Acta Agraria Kaposváriensis (2006) Vol 10 No 2, 315-319
Kaposvári Egyetem, Állattudományi Kar, Kaposvár
University of Kaposvár, Faculty of Animal Science, Kaposvár

Growth and feed conversion of intensively reared Volga perch (*Stizostedion volgensis)*

T. Molnár[1], T. Müller[2], G. Szabó[1], Cs. Hancz[1]
[1]University of Kaposvár, Faculty of Animal Sciences, Kaposvár, H-7400 Guba S. u. 40.
[2]University of Veszprém, Georgikon Faculty of Agriculture, Keszthely, H-8361 Deák F. u. 16.

ABSTRACT

Intensive rearing technology of pikeperch has been developed significantly in Central Europe in the last few years. The variety of species producing excellent quality meat can be widened by the Volga perch, a fish that shows slower growth than pikeperch but much higher tolerance to suboptimal environmental conditions. The experiment to test the growing capacity of pond pre-reared Volga perch was carried out at the fish laboratory University of Kaposvár. Fish were held in 130 L aquaria, setting three stocking densities (1.25; 1.66; 2.08 g/l). The experiment lasted for 6 weeks. Our results suggest that rearing of Volga pikeperch alevins based on commercial trout pellet feeding is viable. Stocking density variations applied in our experiment caused no significant differences, neither in feed consumption (18.19±2.79 g; 19.67±1.41 g and 18.92±1.70 g) nor in feed conversion rate (0.86±0.08; 0.85±0.10 and 0.93±0.03 g/g). The effect of the three stocking densities on total weight gain (21.06±1.80 g; 23.35±2.80 g and 20.28±1.29 g, respectively) was not significant (P=0.065). Growth rate, expressed as S.G.R., was found to be 1.62±0.07; 1.72±0.14 and 1.54±0.06%/day, respectively. Difference between the middle and the highest stocking density was significant at P=0.03.
(Keywords: Volga perch, feeding, stocking density, intensive rearing)

INTRODUCTION

Volga perch is a very little known species of the European fauna. Hungarian research work was focused on the Balaton lake population. It was found that in spite of the relatively high fecundity its occurrence ratio is below 1% (*Specziár* and *Bíró*, 2002). Invertebrate fauna is the main feeding source even for the older age groups. Volga perch reaches sexual maturity at the age of 3–4 years in Lake Balaton when generally measures 200–250 mm (*Szipola*, 1994). According the finding of *Specziár* (2002) the 30–100 mm long first-summer-old fish feed mainly on planctonic Cructaceans and bentonic Chironomids. This feeding spectrum suggested that the weaning of fry from zooplankton to artificial feed would be easier than it was in case of pikeperch. The conversion for pelleted feed was found to be successful even with larger (60–100 mm long) fish in an earlier study (*Müller et al*., 2003).

The aim of our experiment was to adapt the rearing methods developed for pikeperch to Volga perch fry and to test the effect of stocking density first.

MATERIALS AND METHODS

The experiment was carried out at the fish laboratory of University of Kaposvár. The experimental stock, already weaned to pelleted feed, was received from the Georgikon Faculty of the University of Veszprém.

Fish were stocked in 130 l aquaria functioning in recirculation system with individual aeration where the water temperature was 22±0.5 °C. Three levels of stocking density were set up with means of 1.25, 1.66 and 2.08 $g.l^{-1}$ in four randomly assigned replications each. The whole experimental stock was weighed and measured individually at the beginning and at the end of the experiment that was continued for six weeks. Data of starting weight and standard body length are summarized in *Table 1*. Commercial trout feed was offered once a day. The composition of the feed was as follows: crude protein: 43.9%, crude fat: 17.4%, crude fibre: 1.3%.

Growth rate of fish was expressed as specific growth rate (S.G.R.) and as daily weight gain. Feed consumption was recorded daily for every aquarium. Condition factor was also calculated at the start (K_s) and at the end (K_e) of the experiment.

Statistical analyses were carried out by SPSS for Windows 8.0 package. Treatment effects were analysed by one-way ANOVA and treatment means were compared by Tukey's test.

