

<https://doi.org/10.30546/300045.2026.03.1.523>

## DEVELOPMENT OF A TECHNOLOGY FOR BREEDING THE RARE AND ENDANGERED BLACK FRANCOLIN (*FRANCOLINUS FRANCOLINUS* LINN., 1766) IN AVIARY CONDITIONS IN THE LIBERATED TERRITORIES

Avtandil Musayev\*, Anar Mammadov

Baku State University, Z. Khalilov Str., 23, AZ-1073, Baku, Azerbaijan

Received 23 april 2025; accepted 30 november 2025

---

### Abstract

In the territories liberated from occupation, black francolins (*Francolinus francolinus*) were studied during the reproductive period (based on parameters such as egg collection from the wild, incubation regimes, and feeding rations for chicks of different age groups), and a technology for keeping these birds in aviary conditions was developed. It is recommended to maintain parent populations of black francolins in aviary conditions, ensure their reproduction, preserve their gene pool, and release them into the wild based on ecological principles.

**Keywords:** rare; black francolin; aviary; reproduction; technology; conditions; endangered

---

### I. Introduction

The breeding and introduction of rare and endangered species in captive conditions is part of the strategy for preserving these species in the territories liberated from occupation, and represents one of the methods for their conservation and restoration in nature [6]. Nowadays, theoretical and practical work is being carried out in many zoological parks around the world for the breeding of higher vertebrates. In 1986, V.E. Flint rightfully stated: “*We must be able to develop the scientific and practical foundations for breeding any species of animal in aviary conditions. We should not wait for the population to decline before beginning to develop breeding methods in captivity.*” Before the occupation, the largest populations of black francolin in the Karabakh natural region were found in the territories of Zangilan, Jabrayil, and Fuzuli districts. During the period of occupation, the natural environment of these areas was destroyed. Therefore, developing the scientific and practical foundations for the breeding of black francolin in aviary (artificial) conditions remains a relevant and important task.

---

\* Corresponding author: Tel.: +994 050 490 86 07  
E-mail address: [musayevavtandil@yahoo.com](mailto:musayevavtandil@yahoo.com)

## **II. Materials and Methods**

The seasonal ecological and ethological characteristics of the habitats of the studied birds, as well as their evaluation, are determined based on a five-point scale [1]. During the reproductive period, each bird species stimulates its reproductive phase through specific acoustic signals. These acoustic signals serve two main functions: first, they synchronize the overall mating activity of the micro-population; second, they stimulate the development of the reproductive systems of both individuals. Research in this area has been carried out following methodologies from [2, 3].

To achieve successful breeding of the Caucasian black grouse (turach) in aviary (artificial) conditions, studies were conducted in accordance with methodologies proposed by [2, 3, 7, 8, 9]. Acoustic signals of turach birds living in different biotopes during the reproduction period were recorded and analyzed using a *Kay Electric company* synthesizer. While recording the acoustic signals, the birds' social-physiological condition and their behaviors during vocalization were noted [4, 5]. During the egg-laying period, the behavior of the female in the nest was observed using a telescope and binoculars.

## **III. Results and Discussion**

The vocal communication of our research subjects—galliform birds—is the most reliable form of interaction in their ecological environment. Through acoustic communication, they search for food, form pairs, protect themselves from predators, and determine their direction of movement. The acoustic activity of the turach is directly influenced by weather conditions. During the years of research, their vocal activity began in the first ten days of March. If no disturbing factors are present, turach can move easily on the ground throughout the day. In all seasons, they move among dense grass and reeds with their bodies lowered and necks extended. When sensing danger or stress, they hide. Under threat, they rise vertically into the air and fly 200–400 meters to hide again in dense vegetation.

### **Egg collection mechanism from nests:**

In Azerbaijan, turach starts laying eggs in April, with peak egg-laying occurring in May. Our research showed that the female begins brooding after laying the last egg. Three nests were monitored for egg collection. The second and third eggs in the nests were marked with a pencil. To mark the eggs, 3–4 eggs were taken from each nest. It was found that, in most cases, the first and last eggs in the nest were not fertilized. To assess the efficiency of the egg collection method, observations continued on the nests. By collecting fresh eggs from the nests in natural conditions, we prevented a decrease in the productivity of laying birds. The females continued laying eggs and brooded with 7, 8, or 9 eggs in each nest.

The eggs are placed in cardboard boxes in a single horizontal layer. The bottom of the box is lined with cotton. Collected eggs are transferred to the incubator within 24 hours.

The rate of incubation in natural and artificial conditions is determined, which provides several advantages:

1. In the artificial setting, only unincubated eggs are placed in the incubator.
2. Eggs at the third stage of brooding can be quickly warmed and transported from the nesting site.
3. Collecting unincubated eggs from the nest allows for an extended laying period and increased egg count.

