

*Bulgarian Journal of Agricultural Science, 14 (No 1) 2008, 93-99*  
*National Centre for Agrarian Sciences*

## **STUDY OF SOME GONADIC GROWTH INDEX OF GREAT STURGEON (*HUSO HUSO*) CULTURED IN BRACKISH WATER CONDITION**

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### **Abstract**

HEDAYATI, S. A. A., V. YAVARI, M. BAHMANI, M. ALIZADEH and T. BAGHERI, 2008. The study of some gonadic growth index of great sturgeon (*Huso huso*) cultured in brackish water condition. *Bulg. J. Agric. Sci.*, 14: 93-99

Recognition of Gonadic feature in sturgeons is important for caviar production, early maturity and recruitment. The aim of this investigation was to examine effect of different content of food, Somatic growth and blood parameter on Gonadic growth. Four diets with constant protein (%40) and different energy content (400,425,450,475 kg/100g) was fed to 74 Grate sturgeons (4-5 years old) cultured in brackish water pools in Bafgh-IRAN. every three month we biometry fishes, Blood sampling was performed in caudal vein and plasma was frozen until future analyses, Glucose was measured with Authoanalyser, calcium and magnesium with spectrophotometer and sodium and potassium with film photometer, Hormone profiles measured by Radio Immunoassay. Histological preparation was stained with Hematoxylin & Eosin. In male diet had not affect on gonadic growth, but in female it had significant correlation. Somatic growth only in female had direct correlation with gonadic growth and with increase total length and weight, gonadic growth was increased. Among serum biochemical parameter, with progress of gonadic growth, in male magnesium decreased and in female sodium increased. Among hormonal profile, in male just testosterone, and in female just cortisol had significant correlation and with progress of gonadic stage were increased. Progesterone and estradiol had not significant correlation that it is because for young fish. Analyses and comparative of result show that blood profile, diet content and somatic growth had correlate with gonadic growth and with use of this factors, we can decrease long time of maturation in sturgeons.

*Key words:* brackish water, gonadic growth, great sturgeon, somatic growth

### **Introduction**

Gonadic feature of sturgeon appearance a long and definite time that this time for Sterliad is 4-6 month and for Great sturgeon is 36 month. This phenom-

enon states a compatibility and gonadic growth in this fishes. Gonadic growth in young Great sturgeon is faster than other sturgeons. This subject show that young Great sturgeon has better growth than other sturgeon, because growth rate is depended to growth of dia-

phragm somatic cell in young fishes, so potential possibility of gonadic growth in young Great sturgeon is high.

Scientist believes that successful management in sturgeon need to knowledge about composition of diet and gonadic stage (Feist et al., 2004). Also relationship between serum steroid hormone and different stage of gonadic growth was examined (Yousefian, 2005).

Recognition of gonadic feature and increase of gonadic growth rate and decrease of maturity long time in sturgeon is very important for caviar production, early maturity and recruitment in this under extinction fishes. In other side, culture for production of meat will be more increase with recognition on gonadic feature and capture in suitable time. With culture of sturgeon in new brackish water pond, in this study we examine gonadic growth feature and also effect of different dietary energy and blood profile to this index.

## Material and Method

Experiment were carried out in one year (summer 2005 – spring 2006). The fish were 4-5 years old. For field study we used 8 circle cement pond that supplement with air/water supply system (salinity was 12-17 ppt, pH was 7-8.5). fishes (74 specimen) were fed with four commercial formulate diet with constant protein 40% and four energy content ( 400, 425 and 475 kcal/100g) in Salt Water Fishery Research Station BAFGH, fishes fed three time in day (7am - 12am - 5pm) (Bahmani, 1999).

Every three month, we biometry fishes (total length and weight). Histological preparation was stained with hematoxyline & Eosin method (Bahmani and Kazemi, 1998). Glucose was measured with Authoanalyser apparatus. Calcium was measured with Spectrophotometer method using DARMANKAV kit. Magnesium was measured with Spectrophotometer method using ZIST-SHIMI kit. Sodium and potassium was measured with Film photometry apparatus using ZIST-

SHIMI kit. Steroid hormone profile, Testosterone (T), Esteradiol (E2), Progesterone (P) and Cortisol (C) was measured by Radio Immune Assay (RIA) method using KAVOSHYAR kit. The experiment was done in duplicate. For statistical analyses we used SPSS (version 10).

## Results

### *Correlation between diet and gonadic stage*

Statistical result in male show that there is no significant correlation between different energy dietary and gonadic stage ( $p > 0.05$ ) that means in males with change of energy contact couldn't affected on gonadic maturation, but in female result was different, and was significant correlation between energy content and gonadic stage (sig=0.02,  $r = -0.53$ ) (Figure 1), so we can state that with change in diet, could increase gonadic growth in female.

