

## AQUAFEED INGREDIENTS OF THE FUTURE

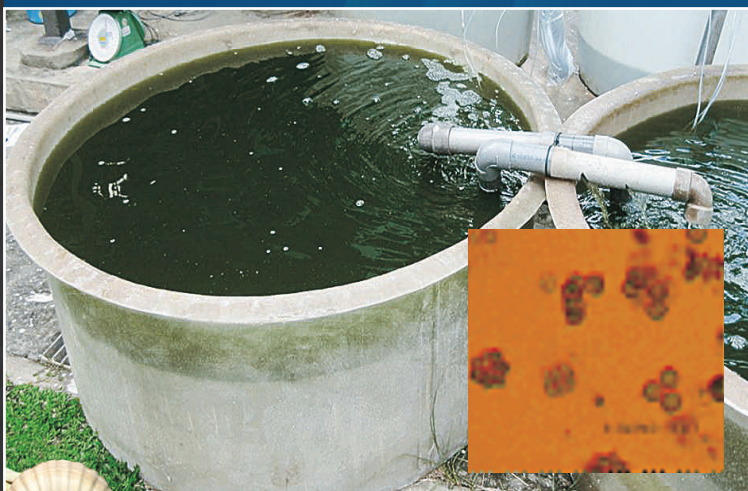
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The approach of 'feeding fish to fish' is still widely practiced in many parts of the world especially in the Asia-Pacific region. Even though the use of formulated feed in aquaculture industry is increasing in recent years, the industry still heavily relies on conventional feed ingredients (fish meal and fish oil) which are extracted from pelagic fish. These products of high nutritional value are subjected to common global market unpredictability and have many issues related to their sustainability, thus making them unfavourable feed ingredients for the future. Therefore, most fish nutritionists from all over the world are exploring suitable alternative feed ingredients.



*Maggot and pupae of house fly were reported to have similar amino acid profile to fish meal*

However, search of alternative ingredients requires a thorough evaluation based on several criteria such as the nutritional composition and digestibility, palatability, sustainable supply, stability and ability to bind with other ingredients. At the Aquaculture Feed Laboratory of our institute, we have been working on several potential alternative ingredients such as poultry by-product meal, feather meal, soybean meal and vegetable oils. Based on our findings, poultry by-products and vegetable oils have shown very promising results and proven successful in supporting growth of high value marine fin fish such as groupers. More fish species are now being investigated for their performance using these ingredients in the diets. We are also exploring other less common alternative ingredients such as microalgae and insects. Microalgae have been used as live feed for larvae of many cultured fish and crustacean (shrimp and crab) species. However, their use as an ingredient in formulated fish feeds is rarely reported, although the nutritional values of many microalgae species are widely documented. The major challenge now is to mass produce the microalgae before turning them into meal. In the case of insects, our preliminary data shows that breeding success of the house fly is strongly influenced by the given diet. The feasibility of insect as an ingredient in fish diet requires more intensive investigations.



*Green water consisting mainly Chlorella sp. can be harvested and concentrated to produce microalgae meal*