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Economic evaluation and ecological characterisation of a semi-enclosed and open water system of Goa, India

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A study was conducted for ecological and economic evaluation of four different aquaculture systems in coastal waters of Goa during 2013 to 2015; two semi-enclosed water systems (SEWM- with mussel and SEWMS- multispecies) and two open water systems (OWSM with mussel and OWSMS with multispecies). Economics of all the systems with break-even analysis has been carried out to compute the cost structure of different culture systems. End results revealed that the highest rate of return and lowest payback period were from SEWMS. Benefit cost ratio and rate of return were highest and payback period was found to be shortest for SEWMS. Thus, multi-species culture in semi-enclosed coastal waters was found to be profitable, economically efficient and productive system compared to mono-species culture. Considering all this, an ecological model was constructed for SEWMS and simulated the impacts of multispecies aquaculture at various scales (variation in the number of cages) in this ecosystem. An optimal ecologically sustainable scenario was established for a period of ten years. The work concludes that there is enough scope for developing the multi-species aquaculture practices in unutilised semi-enclosed coastal waters of Goa as a secondary livelihood option by giving adequate technical support to the farmers.

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Protein hydrolysate from yellowfin tuna (*Thunnus albacares*) red meat for oxidative and structural stabilisation of microencapsulated fish oil

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Microencapsulation by spray drying is a well-accepted technique for protecting fish oil against oxidative deterioration. However, the severe operational conditions during spray drying destabilise the emulsion, leading to capsule collapse and induction of auto-oxidation. Consequently, use of food grade anti-oxidants and cross-linkers has been suggested to ensure oxidative stability and structural integrity of the microcapsules. A promising option in this regard is the employment of antioxidant peptides or protein hydrolysates, which also serve as filling moieties when used as wall polymer, owing to their reduced molecular size. Moreover, protein hydrolysates are considered to improve the stability of the emulsion during atomisation. Hence, in the present study an attempt has been made to compare the efficacy of yellowfin tuna (*Thunnus albacares*) red meat hydrolysate of known antioxidant potential as wall and core polymer, for encapsulating sardine oil. The primary wall materials used in the study were sodium caseinate, gum arabic and