INTENSIVE REARING PERFORMANCE OF THREE PIKEPERCH (*SANDER LUCIOPERCA)* FINGERLING POPULATIONS FROM HUNGARY

UROŠ LJUBOBRATOVIĆ[1], GÉZA PÉTER [1], ZOLTÁN HORVÁTH[2], BALOGH ENDRE[1], SVETLANA LENGYEL[1], GYULA KOVÁCS[1], ANDRÁS RÓNYAI[1]

[1]National Research and Innovation Centre, Research Institute for Fisheries and Aquaculture NARIC HAKI, 5540 Szarvas, Anna-liget 8., Hungary

[2]H&H Carpió Halászati Kft., 7814 Ócsárd, Kossuth u. 7., Hungary

INTRODUCTION

Pikeperch, *Sander lucioperca*, has a wide range of distribution (both natural and artificially stocked) making it today present throughout Europe, in Northern Africa and territory of former Soviet Union (Schlumberger and Proteau, 1996; Fuller, 2011). Production of this specie in Hungary is mainly based on the extensive pond production but still it has considerable share in the total European production (Dill and Teletchea, 2008). Taking into account that main sources of breeders are pond reared and wild fish, it is of significant importance to get the information which breeders would be more suitable for fingerling production with purpose of intensive rearing. Therefore, in this study we intent to evaluate intensive rearing performance of two groups of fingerlings originating from pond reared breeders and one group originating from the largest water body in the country, river Danube.

MATERIALS AND METHODS

Three batches of pikeperch fingerlings prepared for intensive on-grow were obtained from two producers from Hungary. Each batch was consisted of 200 individuals of average mass 10g. Two batches obtained from H&H Carpio Ltd, Ócsárd, Hungary, were originating from pond reared breeders (Attalai Halászati és Értékesítő Kft, Hungary and ÖKO2000 Kft., Hungary). One batch obtained from SZAT Akvárium Bt., Vonyarcvashegy, Hungary, was originating from wild Danube breeders. With this respect, three populations were named Akaszto, Attala and Duna. After the quarantine period, all fish were tagged in the right cheek with NMT Alpha visible tags (NMT INC Northwest Marine Technology, WA, USA) and individual weight was recorded. 60 fish with similar masses from each group were distributed in three tanks in equal proportion 20:20:20= Akaszto: Attala: Duna. On this way, each tank was stocked with 60 individuals making it triplication of each origin. At the beginning of the trial individual total length (TL, ±0.1 cm) and body weight (BW, ±0.05g) was recorded. Further on, individual BW measurement was done on a two weeks period. At the end of the trial both BW and TL were recorded for each fish.

During the trial fish were fed with SteCo PRE GROWER-14 2.0 mm (protein 50 %, fat 14 %, Coppens International, The Netherlands) in first 10 weeks and SteCo SUPREME-10 3.0 mm (protein 49 %, fat 10, Coppens International, The Netherlands) further on. Feed was distributed with mechanical FIAP belt feeder (4305 FIAP belt feeder; Aquacultur Fishtechnik, Germany) two feedings per day in excess.

The ammonium nitrogen N-NH_4^+, nitrite nitrogen N-NO_2, and nitrate nitrogen N-NO_3 were kept under 0.3, 0.45 and 33 mg L^{-1}, respectively. Oxygen was kept above 67% satiation. Temperature and pH were kept on 21.6 ± 0.9 ˚C and 8.0 ± 0.1, respectively (mean ± standard deviation, SD further on), while the conductivity ranged from 4.7 to 7.1 mS cm^{-1}.

Statistical analysis was based on one-way Analysis of Variance (ANOVA). Significant differences between treatments were estimated using a post-hoc Duncan's Multiple Range Test with a significance level at P≤0.05.

