

Feeds for organic fish production: constraints and possibilities

Introduction

Aquaculture, the cultivation of aquatic species such as fish, shellfish, and aquatic plants, has increased in popularity as a solution to satisfy the rising global demand for seafood. Nevertheless, the industry's expansion has raised apprehension over its ecological effects and the viability of its methods. In response to these worries, the idea of implementing feeds approved for organic production in aquaculture has become more prominent. Feeds approved for organic production provide a promising solution to enhance the sustainability of aquaculture operations, while ensuring the health of both farmed organisms and the ecosystems in which they reside.

Organic aquaculture refers to the process of producing aquatic organisms according to standards for organic farming and legislation, which cover the entire production chain, as well as labelling, controls, and trade. This method prioritizes practices that preserve biodiversity, make responsible use of natural resources and uphold a high level of animal welfare, among other principles. In the European Union, the European Union organic logo outlines an extensive set of regulations and recommendations enabling producers to promote their organic goods and granting customers quick identification and confidence in certification. Despite being a fledgling industry, organic aquaculture growth has plateaued, presently accounting for only 1-2% of total aquaculture production in Western European countries. Most of the organic aquaculture production in Europe is dominated by Atlantic salmon, Common carp, and Rainbow trout. However, there has been increasing interest in Italy for organic production of Sea bass and Sea bream (Sicuro, 2019). The current article provides an overview of current constraints and opportunities related to fish feed that can be used in organic fish farming, from the perspective of fish feed producers. For more detailed information, readers are directed to the excellent review by Mente et al. (2019). Throughout this text, fish feeds approved for organic fish production will be simply referred to as "organic feed".

Understanding fish feed for organic aquaculture

Organic feeds in aquaculture refer to feed formulations that adhere to strict organic production standards and legislation. These guidelines cover various aspects, such as the sourcing of raw materials, processing methods, and environmental sustainability. The main aim of using such feeds is to minimize the negative impact of aquaculture on the environment and to ensure the welfare of farmed organisms. Furthermore, organic feeds exclude the use of raw materials derived from genetically modified organisms (GMOs).

Aller Aqua is approved by the Danish Agricultural Agency under the Ministry of Environment and Food of Denmark. Aller Aqua is subject to yearly audits in the regulatory requirements that is mandatory for authorization to produce fish feed for organic production. The authorization encompasses

- the treatment of raw materials, such as traceability and documentation as well as segregation between organic and other raw materials,
- the production steps, which include milling, mixing, and bagging, must be carried out in accordance with established protocols,
- proper storage procedures are essential for both raw materials and finished goods,
- sales activities must adhere to accepted labelling and transport guidelines and
- if exporting to third countries, all necessary regulations must be met.

Specifically, the production of organic feed necessitates recorded procedures and processes within the company, including procurement and supplier management, goods receipt, manufacturing, labelling, and sales. Moreover, the cleaning protocols in the factory and cleaning between batches are documented pre-goods receipt and during manufacture respectively. Furthermore, a thorough quality control is carried out on both raw materials and finished products.

Constraints and considerations

The use of only approved raw materials by legislation in organic feeds inevitably limits the variety and availability of these materials for formulating fish feed when compared to non-organic feed. The choice is restricted to only a few raw materials that are of significant volume and availability, leading to an eventual increase in organic feed prices and making them more prone to price fluctuations of their main ingredients. Additionally, several additives and functional ingredients may not be obtainable in their organically certified form, which restricts the availability of features and benefits customers demand in non-organic fish feeds. Expanding the certification of a greater range of raw materials in the future will facilitate the provision of a wider selection for organic feed formulation. In this respect, organic feeds can be deemed more traditional in their composition as they tend to contain a higher proportion of fishmeal in comparison to their non-organic and contemporary equivalents. Organically certified fishmeal is primarily sourced from trimmings and/or fisheries that are sustainably managed. The utilization of trimmings in organic feeds has the significant benefit of reducing reliance on wild fish stocks in terms of sustainability. Furthermore, plant protein and other raw materials for organic feeds may come from byproducts of food processing for human consumption. Procuring adequate quantities of feed ingredients certified as organic, particularly alternative protein sources, can be problematic due to their limited availability and high demand. With this in mind, organic feeds are formulated according to the nutritional needs of the fish species of interest while ensuring their health, well-being, and high final product quality. The high proportion of fishmeal in organic feed may be justified to meet the high protein requirements of carnivorous juveniles, given the lack of other organically certified raw materials that are rich in protein.

Experiences in research and markets

The formulation of organic feed is conditional on the species which has a market for organic products. The demand is stable for organically certified Atlantic salmon, Rainbow trout, Sea bass and Sea bream markets, while organic products might become more prevalent for other fish species in the future. Producers who sell such products depend on consumers being willing to pay more to offset the increased costs of producing fish that are organically certified. However, producers encounter obstacles when trying to increase their market shares, as indicated by Sicuro's (2019) analysis of Italy.

There is a scarcity of research and information on the performance comparison between organic and non-organic feed. Extensive trials conducted at Aller Aqua Research using trout of different sizes have demonstrated excellent growth performance and feed conversion with organic feed, nearly on par with non-organic feed. A study conducted by Siano et al. (2016) found marginally higher mineral levels in Sea bass when fed with organic feed as opposed to non-organic feed. Regarding environmental discharge, sea bass and sea bream exhibited a greater excretion of nitrogen and in particular phosphorus when fed organic feed compared to non-organic feed (Ballester-Molto et al., 2016). The increase in phosphorus discharge in organic feed is mainly due to the higher phosphorus content of organically certified fishmeal derived from trimmings and a more unpredictable digestibility of phosphorus in organic feeds.

Environmental aspects

It is clear that the use of raw materials for organic fish feed has a beneficial impact on the environment, specifically in reducing dependence on wild fish stocks. However, certain regulations can contradict

other environmental laws. One notable instance is the restricted discharge of phosphorus and nitrogen in Sea trout farming in Denmark. This conflicts with the use of fishmeal from trimmings abundant in phosphorus and the requirement to incorporate considerable amounts of aforementioned fishmeal in organic feed to attain the aimed protein content.

Conclusion and outlook

The integration of feeds with organic certification into aquaculture practices represents a significant advancement towards a more sustainable and responsible seafood industry. With the increasing global demand for seafood, the significance of lessening the environmental impact of aquaculture cannot be overstated. Organic feeds offer a way to mitigate the adverse effects connected with conventional aquafeeds, promoting both environmental health and the welfare of farmed organisms. Through research, investment, and commitment from stakeholders in the aquaculture sector, the vision of a thriving and sustainable industry can be realised. This will benefit both present and future generations.

Ongoing research should focus on formulating organic feeds for different species which consider their nutritional requirements and growth patterns, thus optimising their growth potential.

References on request.

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FACTS ABOUT ALLER AQUA GROUP

- Danish family-owned group with headquarters in Christiansfeld, Denmark
- Produces fish feed for more than 70+ countries worldwide from factories in Denmark, Poland, Germany, Egypt, China, Zambia, and Serbia
- The company employs a total of 650+ people
- Production capacity of 340.000+ tonnes
- Total yearly turnover in the region of 274 mill. EUR (2022)