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Salinity Effect on Growth, Permanence, and Blood Factors of Abramis Brama Orientalis Fry of Caspian Sea in Different Weights

Mahshid Amiri, Mehdi Shamsaie Mehrjan

Astract - The present study is developed for determination of an appropriate weight of releasing Abramis Brama Orientalis fry of Caspian Sea toward increase in fisheries returning coefficient. Consequently, blood factors including Sodium Ion, Potassium Ion, chlorine Ion, Cortisol Hormone, Blood Protein, growth and permanence indexes of Abramis Brama Orientalis fry are considered in four different weight groups of 320, 470, 730 and 990 mg. in fresh and brackish waters. The test extended up to 14 days in brackish water (9 g/l salinity). The result show that the blood factors in all weight groups have high significant differences in fresh waters (p<0.01). In the end of the test, the Sodium viscosity of Abramis Brama Orientalis fry blood has no any significant differences in none of the weight groups (p>0.05); whereas, other blood factors have significant differences to each other (p<0.01). No any differences were observed within growth index of the weight groups (p<0.05). Also, holding higher percentage of permanence at the end of the test and considering the quantity of mortalities, the weight group of 990 mg. is selected as the best weight option of Abramis Brama Orientalis due to its physiological readiness for releasing to the Caspian Sea.

Keyword- Abramis Brama Orientalis, Cortisol Hormone, brackish water, Caspian Sea

I. INTRODUCTION

Caspian Sea is known to have been a habitat of different spices of fishes and aquatic animals. Some of the spices are known as migrant ones that migrate to rivers and ponds for reproduction. The *Abramis Brama Orientalis* is a member of *Cyprinidea* family and *cypriniformes* group and ostheichtheye classification [1] that is found in groups near Caspian Sea Costs, especially Anzali pond. The *Abramis Brama Orientalis* is lived in lakes and rivers with a soft current and muddy bank as well as North Sea area and north of Iran (Caspian Sea) that may entered in brackish waters [2]. Their hibernation happens in group in river sumps. The *Abramis Brama Orientalis* will be maturated in three years. The spawn commenced as of the March middle up to the beginning of the June. A 2.5 Kg *Abramis Brama Orientalis* may spawn 140000 [3]. *Abramis Brama Orientalis* fry are found in schools near the costs and feed from planktons. The older ones are more prudent than the younger ones and may be found at deeper areas of the lake.

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This spices is known as slow growth ones [4]. Unfortunately this spice is about to be instanced. According to the reports, in order to save resources of this valuable spice, different reproduction methods were done in center for reproduction and restoration. The baby fishes encounter a change in salinity upon the releasing to the river and pond. The salinity is one of the most essential factors on growth and permanence of fish fry. Alternation in blood factors and chloride cellular quantity of fish gill were approved after encountering salinity changes. Determining an appropriate weight for releasing *Abramis Brama Orientalis* fry, the present study tries to decrease losses upon encountering salinity changes of Caspian Sea. The results may help the center for reproduction and restoration to be successful in generation restoration of the mentioned spice.

II. MATERIALS AND METHODS

All executive stages of the present project are done through 20 days (6 days for adaptation of the samples with the manual nutrition in pools and 14 days for classification in 40-liter pools) in Shahid Ansari center for reproduction and restoration of ostheichtheyes resources of Guilan Province as of July 18, 2014. There were four different weight groups of fry spawned through continuous reproduction of the generators in the workshop. The first weight group is 990 mg and the last one is 320 mg. Thus classification samples of fry are set for 320, 470, 730 and 990 mg and three repeats were assigned for each one in order to take necessary measures toward determination of the most appropriate group for releasing to brackish waters of the Caspian Sea. Testing crates were provided by 20x50x40 Cm aquariums which hare filled by brackish waters of Nahang Roga region (Salinity of 9 ppt). A central pump provided The air of the aquarium. Physicochemical conditions of the water including Oxygen (oxygen meter, HACH-sensioal) [5] temperature (WTW, Germany) [6], PH (HACH-sentioal) [6], salinity by salinity meter (WTW, Germany) were daily monitored and inspected. Also 20% amount of the waters was replaced for exhaustion of excrements and leftovers. Reproduction workshop salinity degree was 0.9 g/l. The test was begun upon fishing 30 fry of each weight group from workshop water. This was done for biometrics and blood sampling toward determination of Cortisol, Protein, Sodium Ion, Potassium Ion, and Chlorate Ions levels. Samples were moved to pathology laboratory in Rasht City. All executive stages of the present project are done through 20 days (6 days for adaptation of the samples with the manual nutrition in pools and 14 days for classification in 40-liter pools) in Shahid Ansari center for reproduction and restoration of ostheichtheyes resources of Guilan Province as of July 18, 2014.

