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EVALUATION OF THE SIBERIAN STURGEON (*Acipenser baeri* Brandt) AND GREEN STURGEON (*A. medirostris* Ayres) HYBRID COMPARING TO THE MOTHER SPECIES

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A B S T R A C T. Good results of rearing beluga (*Huso huso* L.) and sterlet (*Acipenser ruthenus* L.) hybrids encouraged fish farmers to hybridize various species of sturgeons. Siberian sturgeon (*Acipenser baeri* Brandt) and green sturgeon (*A. medirostris* Ayres) hybrid is one of the crosses. The aim of the present study was a comparison of growth rate and food conversion rate of the hybrid and Siberian sturgeon under intensive tank rearing conditions. At the end of rearing (on day 325) average individual body mass of the hybrids was 2110 g, and was 27% higher comparing to Siberian sturgeon. Food conversion rate was also higher.

Key words: STURGEONS, HYBRIDS, INTENSIVE FISH REARING, GROWTH RATE, FOOD CONVERSION RATE.

INTRODUCTION

During the last decade considerable increase of interest in intensive sturgeon rearing took place in Europe. Total sturgeon production in Italy, Germany, France and Spain attained almost 1000 tons of marketable fish per year (Steffens et al. 1990, Gershanovitch, Burtsev 1993, Williot et al. 1993). The increase of intensive sturgeon production was caused mainly by an over two fold drop in sturgeon catches in the Caspian Sea, Black Sea, and in the Adriatic which took place in the eighties, after a period of stable natural production (Gershanovitch, Burtsev 1993).

Development of sturgeon production is favoured by very good growth rate and food conversion rate of the fish (Steffens et al. 1990, Müller 1992, Zobel 94, Kolman, Szczepkowski 1995). Pure sturgeon species are used for rearing such as Siberian sturgeon (*Acipenser baeri* Brandt) and hybrids, among which a cross between *Huso huso* L. and *A. ruthenus* L. is best known. Production characterictics of the hybrid were gradually improved in F2 and F3 generations and the recioprocal crosses - beluga x hybrid (B.Bs) and sterlet x hybrid (S.Bs) (Burtsev et al. 1987, Krylova, Gershanovitch 1992, Arefjev 1989, 1992).

Encouraging results of rearing the hybrid resulted in a creation of new crosses, among which hybrids of *A. güldenstaedti* x *A. baeri* , *A. güldenstaedti* x (*Huso huso* x *A. ruthenus*), *A. ruthenus* x *A. baeri* were most promissing (Burtsev 1983, Burtsev et al. 1985, Ronyai 1992). In spring 1995, in the Stocking Material Production Centre in Konakova (Russian Federation) Siberian sturgeon (*A. baeri* Brandt) was crossed with green sturgeon (*A. medirostris* Ayres) for the first time. Fertilized eggs were brought to the Experimental Fish Farm "Dgal", where incubation took place and larvae were obtained, and after an initial rearing also fry.

The aim of the present study was an evaluation of Siberian sturgeon and green sturgeon hybrid under intensive rearing conditions, comparing to the mother species - Siberian sturgeon.

MATERIAL AND METHODS

The eggs obtained from a Siberian sturgeon female were fertilized with milt from green and Siberian sturgeon males. Fertilized eggs were incubated in Weiss apparatuses, at 17°C. Initial rearing of larvae and fry was carried out in a mixed stock. The hybrid was separated on the day 78 after hatching.

Intensive rearing of Siberian sturgeon and its hybrid with green sturgeon was done in rotation tanks with water recirculation system, in two steps:

I - "heavy fry" rearing from day 79 to 137 (39 days);

II - rearing up to about 2000 g of average individual body weight, from day 137 to 325 (189 days).

During the first period tanks were stocked with 150 individuals per tank (37.5 ind./m^2, and in the second period - the density was reduced two fold.

Water temperature was maintained at 20-23°C. Water quality as regards DO, ammonia, nitrites, nitrates and carbon dioxide contents was appropriate for sturgeon rearing (Kolman 1992).

