

Declining marine ingredient inclusion levels and an hypothesised link with fish health in farmed Atlantic salmon

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The decline in inclusion rates for fishmeal and fish oil is well understood, occurring since the late 1990s for salmon feed in particular, but across all the major farmed fish species groups and their formulations. The current situation is a consequence of both supply volume, and price, and the feed companies need to develop aquafeed volume supply to meet growing demand over time. Annual fishmeal and fish oil production is finite and additional feed volume has come from other ingredients, notably vegetable-based materials such as soya and wheat, of necessity.

The story is one of supplementation as the marine ingredients continue to be the foundation for aquafeeds but in much decreased concentrations in comparison to the feeds that were used in the early years of the modern aquaculture industry. In order to achieve effective substitution of marine ingredients in diets feed companies invested heavily in research in order to ensure that growth performance has not been impacted by changing raw materials use. One aspect of the reduction of fishmeal in particular is the change in supply across the micronutrients that are known to be found in rich concentrations in fishmeal, and which are not found in other protein sources to the same extent. In that respect, the minerals such as Fe, Ca, Zn, Se are important as well as the B-group vitamins and vitamin D, all possibly playing a role in immunocompetence and the ability to cope with pathogen challenge. In some respects the possible impact on fish health of the reduction in supply of these materials is unknown with traditional deficiency studies focused on meeting minimum requirements rather than optimal levels. There also exists the question of how feed composition may influence the gut microbiome, and the link that may have with fish health. Improving farmed salmon's ability to cope with pathogen challenge has the potential to improve production efficiencies.

The situation will vary for different species and production systems, and will certainly be very complex, but it is important to know the full impact that substitution and supplementation has had, and its impact on fish health. The Atlantic salmon as a species is an excellent model to look at these impacts in the first instance.

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