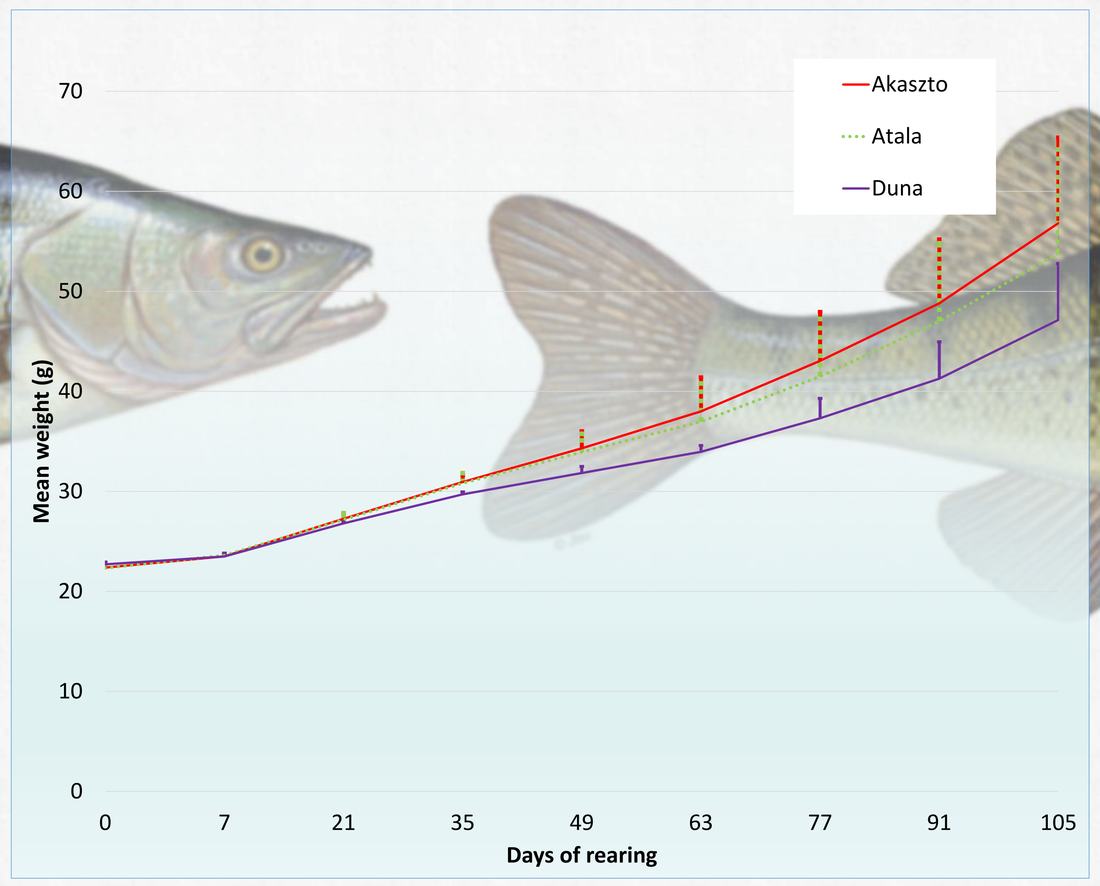

Figure 1. Mean weight + SD of fish throughout the 105 days of trail

RESULTS AND DISCUSION

Growth parameters are presented in Table 1. Higher growth was noticed in stocks originating from pond reared breeders but without statistically significant differences. Based on the growth curve (Figure 1), we can observe higher growth trend among the fish originating from pond reared breeders. This together with higher achieved SGR might be the outcome of extensive selection process among the pond reared fish,

There were no mortalities noticed during the trial period. However, among each batch we have experienced emaciation by the fingerlings. Similar phenomenon has been previously reported by Schram et al. (2014), where the fish emaciation was not found to be the function of the tested factors. In our trial, observed ratio of starved fish was 16.7±15.3, 16.7±16.1, 21.7±12.6 % (mean ± SD) for Akaszto, Attala and Duna respectively, without significant differences between the groups. Nevertheless, it is worth mentioning that as well as for growth parameters, more favourable results were noticed among pond origin fish.

This is in agreement with previous indication of an early domestication process among pond reared breeders.

