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Development of eco-feed for red sea bream, Pagrus major: Replacement of expensive fish meal by low cost fish meal and soy protein

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A lot of efforts have been given to search alternative of fish meal (FM) as protein source due to the high price and less availability of FM. Although soy protein (SP) has been considered one of the most promising alternatives due to relatively high protein content and fair amino acids balance, its utility in marine fish is lower compared to freshwater fish. As a result, a greater portion of expensive FM still need to be included in marine fish feed, which has been reduced the profitability as well as affect the sustainability. This study is aimed to replace all expensive FM by the combination of SP and cheaper residue FM (RFM) made from the fish market's by-products. Three isoenergetic feeds were formulated: FM 20.4% + SP 47.6% (D1, control), and expensive FM in D1 was replaced by two types of RFM (D2 and D3). Phytase was included in all feeds at 1,000 units/kg diet. Twenty five red sea bream juveniles of mean weight 38g were stocked into each of nine 500 L tanks, fed the feeds until apparent satiation two times a day for 8 weeks. There were no significant differences in growth parameters and retention efficiencies of nutrients and energy in fish fed RFM diets compared to the control group ($P>0.05$). Moreover, the lack of difference in plasma constituents among the treatments indicates that the RFM didn't have bad effect on physiology. The results suggested that cheap RFM can replace the expensive FM from red sea bream diet without compromising growth. It will help the aquaculture industry to reduce dietary cost as well as contribute to the sustainability.

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Experiences and strategies in tilapia biofloc cultivation

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According to the results of the investigation conducted by our research group, it is possible to ensure that the biofloc cultivation is an efficient technology that significantly increases production and promotes sustainable aquaculture practices in different phases of tilapia´s life. Our first evaluation consisted of determining the carbon: nitrogen ratio more efficiently during intensive cultivation of Nile tilapia *Oreochromis niloticus* (75fish/m^3). Survival was >95%, growth rate 20% higher than the other treatments, there was a 15% reduction in TCA and a 12.9% decrease in production costs when using a 10:1 ratio of C:N. From the results of the C: N treatment, we determined the percent of reduction in artificial food (to 90, 80, 70 or 60% less) to support high productivity with or without biofloc. The result indicated that tilapia (100±14 g) cultivated in biofloc required 20% less feed ratio with the same growth gain that fishes feed full ratio. On the other way, we determined the efficiency in masculinization and feminization subjecting tilapia fingerlings in a system with biofloc to 17-α methyl-testosterone or 17β-estradiol. The resulting males (92.55%) and females (99.6%) were similar to other studies involving open systems and RAS but with the advantage that when using biofloc the volume of water was reduced by 90% during the 35 days of this phase. These results support the conclusion that biofloc cultivation is environmentally advantageous as well as sustainable and economically profitable.

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