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Review Paper

Investigation of parameters relevant to the pheasant population in Serbia from 1999 to 2023

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ABSTRACT

The aim of this study was to present data on the number of pheasants, their harvested numbers due to hunting, the volume of obtained meat, and the numbers of pheasantries, feeding grounds for small feathered game, and hunters in Serbia from 1999 to 2023, based on data from the Statistical Yearbooks of Serbia, which report these parameters for each odd-numbered year. The average number of pheasants during the study period was 373 thousand, with 146.2 thousand harvested (39.28% of the total population). From the harvested pheasants, 102.4 tons of meat was obtained. The average number of pheasantries was 500.5, with varying production capacities. For supplementary feeding of pheasants from late autumn until spring, an average of 23,880 feeding grounds were installed, maintained by an average of 83,622 hunters. All examined parameters showed a slight increasing trend from 1999 to 2023, except for the number of pheasants, which showed a decline.

1. Introduction

The pheasant (*Phasianus colchicus L.*) is a non-migratory bird species from the order *Galliformes*, family *Phasianidae*. It originates from East Asia, from where it spread through Central and Western Asia to the Roman Empire and the Balkans. Today, it is distributed across all continents except Antarctica. Climatic and spatial conditions, along with dietary diversity, have contributed to minor genetic but more pronounced phenotypic variations within this bird species, which is now classified into 42 subspecies (*Davidović et al*., 2023), or 31 subspecies according to *Ashrafzadeh et al.* (2021). In Serbia, besides *Phasianus colchicus*, four additional subspecies are present in smaller numbers.

From the eighth to the twelfth week of life, pheasants exhibit clear sexual dimorphism. The primary differences between males and females are in body weight and body length (both greater in males), as well as in plumage color, which is especially vivid in males on the breast, neck, and head. In the wild, pheasants live in small groups (up to 20 birds), with one male typically accompanied by 5–6 females. Pheasants face numerous natural predators (foxes, cats, martens, hedgehogs, hawks, crows, magpies, wild boars), as well as threats from humans (hunters)

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and farmers (agricultural machinery) (*Ashrafzadeh et al*., 2021). In addition to predators, adverse weather conditions and food shortages also threaten their survival in the wild, leading to population declines, which are compensated for by pheasants bred in pheasantries. Pheasantries provide the necessary conditions for raising pheasants and preparing them for life in the wild.

The aim of this paper is to analyze pheasant population numbers and the harvest due to hunting, estimate the volume of meat obtained, and analyze the number of pheasantries, feeding grounds, and hunters in Serbia from 1999 to 2023.

2. Materials and methods

Data on the number of pheasants, number of harvested individuals, number of pheasantries, and number of hunters in Serbia from 1999 to 2023 were collected from the *Statistical Yearbook* of the Republic of Serbia, published by the Statistical Office of the Republic of Serbia. In the Statistical Yearbook, the data are presented from 1999 to 2023 for each odd-numbered year (n=13). Based on the total number of pheasants and the total number of harvested pheasants for each year, the percentage of harvested pheasants was calculated. The quantity of meat obtained was calculated from the number of harvested pheasants and the estimated carcass weight (based on literature data, the average carcass weight is 700 g), considering processing as for poultry carcasses prepared for roasting.

Statistical analysis of the results was performed using GraphPad Prism software version 7.00 for Windows (GraphPad Software, San Diego, CA, USA (http://www.graphpad.com)). All parameters were described using means and standard deviations. Trend lines were created for each examined parameter (Microsoft Excel 2010). The results are presented in tables and graphs.

3. Results and discussion

Data on the total number of pheasants, number of harvested pheasants, percentage of harvested pheasants relative to the total population, as well as the quantity of pheasant meat obtained through hunting in Serbia from 1999 to 2023 for each odd-numbered year (n=13), are presented in Table 1, while the trends for the examined parameters are shown in Figure 1.

In Serbia, from 1999 to 2023, the average number of pheasants was 373±30.06 thousand, with a relatively low coefficient of variation (Cv) of 8.06%. A slight decline in the pheasant population during the observed period can be noted from the graphical representation of population changes. The number of pheasants harvested annually ranged from 122 thousand (in 1999) to 173 thousand (in 2009), with an average of 146.2±17.05 thousand, showing a slight increasing trend. On average, 39.38±5.17% of the total pheasant population was harvested annually, also showing an upward trend. The quantity of meat obtained annually from harvested pheasants averaged 102.4±11.95 tons, following the trend of the number of harvested pheasants.

Among landfowl species, two orders—*Galliformes* and *Columbiformes*—are the most significant for hunting. In Europe, 52 million birds from these two orders are hunted annually, accounting for 42.12% of the total number of landfowl species birds that are hunted. Among them, the pheasant is the most frequently hunted species, being widely distributed across Europe and the most economically important non-migratory bird species (*Quaresma et al.,* 2016). The population of wild pheasants in Europe is estimated to be between 9,700 and 16,300 adult individuals. The total number of male pheasants in Europe ranges from 4,140,000 to 5,370,000, with the trend being further increase.

