



## SUMMARY

This research evaluated the effects of lactic acid bacteria (LAB), applied through different types of feed, on the health of larval pike-perch (*Sander lucioperca*). The results showed that administration of LAB through live feed (*Artemia nauplii*) improved fish growth and reduced skeletal deformities. Supplementation of LAB through commercial dry feed also reduced skeletal deformities and significantly reduced the number of potentially pathogenic bacteria. Both treatment types improved protein utilisation. These findings will be of particular interest to pike-perch feed producers and farmers.

## KNOWLEDGE NEED

Pike-perch is a relatively new fish species for cultivation, and is considered to have high potential for inland aquaculture diversification in Europe. This is a result of increased demand due to the decline of wild catches, and also due to the pike-perch flesh quality (neutral taste and fillets without bones). Major bottlenecks for further expansion of the pike-perch culture industry in Europe include low larval survival, high incidence of deformities, and high sensitivity to stressors such as pathogenic bacteria. Overcoming these challenges is crucial for the successful expansion of pike-perch aquaculture production.



## POTENTIAL IMPACT

- The administration of LAB through feed improves the growth, health and survival of pike-perch juveniles which could lead to an increase in production yield and an improvement in fish welfare.
- The potential for LAB to minimise fish pathogenic bacteria growth could minimise the ecological consequences of fish farming related to the spread of pathogens to the environment.
- The observations are promising in terms of usage of probiotics for more environmentally friendly production of pike-perch in Recirculating Aquaculture Systems (RAS).
- The findings could contribute to a better overall understanding of LAB action in RAS.

**EATiP - Strategic Research and Innovation Agenda (SRIA)** Thematic Area 7 – Aquatic Animal Health and Welfare; Goal 3, Thematic Area 4 – Sustainable Feed Production; Goal 2. To see the full list and descriptions of the thematic areas and goals, please visit: [eatip.eu/?page\\_id=46](http://eatip.eu/?page_id=46)

## UNDERLYING SCIENCE

This study aimed to test the effects of lactobacilli applied to juvenile cultured pike-perch, either through commercial dry feed or through live feed. The effects examined were on fish growth, microbiota balance, and skeletal development. On the twelfth day post-hatching (DPH), the fish were divided into groups to receive different combinations of feed and LAB, including a control group which received the same feed minus the LAB. After 14 days of treatment, fish were assessed for digestive enzyme activity and microbiota composition. Skeletal deformities, individual total lengths and individual body weights were also recorded at the end of the treatments.

## RESULTS

- Administering LAB through live feed had beneficial effects on larval growth, skeletal development and protein digestibility (trypsin to chymotrypsin activity ratio (T/C)).
- Application of LAB-processed dry feed was also associated with better skeletal development, and significantly reduced numbers of potentially pathogenic bacteria (*Aeromonas* and *Mycobacterium*).
- Both treatment types improved protein utilisation, as evidenced by digestive protease activities.

## END-USERS & POTENTIAL APPLICATIONS

### END-USER 1: Pike-perch farmers

**APPLICATION:** Using optimal feed combinations for improved growth and health of larval pike-perch and reduction of pathogen burden.

### END-USER 2: Pike-perch feed and nutrition manufacturers

**APPLICATION:** Developing novel feed combinations that will improve growth and health of larval pike-perch and reduce pathogen burden.

### END-USER 3: Pike-perch breeders

**APPLICATION:** Support in the breeding of larval pike-perch during the weaning process, by reducing the costs and time associated with *Artemia* feeding through early transition of pike-perch to an inert diet. Additionally, supporting eco-friendly pike-perch rearing through antipathogenic potential of probiotics.

### END-USER 4: Nutrition and microbiology research community

**APPLICATION:** Greater understanding of important nutritional demands of pike-perch larvae for growth and

proper bone development. Additionally, it provides the opportunity for further research with other fish species, and also for further examination of proteolytic properties of lactobacilli using animal proteins as a substrate.

## STATUS

**Technology Readiness Level (TRL) 3 - Proof of concept has been demonstrated in experimental conditions**

- The research is currently being exploited by the scientific community through a scientific publication (see 'AT A GLANCE' below).
- Further technical optimisation through additional testing in larger cohorts is required for industry exploitation.
- A follow-on project is currently in progress which builds on the results of this research. This project should support technological improvement of probiotic supplementation to larval pike-perch during weaning.

## AT A GLANCE

**TITLE:** Lactic Acid Bacteria Improve Growth and Reduce Potentially Pathogenic Bacteria Level in Juvenile Pike-Perch

**KNOWLEDGE TYPE:** Scientific publication

**WHERE TO FIND IT:** Ljubobratovic et al. 2017. Supplementation of lactobacilli improves growth, regulates microbiota composition and suppresses skeletal anomalies in juvenile pike-perch (*Sander lucioperca*) reared in recirculating aquaculture system (RAS): A pilot study. *Research in Veterinary Science* 115, 451 - 462. DOI: 10.1016/j.rvsc.2017.07.018

**STATUS:** Published

**TNA FACILITY USED:** National Agricultural Research and Innovation Centre (NAIK), Indoor System for Fish Disease Challenge (SDC), Hungary

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**PATENTS OR OTHER IPR EXPLOITATIONS:** No

