



Market dynamics

The fish feed industry is at the cusp of a major industry disruption. Aquaculture, a \$160B market¹, has been the fastest-growing agricultural sector and is expected to grow at 2.5% CAGR until 2030¹, as worldwide demand for seafood increases and volumes of wild catch stagnate. Demand for aquaculture feeds will surge accordingly at 5% CAGR between 2016 and 2025³, as operations intensify and require more and better-formulated feed³.

Unfortunately, key aquafeed ingredients made from wild-caught fish are in limited supply and are highly volatile in price. Since 1997, FM and FO production has declined by 2M tonnes³ (-33%) due to overharvesting and climatic events (e.g., El Niño) and is not expected to grow significantly in the long term due to quota restrictions. As a result, wild fish-derived ingredients will become a minor (10%)³ and more strategic ingredient in the future.

This shortage of traditional fishmeal presents a huge opportunity for innovative protein alternatives to fill the gap. Current alternatives such as soy meal or processed animal proteins have significant nutritional shortcomings (see figure), which creates a need for more reliable, scalable and sustainable proteins that have an optimized nutrient profile. Production of sustainable alternatives such as bacterial, algal and insect-based proteins is expected to reach 500,000 metric tons (~10% of the market) by 2022³.

Innovative fish feed producers are now entering the market and racing to reach commercial scale in order to lower costs and serve larger buyers. To grow, they must find support from investors that have medium- to long-term horizons and a willingness to invest in capital-intensive infrastructure. Analogous to the challenge posed by alternative energies to fossil fuels, the relative attractiveness of alternative proteins varies with the price of FM/FO in the short term. Alternatives are expected to offer better value over the long term, but to withstand the price fluctuations of fish and grain meals, they must compete on enhanced functionality, not only on price.³

Alternatives to Traditional Fish Feeds

Traditional Feed

Fishmeal/oil

- ✓ Preferred nutrient profile (high protein, omega-3 and minerals)
- ✗ Difficult to scale while maintaining sustainability of stocks.
- ✗ Limited, volatile & seasonal supply
- ✗ Price increases expected in long-term

Alternatives Feeds

Fish trimmings

- ✓ Good nutrient profile
- ✗ Limited, volatile supply
- ✗ Logistics challenges

Animal by-products

- ✓ Provides protein/bulk
- ✗ Some market acceptance constraints.
- ✗ End products lack needed omega-3 and minerals

Vegetable/grain meals

- ✓ Provide bulk, widely available
- ✗ Low protein, no omega-3s
- ✗ Contains anti-nutrients

Novel proteins

- ✓ Predictable, stable, all-year round production
- ✓ Use less water, land, energy
- ✗ Not scaled yet

Technologies for investors to watch

Algae protein – the “superfood” of fish feeds

Oil from microalgae is a fish oil alternative that contains the high levels of proteins and high-quality omega-3 fatty acids (DHA and EPA) required by most fish species. Indeed, its superior omega-3 levels deliver better animal health and growth rates and better-tasting, more-nutritious fish flesh, compared with other vegetable/grain meals. It is produced in scalable and predictable closed-loop systems that minimize land and water use. It is estimated that algal oil will provide 20% to 30% of all non-vegetable oils used in aquafeeds in the medium term, and it is being commercialized for human consumption and other animal feeds as well.

Bacterial proteins – making feed out of thin air

Several players, including large agribusinesses, are developing fish feeds by a process that places bacteria in fermentation tanks and feeds them methane. Growth of this technology can allow methane as well as other industrial by-products like ethanol, and waste carbon to be used productively. While these bacterial proteins don't contain omega-3 fatty acids, they provide high protein and low lipid content comparable with the best fish meals. Crucially, they are manufactured at industrial scale in very sustainable, scalable, and predictable systems, and they have already been approved for use in human food chains by the EU (FDA approval in progress).

Insect protein – from waste to feed

Fast-growing insects, such as black soldier flies, that feed on food waste or cereal by-products are another excellent sustainable source of protein for fish feeds, and have already been approved for use in aquafeeds by the EU (FDA approval in progress). The relatively low capital intensity of insect feed has attracted many smaller players seeking to scale quickly. Scaling of insect-based proteins relies on an adequate supply of local waste as feedstock, which dictates an industry structure of many regional players as well as replicable systems that allow production wherever waste is available.

Sources:

*1 FAO, The State of World Fisheries and Aquaculture, 2016;

*2 Research and Markets, Global Aquafeed Market Analysis & Trends - Industry Forecast to 2025, 2017;

*3 Rabobank, Gorjan Nikolic, To Fishmeal or Beyond?, 2016.

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