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Number of the fry of each group in 40 liter- pools (containing 2 liter water) was calculated on the bases of live schools [7]. Consequently 320, 470,730 and 990 mg. weights were considered under the salinity degree of releasing region of fry with the amount of 18, 24, 35 and 50 in each liter of Anzali pond (0.9 g biomass in each liter). fry were kept in in brackish water for 14 days and daily losses were recorded. After the test was done, a number of fry were taken and blood sampled from each test crate toward calculation of cortisol, protein, Sodium Ion, chlorine Ion, blood potassium level. Blood sampling was done by severing tail curtail by heparinized and non-heparinized capillary tubes (toward evaluation of cortisol hormones) and resulting samples were transported to the pathobiology laboratory [8]. Cortisol hormone was premeditated with a unit of quantification of Nano grams in ml through radioimmunoassay method on the bases of competitive reaction between existing hormones of serum sample, marked by radio activated 125 iodine toward joining with anti-hormone anti-body in solid phase [9]. Blood protein was evaluated on the bases of calimetric reaction done by Biotecnica auto-analyzer made in Italy with a unit of quantification of g/dl. Different calibrators and commercial controllers were used to insure the accuracy and correctness of the method [10]. Sodium ion, potassium ion and chlorine ion were evaluated by Ceretium electro-autolizer made in Germany with a unit of quantification of mEq/L [11].

III. CONCLUSION

The results indicated the existence of significant difference in blood sodium viscosity of different weight groups of fry in the beginning of the test ($p<0.01$) (figure 1) yet it changed to significant differences at the end of the test ($p>0.05$).

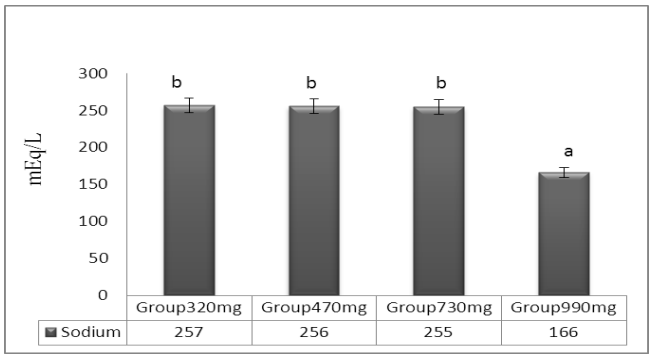

Figure 1: Blood sodium viscosity in the beginning of the test.

Different alphabet shows significant differences ($p<0.01$).

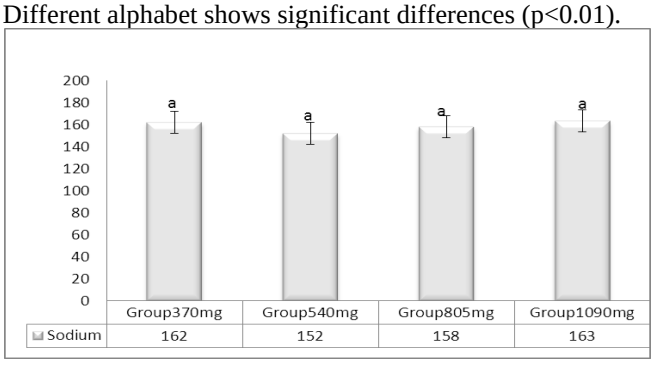

Figure 2: Blood sodium viscosity at the end of the test.

Different alphabet shows significant differences ($p<0.05$).

The results in figure 3 and 4 indicated the existence of significant difference in blood potassium viscosity of different weight groups of fry both in the beginning and the end of the test ($p<0.01$).

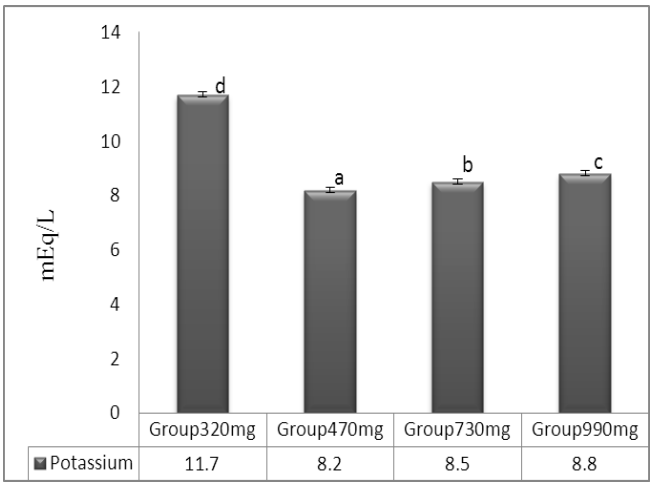

Figure 3: Blood potassium viscosity in the beginning of the test.

