

DESCRIPTION FOR THE GENERAL PUBLIC

In Poland, as in others Western European countries, despite many of protective actions aimed at reducing the negative phenomena in the forest biotopes, the reports of unfavorable condition of many animal species population living in these areas, are still numerous. One of this species is capercaillie (*Tetrao urogallus*) whose population in Poland in the 60s of the last century exceeded 1,500 individuals. To 1995 it was still a hunted bird, while now is one of the most endangered bird species. Their total number is estimated at approx. 600-700 individuals. As in many others feral avian species, the causal factors known to have a negative impact on capercaillie populations include environmental pollution, unfavorable forestry management, perturbation of their habitat by human occupations due to increased tourist activity and density of natural predators.

In order to assist the reproduction of captive kept capercaillie and to improve the effectiveness of aviary breeding, as well as to create a capercaillie genetic reserve *ex situ in vitro*, the cooperation between Wisła Forest District (the largest capercaillie aviary breeding center in Poland) and Wrocław University of Environmental and Life Sciences, was established in 2008. As the results of this cooperation the effective methods for semen collection both, from males kept in aviary with or without the females, as well as from the wild males, the assessment of capercaillie males' usefulness as sperm donors, methods for short-(in a liquid stage) and long-term (cryopreserved in liquid nitrogen) semen storage were developed. We also initiated the creation of database of genetic profiles of individuals kept in captivity and wild living birds.

Unfortunately, despite the introduction of many innovative solutions in captive birds' management and reproduction, the way of chicks rearing and their restitution, and a huge commitment from Forestry Wisła District and other centers involved in capercaillie protection, there are still many problems, which solution may contribute to further increase in efficiency of capercaillie bred in captivity, and as a consequence, increase in wild living in various regions of Poland.

In small, isolated populations, both maintained *ex situ* and *in situ*, the reduction of genetic diversity and growth of inbreeding is observed very often and the question is how this affects the males' reproductive potency and the most important, the breeding success, and a quality and survival rate of a progeny. Moreover, in captive breeding, where females have a limited ability to choice a male as the father of their progeny, then later nesting sites, the observation of reproductive behavior, which largely depends on the individual characteristics, is of particular importance in the reproductive success. Also, in order to protect the first laid egg from excessive supercooling, which may result in embryo mortality, and to encourage female to lay more eggs, the collection of early laid eggs is practiced in aviary breeding. Such action is based on a phenomenon often observed in the natural environment, so-called reneesting. It occurs when the first eggs are destroyed by predators and females decide to start a new clutch. In aviaries, the application of this phenomenon may contribute to increase in number of reared chicks and breeding efficiency. However, the question is how this will affect the hatchability and survival rate of chicks.

The overall plan of planned study is to determine: what threshold of genetic variability of individuals (level of inbreeding and parents relatedness) is the limit, allowing for correct reproduction and offspring survival; the relationship between semen quality and the level of inbreeding; whether there is a correlation between the genetic distance of parents and the level of egg fertilization, hatchability and early survival of chicks; whether the differences in reproductive behavior of both sexes (the way and intensity of male tooting, attempts of contacts with females and mating frequency), depend on parents relatedness, and whether female nesting behavior is related with their age, nest location and weather conditions, as well as, if an increase in egg number (through egg picking-up procedure), will not affect the quality, and above all, the survival rate of chicks.

The proposed project is of a great importance with regard to the necessity of increasing the reproductive efficiency of capercaillie kept in captivity and to prevent their further inbreeding. The results obtained can be used to determine the minimum level of population genetic variability required for proper reproduction, and thus reconstruct the population without necessity of outside interference. They will be very valuable both, for captive flocks and wild living small, isolated populations. Obtained results will expand the knowledge on relationship between genotype and traits associated with reproduction, and will accelerate the process of renewal and strengthening of wild population by providing the greater number of healthy offspring, as is urgently needed to rebuild the Polish population of capercaillie.