The fish were fed appropriate fractions of pelleted trout feed FM-48/14, produced by Kraft. The feed was supplied continuously, using conveyor feeders. During the first period of rearing daily feed doses were gradualy reduced according to average individual body weght of the fish from 4.5% to 2%. In the second period - from 2% to 0.95% of stock weight per day. Daily feed dose was adjusted al least once a week.

The following parameters were measured, assumed to be the most important indicators of fish usefulness for intensive rearing: growth rate, food conversion rate, and survival. The first two parameters were calculated from average individual body weight, estimated from samples of 30 individuals. Growth rate was calculated as an increase of body weight in percent per day, according to the formula:

$$\Delta W_{\%} = \frac{Wp - Wk}{Wp} \cdot \frac{1}{n} \cdot 100$$

where:

$\Delta W_{\%}$ - increase of average body weight per day [%],

Wp - initial average weight [g],

Wk - final average weight [g],

n - number of days.

RESULTS AND DISCUSSION

No mortality was observed during both rearing periods. At the beginning of the first period average body weight of the hybrid was lower comparing to Siberian sturgeon (fig. 1). Initial diference, however, gradually decreased, and on day 137 of rearing average body weights of both groups were equal. This was due to a two fold higher growth rate of the hybrid comparing to Siberian sturgeon during an initial phase

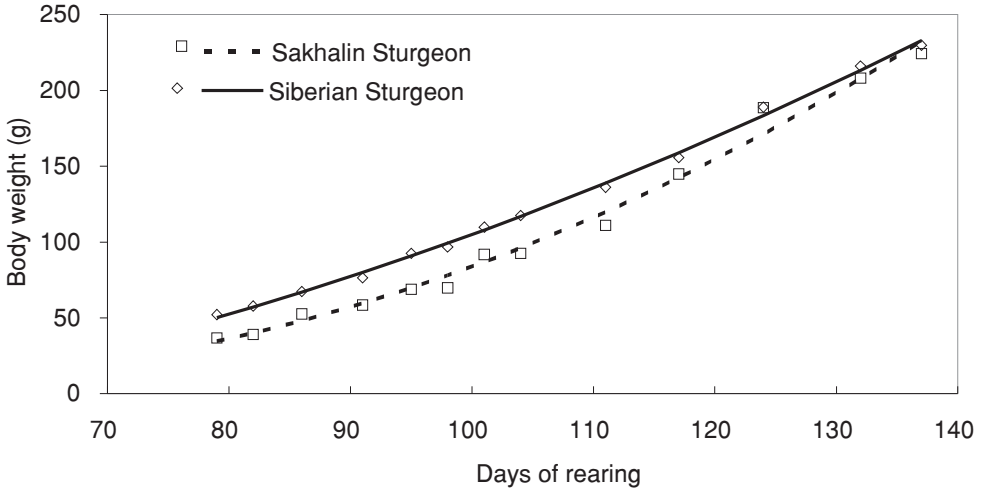

Fig. 1. Dynamics of average individual body weight of Siberian sturgeon x green sturgeon hybrid comparing to the mother species, during the first period of rearing.