Different alphabet shows significant differences ($p<0.01$).

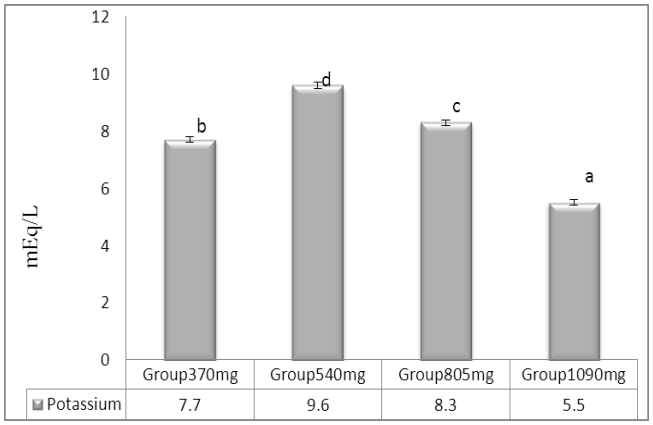

Figure 4: Blood potassium viscosity at the end of the test.

Different alphabet shows significant differences ($p<0.01$).

The results indicated the existence of significant difference in blood chlorine ion viscosity of different

weight groups of fry both in the beginning and the end of the test ($p<0.01$) (figure 5, 6).

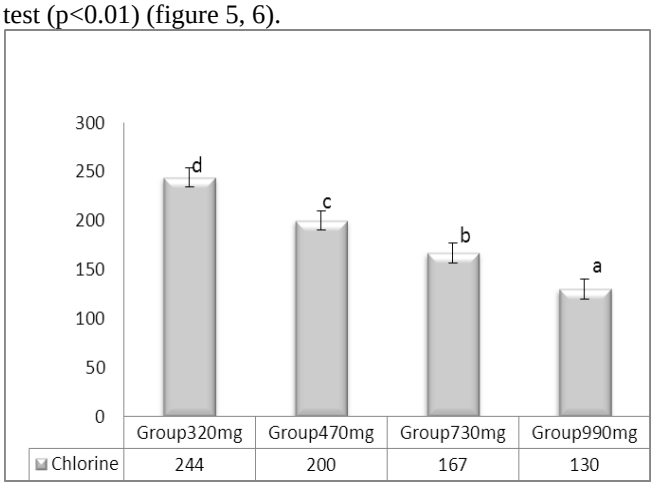

Figure 5: Blood chlorine ion viscosity in the beginning of the test.

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Different alphabet shows significant differences (p<0.01).

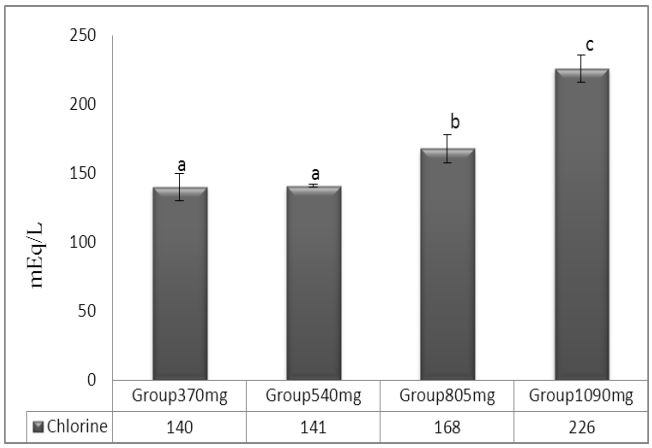

Figure 6: Blood chlorine ion viscosity at the end of the test.

Different alphabet shows significant differences (p<0.01).
The results indicated the existence of significant in blood cortisol viscosity of different weight groups of fry
both in the beginning and the end of the test (p<0.01) (figure 7, 8).

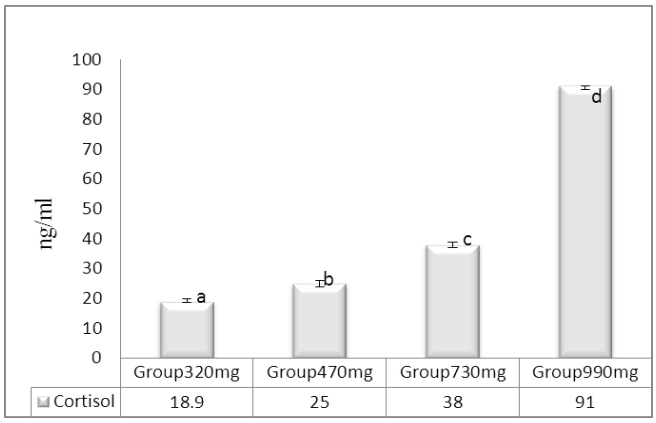

Figure 7: Blood cortisol viscosity in the beginning of the test.