RESULTS AND DISCUSSION

The most important production traits achieved in the experiment are shown in *Table 1*. Different stocking density did not cause significant differences in feed consumption (*Figure 1*). It is important to remark that Volga perch, in contrast with pikeperch, is inclined to pick up feed pellets from the bottom of the aquarium.

Table 1

Production traits of the experimental stock (mean ± S.D.)

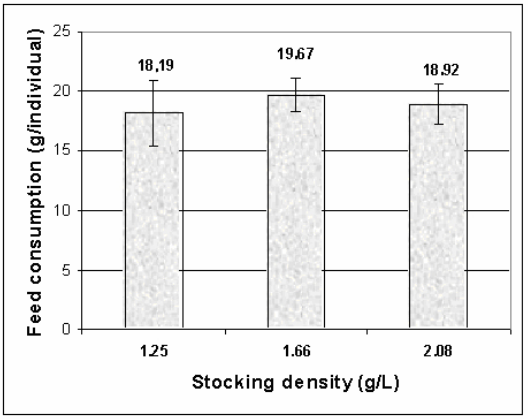
Trait	Stocking density ($g.l^{-1}$)		
	1.25	1.66	2.08
Initial weight (g)	21.5±1.1	21.9±0.7	22.2±1.3
Initial s. length (mm)	119.4±7.3	118.7±4,7	123.5±6,6
Daily weight gain ($g.day^{-1}$)	0.50±0.04	0.55±0.06	0.48±0.03
Growth in length ($mm.day^{1}$)	0.70±0.19	0.77±0.05	0.63±0.11
Starting condition factor(K_s)	1.28±0.22	1.31±0.1	1.18±0.12
Ending condition factor (K_e)	1.28±0.05	1.30±0.11	1.25±0.02

Mean values of F.C.R. were found to be 0.86; 0.85 and 0.93 $g.g^{-1}$ that shows excellent conversion of the trout feed. Differences were not significant.

Daily weight gain showed the lowest value at the highest density but the differences were also not significant (P=0.065). However the difference of S.G.R. between the medium and high density was proved to be significant (*Figure 2*). Condition factor of fish practically did not change during the experiment and also was not changed by the treatments.

Figure 1

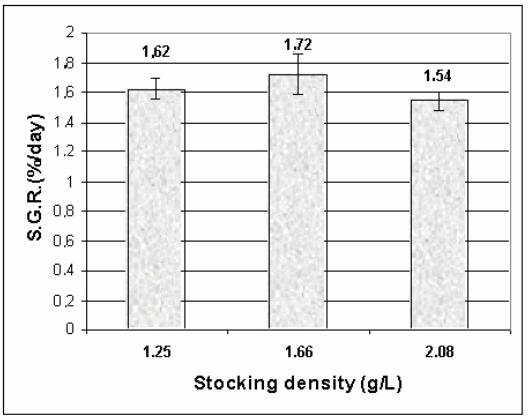
Feed consumption at the different stocking densities



There was no loss of fish during the six weeks of experiment. It is a remarkable difference from pikeperch, however, that Volga perch proved to be more sensitive to the handling stress during measurements. Clear symptoms of shock (with spasmodic bending of the backbone) were observed many times but these fish recuperated within a period of one to two hours when replaced to their aquarium and showed no apparent lasting damage.

Figure 2

Growth rate of fish at different stocking densities



CONCLUSIONS

Numerous studies can be found dealing with the weaning of pikeperch larvae to collected zooplankton and artificial feed. Several types of formulated starter feed were

also tested but generally very slow growth and high mortality was observed (*Ruuhijärvi et al*., 1991) or, although larvae consumed the offered feed, they were not able to digest it (*Schlumberger* and *Proteau*, 1991). It can be concluded that the intensive rearing of Volga perch larvae, similarly to the pikeperch, seems to be unviable. Using the simple and cheap method of pond rearing of fry the desired volume of pre-reared fry of about 30 mm body length can easily be produced. This size can already be weaned to pelleted feed with acceptable losses in intensive systems. This transition period was found to be at least two weeks for the pikeperch fry (*Molnár et al*., 2002 a,b). Weaning of Volga perch fry from zooplankton to pellet demands only from 8 to 10 days. Survival of pellet fed pikeperch changes between 44 to 49% in which cannibalism plays a significant role while "natural" causes of losses have a ratio of 8 to 14% (*Molnár et al*., 2004). No cannibalism was observed in this experiment showing that Volga perch has quite different feeding behaviour than pikeperch.

