduction season), all three hens were observed in the volier. Hen No. 1 spent most time sitting on the roost (140 min) observing the neighbourhood, hen No. 2 spent 173 min in the brush, and hen No. 3 showed most different kinds of behaviour. She spent most time sitting on the roost (95 min) observing the area and sat on the perch for 91 min. Additionally, all the hens were out of the sight of the observer for over 300 min.

On the second day of observation, hens No. 1 and 2 observed the area from the ground for about 40 min, and hen No. 3 for 46 min took natural food from herb flora. The behaviour of hen No. 2 on that day was very interesting. She appeared in the volier and then, suddenly, hid in the brush where she stayed for 122 min altogether. All the hens were out of observation for over 400 min (they were in other voliers). Both on the first and the second day of the observation only hen No. 1 gave off sounds, quacking for 1 min.

**Table 3.** The behaviour of the capercaillie hen at the beginning of the tooting period\*

Kind of behaviour	Term of the observation					
	08.03.2000			09.03.2000		
	Hen 1	Hen 2	Hen 3	Hen 1	Hen 2	Hen 3
Eating from a litter tray	7	23	21	5	0	1
Pecking branches	29	3	15	11	0	3
Cleaning feathers	32	10	29	6	6	6
Walking along the volier	46	78	56	14	5	10
Sitting on the perch	89	1	91	38	0	0
Walking along the fence	0	0	0	0	0	0
Flying up to the fence	0	0	0	0	0	0
Sitting in the brush	6	173	41	2	122	7
Running through the volier	0	1	1	2	0	0
Observing the area from the ground	36	88	35	40	47	21
Observing the area from the roost	140	30	95	4	0	40
Flying up the roost	4	3	6	0	0	1
Flying down	4	1	3	0	0	0
Giving off sounds	1	0	0	1	0	0
Pecking from the ground	25	6	18	10	0	46
Tooting	0	0	0	0	0	0
Copulation	0	0	0	0	0	0
Individual outside observation area	302	304	310	468	421	466

\* time of particular kinds of behaviour in minutes

On the first day of observation of the hens in the second period (full reproduction season) (Tab. 4), a completely different behaviour took place. All three hens spent most of their time on the ground, and they were out of the observation on average for over 100 min. Hen No. 1 spent most of her time on the perch and cleaned her feathers. Hen No. 2 spent most of her time in the brush, and hen No. 3 was on the perch and observed the area from the roost for 106 min. On the second day of observation in that period the hens spent most of their time out of the volier (out of the sight of the observer) – on average for about 450 min. Hens Nos 1 and 3, staying in the volier, spent most of their time on the perch – relatively for 92 and 144 min, and hen No. 2 spent most of her time in the volier in the brush. During this period, the hens most often gave off sounds, especially on the first day of the observation, when hens Nos 1 and 3 gave off sounds for about 26 min and hen No. 2 – only a minute. On the second day, only hen No. 1 gave off sounds.

The results presenting hens' behaviour in closed breeding farm in different tooting periods show a big diversity of behaviour patterns on particular days of the same period as well as between the particular periods. A social hierarchy of females appeared, with hen No. 1 being the dominant one in the rows of the voliers. She was the most active of all, both at the beginning of that stage and during the full tooting. Hen No. 2 occupied the lowest position of this hierarchy and, in spite of the fact that she

spent a similar time in that volier, she spent most of the time in the brush and gave off the least sounds. It seems to be obvious, as that hen walked with a limp.

**Table 4.** The behaviour of the capercaillie hen during the full tooting period\*

Kind of behaviour	Term of the observation					
	07.04.2000			08.04.2000		
	Hen 1	Hen 2	Hen 3	Hen 1	Hen 2	Hen 3
Eating from a litter tray	43	33	44	19	3	14
Pecking branches	42	2	22	7	0	10
Cleaning feathers	101	46	88	0	3	3
Walking along the volier	133	71	96	58	19	57
Sitting on the perch	191	30	106	92	79	144
Walking along the fence	21	0	28	0	0	0
Flying up to the fence	0	0	0	0	0	0
Sitting in the brush	6	318	67	64	184	1
Running through the volier	0	0	0	0	0	0
Observing the area from the ground	3	158	34	6	0	19
Observing the area from the roost	54	0	106	0	0	0
Flying up the roost	32	0	21	1	1	3
Flying down	34	0	28	4	1	3
Giving off sounds	25	1	27	2	0	0
Pecking from the ground	38	27	30	11	2	13
Tooting	0	0	0	0	0	0
Copulation	0	0	0	0	0	0
Individual outside observation area	118	152	96	456	429	454

\* time of particular kinds of behaviour in minutes

The behaviour patterns of the hens in the breeding volier were close to those in natural conditions (pursuant to written documents). All three hens were able to move freely within the given row of the voliers, and mainly showed a profound interest in the adult cock from the observed volier. It might have resulted from the fact of visible domination of that cock in the volier (a potential tooting-ground) as well as his physical advantage (bigger body weight) and his behaviour during the tooting. Similar behaviour can be observed among other animal species. In the population of deer on Rhum Island (Scotland), just superior body weight ensured high position in the social hierarchy among males [1]. Among hens, the lowest position was occupied by a slightly limping hen – a hen with a visible body asymmetry. Bibliographic data shows that such a body asymmetry among certain animal species may affect social behaviour, height, fertility and even survival [9]. As for the research on colouring asymmetry (ornaments) of birds' feathers, it turned out that the degree of the asymmetry reflects their phenotype quality and the ability to face a wide spectrum of the influence of the environment. [10].

