

## Utilization of dietary protein, lipid and carbohydrate by flounder (*Paralichthys olivaceus*)

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Although flounder is one of the most important marine fish for aquaculture in Korea, feeding the flounder in commercial farms depends mainly on moist pellet in which over 70% frozen fishes (e.g. frozen horse mackerel) are incorporated in its formulation. Therefore, for further expansion of flounder farming, it is essential to employ practical formulated feeds that can support reasonable growth.

Development of nutritionally balanced and cost-effective feeds is dependant on the information about nutritional requirement and feed utilization of the species. Nutrient and energy source in feed are needed for the growth and maintenance of fish. Protein is probably the most important nutrient affecting fish growth and feed cost. Therefore, it is essential to determine the optimum dietary protein level for the growth of fish, both its high proportion in the feed and because it is the main factor in determining feed cost. Dietary energy level is also critical because protein source in the feed is utilized as an energy source when the feed deficient in energy is fed to fish, whereas when the feed excess in energy is fed to fish, feed consumption decreased and resulted in growth reduction due to lack of other necessary nutrients for normal growth. Improper dietary protein, energy levels and/or their ratio will lead to an increase of fish production cost and deterioration of water quality resulting from wasted feed; thus, they are important in formulating commercial feed. Dietary lipids play important roles in providing energy and essential fatty acid for normal growth and survival of fish. Although carbohydrates are not essential nutrients for carnivorous fish, these compounds play important roles as a low-cost energy source for protein sparing and also as a feed binder.

Nutrition researches for flounder have identified its requirements of protein, lipid and essential fatty acid, vitamin, and minerals for normal growth. Other studies have also been carried out to investigate the utilization of the protein, lipid and carbohydrate sources. Based on these nutritional information obtained, practical feed formulations have been studied for improve aquaculture production of flounder. The results of the researches on utilization of dietary protein, lipid and carbohydrate by flounder are discussed in this review.

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