The Study of Embryos Survival Rate after Eggs Triploidy Treatment in Rainbow Trout (*Oncorhynchus mykiss* Walbaum *)*

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Abstract

The aim of the paper was the study of embryos survival rate after eggs triploidy treatment in rainbow trout (*Oncorhynchus mykiss* Walbaum). The triploidy induction was preformed during the cold period of January when the water temperature reached 8-10°C and the environmental conditions inducted the natural reproduction of rainbow trout. The reproducers used for the experiments were between 3-5 years old. The spawn fertilization was made by the wet method. For each experimental lot higher losses have been observed at the end of the first, second, third and the middle of the fourth decade. The T1 experimental lot has registered the highest losses in the first decade while the T2 lot in the last decade. The losses registered for the T1 and T2 experimental lots during the spawn incubation were significant higher comparing to the control lot M as resulted by the statistical interpretation of data's.

Keywords: embryos survival, rainbow trout, triploids

1. Introduction

The polyploidy is referring to multiplication of the number of chromosome sets of an individual. The individuals with two sets of chromosomes are called diploids, with three are triploids [1,2], with four are called tetraploids and so on [2,3]. Usually the majority of the individuals are diploids with two sets of chromosomes (2n), one set of chromosomes inherited from the mother (n) and other set of chromosomes from the father (n). The triploids are individuals with three sets of chromosomes (3n).

In mammals and birds triploidy is usually deathly [4], but in several species of plants and fishes is not lethal. The triploid fishes are viable but in most of the cases are sterile because of insufficient gonads development, Allen [4]. Breeding of triploid fishes has several advantages like increase daily body weight and development, high percentage of meat per carcass better meat quality and increase rate of individual surviving. The sexual maturity delay by gonads development inhibition allows the energy transfer needed for reproductive function development to the somatic tissue development, Walters [4]. The triploidy can be preformed just after a normal fertilization forcing the retaining of the second polar body by applying a heat shock (warm or cold), a high hydrostatic pressure, with anesthetics or other chemical substances [1,4-8].

The success of the triploids treatment depends on the time of heat shock initiation, its magnitude and its duration.

2. Materials and methods

The starting period for performing the experiments was January when the water temperature reached 8-10°C and the

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environmental conditions inducted the natural reproduction of rainbow trout (*Oncorhynchus mikiss* Walbaum*).* The reproducers had the age between 3-5 years. The eggs fertilization was made by the wet method. The eggs from several females was recovered in a bowl (Figure 1) onto which was deposit the milt from the males (eggs from one female and milt from two males) and easily blend using a feather (Figure 2). After mixing, the bowl with eggs was introduce in water for thermal equilibration and fallowing was preformed the sperm activation for fertilization.

Figure 1. Eggs recovery

Figure 2. Milt recovery and homogenization

At 5 minutes from the sperm activation and eggs fertilization the heat shock was applied in order to retain the second polar body.
The heat shock was preformed with warm water at 28°C for the experimental lot T1 and 29°C for the experimental lot T2. The control lot was directly introduced in the normal incubation circuit of fertilized eggs. For heat shock induction was used an stainless steel thermostatic water bath. The fertilized eggs were introduced into a container provided with holes to allow heating at the desired temperature (Figure 3). The exposure time was 7 minutes for the T1 lot and 5 minutes for the T2 lot.

Figure 3. Appling the heat shock in the thermostatic water bath

After applying the heat shock the eggs were numbered and than incubated (Figure 4).

Figure 4. Incubators for rainbow trout spawn

The death eggs, having a white color were removed and counted daily from the incubator at both experimental lots (T1 and T2) and the control lot (M) during the 38 days of incubation period. The entire incubation period of eggs summed approximately 340°C. The software statistical interpretation of data's and chart representation was preformed.

3. Results and discussion

Each lot (T1, T2 and M) had at the beginning of experiments approximately 35.000 fertilized eggs. Daily during experiments the death eggs (white color) from each lot were removed and counted.

The loss dynamic over the experimental period of 38 days from the eggs fertilization, heat shock application and sprout hatching is presented in Figure 5. From the chart data's presentation with the help of logarithmic curves can be observed that in the case of the T1 lot the loss curves has an ascendant tendency up to the end of the second decade (20 days) after that becomes linear. For the T2 experimental lot the loss curves has a descendent tendency up to the middle of the second decade before becoming linear. For the control lot M, the loss curve is almost linear for the entire experimental period. For each experimental lot higher losses have been observed at the end of the first, second, third and the middle of the fourth decade. The T1 experimental lot has registered the highest losses in the first decade, while the T2 lot in the last decade.

The total number of eggs lost during 38 days of incubation was different for each lot. For the T1 lot 7841 death eggs, for the T2 8759 death eggs and for the M lot 2316 death eggs were eliminated.