The introduction of pheasants into hunting grounds is a widely accepted practice in Europe. Introduction refers to the release of pheasants raised in pheasantries into hunting grounds when they are sufficiently mature (10–12 weeks old) and adapted to survive in the wild. In France, 10 to 15 million pheasants are released into the wild annually from pheasantries, with a smaller portion intended for export. Finland imports about 15,000 pheasants annually from France (*Chiatante and Meriggi*, 2022). Between 10 and 57 million birds annually are exported from the European Union to the United Kingdom (*Madden***,** 2022).

The highest natural population of pheasants is in Eastern and Central Asia, Russia, Georgia, and to a lesser extent Turkey, Armenia, and Greece (*Chiatante and Meriggi*, 2022). In Hungary, the pheasant population in 2016 was 630,435 individuals, with around 300,000 harvested (47.59%), which is higher both numerically and proportionally than the harvest in Serbia. In Hungary, the pheasant is considered the most important wild bird species, with its meat pri-

Table 1. Pheasant population parameters in Serbia from 1999 to 2023 (measured in odd-numbered years, n=13)

Parameter	$\bar{X}$	Measures of variation				
		Sd	Se	Min	Max	Cv (%)
Total number*	373	30.06	8.337	334	421	8.06
Harvest*	146.2	17.05	4.73	122	173	11.66
%	39.38	5.17	1.434	28.74	48.07	13.13
Meat**	102.4	11.95	3.314	85.4	120.1	11.66
Number of pheasantries	505.2	263.6	73.12	51	763	52.18
Feeding stations	23880	2761	765.7	19103	27901	11.56
Hunters	83622	5553	1540	74544	93078	6.64

* thousand; ** ton.

marily consumed by hunters themselves (*Fernye et al*., 2017).

Hunting of game species in Serbia also includes feathered game, among which the pheasant is the most commonly hunted species, primarily for its meat. Considering the volume of harvest, the estimated pheasant carcass weight (700 g), and the human population in Serbia (6.5 million), the calculated per capita meat consumption is approximately 17 g per year. In Hungary, this figure is slightly higher, around 22 g. The estimated carcass weight of pheasants, used to calculate meat consumption in Serbia and Hungary, was taken from literature data reporting average carcass weights of pheasants and pheasant hens. These values for male pheasants are 898 g, 900 g, 759 g, 720 g, 896 g, and 915 g, while for hens they are 644 g, 732 g, 583 g, 755 g, 660 g, and 895 g, mostly depending on age and diet (*Kokoszynski et al.*, 2014; 2018; 2024).

Pheasant meat cannot be found in Serbia's retail stores (unless imported), not even in the best-supplied shops. Occasionally, during the peak hunting season (autumn), pheasant meat may be available at local markets in Vojvodina (Novi Sad, Sombor, Subotica). There are no registered slaughterhouses for pheasants in Serbia. This could potentially be addressed by the introduction of mobile slaughterhouses, which are registered for animal slaughter in some countries (*Baltić et al*., 2024).

Pheasant meat has exceptional nutritional value due to its high protein content (over 25% in breast meat) and lower fat content (below 0.5%) compared to other types of meat. The protein content in thigh and drumstick meat ranges from 22% to 23%, with fat content not exceeding 2% (*Kokoszynski et al*., 2024; 2018; *Franco and Lorenzo*, 2013; *Tucak et al*., 2008; *Fernye et al*., 2017; *Strakova et al*., 2011).

