

ADVANTAGES OF USING FISH MEAL AND FISH OIL IN FEEDS FOR AQUATIC ANIMALS

SUSTAINABLE RAW MATERIAL; RETURNS VALUABLE NUTRIENTS TO HUMAN FOOD CHAIN

The rapid growth in aquaculture in the past, and expected for the future, are needed to supplement catches of wild fish which are not expected to increase. To feed these aquatic animals, fish meal and fish oil will be required in increasing amounts. They are produced from wild fish which are inedible – typically small bony oily fish (feed fish) and trimmings from human grade fish (food fish). Their main use is in aquaculture. There they effectively return an otherwise unutilisable yet sustainable product (RRI) back into the human food chain. Here it augments the wild catch to provide a highly nutritious food for a growing world population.

IMPROVEMENTS IN PROCESSING

Improved technology in the fish meal and oil industry, with emphasis on fresh raw material and gentle drying, gives fish products which retain virtually all the original nutritional properties of the fish as caught. When used as major components of feeds for carnivorous fish and

crustacea, these become very close to those of their wild counterparts.

The advantages of fish meal and fish oil use for aquatic animals can be summarised as follows:

BENEFITS OF FISH MEAL AND FISH OIL

- Together they provide a feed source virtually the same as in the wild.
- No farmed fish species or their trimmings are used to produce aquaculture grade fish meal and fish oil for the same species – there is no intra-species recycling.
- Correctly balanced to achieve optimum protein and oil in the feed – they optimise growth and feed required (feed conversion)¹ (TB 24 – salmonids; Res Rep 1993-3 – shrimp)
- Help to maintain immune system and optimise disease resistance²
- Can produce high nutrient dense feed reducing feed needed for given growth. (Res Rep in press)
- Reduce water pollution through more efficient feed use
- Contribute DHA and EPA helping to maintain levels in farmed fish similar to those in wild fish consumed by humans³
- Help to produce farmed fish with flesh quality similar to that of their wild counterparts

^{1,2 and 3} apply also to omnivorous and herbivorous fish, e.g. carp (Res Rep in press) and tilapia. In these feeds they would not be major ingredients.

SUBSTITUTION OF FISH MEAL AND FISH OIL

In some situations where economics/markets demand cheaper feeds, substitution of some fish meal and/or fish oil in feeds for carnivorous fish may be considered. The following should be taken into account:

- Partial replacement of fish meal with vegetable protein is likely to reduce dietary energy. Where feed oil content cannot be increased to compensate for the poor utilisation of the carbohydrate content of vegetable protein, feed required will increase (poorer feed conversion). If the feed also becomes less palatable, growth will also be reduced.
- Partial replacement of fish meal with vegetable proteins will reduce amino acid content – especially the level of digestible amino acids. Supplementing with synthetic amino acids is not very effective, especially if levels are needed above 0.5%. This would occur in salmonid diets if more than a quarter of the fish meal is substituted.
- Partial replacement of fish oil in the grow out period may be possible with little adverse effect on growth. However in the early growth period (up to 200 g) immunity may be compromised leading to greater susceptibility to disease. In the “finishing” period, substitution is likely to reduce the valuable long chain omega-3 fatty acids in the fish as well as meat quality. It is also likely to introduce levels of omega-6 fatty acids which are not appropriate from a human nutrition standpoint. Many Western diets are already excessively high in these, with omega-6 : omega-3 ratios 10 : 1 or higher. Fish is recommended to reduce this ratio. It will only do so effectively if it retains levels of omega-3 and/or low omega-3 : omega-6 ratios as found in wild fish.