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ISBN: 9798554163623

CHAPTER-22

NANOTECHNOLOGY APPLICATION IN THE PREPARATION OF FISH FEED

Sagarika Swain¹, Hauzoukim¹, Aditya Pratap Acharya², Subal Kumar Ghosh¹, Biswajit Mohanty¹

¹School of Fisheries, Centurion University of Technology and Management, R. Sitapur, India

²West Bengal University of Animal and Fishery Sciences, Mohanpur, West Bengal, India

Introduction:

Feed is the highest cost of intensive fish farming and the objective of feeding fish is to provide reasonably priced nutritional requirements for good health, optimal growth, optimal yield and minimum waste in

order to optimize revenue (Schmittou et al., 1998). Even if natural feed is the main source of nutrition, to achieve increased production in ponds, supplementary feeding is necessary. India produces large amounts of crop-extracted feed materials. These involve a wide range of oil cakes, pulses, seed and grain byproducts. Smaller amounts of by-products from the poultry, fish and dairy processing industries also occur. Good quality supplementary feed for fish can be formulated with these types of feed ingredients.

Artificial feeds exhibit rapid nutrient loss by normal degradation processes and leaching by water until rapidly consumed, unlike natural foods that are usually present as distinct living forms and thus biologically stable once consumed. In addition, when feed aggregates begin to disintegrate and separate into the components of their ingredients, their original nutritional properties are thus lost. Therefore, apart from meeting nutritional requirements, an efficient artificial feed should have good water stability and fish acceptance. Nanotechnology plays a major role in feed processing in the manufacture of feed with the required physical characteristics for quality feed production.

The fisheries and aquaculture industries can be revolutionized by using nanotechnology with new tools, such as rapid diagnosis of diseases which will enhance the ability of cultivable organisms to uptake drugs like hormones, vaccines and essential nutrients etc.

(Srinivasan et al., 2016). The metal nanoparticles (NPs), such as Fe, FeO, Se, Zn, ZnO, Cu, and MgO etc., play a crucial role in aquaculture operations. It has been reported that iron NPs when fed to young carp, *Carassius auratus* and sturgeon, *Acipenser gueldenstaedtii* showed a faster growth rate, 30% and 24% respectively (Srinivasan et al., 2016). Different Se sources (nano-Se and Selenomethionine) supplemented diets improved the growth, antioxidant status and muscle Se concentration of Crucian carp, *Carassius auratus* (Srinivasan et al., 2016). In the production of feed with the necessary physical characteristics for quality feed production, nanotechnology plays a major role in feed processing.

Fish Feed Technology in India:

The idea of feed technology began about 30 years ago in India. The Compounded Livestock Feed Manufacturers Association of India (CLFMAI) was founded in 1967 to represent the interests of producers in the public, cooperative and private sectors with an estimated built capacity of 1.73 million tons per year. Nevertheless, the compounded feed production was for livestock and poultry. There has not been any industrial production of fish feed. Some mills gradually developed pelleted feed by using an old pelleting technique suitable for producing large-size pellets for livestock and poultry; it was insufficient to make small-size pellets suitable for fish feeding of reasonable hardness and compactness. For the development of