



ADRIAQUANET - ENHANCING INNOVATION AND SUSTAINABILITY IN ADRIATIC AQUACULTURE

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INTRODUCTION

Farmed fish is a growing source of protein-rich food. While aquaculture grows globally, knowledge of the welfare of farmed fish is still lagging behind. Yet, animal welfare is at the heart of food supply sustainability; fish diseases stem from poor environmental conditions and antimicrobial resistance, which together result in poor food quality and lead to consumer mistrust. We must, as a matter of urgency, make a systematic and long-term commitment to defining farmed fish welfare parameters. To address this issue in the Adriatic Sea region, a community of Croatian and Italian researchers and aquaculture SMEs have joined forces in the AdriAquaNet project, which is funded by the 'Interreg Italy-Croatia 2014-2020' cross-border cooperation programme. The project is addressing the innovation needs of the 'fish farm', the 'fish doctor', and 'the fish market' - the three main segments of the aquaculture value chain. Fish farms in the Adriatic Sea supply high-quality products for global export or to meet the intensive local demand during the summer touristic waves. Having a well-managed aquaculture sector is clearly essential for the local economy and maintaining consumer trust.

METHODOLOGY

The AdriAquaNet community brings together six research organisations and three fish farms. Through their collaboration, they are implementing R&I for three interconnected aquaculture sustainability goals: fish farm management, farmed fish welfare and health, and farmed fish marketing. The core approach for improving farmed fish welfare consists in integrating technological innovations into fish farms specialised in sea bass and sea breams, such as: a) the use of new feeds with alternative protein sources (insects) and added probiotics that protect against gut diseases; b) the use of new vaccines and vaccination protocols against pathogens; and c) the use of new natural drugs. The impact of these innovations on fish welfare has been assessed by gathering the data needed to both frame the intervention mode of action (i.e., gene expression, histology, haematology, gut microbiota, and biochemistry) and define end-points for monitoring animal welfare (i.e., Operational Welfare Indicators, growth, nutrient composition, sustainability index). From the One-health perspective, other datasets have been gathered on both environmental quality (climate and ecotoxicology indicators) and the nutritive parameters of food.

RESULTS

Our data series show that the fish on the new diets with probiotics have the same sustainability index and nutritive properties as those fed conventional feed. However, the probiotic supplement changed the intestine gene expression pattern towards a low inflammation state and improved resistance to gut pathogens, giving us reason to expect increased innate resistance to gut pathogens. Fish immunisation against pathogens by means of two autologous vaccines has been standardised and a manual for implementation will soon be delivered. Following a large-scale screening of several dozens of extracts and purified natural compounds, new bioactive entities have been identified that may undergo further testing as natural drugs for enhancing fish health and resistance against pathogens. A manual for the implementation of a new bivalent method based on the use of Operational Welfare Indicators in fish farms is due to be released by the end of the project. An important result of the project is the establishment of a close collaboration between researchers and fish farm managers, and their direct engagement in testing fish welfare innovations in their business.

DISCUSSION

The goal of improving the environmental, nutritional and economic sustainability of Adriatic aquaculture by focusing on new science and technology is strategic for both Italy and Croatia. This has been made clear not only through the strategic R&I innovation plans of both EU Member States but also through the results of a consumer survey, which we gathered as part of this project. Citizens in our region appear to have a deep-rooted concern for the One-health concept and expect to be assured that the fish market offers them food that is produced with a great deal of respect for the environment and animals.