Recommendation on the circularity of fish feed

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Background

The European Commission's Farm to Fork strategy, published in May 2020, provided a stimulus for making more use of alternative feed ingredients and lowering the environmental footprint of animal products by increasing the use of circular feed, thus reducing reliance on agricultural land and lowering GHG emissions from feed production. It is also clear that countering linear resource depletion by increasing circularity and using secondary raw materials must be integrated into feed production and could help to address the challenge of competition with direct human consumption, which is often referenced in the public debate. The new dynamics created by the Russian invasion of Ukraine in February 2022 reinforce the importance of strategic feed security to improve EU feed autonomy by reducing the EU's reliance on feed imports, especially high-protein feed sources.

The traditional resource efficiency indicator in the aquaculture sector is the feed conversion ratio, which is based purely on the 'input–output' efficiency from 1 kg of feed to 1 kg of animal product. However, in a circular economy, the resource efficiency of a system must also be evaluated by its ability to maintain as many nutrients as possible within the system, thus minimising waste or usage outside the food chain, such as bioenergy. In that sense, circular feed can be implemented by generating food of animal origin using nutrients that are not directly used as food. Although this concept is a rather recent development, the aquafeed industry has been recovering secondary raw materials from a circular economy for many decades.

Circularity in feed production is a concept that is still in the process of being defined. A provisional definition of circular feed could be 'Non-food-grade ingredients recovered as secondary raw materials from the (local) circular economy with a small land use footprint'.

This definition can be broken down into several components, which jointly form a circularity metric. The different dimensions of the components allow for a non-binary approach, from which it could be concluded that some feed ingredients have greater circularity than others.

- Food/feed grade status
- Proximity of the origin to the feed mill
- Land use ratio
- Forage fish dependency ratio (FFDR)
- Nutrient digestibility

Further information on these components is provided in the annex.

Recommendations

<u>Recommendations to policymakers:</u>

- EU policy:

1. Public authorities should design a political framework that favours the maximisation of use as feed for food-producing animals of such resources of the bioeconomy as are not used directly for food; this entails giving priority to usage as feed over any other usage (particularly bioenergy production), in line with the EU waste hierarchy.
2. An indicator to measure feed circularity should be selected from among the indicators that measure progress in sustainability development as part of the future dashboard for the announced legislative framework proposal on sustainable food systems.
3. Public authorities should establish, when needed to preserve the safety of the feed and food chain, specific requirements for operations that might be required to ensure fitness for use as feed, such as the approval of establishments, especially those using specific processes or resources for a certain stream of raw material.
4. Public authorities should identify bottlenecks, including legal standards, that restrict circularity (e.g., prohibitions on the use of certain products as feed) so as to establish conditions for possible use in feed of nutrients recovered from waste streams (currently prohibited). Public authorities must then ensure that the relevant business establish a solution. They should pay particular attention to the use of former foodstuffs or catering waste containing fish and meat for insect or polychaetes farming, which would allow about a third of the food waste generated in the EU to be transformed into highly nutritious protein animal feed, including fish and aquaculture feed.
5. Public authorities should help to secure more feed and food for a growing global population by establishing appropriate scientific, legal and industrial frameworks to ensure that we can benefit safely from the results of existing and upcoming gene editing technologies.

- Public Research:

1. EU policy should support research into proposed definitions, characterisations and a preferred methodology for quantification of the level of circularity of feed, thus ensuring a level playing field among operators and avoiding unjustified and fake claims.

2. Public authorities should support research into the use of underused or unused resources of the bioeconomy as feed and into new resources with low land use (e.g., marine resources), particularly proteins and omega 3 sources. The utilisation of the new resources should take the necessary care regarding environmental impact.

- Communication:

1. Public authorities should support the promotion of aquaculture production systems based on circular feed among citizens and consumers.
2. The EU, in its communications with consumers, should, whenever possible, emphasise information on the circularity of fish feed.

<u>Recommendations to operators:</u>

- Aqua chain responsibilities:

1. Operators should integrate 'circular feed' thinking into their activities, with a view to reducing the environmental impact of the feed production stage (especially GHG emissions) and to reducing the competition for resources with food and with feed use (minimising nutrient losses at the feed use stage).
2. Feed circularity targets should be set at the sector level.
3. Operators should implement procedures to minimise and mitigate the risk of fraud; the limitations on available resources and any incentives to use more material from the circular bioeconomy may also increase potential exposure to fraud.

- Feed ingredient suppliers:

1. Operators in the bioeconomy should have procedures in place to prioritise feed as the destination for nutrient resources that are not used as food over any other destination (bioenergy, non-feed/food uses, waste). This implies an assurance of feed safety and the preservation, as much as possible, of feed quality; processes that negatively impact the nutritional value of the by-products/residues of food processing should be avoided.
2. Operators in the circular feed chain must be conscious of their responsibility to ensure that flows from the circular economy are fit for use in feed and, in particular, safe for animals, users, the environment and consumers of animal products.

3. Operators in the circular feed chain must be transparent, especially regarding operations/processes, to maintain a high level of safety. Certifications from private feed safety assurance schemes should be a prerequisite for accessing the market.

