

**UNIVERSITI TEKNOLOGI MARA**

**THE ENRICHMENT OF OMEGA-3  
IN RED TILAPIA (*Oreochromis* sp.)  
BY PRODUCTION OF FERMENTED  
*Azolla microphylla* FOOD-BASED  
PELLET USING SOLID STATE  
FERMENTATION**

**AIMI NADIA BINTI RAMLI**

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## ABSTRACT

High demand from aquaculture sector and human consumption resulting to the increasing price and declining of protein source such as fishmeal. Fishmeal, the main protein source in the feed, however, will not have capability to maintain and fulfil the demand for aquatic food to establish food security and sustainability. Therefore, it is essential to find substitution of fishmeal in aquaculture feeds. Moreover, a diet that includes seafood with a high omega-3 fatty acids content provide health benefits such as reducing the risks of coronary heart disease, hypertension and inflammation. The aim of this research is to discover the potential of plant protein source, *Azolla microphylla*, as an aquaculture feed for red tilapia, *Oreochromis* sp. growth performance. Besides, to explore the effect of supplementary feeding, fermented *A. microphylla* with cellulolytic bacteria, *Flavobacterium* sp., on the quality and profile of fatty acids in tilapia fish oil extracts content. In this research, *Oreochromis* sp. were divided into six different feeding treatments: control diet consists of commercial pellet (T1), fermented commercial pellet (T2), and non-fermented *A. microphylla* pellet (T3); while the rest as experimental diet consists of 2-day fermented *A. microphylla* (T4), 4-day fermented *A. microphylla* (T5) and 6-day fermented *A. microphylla* (T6). These fishes were characterized for their growth profile and fatty acid in fish oil. Approximately 83.42% of total cellulose content in fermented *A. microphylla*-based feed pellets have been reduced while 28.40% increase on glucose level. It is also showed that the total protein content of fermented leaves-based pellet is significantly higher than the non-fermented leaves-based pellet. The results show that the highest oil yield from tilapia fish extracted using Bligh and Dyer method was obtained from T6. T6 also shows the best in growth performance (average weight gain and specific growth rate) and feed utilization (feed conversion ratio). Docosahexaenoic acid (DHA) eicosapentaenoic acid (EPA) and eicosatetraenoic acid (ETA) are the major constituent of unsaturated fatty acid in all these fish samples. Thus, it can be suggested that fermented *A. microphylla* leaves-based pellet would be a potent candidate as a protein source in aquafeed that can raise levels of healthy fats in aqua cultured tilapia for enrichment of omega-3 fatty acids.

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