Different alphabet shows significant differences (p<0.01).

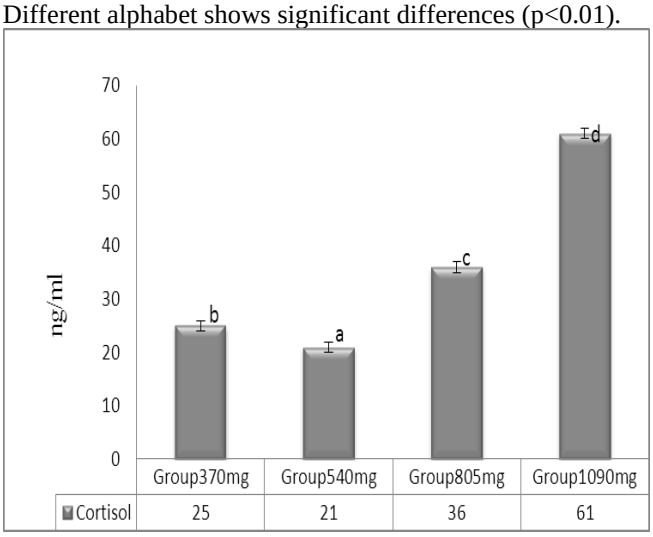

Figure 8: Blood cortisol viscosity at the end of the test.

Different alphabet shows significant differences (p<0.01).
The results indicated the existence of significant in blood protein viscosity of different weight groups of fry both in the beginning and the end of the test (p<0.01) (figure 9, 10).

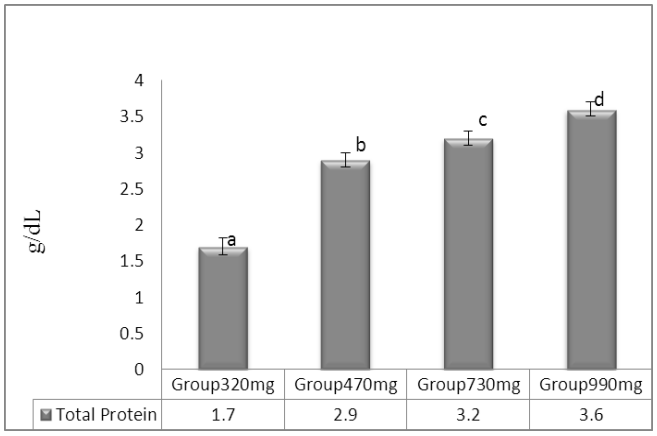

Figure 9: Blood protein viscosity in the beginning of the test.

Different alphabet shows significant differences (p<0.01).

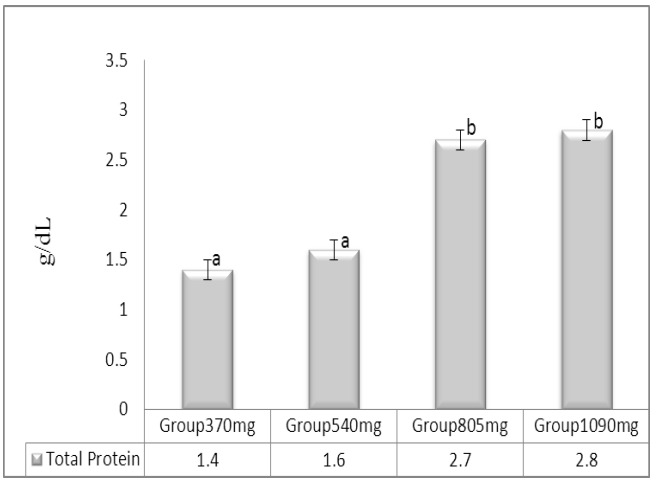

Figure 10: Blood protein viscosity in the beginning of the test.

Different alphabet shows significant differences (p<0.01).
The results indicated the existence of significant in survival index of different weight groups of fry at the end of the test (p<0.01) (figure 11).