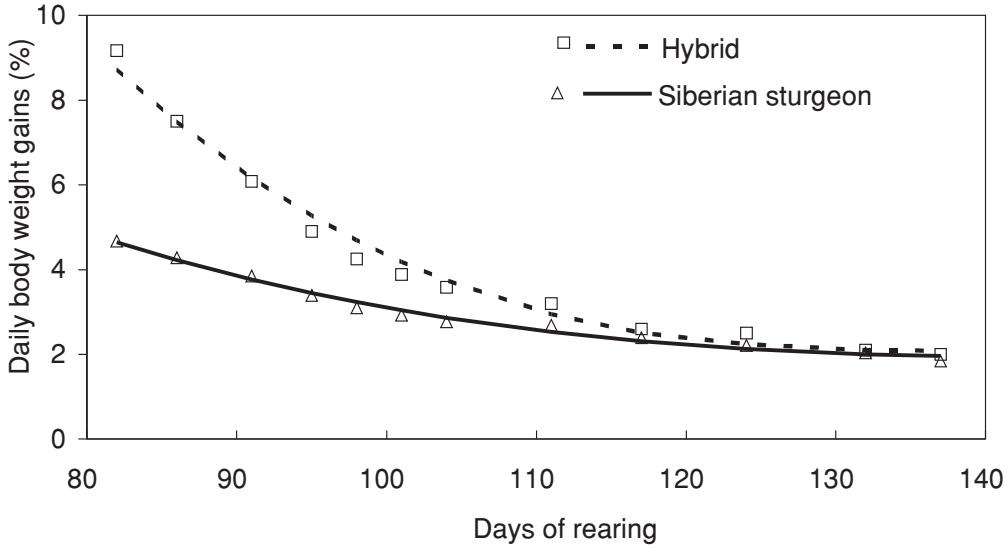

Fig. 2. Changes of growth rate of Siberian sturgeon x green sturgeon hybrid, and of the mother species, during the first period of rearing.

of the first period (fig. 2). It is noteworthy that growth rate of the hybrid decerased stronger with inceasing body weight, which resulted in equal growth rate of both groups at the end of rearing.

In the second period of rearing, after reduction of fish density, hybrid grew faster comparing to the mother species (fig. 3). The difference between average body weight of the two groups increased in time (fig. 4). Dynamics of growth rate of the hybrid, comparing to Siberian sturgeon was similar to that observed during the first period of rearing: in the initial phase the hybrid grew considerably faster, and then its growth rate decreased to the level of Siberian sturgeon (fig. 3).

The differences of growth rate between the two fish groups given the same feed doses resulted in different food conversion rates (figs. 5, 6). During both rearing periods food conversion rates of the hybrid were lower comparing to Siberian sturgeon. Average values of the coefficient during the first and the second rearing period were equal to 1.00, 1.19, and 1.07, 1.33, respectively. Moreover, during the second period of the experiment, dynamics of food conversion rate also differed between the groups (fig. 6). The coefficient values for Siberian sturgeon fluctuated close to the average, and in case of the hybrid - decreased to 0.8 after reduction of the fish density, and then gradually increased up to 1.2.