### *Correlation between weight and gonadic stage*

Statistical result in male show significant correlation between weight & total length and gonadic stage (sig=0.01,  $r = 0.5$ ) (sig=0.46,  $r = 0.39$ ), but in female significant correlation do not observed ( $P > 0.05$ ) (Figure 2). Therefore, we can state that only in male is direct correlation between weight & total length and gonadic stage that with increase of them, gonadic stage will be increase.

### *Effect of gonadic growth index on biochemical blood profile*

Statistical result show that in  $P > 0.05$  none of biochemical profile had not significant correlation, but in  $P > 0.10$  definite that in male only magnesium (sig=0.06,  $r = -0.37$ ) (Figure 3) and in female only glucose (sig=0.06,  $r = 0.39$ ) and sodium (sig=0.08,  $r = 0.37$ ) had significant correlation (Figure 4). Therefore we can state that in male with progress of gonadic stage, magnesium will be decrease but in female with progress of gonadic stage, glucose and sodium will be increase.

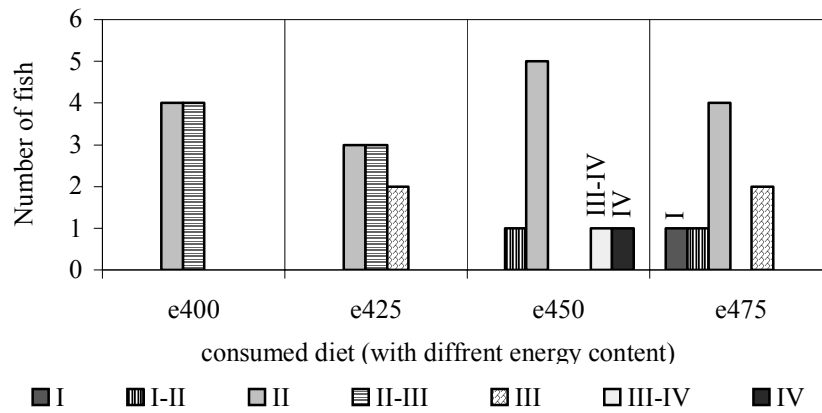


Fig. 1. Change of gonadic stage in different diet

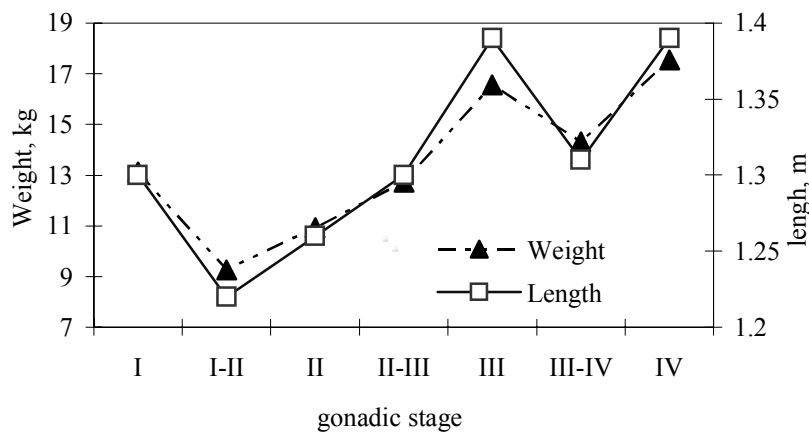


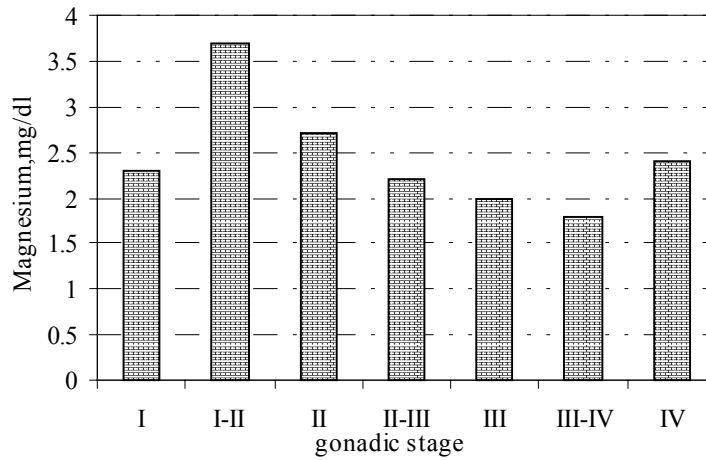
Fig. 2. Change of weight and length in gonadic stage of male

**Effect of gonadic growth index on steroid hormones**

Statistical result show that T had significant correlation (sig = 0.01 , r = 0.50) (Figure 5) with gonadic stage and could state T is index of gonadic stage in male, but in female P & E2 hadn't significant correlation with gonadic stage (Figure 6) that probably its for young fish. Cortisol in male had not significant correlation with gonadic stage but in female had significant correlation (sig = 0.03, r = 0.44) (Figure 7), so could state C is index of gonadic stage in female. Also with progress of gonadic stage amount of all steroid hormones will be increase.