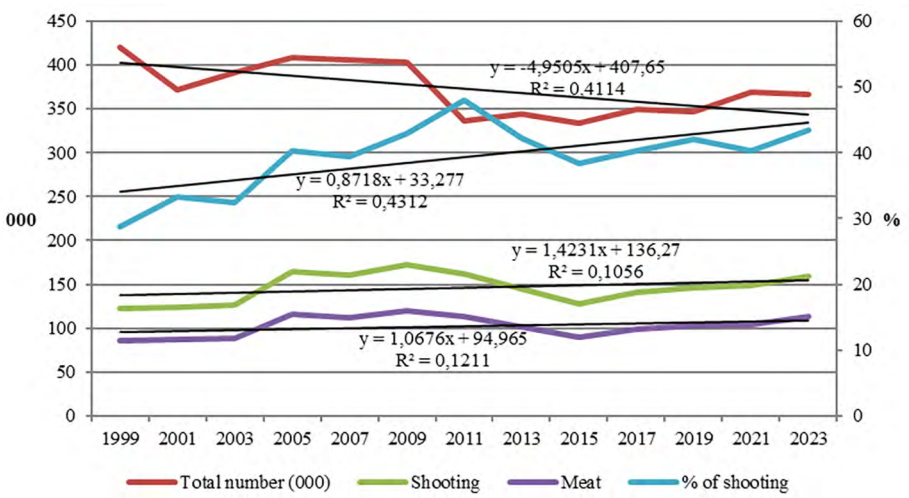

Figure 1. Trend of pheasant population parameters in Serbia from 1999 to 2023

In natural conditions, pheasant mortality is extremely high (75% to 78%) due to numerous predators, food shortages, adverse weather conditions, and the large number of hunters. Therefore, pheasants raised in pheasantries are released into the wild. These facilities have breeding flocks, incubators, and the ability to provide optimal housing and feeding conditions for birds of different ages, as well as gradual adaptation for survival in the wild.

Since a decline in the wild pheasant population was noticed even before 2000, increasing attention has been given to establishing new pheasantries and expanding the capacities of existing ones. The number of pheasantries in Serbia has notably increased since 2003. The trend of changes in the number of pheasantries in Serbia from 1999 to 2023 is shown in Figure 2. The average number of pheasantries in Serbia during this period was 505.5±263.6. Pheasantries in Serbia have different production capacities, ranging from several thousand to over 200,000 birds (as in the pheasantry in Bač). The total capacity of pheasantries in Serbia is close to one million (*Popović and Stanković*, 2009).

To maintain pheasant populations in the wild, supplementary feeding is essential, especially from late autumn through early spring, as well as during the summer when pheasants are released from pheasantries into the wild (*Đorđević et al*., 2008). For this purpose, feeding stations are established in open areas or under shelters, where food is provided for the birds. The trend of increasing numbers of feeding stations for small feathered game (pheasants, quails) from 1999 to 2023 is shown in Figure 3. The same figure also presents the change in the number of hunters during the same period. The ratio of the average number of feeding stations (23,880±2,761) to the average number of hunters (83,622±5,553) indicates that three to four hunters are responsible for providing food at one feeding station for feathered game.

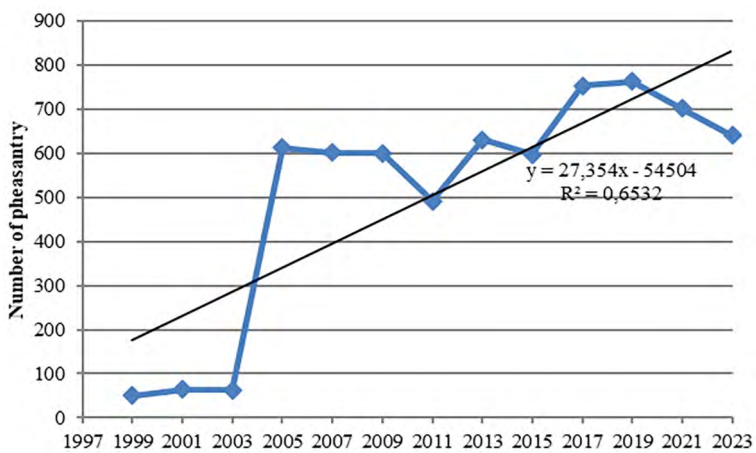

Figure 2. Trend of the number of pheasantries in Serbia

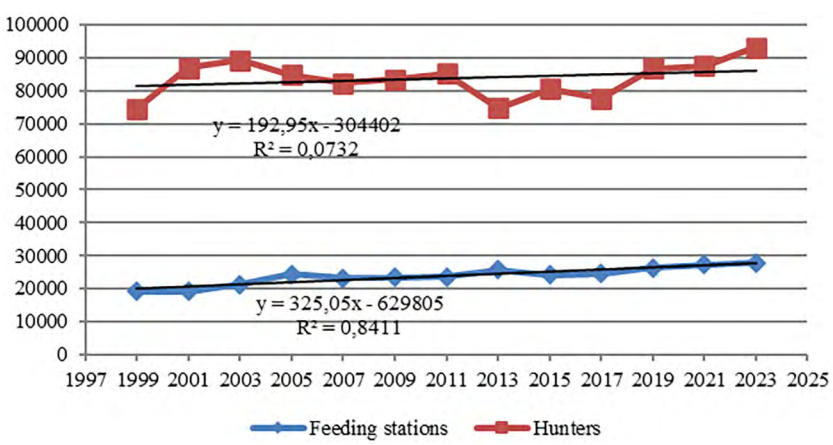

Figure 3. Trends of the number of feeding stations and hunters in Serbia

4. Conclusion

The pheasant population in Serbia has been declining from 1999 to 2023, which could be a result of increased hunting harvest and the growing number of hunters. An increase in pheasant numbers in hunting grounds can be expected through greater introduction of pheasants from pheasantries, an increased number of feeding stations and the larger amount of food provided for small feathered game, as well as a reduction in the number of predators near the hunting grounds.

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