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Editorial: Sustainable feed for aquaculture

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Editorial on the Research Topic Sustainable feed for aquaculture

This special issue of the “Frontiers in Sustainable Food Systems” was intended to provide a forum for publishing scholarly papers focused on sustainable aquaculture feed.

Aquaculture production has exceeded harvest from capture fisheries and demonstrated its contribution to global food security. There is a growing number of publications that provide evidence and reasons highlighting the capacity of aquaculture for further growth. However, there are challenges that this sector should address to be able to meet the requirements of sustainable development. In this context, nutritionally optimized feeds from sustainable sources are crucial for aquaculture development, not just with reduced environmental impact but a positive contribution to the natural capital. Recent findings are beginning to emphasize the increasing relevance of focused research on aqua feed that offers alternative to meal and oil from wild fish stocks and presents solutions for achieving synergies between aquaculture and marine ecosystem services. This approach provides the best way forward in developing blue economy to tackle the problem of food insecurity and meeting several other targets of Sustainable Development Goals.

Scholarly articles that passed through the review process generated useful information consistent with the aims and objectives of producing this special issue.

A paper provided evidence that demonstrated growth of Asian seabass, *Lates calcarifer*, fed palm oil as a dietary lipid source. The authors analyzed the fatty acid profile of the fed species and suggested the use of palm oil in developing weaning diet for the fish larvae.

The effect of refined palm oil on several physiological and biochemical parameters of juveniles of hybrid grouper (*Epinephelus fuscoguttatus* x *E. lanceolatus*) was established by another team of authors. It was supported by quantitative data on proportion of this plant-based product in the diet of increasingly popular hybrid grouper in the aquaculture industry.

Interesting research on rainbow trout (*Oncorhynchus mykiss*) focused on alternative to dietary fish oil. The study examined fatty acid profile, histology, non-specific immune response, and growth resulting from feeding transgenic canola oil. Evidently, this dietary ingredient is highly digestible, meets the nutritional needs of the fish as well as consumer expectations. The authors recommended the suitability of feeding transgenic canola oil over the entire production period of the farmed rainbow trout.

Incorporating feed components from wild-caught fish is not confined to species used in marine aquaculture but also freshwater fish. Elaborating this problem, a paper draws attention to the need for alternative sources in aqua feed and provides insights into the significance of groundnut oil which is one of the most widely used vegetable oils in several developing countries. The authors explained the nutritional profile of the groundnut oil, especially the metabolically active phytochemicals and antioxidants, and their collective influence on fatty acids, lysozyme activity and other metabolic factors in a popular major carp, *Labeo rohita*. They recommended use of groundnut oil in a certain percentage to support growth of the fish and file quality and cautioned against exceeding this limit.

Plant-based alternatives are most common but recent findings also suggest the nutritional importance of organic substances from animal sources. A paper in this issue deals with the nutritional characterization of aquaculture processing waste. Common by-products (heads, frames, trimmings, skin, and viscera) of European seabass (*Dicentrarchus labrax*), gilthead seabream (*Sparus aurata*), common carp (*Cyprinus carpio*), and turbot (*Psetta maxima*) contain eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) that are suitable for human consumption besides crude protein and lipid and some other components that are suitable for feed development.

There is a need to continue exploring the effectiveness of raw materials and by-products for extraction of nutrients for aquafeed. The scope of this area is enormous as the trials involving the use of microalgae, insects and genetically modified

plants are yielding interesting results. However, there are issues about the sustainability of resources and societal perceptions. Investment in research and development should continue to address these problems and concerns for successful growth of sustainable aquaculture for food security. The mounting environmental problems, especially related to climate change and the COVID-19 pandemic, expose the vulnerability of the current food systems and imperatives for ushering aquaculture into a new era of innovation and adaptation.

The number of research papers in this Research Topic is limited due to timeframe and screening standard, yet it brings important contributions to the understanding of the role of sustainable feed in aquaculture during challenging times for global food security.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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