## CONCLUSIONS

1. At the beginning of the reproduction season (tooting) the establishment of a social hierarchy among males staying in the same volier was observed. The adult cock with bigger weight became a dominant, treating the whole volier as his own individual area during the full tooting. He also tried to get rid of the subordinated cock.

2. The subordinated young cock, not having any opportunity to leave the volier (the dominant's area), spent most of the time being hidden, trying not to compete with the tooter, but also made attempts to toot.

3. Hens, having an opportunity to choose other voliers with tooting cocks, spent most of the time in the volier under observation, which proves that the cock-dominant was a potential candidate for reproduction.

4. There was also a social hierarchy among hens, and the hen with the body asymmetry (limping) occupied the lowest position in this hierarchy.

5. The results of the research show similarity in capercaillies' behaviour in volier breeding and in natural conditions (bibliographic data), and the diversity in their behaviour results mainly from the limitation of the voliers' size of the individual areas and tooting places.

6. The results presented allow to claim that capercaillies (both males and females) coming from the volier breeding carried out by the Leżajsk Forest District, as far as behaviourism is concerned, are fully prepared for adaptation in the natural settlements and display alertness to compete during the tooting period, which may have a positive influence on currently living subpopulations of the species.

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#### WYBRANE ELEMENTY ZACHOWAŃ GŁUSZCÓW (*TETRAO UROGALLUS* L.) PODZAS ROZRODU W HODOWLI ZAMKNIĘTEJ

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**Streszczenie.** Od kilkudziesięciu lat w Polsce, jak i w większości krajów europejskich obserwowany jest spadek liczebności oraz kurczenie się areałów osobniczych głuszców (*Tetrao urogallus* L.). W związku z tym faktem od kilkunastu lat podejmowane są próby hodowli zamkniętej głuszców, a odchowane osobniki wsiedlane są do naturalnych siedlisk. Obecnie w Polsce funkcjonują dwie hodowle wolierowe tego gatunku, charakteryzujące się nieco odmienną specyfiką odchowu ptaków. Celem badań było określenie przydatności ptaków hodowlanych do introdukcji na podstawie ich behawioru w różnych okresach tokowiska. Obserwacje zachowań ptaków prowadzono w jednej wolierze, w której żyły 2 koguty, a swobodny dostęp do niej miały 3 kury. Badania prowadzono w dwóch okresach sezonu rozrodczego, metodą całodziennych obserwacji (od świtu do zmierzchu) notując czasokresy trwania poszczególnych rodzajów zachowań. W początkowej fazie tokowiska wystąpiło ustalanie się hierarchii społecznej pomiędzy kogutami. Kogut starszy więcej czasu spędzał na ziemi, starając się wyprzeć potencjalnego konkurenta ze swojego areału. W drugim okresie tokowiska kogut starszy był już wyraźnym dominantem, większość czasu przebywał na ziemi wykazując zachowania tokowiskowe (granie pieśni), natomiast kogut młody jako osobnik podporządkowany był mało widoczny, pojawiał się na chwilę na otwartym terenie, po czym chował

się w zaroślach, ustępując tym samym miejsca głównemu tokowikowi. Ponadto zachowanie koguta dominanta w okresie pełni tokowiska wskazuje na pewne podobieństwo do zachowań tokowików w warunkach naturalnych, objawiające się przebywaniem na grzędzie (żerdź nad ziemią), sfruwanie z niej i granie pieśni godowej (tokowanie). Wystąpiło duże zróżnicowanie zachowań kur (głuszek), zarówno w pierwszej fazie jak i w pełni tokowiska. Pomimo faktu, że kury miały swobodny dostęp do wszystkich wolier, najwięcej czasu spędzały w wolierze, z kogutem dominantem, którego traktowały jako potencjalnego kandydata do rozrodu. U kur wystąpiło również ustalanie się hierarchii społecznej, a najniższe miejsce w tej hierarchii zajęła głuszka o wyraźnym stopniu asymetrii ciała (kulawizna). Otrzymane wyniki wskazują na podobieństwo zachowań ptaków pochodzących z hodowli wolierowej, do zachowań w warunkach naturalnych, a tym samym sugerują, że ptaki te nie zatraciły naturalnych instynktów i są w pełni przydatne do zabiegów reintrodukcyjnych.

Słowa kluczowe: głuszc, tokowisko, hierarchia społeczna, behawior, rozród