**Discussion**

In male stage II, II-III, III, IV respectively serum Testosterone (T) was 5.5, 4.4, 6.3 and 2.6 ng/ml. that definite with progress of gonadic stage until stage III, amount of T increase and then in stage IV intense decrease was observed in stage IV. In female stage II, II-III respectively serum T was 0.10, 0.16 , serum Estradiol (E2) was 1.45, 0.81 and serum Progesterone (P) was 0.12, 0.13 ng/ml. that definite also in female with progress of gonadic stage, amount of T & P have increase but E2 have decrease. This entire amount is because for formation of sexual gonad that affect amount of hormone.



**Fig. 3. Change of serum magnesium in gonadic stage of male**

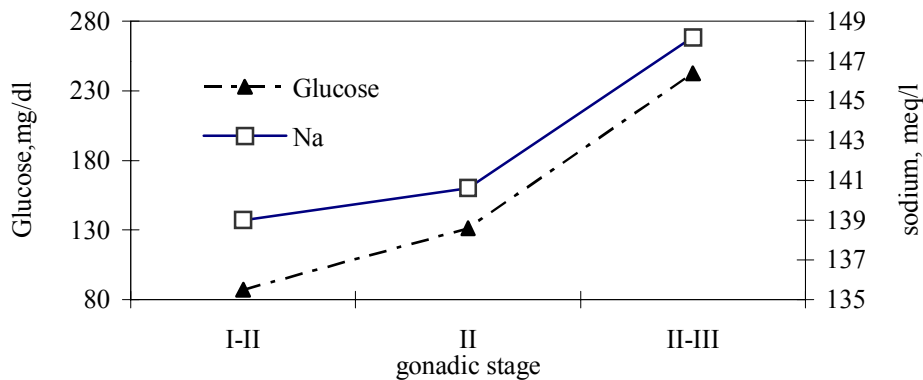
In male stage II, II-III, III, IV respectively serum cortisol was 15, 8.5, 10.7, 4 mcg/dl that definite in different gonadic stage, amount of cortisol is variety and have not same process. In female stage II, II-III respectively serum cortisol was 7.21 mcg/dl. That state with progress of gonadic stage, amount of cortisol have increase. E2 & P have not affect by gonadic growth index that is probably for immature fish and we predict in upper stage (near maturity) all of steroid hormones will affect by gonadic growth index and will have significant correlation in different gonadic stage.

Researcher show that variety in formation of blood cell and their function could be affected by consumed

diet (Qiu-zhi et al., 2005). In addition, diet could change amount of serum steroid hormone (Feist et al., 2004).

Correlation between serum calcium and gonadic condition was examined in freshwater eel and definite that in male calcium hadn't significant correlation with gonadic stage but in female with maturity of ovary, serum calcium were increased and during spawning and after that were decreased (Frantzen et al., 1997).

Result in present study was same with other report about lower hormone in early stage of gonad development (Eenennaam and Doroshov, 1998) In stage of gathering vitellin in ovule (that still nucleus is



