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PRELIMINARY RESULTS ON GROWTH OF JUVENILE STURGEON (*Acipenser gueldenstaedti* Brandt & Ratzeburg, 1833) IN OPEN AQUACULTURE SYSTEMS

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Abstract. The paper presents preliminary results on growth of juvenile Russian sturgeons in an open intensive system. The experiment was conducted at the farm SC Beluga Farm Grup SRL in Tamadau, the Calarasi county. Stocking biomass was provided trough artificial reproduction of sturgeons captured in the Danube. The experiment lasted about 131 days and 30 fiberglass rearing tanks were used. The initial density was 12.5 kg fish/m^3 per tank and the feed practice was appropriate to the development status of the sturgeons. During the experiment were evaluated the following technological parameters: monthly weight gain, daily weight gain and monthly average weight of biomass culture. Also, the physical and chemical parameters of used water were maintained between the limits of optimum range specific to sturgeon growth.

Keywords: Russian sturgeon, aquaculture open systems, feed conversion rate (FCR), specific growth ratio (SGR).

AIMS AND BACKGROUND

The Ministry of Agriculture and Rural Development and Environment and Water Ministry has issued Order 262/2006 for the conservation of sturgeon populations in natural waters and for development of sturgeon aquaculture in Romania. This remedial action for natural habitat has encouraged farmers to invest in developing sturgeon aquaculture accessing European funds.

Actions performed to protect stocks of fish in the waters of the continental shelf and oceans have led to the implementation of programmes for the restocking and conservation of the species that are at different stages of danger: ship sturgeon (*Acipenser nudiventris*) – critically endangered species/extinction, Russian sturgeon (*Acipenser gueldenstaedti*) – endangered species, stellate sturgeon (*Acipenser stellatus*) – endangered species, starlet (*Acipenser ruthenus*) – vulnerable species, beluga (*Huso huso*) – endangered species[1,2].

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EXPERIMENTAL

The study was conducted from 4th of July to 12th of November 2007 on a sample of 12 000 juvenile of sturgeon (*Acipenser gueldenstaedti*). During experiment were monitored biotechnological growth indicators such as average weight, total biomass, the daily rate of growth, total growth and total survival. For the juvenile sturgeon culture, a total of 30 fiberglasses with the following dimensions: 2 × 2 × 0.7 m were required.

The tanks have on their exterior water volume regulation system. Water supply units increase is achieved by the opposite side of device effluent wastewater. Oxygen was supplemented by suitable infusion liquid oxygen.

The physical and chemical parameters have been conducted with Polaris, Handy, and a portable measuring equipment was used for measuring the concentration of dissolved oxygen, temperature and pH, before distributing the feed. During the period of monitoring, parameters were within the limits of acceptable growth of sturgeon. In Table 1 are presented mean values for each period.

Table 1. Growth performance of the biological material in the period 04.07–12.11.2007

Indicators	Period							
	04.07 S	31.07. H	01.08 S	21.09 H	22.09 S	09.10 H	10.10 S	12.11 H
No fish/fiberglass	1000	985	700	697	500	500	450	450
No fiberglass	12		17		24		26	
Biomass (g)	7600	16745	11900	55760	40000	50000	45000	64800
Average weight (g/ex.)	7.6	17	17	80	80	100	100	144
Individual weight gain (g)	9.4		63		20		44	
Biomass gain (g)	9259		43911		10000		19800	
SGR (specific growth ratio) (g%/day)	2.82		2.97		1.39		1.07	
Biomass (kg/m^3)	12.5	17	7.44	34.85	25.00	31.25	28.13	32..4
Days growth	28		52		18		34	
Survival (%)	98.5		99.6		100		100	
FCR (g fodder/g biomass gain)	1.20		0.80		1.50		2.50	
Daily ration (% biomass)	4.1		4.1		3		3	

S – stocking density; H – harvesting.

The main bioindicators were determined by the classical formulas, the data obtained by weighing (to nearest 0.05 kg) survival of biological material:

- S (%) specific growth rate;
- $G = [(\ln w_f - \ln w_i)/T] \times 100$ where: w_f – final mass, w_i – initial mass, T – time (days);
- an increase in individual growth $w_f - w_i$;
- daily growth rate $R = w_f - w_i/T$.

For feeding was used a feed with different grains and biochemical components depending on the stage of development of the specimens[3].

RESULTS AND DISCUSSION

Between 4th of July and 31st of July was an individual growing of 9.4 g increase in conditions and population densities of 12.5 kg/m^3. In Table 1 it can be seen specific growth rate (SGR) and also feed conversion ratio. They are the most significant indicators aids. During the first phase of monitoring was recorded insignificant mortality (1.5%). The transition from feed to feed Classic Extra Aller 45/15 1P was performed gradually by mixing the two types of feed in different percentages[4]. The second stage of monitoring densities was 700 fish/ fiberglass. Specific growth rate – SGR indicates higher values than previously from 2.82 to 2.979 %/day. These data were correlated with very low values of feed conversion ratio – FCR (g feed/g gain biomass) and suggest that fishes consumed the given food. At the end was registered a personal growth (SGR) of 2.97% g / day.

Analysing the data obtained in the period 22.09–09.10 period, we can notice that individual growth increased with 20 g. Physical and chemical parameters of the water in the months of September and October have been favourable for populating the rearing units with an initial density of 25 kg/m^3, fact that led to a final one of 31.25 kg/m^3. Importantly, the density was increased from 28.13 to 32.4% and highlights the bioindicators recorded during the period from 10th October to 12th November.

In Fig. 1 are observed larger values of feed conversion factor (FCR) during the first stages of monitoring, and specific values of growth rate (SGR). Tthese results show an evolution of food conversion at temperatures between 20–25^{o}C.

In Fig. 2 is observed a significant increase in density between 08.01.2007 to 09.22.2007 from 34.85 to 7.44 kg/m3 kg/ m^3 and fishes get personal about 6-fold increase to an average of 63 g/fish.

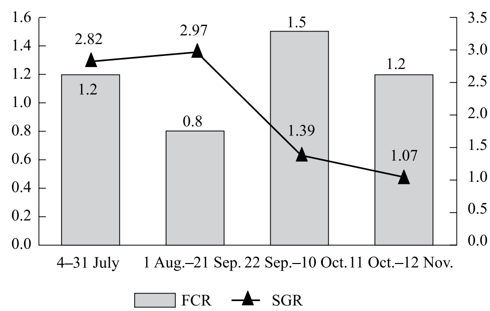

Fig. 1. Evolution of feed conversion ratio (FCR) and spirific growth rate (SGR)

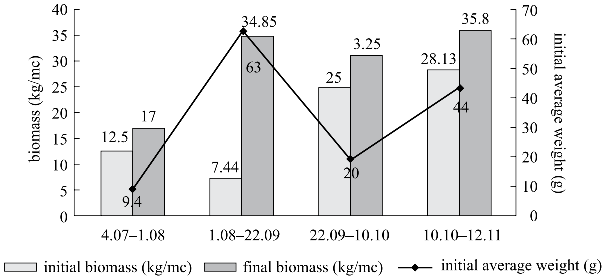

Fig. 2. Dynamics of fish growth during the culture period

CONCLUSIONS

As a conclusion, after all the experiments that were made and all the obtained data, we can say that basis of developing a farming technology for sturgeon juveniles in open aquaculture system, surely exists.

Another result of this study is the fact that distribution of dauly feed for at least 3 times/day provides an uniform growth of total biomass.

The growing of juvenile sturgeons in an open aquaculture system allows rigorous control of health and permanent monitoring of water quality.

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