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# Radiotelemetric Tracking of Farm Pheasant (*Phasianus colchicus*) Released in the Pazardzhik Region, Bulgaria

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**Abstract:** The aim of the study is to determine the losses after farm pheasants are released in nature. In the spring of 2011, 20 pheasants (*Phasianus colchicus*) were tagged with radiotelemetry transmitters. Only 20% of the birds survived until the end of the study. The main reason for the losses was carnivorous mammals. Human activities affected significantly the pheasant survival rate. The dispersion of birds from the place of release increased with the time. The direct displacement of farm pheasants in nature is not an appropriate method for the population recovery in Bulgaria.

**Key words**: Pheasant, survival, loss, dispersion, radiotelemetry, release

## Introduction

Common Pheasant (*Phasianus colchucus colchicus* L.) was an autochthonous species for the Bulgarian fauna. At the end of the 19th century, the Pheasant inhabited areas from the middle reaches of the Maritza River to the Black Sea Coast (Simeonov *et al*. 1990). It had a natural population in this country until 1895, when introduction of other subspecies had started. over the years, Ring-necked Pheasant (*Phasianus colchicus torquatus* Gmelin), Japanese Green Pheasant (*Phasianus colchicus mongolicus* Brandt) and Korean Ring-necked Pheasant (*Phasianus colchicus karpowi* Buturlin) have been introduced in Bulgaria. The hybridisation that followed subsequently led to the local subspecies disappearance (Boev, Gerasimov 2007). Nowadays, about 20 000 pheasants with morphological features of the Common Pheasant subspecies are released in southern Bulgaria yearly (data provided by the National Hunting and Fishing Association).

The release of hand-reared birds is widespread in Bulgaria. They are bred in specialised farms and released into the wild in their typical habitats. The purpose of placing farm birds in the wild is to increase their number in nature and thus to optimise birds availability for hunting purposes. The low level of control exercised over the quality of birds at farms may lead to disease or genetic diversity impoverishment in wild populations (Viggers *et al*. 1993; Hodder, Bullock 1997).

The aim of this study is to determine the losses and dispersion of the farm-produced pheasants that are released into the wild.

## Material and Methods

The study was carried out in the village of Govedare (42º 09'N; 24º 29'E), within the territory of the Hunting and Fishing Association, the town of Pazardzhik. Radiotelemetry transmitters weighing 10 grams RI–2BM (12) (Holohil Systems Ltd) were placed onto 20 pheasants (10 males and 10 females). All the marked birds exhibited the morphological features of the common pheasant subspecies. The birds were at the age of 120 days and were dispersed

by a method of direct release into the environment (this is the most popular method of settling practised by the Bulgarian hunters).

The study area was characterised by a wealth of farmlands, divided by a network of irrigation canals, around which there was dense vegetation of Common Reed (*Phragmites austrialis* (Cav.) Trin. ex Steud), Blackberry (*Rubus* spp.), Willows (*Salix* spp.) and Poplar (*Populus* spp.). The surrounding farmlands were planted primarily with Alfalfa (*Medicago sativa* L.), cereals and maize. There were small orchards of peaches, scattered in a mosaic pattern over the whole territory, along with abandoned vineyards, with an area that accounts for less than 10% of the study area.

The pheasants were tracked during the period 18.03 – 28.05.2011. A total of 11 site visits were performed, with each bird being located between 3 and 5 times in an average of 3 days. There were 78 localised displaced pheasants. All distances were measured using the Garmin eTrex Legend Global Positioning System and the program MapSource, Version 6.11.6 (Garmin Ltd.).

The causes of death were determined by means of the traces left on dead animals and the footprints around them. The causes were divided into 4 categories: birds of prey, predatory mammals, humans, and unspecified reasons. The index of survival was determined by Kaplan - Meier (Kaplan, Meier 1958).

The resource selection performed by the birds was determined by dividing the area of the habitat into different categories (Table 1) and by calculating the total number of birds in the respective habitat category.

After that a $\chi^2$ test was used to determine whether the number of birds in a localised area was significantly higher than the number of birds in the other areas (Fowler, Cohen 1995). To avoid the distortion of the results by the impact of external factors, such as strong wind or torrential rain, the only observations taken into account were those carried out in the same time period of the day between 10 a.m. and 4 p.m. and under good weather conditions.

