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SHORT COMMUNICATION

Nanoparticle mucoadhesive system as a new tool for fish immune system modulation

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Nanoparticle-based drug delivery systems (NDDS) have been developed to prolong and optimize drug administration and decrease toxicity in several specific applications [1,2]. Many studies have demonstrated advantages of using NDDS in comparison with the conventional formulations by improving pharmacokinetics and bioavailability of drugs and reducing their side effects [1,3]. Among the various materials available for drug delivery, we can highlight poly (D, L-lactide-co-glycolide) (PLGA), which has high safety and excellent characteristics, such as biocompatibility, biodegradability, and absence of toxicity [4]. In addition, the U.S. Food and Drug Administration has approved its use in veterinary and human medicine [5]. Several studies have used PLGA nanoparticles as drug delivery carriers to modulate and improve the fish immune system [6–10]. Recently, the use of nanoparticles with mucoadhesive properties has emerged as a strategy for mucosal drug release. Chitosan-coated nanoparticles have attracted interest because of their ability to interact electrostatically with the mucosa and increase permeation due to the reorganization of intercellular junctions and interference in the lipid deposition of the epithelium in mammals [11]. Some studies have described the use of chitosan micro and nanoparticles in supplemented diets to improve immunological defense of fish [12,13]. In addition, another study reported that mucoadhesive properties help to model drug release by