According to our previous results pikeperch alevins fed on trout pellet showed excellent growth rate (S.G.R.=6.5–7%.day^{-1}). Individual feed consumption on the 10th week of life was between 0.17 to 0.20 g that is 16 to 20% of fish biomass. Mean F.C.R. was about 0.8 g.g^{-1}. No data of this kind were found about Volga perch in the literature. *Specziár* and *Bíró* (2002) estimated the growth rate of +1 age group to be about 2%. day^{-1} in Balaton lake and although this is not really comparable to our present results it is at least interesting that we measured similar values in our above described experiment. Investigating the effect of stocking density on weight gain, feed consumption and F.C.R. on pikeperch no significant differences were found below 2.08 g.l^{-1} stocking density (*Molnár et al*., 2004). Similar results were achieved with Volga perch in the present study.

The idea of producing the hybrid of pikeperch and Volga perch has also emerged (*Müller et al*., 2003). The fish in which the fast growth of pikeperch and the higher resistance of Volga perch would be alloyed should really be ideal for intensive culture. However a lot of further investigations are needed to determine favourable keeping conditions and species specific feeds for the intensive rearing of both of these valuable Percids. To test the fishpond culture of Volga perch also needs to be considered.

REFERENCES

Molnár T. (2002a). A süllő (*Stizostedion lucioperca* L.) mesterséges környezetben történő tartásának, népesítésének és takarmányozási problémáinak vizsgálata. PhD értekezés. Kaposvár, 123.

Molnár T., Hancz Cs., Molnár M., Stettner G. (2002b). Két eltérő takarmányváltási módszer hatásának vizsgálata az előnevelt süllő (*Stizostedion lucioperca* L.) növekedésére. Acta Agraria Kaposvariensis. 6. 1. 45-52.

Molnár, T., Hancz, Cs., Bódis M., Müller, T., Bercsényi, M., Horn, P. (2004). The effect of the initial stocking density on the growth and survival of the pike-perch fingerling reared under intensive conditions. Aquaculture International. 12. 2. 181-189.

Müller, T., Merth, J., Nyitrai, G., Kucska, B., Bercsényi, M. (2003). Sügérfélék (*Percidea*) hibridizációjának lehetőségei: előzetes eredmények. XXVII. Halászati Tudományos Tanácskozás. Szarvas, 2003. május 7-8. 28.

Ruuhijärvi, J., Virtanen, E., Salminen, M., Muyunda, M. (1991). The growth and survival of pike-perch, *Stizostedion lucioperca* L., larvae fed on formulated feeds. In: Larvi '91. P. Lavens et al. (Eds) EAS Special Publication. 15. Gent. 154-156.,

Schlumberger, O., Proteau J. P. (1991). Production de juveniles de sandre (Stizostedion lucioperca) Aqua Revue. 36. 25-28.
Specziár A. (2002). A fogassüllő és a kősüllő ivadék tápláléka a Balatonban. Halászatfejlesztés. 27. 70-80.
Specziár A., Bíró, P. (2002). A balatoni kősüllő (*Stizostedion volgensis*) ökológiájáról. Halászat. 95. 33-39.
Szipola I. (1994). A kősüllő (*Stizostedion volgensis*) szerepe természetes vizekben és szaporítása. Halászatfejlesztés. 17. 140-146.

Corresponding author:

Molnár Tamás
University of Kaposvár, Faculty of Animal Science
H-7400 Kaposvár, Guba S. u. 40.
Tel.: +36 82 314155, Fax.: +36 28 320175
e-mail: molnart@mail.atk.u-kaposvar.hu