Tagging the pikeperch fingerlings with NMT Alpha visible tags seems to yield rather favourable outcome in this size class of fish. Previous reports on tagging juvenile pikeperch considered higher size classes of fish (Hopko et al., 2010; Żakęś and Hopko, 2013). By our observations, tagging lower size classes with these visible implants presents rather fast and non-harmful procedure. Found tag retention was 94.2±1.4, 92.5±4.3 and 88.3±7.6 % (mean ± SD) for Akaszto, Attala and Duna respectively, without significant differences between the groups. Once more, we must point to the lower observed tag retention among the fish with wild origin which is indicating more aggressive and stressful behaviour of these fish.

Table 1. Performance of the three pikeperch populations based on the assessed parameters

Parameter	Akaszto	Atala	Danube
BWi (g)	22.4±0.1[a]	22.3±0.2[a.b]	22.7±0.2[b]
CV BWi (%)	12.5±0.0[a]	12.3±0.0[a]	10.6±0.0[b]
TL_i (cm)	14.5±0.1	14.3±0.1	14.6±0.3
BW_f (g)	56.8±8.6	53.8±10.4	47.1±5.6
CV BW_f (%)	39.5±10.3	36.2±5.5	37.1±2.6
TL_f (cm)	19.6±0.8	19.1±1.0	18.5±0.6
FBG (kg m^{-3})	2.8±0.7	2.5±0.8	2.0±0.5
SGR (% day^{-1})	0.88±0.15	0.83±0.18	0.69±0.11
Starved fish (%)	16.7±15.3	16.7±16.1	21.7±12.6
Tag retention (%)	94.2±1.4	92.5±4.3	88.3±7.6

Values (mean±SD) in the same row with different superscript (a, b) are significantly different (P≤0.05).

Figures 2 and 3. Tagging and reading the NMT Alpha visible implant

CONCLUSIONS

Considering the small sample size used in this study, we may characterize it as the preliminary. However, the indications of the more favourable results of intensive rearing with fish originating from pond reared breeders presents basis in which direction further studies could address. Finally, tagging the fish with NMT alpha implants may be suitable method for lower size classes in further similar studies.

ACKNOWLEDGEMENTS

This study was financed by the Hungarian Ministry of Agriculture though project “Improvement of artificial propagation of economically important percid fish species (pikeperch, perch) with special regards to geographical distribution”. Special gratitude goes to fish farm H&H Carpio Ltd, Ócsárd, Hungary for their guidance through the quarantine treatments and provision of stocking material and feed. Finally, acknowledgements are addressed to EU FP-7 project AQUAREDPOT (reference number: 316266) for supporting the researchers involved.

REFERENCES

Dil, H., Teletchea, F. (2008): The European market of the pikeperch for consumption. In: Fontaine, P., Kestemont, P., Teletchea, F., Wang, N. (Eds.), Percid fish culture, from research to production. Presses Universitaires de Namur, Namur, Belgium: 15-16.

Fuller, P. (2011): *Sander lucioperca*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. http://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=830 RevisionDate: 3/17/2009.

Hopko, M., Żakęś, Z., Kowalska, A., Partyka, K. (2010): Impact of intraperitoneal and intramuscular PIT tags on survival, growth and tag retention in juvenile pikeperch (*Sander lucioperca* (L.)). Archives of Polish Fisheries, 18: 85-92.

Schlumberger, O., Proteau, J.P. (1996): Reproduction of pikeperch (*Stizostedion lucioperca*) in captivity. Journal of Applied Ichthyology, 12:149-152.

Schram, E., Roques, J.A.C., Van Kujik, T., Abbink, W., Van de Heul, J., De Vries, P., Bierman, S., Van de Vis, H., Flik, G. (2014): The impact of elevated water ammonia and nitrate concentrations on physiology, growth and feed intake of pikeperch (*Sander lucioperca*). Aquaculture, 420–421: 95–104.

Żakęś, Z., Hopko, M. (2013): Tagging juvenile pikeperch (*Sander lucioperca* (L.)) in the cheek with Passive Integrated Transponders (PIT) – impact on rearing indexes and tag retention. Archives of Polish Fisheries 21: 243-248.
43,713–721.