

Feed additive an important non-nutritive feed ingredients used in aqua-feed

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A variety of substances, called feed additives are added in aquaculture feeds to protect the labile nutrient availability and improvement of the performance and efficiency. The feed additives are also called non-nutritive feed ingredients which are added in small amounts 10-25% in commercial fish feed. Feed additives improves growth rate, survival and feed conversion ratio (FCR). There are different categories of feed additives used in animal feed industries includes binders, enzymes, amino acids, acidifiers, vitamins, minerals, antioxidants, antibiotics, probiotics, immunostimulants etc.

Aquaculture sector is growing in exponential rate to meet the global demand as the population is increasing. The capture fisheries sector reaches in its stagnant growth rate. Therefore, to meet the gap between the supply and demands the aquaculture sector needs intensification. Feed and seed are the two most critical inputs in intensified

aquaculture is. Feed based aquaculture plays a very important role to increase the production of aquaculture sector. Hence, feed added the 60% operational cost, in the aquaculture attention should be given in feed formulation procedure to improve the efficiency of feed. Proper selection of feed ingredients, their local availability, cost, formulation, processing, storage, feeding frequency and schedule are some critical factors need to take care while deal with aquaculture.

Feed additives plays an important role to increase the efficiency of commercial feed. It enhances the durability, by protecting the feed from spoilage, bad flavor, taste, staleness. It also protects the feed from alteration of nutritional status, highly toxic and carcinogenic mycotoxins. The feed additives also used for improvement of the flesh colour, immunity and health status of fish. There are different kind, source, dose of feed additives having

Table 1: Different types of feed additives used in aquaculture

Name	Source	Dose	Function
Pellet Binder	CMC, Alginates, Agar, Tapioca, wheat gluten	1%	❖ Improves pelletability ❖ Enhance the durability ❖ Preserve their physical form during storage. ❖ Enhance water stability
Antioxidant	Vitamin E and vitamin C	0.2%	❖ Prevent or delay the onset of lipid rancidity and prevent vitamin loss in feed.
	Butylated Hydroxy Toluene (BHT)	0.2%	
	Butylated Hydroxy Anisole (BHA)	0.2%	
Preservatives or Anti-microbial agents	Ethoxyquin	0.015%	❖ Prevent growth of microorganism
	Ca and Na propionates	0.1-0.25%	
Chemo-attractants and feeding stimulants	Blanch water, fish soluble, Glycine betaine, Inosine, Inosine Mono Phosphate (IMP), Free Amino acids and Nucleotides, Mixture of L-amino acid, Glycine-betaine	0.1%	❖ Induces feeding behavior and help to improve feed intake.
Pigments (Carotenoid supplements)	Astaxanthin	50 ppm	❖ Good flesh color for salmonids
	Xanthophylls,		❖ Shortening of maturation period.
	Carotenoid (Crustaceans and Polychaetas are good source)		❖ Enhanced hatchability of eggs and better survival of larvae.
			❖ Also act as antioxidant.

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Anabolic agents	Hormones, (17 methyl-testosterone, thyroxin, insulin, triodo-thyronine, growth hormone and recombinant bovine somatotropin and thyro-protein.	0.1-0.2 %	❖	Improve the metabolic or digestive efficiency
			❖	Promote protein deposition.
			❖	Used to treat disease
	Feed antibiotic (Terramycin), Flavophospholipol, Virginiamycin, Zinc bacitracin and Ionophores	6000-7000 IU /Kg	❖	Remove ammonia and serve as trace minerals
	Enzyme: Proteolytic enzyme (bromelain and papain	0.1-0.2 %		
	Zeolite (Sodium alumino-silicate.	2 %		
	Phytosterol (ergosterol, stigma sterol, beta-sito-sterol, stigma sterol, diosgenin	0.1%	❖	Essential for shrimp
	Olaquinox (Growth promoter)	20g/MT		
	Bile acids		❖	Help in absorption of lipids, maintain function of hepatopancreas.
	Probiotics	Lactobacillus	0.01%	❖
Immunostimulants	Glucan, yeast, Lectins	0.01%	❖	Stimulates specific and non-specific immune mechanism.
Micronutrients	Iron bearing protein Transferrin and lactoferrin	0.01%	❖	Involve in immunological response
Prebiotic	Mannan-oligosaccharides (MOS) Fructo- oligosaccharides (FOS) Mixed oligo-dextran	0.01%	❖	Improves gut microbial health
Miscellaneous additives	Aspirin,	1g/kg	❖	Antistressor
	Sorbitol	feed	❖	Liver health
	glycerol-oleate		❖	Water oil emulsifier
	carnitine		❖	Better utilization of lipid
	Sodium polyphosphate		❖	Antiviral effect

different function. The details are presented in tabular format (Table 1).

Conclusion :

A balanced diet is formulated with proportionate amount of nutrient, as per the requirement of cultured fish. To enhance the palatability, water stability, digestibility and overall performance of fish feed, feed- additives needs

to incorporate with desired quantity to make the feed economically sustainable and to increase the overall the production and productivity of aquaculture industry.

Reference :

Anthithan, S., Felix, N. and Athithan, V. (2012). *Fish nutrition and feed technology: A teaching manual.* Daya Publishing House, 296p. ISBN 9351240495,9789351240495.

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