- Feed manufacturers:

1. Operators should aim to optimise nutrient efficiency and minimise environmental losses/emissions. This implies the optimisation of fish diets, including the use of feed additives, particularly for nitrogen and phosphorous.

- Fish farming:

1. Operators should know about and prioritise the use of feed based on the circular economy.
2. Breeding programmes should select fish species/breeds more adapted to feed that has lower nutrient concentrations and is possibly less digestible.

- Downstream part of the chain:

1. More feed circularity may also mean additional feeding costs for farmers (use of less nutritive resources, higher costs to secure nutritionally balanced diets); these extra costs must be valued downstream.
    - Organisations or companies defining guidelines for future quality certification standards are encouraged to include feed circularity as a focus during their preparation.

Annex: Components of the definition of the circular feed concept

Food/feed grade status: 'Food grade' means that the quality of the material is such that it meets the expectations of the human consumption market. The concept of 'human inedible feed', as defined by FAO, is linked to this. The notion of food/feed grade status, however, provides a better understanding of the quality of the biomass used by the feed industry, rather than what is regarded as consumable by a human being. When a product is feed grade, it is not considered suitable for the human consumption market due its quality or simply because there is no demand for it.

From FEFAC's analysis in the 1st Feed Sustainability Charter Progress Report, it can be concluded that practically none of the raw materials used in feed production in general are of food grade. Typically, ingredients sold for direct human consumption command a higher market price than if they go to feed, so the market drives in this direction. However, there are cases of food grade feed ingredients being sold to a feed operator, although this is normally the result of surpluses for which there is insufficient demand from the human consumption market. Nonetheless, a feed ingredient of feed grade has higher circularity potential than a feed ingredient of food grade.

Proximity to the feed mill: The concept of a circular economy has a geographic dimension, in which the closer the origin of the raw material is to the point of final use (i.e., localness), the 'more circular' it is, in general. This proximity is illustrated by the fact that feed mills are located close to their livestock farmer customers, who, as a starting point, favour the use of local resources. In the case of European feed production, the sourcing of feed ingredients from the European continent is a means to boost the European circular economy and thus European feed autonomy. The proximity of the feed material to the feed mill is an element included in the scope of the Product Environmental Footprint Category Rules (PEFCR) on feed for food-producing animals, in which the emissions related to feedstuff transport are part of the environmental footprint of compound feed production, even though the overall impact on GHG reduction may be limited.

Land use ratio: The principles of a circular economy point towards the use of secondary raw materials, meaning they are produced from other (industrial) processes that are themselves geared towards the production of something else. In terms of agronomic resource depletion, the key element is arable land; the less that is dedicated to the production of a feed ingredient, the more that ingredient is a product of the circular economy and, in principle, the lower the carbon footprint.

The principles of economic allocation from LCA-based methodologies, such as the PEFCRs on feed for food-producing animals, could help to quantify a low carbon footprint for the land use ratio of a feed ingredient because they would indicate the extent to which the feed component of a crop is the economic driver for cultivation. This does not exclude the possibility that, even if the feed component is a key driver of crop cultivation, feed production still plays a role in adding value to the bioeconomy and contributes to sustainable arable land use. It is, for example, known that feed crops are often grown on arable land that cannot deliver the nutrients necessary for food grade production, and feed crops also have a role in good agricultural practices as a rotation crop.

Increased proportion of marine ingredients in the compound fish feed will contribute to reduced land use ratio. Untapped marine resources are currently being explored and tested in fish feeds, including pelagic zooplankton such as krill (Euphasia superba) and calanus (Calanus finmarchicus) and various species of so-called mesopelagic fish of which very large biomasses are available in the open sea (Irigoien et al. 2014). Pelagic zooplanktonic resources (quick growth and reproduction) could be harvested at safe levels for the stocks and ecosystem. Increased sustainable utilization of marine resources to replace land-based protein production is mentioned in the Farm to Fork strategy (EC 2019).

Forage fish dependency ratio: Fish ingredients are limited resources that should be used responsibly. The FFDR indicates the amount of wild fish resources used to produce 1 kg of fish or shrimp, calculated according to the ASC farm standards. In terms of circularity, it is important to note that marine protein and marine oil that are based on side-streams from the human consumption of fish do not contribute to the FFDR value.

The FFDR accounts for the protein and oil contributions from wild fish equivalents, in which the most limiting factor determines the feed FFDR. The FFDR of farmed seafood is calculated by multiplying the FFDR of the feed by the economic feed conversion ratio (eFCR).

Nutrient digestibility: When considering the circularity of a feed ingredient, the nutritional characteristics matter. These determine how digestible the feed ingredient will be and the extent to which the nutrients can be expected to contribute to the nutritional profile of the animal product (bearing in mind, of course, that the farm animal plays a crucial role). In other words, the circularity of a feed ingredient is also determined by the extent to which the nutrients can be absorbed by the farm animal and are not lost through manure. For example, an increasing focus on nitrogen and phosphorus losses would focus attention on the digestion and excretion of these key nutrients by livestock.

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