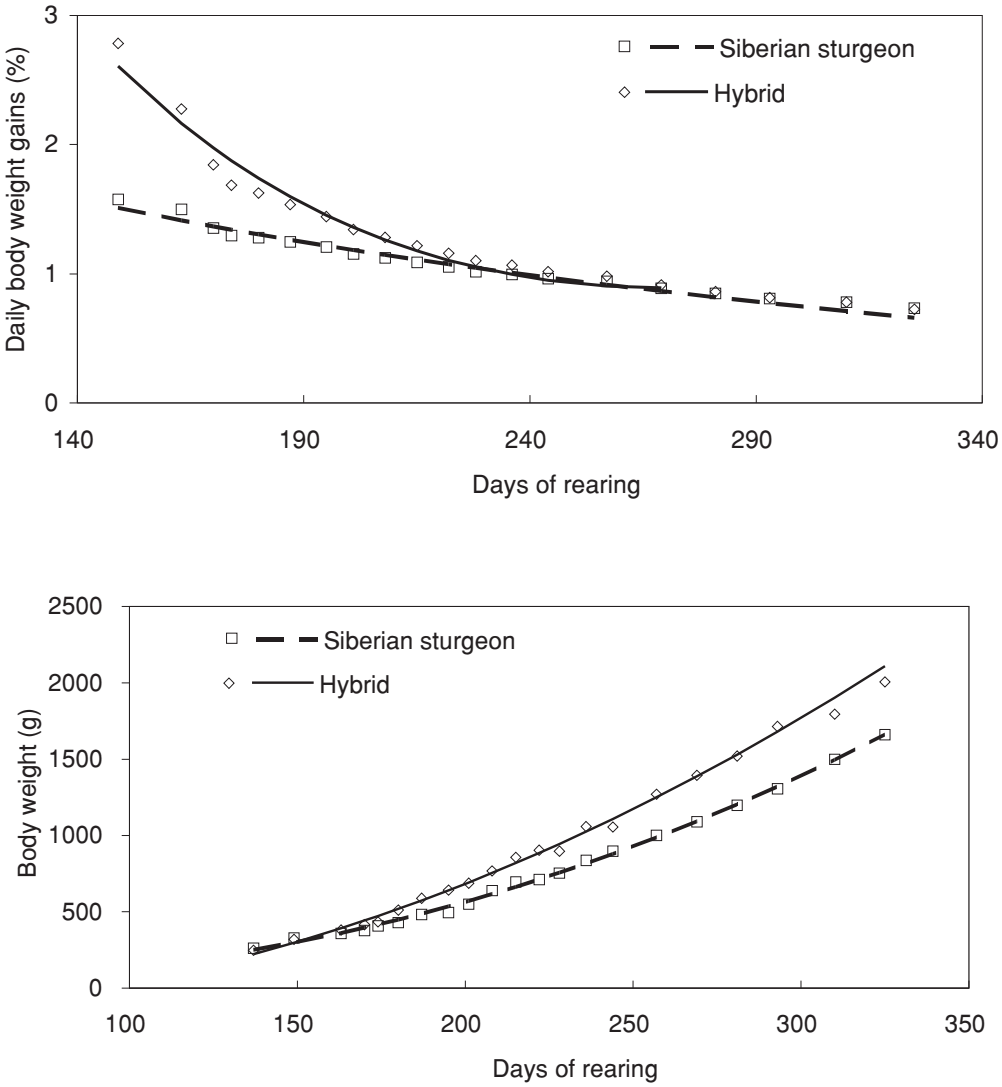

Fig. 3. Dynamics of average individual body mass of Siberian sturgeon x green sturgeon and of the mother species during the second period of rearing.

The results of the measurements and observations done during the experiment indicate that higher growth rate of the hybrid comparing to the mother species resulted not only from an effect of heterosis in F1 generation, but also from fish behavior in the tanks. The fish spent most of the time at the bottom, almost motionless, limiting their activity to feeding. Thus, their energy loss for basic metabolic needs must have

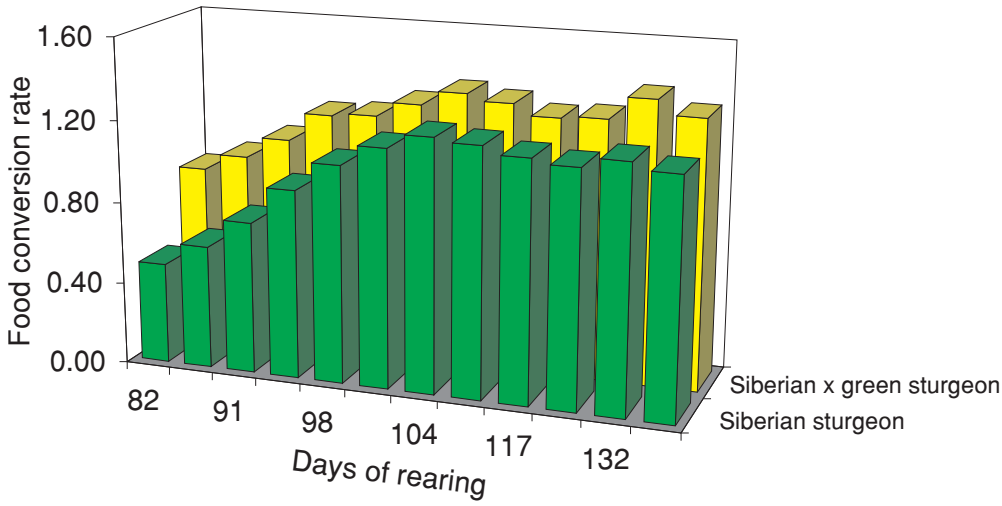

Fig. 4. Changes of growth rate of Siberian sturgeon x green sturgeon hybrid, and of the mother species during the second period of rearing.