From data's presented in table 1 we observed that the highest losses were register to the T2 experimental lot (233.84±20.86) and the lowest were observed to the T1 experimental lot (216.11±26.47). The statistical difference between the experimental lots was assured using the t test. The losses between the experimental lots T1 and T2 were not statistical significant (0.57^{ns}). Between the experimental lots T1 and M the differences were statistical assured as significant (5.74***). Between the experimental lot T2 and M the differences were also assured as significant (9.15***). The highest variance and standard deviation was registered for the experimental lot T1 which indicates the higher variation of daily loss. In the case of M lot the daily losses the variation and a standard deviation were low and the daily losses were constant. High losses were register at the middle of the IV-the decade influenced by the environmental water conditions.

The statistical interpretation and the chart representation of data's are presented in table 1 and Figure 5.

Table 1. The average, dispersal indices and statistical signification of control and heat shocked rainbow trout

Specification	No. of specification (n)	X ±sx	s	Differences and statistical signification		
				T1	T2	M
Experimental lot T1	38	216.11±26.47	163.16	x	0.57^{ns}	5.74***
Experimental lot T2	38	233.84±20.86	128.65	x	x	9.15***
Control lot M	38	69.05±10.96	67.58	x	x	x

-ns=p>0.05; *=p<0.05 ; **=p<0.01 ; ***= p<0.001

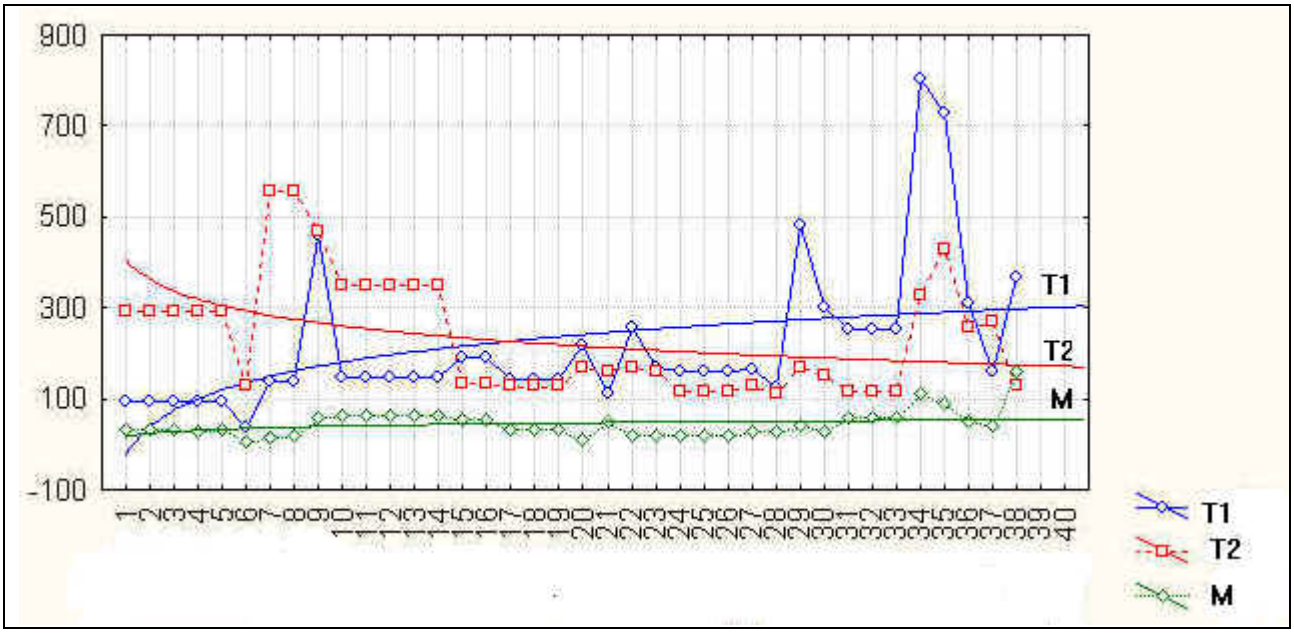

Figure 5. The logarithmic curve of losses registered during eggs incubation

4. Conclusions

A temperature of 28°C for the T1 experimental lot and 29°C for the T2 experimental lot to which was applied the heat shock had no significant influence on to the losses rates during the total period of eggs incubation.

The exposure time to the heat shock for 7 minutes for the T1 experimental lot and 5 minutes for T2 experimental lot had no significant influence on to the losses rates registered during the eggs incubation period.

The losses registered for the T1 and T2 experimental lots during the eggs incubation were significant higher comparing to the control lot M.

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