**Fig. 4. Change of serum glucose and sodium in gonadic stage of female**

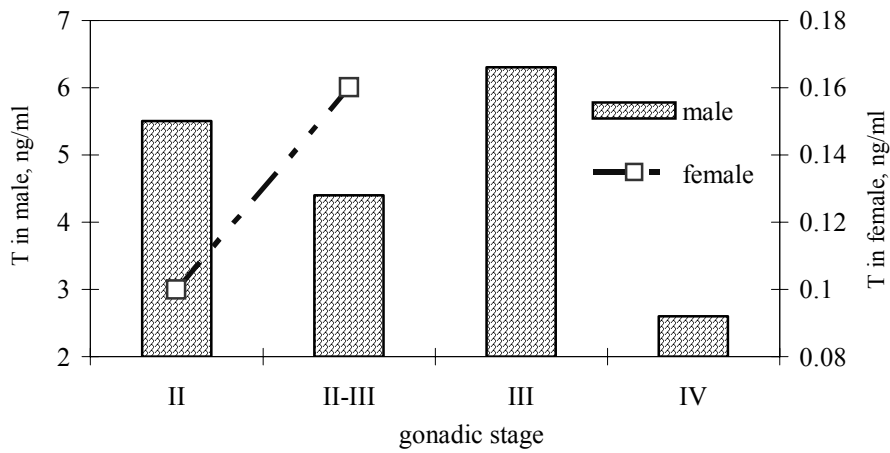


Fig. 5. Change of serum testosterone in gonadic stage

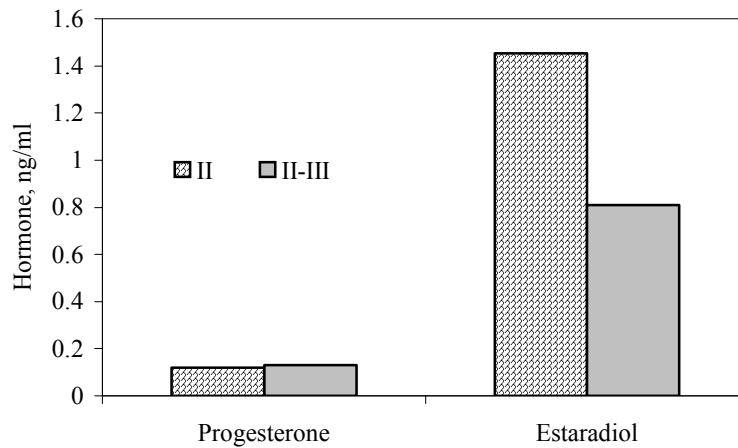


Fig. 6. Change of serum progesterone and estradiol in gonadic stage of female

in center of ovule) and cell layer that produce steroid hormone are in ovule, affected by secretion gonadotropin hormone in pituitary gland and produce of steroid hormone, amount of steroid hormone will be increase (Qiu-zhi et al., 2005). In present study also production of steroid hormone in stage II-III increase that is for this reason.

Several researcher studies on correlation between sexual hormone and gonadic growth index. They believe that amount of sexual steroid in sturgeon is unpredictable and until gonadal distinct this measure is low. Amount of T in beginning of meiosis (Lane and Kohler, 2006) and amount of androgens during de-

velopment of testis (Cuisset et al., 1995) and during development of ovary (Nazari, 2001)) in both male and female have increase to stay at high level. This correlation in Great sturgeon in similar to other sturgeon (Webb et al., 2002). However some different is in structure, especially in ovary of Great sturgeon (Barannikova et al., 1997).

Amount of cortisol in blood is variable and even in culture medium is affect by environmental condition, region, capture, species and gonadic stage. Therefore, we cannot correctly compare fishes in different condition, but it is correct that cortisol have significant correlation and is affect by gonadic stage. In present

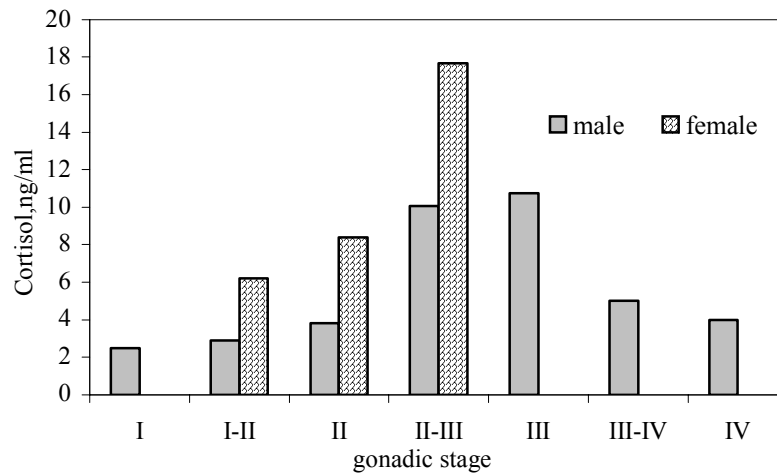


Fig. 7. Change of serum cortisol in gonadic stage

study increase of cortisol in female upper stage II was cause for Hypothalamus- Pituitary- Gland (HPG) and Hypothalamus- Pituitary- Interrenal (HPI) (Mojazi, 1996a). However, fluctuation of cortisol in male was for stressor condition in capture of fishes.

With analyses of result and compare with other similar report, hypothesis of correlation between blood profile and diet with gonadic stage of Great sturgeon cultured in brackish water was confirmed. The lower amount of steroid hormone in early stage, increase until stage III and decrease in stage IV was proved. Also biochemical profile like hormones affects by gonadic stage and has significant correlation with gonadic stage.

Eventually definite that brackish water medium have a wonderful effect on progress of gonadic growth in Great sturgeon and with sustainable management and use of effective factor on gonadic growth of this fishes could reduce long time of maturity in sturgeon cultured in brackish water and produce caviar in short time.

#### Acknowledgments

We acknowledge from researcher in salt water fishery station BAFGH and international institute of sturgeon RASHT, especially engineer Kazemi, Bitaraf, Sarsangi, Mohammadi and Hallajian.

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*Received January, 28, 2007; accepted for printing October, 5, 2007.*