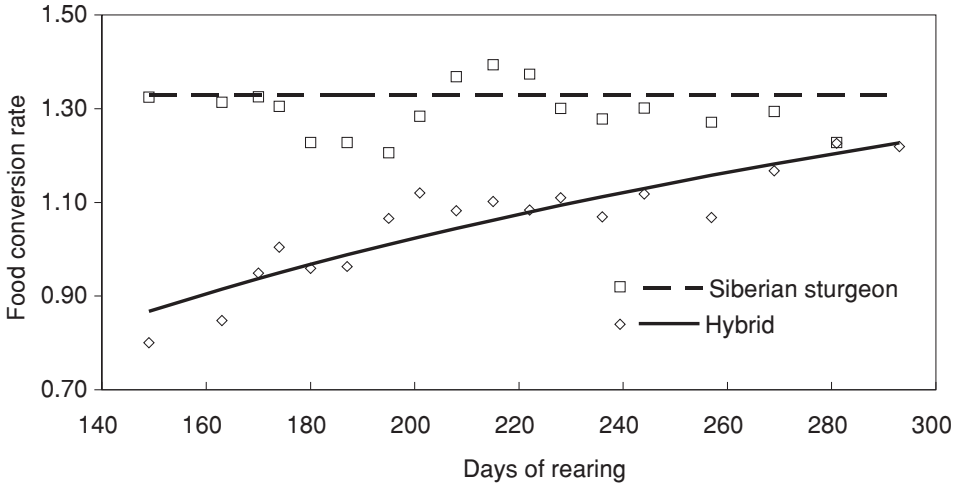

Fig. 5. Changes of food conversion rate values of Siberian sturgeon x green sturgeon hybrid and the mother species, during the first period of rearing.

been much lesser comparing to more active Siberian sturgeons. The results suggest that fish behavior affected the effect of rearing, and that growth rate and food conversion rate depended on the stock density calculated per unit of the bottom area.

Poor locomotor activity and bottom dwelling is characteristic for green sturgeon living as fry in short and fast flowing rivers flowing to the Pacific (Artjukhin, Andro-

nov 1990). The fact that the behavior of green sturgeon is inherited by the hybrid suggests that also further generations may show better productivity than the mother species. Therefore, Siberian and green sturgeon hybrid seems an interesting object for further studies.

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STRESZCZENIE

BADANIE WARTOŚCI HODOWLANEJ KRZYŻÓWKI JESIOTRA SYBERYJSKIEGO (*A. baeri* Brandt) Z JESIOTREM ZIELONYM (*A. medirostris* Ayres) W PORÓWNANIU Z GATUNKIEM MACIERZYSTYM

Powodzenia w intensywnym chowie krzyżówek bieługi (*Huso huso* L.) i sterleta (*A. rutenus* L.) zachęciły hodowców do tworzenia nowych hybrydów hodowlanych. Jednym z nich jest krzyżówka jesiotra syberyjskiego (*A. baeri* Brandt) z jesiotrem zielonym (*A. medirostris* Ayres). Celem przeprowadzonych badań było porównanie tempa wzrostu i wykorzystania paszy przez wspomnianego hybryda i jesiotra syberyjskiego w warunkach tuczu basenowego. Badania porównawcze zmian w/w wskaźników dla obu grup doświadczalnych przeprowadzono w dwóch etepach różniących się gęstością obsad ryb w basenach. W końcowej fazie pierwszego etapu, lżejszy na początku narybek hybryda, osiągnął masę średnią równą średniej masie osobniczej jesiotra syberyjskiego. W drugim etapie badań, po zmniejszeniu gęstości obsad, hybryd charakteryzował się wyższym tempem wzrostu niż j. syberyjski. W końcowej fazie tuczu średnie masy osobnicze obu grup wyniosły odpowiednio: 2110 i 1660. Hybrydy charakteryzowały się lepszym wykorzystaniem paszy w obu etapach badań, o czym świadczą niższe średnie wartości ich współczynników pokarmowych w porównaniu z jesiotrami syberyjskimi (odpowiednio: 1.0 i 1.2 oraz 1.1 i 1.3). Obserwacje prowadzone w trakcie badań pozwalają przypuszczać, że na korzystniejsze wskaźniki chowu hybryda miało wpływ jego zachowanie w basenach polegające na niskiej aktywności ruchowej.

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