The obtained results were compared and tested for statistically significant differences with non-parametrical (Kruskal-Wallis Test) and parametrical (F-test) tests. In all statistical tests the significance level was $P<0.05$.

**Table 1.** Distribution of the localised pheasants, depending on the type of area.

| Type of area | Area, ha | Number of birds located |
|---|---|---|
| Farmland, pastures, meadows | 640.5 | 8 |
| Rural roads | 4.5 | 2 |
| Irrigation canals and wetlands | 16.1 | 14 |
| Shrubs | 108.9 | 22 |
| Total | 770 | 46 |

# Results

Sixteen (80%) birds died during the study period (Table 2). A total of 4 birds survived until the batteries of their transmitters were depleted (Fig. 1).

In the case of 10 pheasants (62.5%, n=16), the cause of death was a predatory mammal. Five birds (31.25%, n=16) were killed as a result of human intervention. The cause of death of one pheasant (6.25%, n=16) remained unknown.

In three cases, a Red Fox, *Vulpes vulpes* (Linnaeus, 1758) was determined to be the cause of death. In one case a Golden Jackal, *Canis aureus* Linnaeus, 1758, was seen next to the body of a male pheasant (04/05/2011). During the fieldwork, birds of prey were not a cause of the losses. There was no significant difference between the number of dead male and female pheasants where the cause was a predatory mammal ($H=0.004$, $p>0.05$). There was no statistically significant difference between the loss of male and female birds, regardless of the cause of death ($H=0.08$, $p>0.05$). We cannot state that losses were greater with a certain sex of birds.

There was no significant difference between the pheasant losses during the first two days after the release and 4 days later ($H=0.79$, $p>0.05$). However, the losses up to and including the 15$^{th}$ day after the release were significantly higher than those between the 30$^{th}$ day after the release and the end of the study period ($F=5.0081$, $p<0.01$).

Only 2 females built nests. One of them was successfully observed with 12 chicks on 28.05.2011. The nest of the other female was found destroyed by a predatory mammal on 05.04.2011 (Fig. 2). The bird did not breed again and the reasons for this remained unknown. Both females built nests close to irrigation canals.

The average distances of pheasants' dispersal from the site of release are shown in Table 3.

There was no statistically significant difference between the dispersal of male and female pheasants ($H=0.918$, $p>0.05$). The distances increased with the increase of period after release.

During the daylight period between 10 a.m. and 4 p.m., when there are no clouds and no wind,

**Table 2.** Died pheasants by days after release.

| Days after the release of birds in nature | Carnivores | | Birds of prey | | People | | Unknown reason | | Non localised birds | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ | ♂ | ♀ |
| 2 days | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| 4 days | 2 | 3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 3 | 4 |
| 9 days | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 15 days | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 30 days | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 46 days | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 53 days | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 3 |
| Total | 5 | 5 | 0 | 0 | 3 | 2 | 1 | 0 | 1 | 3 | 10 | 10 |

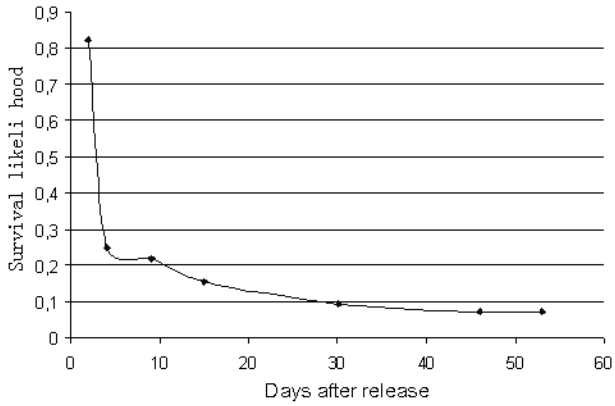


**Fig. 1.** Kaplan-Meier survival functions for pheasant in the study area

the areas occupied by irrigation canals adjacent to vegetation were preferred by the dispersed pheasants significantly more often than the other areas ($\chi^2$=236.4, p<0.01). After that, in our case, the most preferred areas remained the bushes and farm lands along with pastures and meadows. The roads were avoided by the birds and the specimens observed were mainly males.