Based on the incubation regime observed in turach nests in nature, an industrial incubation regime was developed. The ecological basis for egg collection from nests was also studied, as well as the technological aspects of raising turach chicks in aviary conditions. Retention of wild stereotypic behavior forms in chicks was also examined [7, 8, 9,10].

The composition of bird feed, diversity of vegetation, and its utility for shelter and roosting were studied based on their characteristics and significance. During the reproductive period, pair formation,

nesting territory acquisition, nest morphometric measurements, vegetation coverage of the nest from above and the sides, and the openness of the nest were all studied using known methodologies.

The egg-laying duration for each species is determined from the time and date the first egg is laid until the bird lays the last egg and leaves the nest. Egg-laying frequency is calculated based on the interval before the second egg is laid. Eggs are numbered in the order they are laid. The time the laying bird enters the nest, the time spent laying the egg, and the time of departure are measured with a stopwatch. Lighting levels in nests are measured using a lux meter, depending on the angle of sunlight.

Nesting territory acquisition, nesting sites, nest conditions, number of nests, and attachment to the nesting area are determined through brooding and chick-rearing behaviors.

The selection and use of shelter and roosting places by adult birds with chicks, seasonal types of trees, shrubs, vegetation cover, terrain type, and soil moisture levels were all studied.

Before releasing aviary-bred birds into new areas, several issues must be addressed:

1. The food supply and shelter capacity of the release area must be assessed.
2. The number and species composition of predators in the area must be identified.
3. Biotechnical measures must be implemented.

Before chicks are released into the wild, food plants and shrubs that the birds will feed on in different seasons must be planted. It is also advisable to plant natural vegetation and trees used by birds for shelter and roosting. Two to three hours before release, gunfire noise should be used to scare predators away from the area.

#### **IV. Conclusions**

1. During the reproductive period, the black francolin stimulates its reproductive stage using specific acoustic signals;
2. Based on the frequency, timing, and nature of the acoustic signals, the species ready for mating in the aviary can be identified;
3. In this case, the acoustic signals perform two main functions: first, they synchronize the overall mating activity of the micro-population; second, they stimulate the development of the reproductive systems in both individuals;
4. Managing the behavior of birds through acoustic signals is not only the cheapest and most effective method but can also be widely applied in zoological parks, artificial breeding farms, or centers.

#### **References**

- [1] Vinogradov VV, Morozkin NI. Types of habitats in the Kyzyl-Agach Reserve and their qualitative assessment as environments for waterfowl. In the book "Natural environment of birds on the coasts of the Caspian Sea and adjacent lowlands." // Proceedings of the Kyzyl-Agach Reserve. Baku, 1979, Issue 1, pp. 17–53.
- [2] Illichev VD. The biological environment as a signaling and stimulating factor // The sound environment as a stimulating and influencing factor. Methodological recommendations. Moscow, 1985, pp. 83–92.
- [3] Illichev VD, Salaeva OL. Ecological systems of human communication with domestic birds // Bulletin of the Russian University of Peoples' Friendship. Series: Ecology and life safety, 2004, No. 1, pp. 12–18.
- [4] Musayev AM. Acoustic signaling and behavioral control of galliform birds. PhD Dissertation in Biological Sciences, Moscow, 1983, 205 pages.

- [5] Musayev AM, Tikhonov AV. Some sound signals of the Caucasian snowcock and black francolin during the nesting period. // Ornithology, Moscow State University Publishing, 1984, No. 19, pp. 206–208.
- [6] Musayev AM, Tuaeov DG, Babaev IR. Materials on the artificial breeding of some species of galliform birds in Azerbaijan using acoustic stimulation // In the book “First All-Union Meeting on the Problem of Cadastre and Animal Inventory.” Ufa, 1986, pp. 312–314.
- [7] Musayev AM. On the nesting ecology of the black francolin in Azerbaijan. / In the collection “Fauna, Population, and Ecology of Birds of the North Caucasus.” Materials of the scientific-practical conference. Stavropol, April 23–27, 1991, pp. 24–25.
- [8] Musayev AM. The natural temperature regime of the black francolin's nest and the behavior of the incubating bird / X All-Union Ornithological Conference, Vitebsk, 1991, pp. 236–238.
- [9] [Musayev AM, Agaeva SV. Feeding characteristics of the black francolin under artificial breeding conditions / X All-Union Ornithological Conference, Vitebsk, 1991, pp. 238–240
- [10] Mammadova AO. Bioindication of environmental quality based on plant mutational and modification variability. /Cytol. Genet., 2009,v.43, No2,pp.61-64(in Russian)