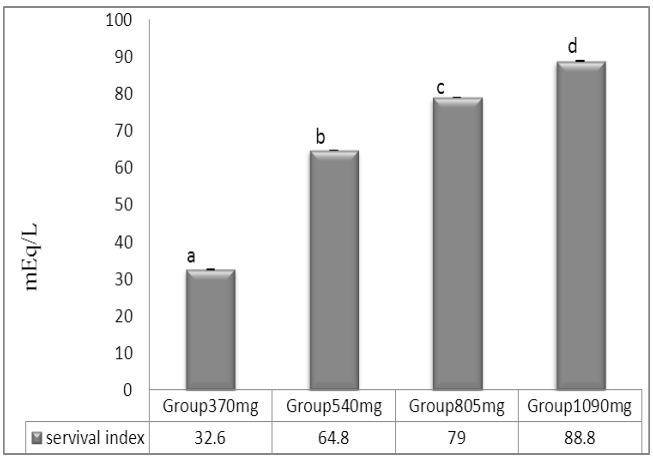

Figure 11: survival index at the end of the test.

Different alphabet shows significant differences (p<0.01).
The results were reported on the bases of mean standard division. Statistical evaluation were done in SPSS software.

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Toward analyzing and interpreting data and studying whether a significant difference is existed between group averages, and also toward comparison of averages and determination of the best weight for releasing, one direction variance data analysis and Duncans multiple range test of the mentioned software were used.

IV. DISCUSSION

Studies done on the ionic and hormone changes of Abramis Brama Orientalis fry is playing an essential role in determination of an appropriate time for migration of this spice. Blood ionic and hormone changes of the fishes upon entering brackish and/or salty waters are done through two stages. In the first days, blood serum ions viscosity are increased (after entering sea water) (first stage). In the second stage, in case of attaining development and ionic adjustment capability, ion viscosity will decrease and will be backed to the normal level [12]. The result showed that cortisol hormone amount between different weight groups has a significant difference in fresh water ($p<0.01$). Holding the least cortisol hormone in the beginning of the test, the first group allocated for "A" rank; whereas, forth group holds the most amount of the mentioned hormone. Results received after 20 days of moving fry to the brackish water indicated an actual significant difference of weight group blood cortisol ($p\leq0.01$) in a way that the forth groups holds the most amount of the mentioned hormone and the second group allocate the least amount to itself. Passing 20 days of the test, blood cortisol was decrease upon the fish fry ageing, since it is considered that the blood cortisol discharge would be increased by weighting; yet, the mentioned hormone discharge was decreased by ageing. Maybe we can describe the occasion through the fishes vulnerability in older ages and higher weights. Salinity increase has a direct effect on physiologic performance of the fish [13]. After several hours of releasing in the salty and/or brackish water blood ions viscosity will be changed [14]. The data analysis and interpretation showed that blood sodium amount had a significant difference in different fry' weight groups at the beginning of the test ($p<0.01$); whereas, on the contrary to other groups which held more and/or equal amount of blood sodium, 990 mg. weight group held the least amount. Generally, the results show a decrease in sodium ion in the all weight groups during the test period, hence, we may recount blood sodium amount to fry' resistance to salinity changes together with their ageing. 320 mg. weight group held the most amount of blood potassium; whereas, 470 mg. weight group held the least amount. figure No 4 indicates the significant differences of blood potassium viscosity of the different weight groups at the end of the test ($p<0.01$); whereas, 990 mg. weight group held the least amount of the mentioned ion in its blood at the end of the period upon reaching 1090 mg. weight; incidentally, the 470 mg. weight group held the most amount of blood potassium. Results showed in figure No 5 and 6 indicates an actual significant differences of different weight groups on blood chlorine viscosity at the beginning and end of the test ($p<0.01$) in a way that 1090 mg. weight group held the most amount of viscosity of the mentioned ion and 370 mg. weight group (group 1) and 540 mg. weight group (group 2) held the least amount of the blood chlorine. The amount of the blood protein in the all fresh water groups have a direct relation with weight increase and releasing fry to brackish water and passing 20 days, the overall amount of protein was deceased. The amount of plasma protein is known as the health and vulnerability indexes as well as accurate performance of different organs of the fishes. Thus it seems that the decrease of this factor in samples' blood of all weight groups upon releasing in brackish water will help their improvement (figure No 9). Permanence percentage of the fry will be increase upon weighting. It means that fry holding higher weight average have the least amount of losses and higher percent of permanence. This issue was reported on ostheichtheye fishes such as Rutilus Firssi Kutum [15], Oncorhynchus Tshawystcha [16] and Mugil Cephalus [17] however, studies indicate increase in losses due to salinity increase that needs further researches. Heeding to permanence rate at the end of research, 990 mg. weight group is determined as the best candidate for releasing to Anzali Pond for fry of this weight group have the least amount of losses and higher percentage of permanence.

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