# Discussion

This study demonstrated that the dispersal losses of pheasants in the study region in Bulgaria had their highest values during the first 15 days after the release. Similar results were reported by other authors in similar studies (*e.g.,* Robertson 1988). The results for the survival of other farm birds are also similar (Brittas *et al*. 1992, Leif 1994, Petrini *et al*. 1995, Sage *et al*. 2001, 2003, Venturato *et al*. 2001).

We found that the highest percentage of losses was caused by predatory mammals. Similar results were presented by Sage *et al*. (2001). During the study there were no registered losses caused by birds of prey, unlike other similar studies. We explain this finding with the low number of the birds of prey in the research area. The losses caused by people amounted to 31.25%. Other authors established increased losses after the start of the hunting season (Bagliacca *et al*. 2008). However, in this case, the losses were out of the hunting season, most likely caused by poachers. One should not underestimate the fact that in many cases the farm pheasants are not afraid of humans. Perhaps this was due to the production practices in the farms. Some authors explained the higher losses in the farm Grey Partridges (*Perdix perdix* Linnaeus) with ethological, physiological and anatomical limitations that reduce their fitness compared to the wild birds (Csermely *et al*. 1984, Paganin, Meneguz 1992, Putaala, Hissa 1998). Other authors found a low mortality rate and statistically insignificant difference between the mortality of the farm and wild pheasants. They attributed those results to the change in the rules of production in the farms and dispersal in nature (Bagliacca *et al.* 2008). In Bulgaria, one of the most popular practices is to release the pheasants directly into the wild without making any effort to improve the quality of the habitats. Often the birds are settling in unsuitable areas. This necessitates the creation of new rules for farm bird breeding and dispersal in nature and the improvement of the qualifications of people engaged in this activity.

The results for the pheasant dispersal after release demonstrated that the distance from the releasing site increased with the increase in the length of their stay in nature. Only a few birds reached further than 1 km away from the releasing site, which indicate that generally the pheasants remained in the

**Fig. 2.** Destroyed nest of one of the released pheasants (photo Chavdar Zhelev)

**Table 3.** Dispersion of pheasants on the day after release. Legend: average dispersion ± SD (min-max m).

| Days after the release of birds in nature | ♂ | ♀ | Total |
|---|---|---|---|
| 2 | 350±345.6 (40-1000m) | 170.2±120.9 (48-435m) | 260.1±268.4 (40–1000m) |
| 4 | 284.1±212.1 (63-631m) | 358.4±306.5 (56-819m) | 323.7±260.2 (56-819m) |
| 9 | 208±145 (49-405m) | 442±407,3 (56-1200 m) | 325±317,8 (49-1200m) |
| 15 | 901.8±1181.9 (280-3300m) | 629±310 (364-1000m) | 754.9±806.3 (280-3300m) |
| 30 | 404,7±42,6 (364-449m) | 765,3±337 (426-1100 m) | 585±291,9 (364-1100m) |
| 46 | 492,5±225,6 (333-652m) | 1000 | 661,7±333,6 (333-1000m) |
| 53 | 708±412,9 (416-1000m) | 996±288,5 (792-1200m) | 852±335 (416-1200m) |

region of dispersal. Similar results were presented by Bagliacca *et al*. (2008). We assumed that the dispersal increased until the dispersed pheasant density within the survey area reached a defined value and then this density remained relatively constant. However, in order to prove this hypothesis additional studies are required.

In this study the preferred habitat areas were the irrigation channels with adjacent vegetation. There, the pheasants found refuges and places to rest. The birds used agricultural land mainly as a source of food. Due to the large scale agriculture in the studied region, the wetlands near the farmlands remained the preferred areas. Similar birds preferences but in the winter period were indicated by Homan *et al*. (2000).

The results obtained demonstrated that pheasants must be dispersed in wetland areas with reliable and constant water sources. The birds remained in the area of release, but mortality was high, which makes the dispersal inefficient. The current production practices and dispersal methods applied in terms of pheasants in Bulgaria cannot be used to restore or maintain populations of this

species. Changes in the farm production technologies and methods of dispersal are needed in order to improve the efficiency of the pheasant release in the wild.

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