

## Correlation between Age and Fertility Indices of Rainbow Trout (*Oncorhynchus mykiss*) Females

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**Abstract.** Because there are few salmonid farms in Romania where trout are artificially breed, is necessary for them to streamline their technological and economic activities, based on a selection-breeding program. Factors that influence the production and reproduction performance of rainbow trout are numerous, one of them being breeding age. Due to this, we aimed to identify the optimal age for use in breeding females of rainbow trout. For this, were randomized retained 20 rainbow trout females with 3, 4, 6, 8 and 10 years age old (20 from each category). They were weighed and measured, being analyzed the breeding performance, like ovary weight, the total number of eggs, egg diameter, egg volume, individual mass of eggs. The obtained data were used to calculate the reproduction indices: gonadosomatic ratio **GSr**, absolute individual index of fertility – Williams **Waif**, Behning-fertility coefficient **Bfc**. Between the values of these indices and the values of initial phenotypic characters analyzed, were calculated correlations. The results lead to the conclusion that, in practice, must be used rainbow trout females between the ages of 4 and 6 years.

**Keywords:** rainbow trout, females, age, fertility indices, correlations

**Introduction:** In Romania there are few salmonid farms were the artificial reproduction of trout is practiced, being preferred the imports of biological material, as embryonated eggs (Finn, 2007). For those who dealing with artificial reproduction of trout, of great interest is the selection of breeding stock, using several indicators: age, conformation, fertility, growth performance (Pante *et al.*, 2002; Serezli, 2011).

**Aims and Objectives.** From the perspective of economic efficiency and the increase of productivity and product quality in Romanian trout farms, we propose to do an analysis of the impact of breeding age in rainbow trout females and its effects on fertility indices.

**Materials and methods:** Were performed somatic and gravimetric measurements on rainbow trout (*Oncorhynchus mykiss*) breeding females, from the Fiad-Telcișor salmonid complex, Bistrița-Năsăud County. Also, were taken samples of eggs, from each specimen, in part. These were subsequently analyzed. Based on the obtained data, were calculated the fertility indices (Gonadosomatic ratio **GSr**, Absolute individual index of fertility – Williams **Waif**, Behning-fertility coefficient **Bfc**) and the correlations between them, different age and phenotypic characters.

**Results and Discussions.** Were analyzed five groups of rainbow trout breeding females at 3, 4, 6, 8, and 10 years age old. The obtained results indicate increasing values for all phenotypic characters, directly proportional to the age. For performance and breeding indices, the values were obtained in the form of a Gaussian curve, which shows precisely the optimal age for breeding. In terms of the obtained correlations, they are generally strong between indices of breeding and gravimetric measurements (body weight before and after egg collection):  $Ibw-Gsr=0.912$  (3 years),  $0.693$  (4 years),  $0.467$  (6 years),  $0.493$  (8 years),  $0.585$  (10 years), decreasing with age, respectively  $Fbw-GSr=0.892$  (3 years old),  $0.835$  (4 years

old), 0.457 (6 years old), 0.559 (8 years old), 0.631 (10 years old). The same situation was obtained for the correlations Ibw-Waif: 0.953 (3 years), 0.847 (4 years), 0.761 (6 years), 0.767 (8 years), 0.353 (10 years), and Ibw-Bfc: 0.993 (3 years), 0.789 (4 years), 0.780 (6 years), 0.777 (8 years), respectively 0.825 (10 years) (Fig. 1, 2 and 3).

Low and negative correlations were obtained for almost all selection and breeding indices, correlated to the total length (TL) of breeding females, as follows: TL-GSr = -0.027 (3 years old), -0.101 (4 years old), -0.475 (6 years old), -0.427 (8 years old), -0.505 (10 years old); TL-Waif = 0.162 (3 years old), 0.027 (4 years old), -0.320 (6 years old), -0.220 (8 years old), -0.157 (10 years old); TL-Bfc = 0.130 (3 years old), -0.045 (4 years old), -0.325 (6 years old), -0.382 (8 years old), -0.314 (10 years old). Therefore, it appears that along with the increase of total length (TL) of the breeding females, the values of coefficients and indices of selection and breeding are decreasing. Also, negative correlations were obtained between selection and breeding indices correlated to the total number of eggs (Etn) produced.

Contrary to the above, the correlations between the indices for breeding and somatic characters respectively gravimetric, the eggs, individually analyzed and expressed as mean values are strong and positive, falling within the following ranges: Ew-GSr = 0.586 (6 years old) – 0.932 (3 years old); Ew-Waif=0.744 (10 years old)–0.971 (3 years old); Ew-Bfc=0.981 (6 years old)–0.997 (3 years old).

The literature does not present data concerning the correlations between indices for breeding and somatic characters, so, this is the reason for we cannot compare the obtained data with other.

However, based on the obtained data, we recommend use in artificial reproduction the rainbow trout females with age between 4 and 6 years.

**Conclusion.** It was found the existence of strong interdependencies between indices of fertility and the age of rainbow trout breeding female, the optimal range for use in the reproduction of these, being between 4 and 6 years of age.

## REFERENCES

1. Finn R.N. (2007). The physiology and toxicology of salmonids eggs and larvae in relation to water quality criteria, *Aquatic Toxicology*, 81: 337-354.
2. Pante M.J.R., Gjerde B., McMillan I., Misztal I. (2002). Estimation of additive and dominance genetic variance for body weight at harvest in rainbow trout, *Oncorhynchus mykiss*, *Aquaculture Journal*, 204: 383-392.
3. Serezli R. (2011). Reproductive performance variation between spawning groups in rainbow trout (*Oncorhynchus mykiss*), *Turkish Journal of Science & Technology*, 6(1): 11-16.