



Aquainnova

www.eatip.eu

LUCIOPERCIMPROVE

Improving egg and larval quality in pikeperch by broodstock management, husbandry and nutrition and sex control

The Challenge

Pikeperch (*Stizostedion lucioperca*) is one of the most valuable freshwater species for commercial and sport fisheries in Europe, but culture of this species is still limited principally to extensive fingerling production in ponds for restocking purposes. Recent research has demonstrated the feasibility of intensively cultivating the species, which is increasingly in demand by both the consumer (large size fish, 2-4 kg each) and the restocking (0+ and 1-year old fish) markets in Europe. However, the supply of eggs and larvae is still largely dependent on the spawning of wild breeders or captive fish held in ponds during the maturation process. Therefore the production of pikeperch eggs and larvae is seasonally restricted and extremely variable in quality and quantity.

In its strategy on the sustainable development of European aquaculture (COM(2002)511), the European Commission set the diversification of farmed species as a top priority. In freshwater fish farming, which has to face the relatively low market value of its products in relation to production costs, enlarging the range of farmed species could create new opportunities.

Project Objective

In order to support the development and sustainability of pikeperch farms in several European countries, the LUCIOPERCIMPROVE project aimed to develop reliable methods for securing the continuous supply of high quality eggs and larvae of pikeperch. By ensuring the supply of high quality pikeperch eggs and larvae, as well as an optimized broodstock management, the LUCIOPERCIMPROVE project aims to enable producers to provide the market with an all-year-round availability of portion-size pikeperch.

Key Points

- Inducing out-of-season spawning through temperature and photoperiod control during broodstock maturation.
- Investigating the effects of different husbandry and dietary factors on the reproductive physiology and nutritional status of breeders, as well as related effects on gamete and larval quality.
- Comparing the egg and larval quality of breeders stocked in various environments (tanks vs. cages vs. ponds).
- Setting up an efficient procedure for broodstock and larval rearing in order to produce pikeperch sex-reversed males and, in a second step, all-female populations of juveniles.

EATiP Thematic Area of Relevance

TA1: Product Quality, Consumer Safety and Health

TA2: Technology and Systems

TA3: Managing the Biological Lifecycle

TA4: Sustainable Feed Production

TA5: Integration with the Environment

TA6: Knowledge Management

TA7: Aquatic Animal Health and Welfare

TA8: Socio-Economics and Management

Key Words

Pikeperch, Egg quality, larval quality, management, husbandry, nutrition

Project Information

Contract number:

17646

Contract type:

SMEs-Co-operative research contracts

Action line:

SME-1 Co-operative Research (all areas of science and technology)

Duration:

24 Months (01/11/2005 – 31/10/2007)

Coordinator:

Prof. Patrick Kestemont - University of Namur (FUNDP), Unit of Research in Organism Biology
Rue de Bruxelles 61, 5000 Namur, Belgium

Tel:

+32 81 72 43 63

E-mail:

patrick.kestemont@fundp.ac.be

Project website:

<http://www.luciopercimprove.be/>



Output Highlights

New knowledge on reproductive biology of pikeperch

The current study provides new insight into the reproductive cycle of male and female pikeperch. The reproductive cycle of pikeperch can be now successfully controlled in captivity and out-season spawnings can be obtained from cultured pikeperch breeders held under suitable temperature/photoperiod conditions. Investigation revealed that fish origin and production environment did not negatively affect the reproductive cycle. Initial indications are that intensive reproduction of pikeperch seems feasible as reproduction performance was not affected intensively reared F1 breeders (male & female). Essential gonadal maturation of male breeders appears to be completed several months before spawning (spermiogenesis), suggesting that it might be possible to induce male pikeperch (wild and F1) to spawn several months out-of-season.

Out-of-season spawning and artificial fertilization

Different photo-thermal regimes have been successfully applied and led to maturation of both male and female breeders. However, fertilization and/or hatching rates were still low. Out-of-season spawning performed with cultivated specimens held exclusively (from larvae to spawners) in re-circulating systems with artificial temperature and light regimes and fed with formulated feed is possible and further studies should improve the productivity. Artificial fertilization with fresh or cryopreserved semen was successfully achieved.

Improving egg and larval quality of farmed pikeperch through improvement of broodstock diet

The effects of three different feeding regimes during the whole reproductive cycle were compared. Using the spawning rate as well as the survival, composition and resistance of larvae obtained from the different broodstocks as indicators, the study suggests that mixing dry feed and forage fish in the broodstock diet could be an effective mid-term method to obtain spawning of good quality. Nutritional reserves in males also influenced the semen quality during spawning. Enrichment of the broodstock feed with arachidonic acid led to an increase of this fatty acid in the lipids stored into the egg, while supplementation of larval feed with phospholipids significantly improved the survival and growth rates of pikeperch larvae.

New protocol on production of all-female populations and effect on productivity in intensive culture

A protocol to produce hormonally sex-reversed males breeders" was developed. All male populations were produced by feeding undifferentiated juveniles at an initial mean body weight of 70 mg (30 days post-hatching) with 17 α -methyltestosterone at 40 mg kg⁻¹ food during 30 days.

The Full Report:

For a comprehensive description of the research project, visit <http://www.luciopercimprove.be/>

Next Steps – Suggested Actions/Follow On



RTD

- Larval quality is still highly variable and this strongly affects the profitability of juvenile production under intensive culture conditions. Further research should focus on the improvement of juvenile quality production in indoor systems, reducing larval and juvenile deformities and increasing profitability.
- There is a need for more research to determine the extent that Gonadosomatic Index growth and final maturation can be accelerated and advanced spawning induced.

Related Publications/Projects

Kestemont P., Xu X., Hamza N., Maboudou J. & Imorou Toko I., 2007. Effect of weaning age and diet on pikeperch larviculture. *Aquaculture* 264, 197-204.

Kucharczyk D., Kestemont P., Mamcarz A., 2007. Artificial reproduction of pikeperch. Olsztyn University Press, Poland, 80p.

Fontaine P., Kestemont P., Teletchea F. & Wang N., 2008. Percid Fish Culture – From Research to Production. Presses Universitaires de Namur, Belgium, 148p.

Wang N., Mandiki SNM, Henrotte E., Bouyahia A-G., Mairesse G., Rougeot C., Mélard C. & Kestemont P., 2009. Effects of partial or total replacement of forage fish by a dry diet on the quality of reproduction in pikeperch *Sander lucioperca*. *Aquaculture Research*, 40: 376-383.

Wang N., Xu X. & Kestemont P., 2009. Effect of temperature and feeding frequency on growth performances, feed efficiency and body composition of pikeperch juveniles (*Sander lucioperca*) *Aquaculture*, 289, 70-73.

Hamza N., Silvestre F., Mhetli M., Ben Kemis I., Dieu M., Raes M., Cahu C. & Kestemont P., 2010. Differential protein expression profile in the liver of pikeperch (*Sander lucioperca*) larvae fed with increasing levels of phospholipid. *Comparative Biochemistry and Physiology. Part D. Genomics and Proteomics*, 5, 130-137.