

# **ADDITIVES USE IN FISH FEED**

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## Introduction

- Substances added in aquaculture feeds to protect the labile nutrients, to improve nutrients availability.

Increase overall efficiency of the feed.

## Criteria for selecting additives

- They should not be toxic
- Should not react with feed ingredients and alter nutritional quality of the feed negatively
- Should not negatively affect the eating quality and consumer appeal of the meat of the animal to which it is fed.
- The substance should be available in sufficient quantities and at reasonable cost.

## Some of the categories of additives are (based on their function):

**Binders:** added to improve the water stability of the feeds, to prevent disintegration of feed and leeching of nutrients into water.

Gelatinized starch from tapioca, wheat flour and rice flour are adequate in most feeds.

## Recommended levels are:

Binder	Rate of inclusion
Guar gum, gum-acacia	1-2%
Gelatin, collagen, alginates, carragenan and agar	2-5%
Wheat gluten	10-12%
Starch from wheat flour and tapioca	Upto 30%

**Antioxidants:** added to protect fatty acids and other oxidisable components in the feed.

The most commonly used antioxidants are:

- i) Ethoxyquine @ 0.015%.
- ii) Butylated Hydroxyanisole (BHA) @ 0.2%
- iii) Butylated hydroxytoluene (BHT) @ 0.2%.
- iv) Vitamin E is a natural antioxidant in fish feed.

**Antibiotics/ antimicrobial agents:** Nutrition in fish feed attracts microflora.

Fungi are the biggest problem that grows rapidly in water content exceeding 13%, relative humidity 70-90% and temperature 25°C. E.g. *Aspergillus* spp., *Fusarium* spp., and *Penicillium* spp.

**Preservatives are used to tackle this problem.**

- The most common preservatives used are sodium and calcium propionates @ 0.1-0.25%.
- Sorbic acid, potassium sorbate, sodium sorbate, propionic acid, calcium sorbate, menadione, sodium benzoate are some of the other preservatives

**Chemo-attractants and feeding stimulants:** Are added to invite or stimulate the organism to receive the feed.

Free amino acids and nucleotides are the most common stimulants added.

Squid, shrimp, clam , mussel and polychetes are known to stimulate feeding behaviour.

**Pigments:** Carotenoids are primarily responsible for imparting the characteristic colours to the fish.

In crustaceans carotenoids have importance in reproductive biology other than just being a colouring agent.

Carotenoids have a role to play in immune system too especially in crustaceans.

Astaxanthin can be added to shrimp diets.

Crustacean and polychetes are good source of carotenoids.

**Anabolic agents:** added to accelerate the growth above the normal physiological maximum.

Stimulate growth by improving metabolic and digestive efficiency, or by promoting protein deposition

17-  $\alpha$ -methyl testosterone @ 2mg/Kg is the most successfully used hormone for the purpose.

**O**ther potential candidates are thyroxine, insuline, triodothyronine, growth hormone and recombinant bovine somatotropin.

**A**ntibiotics like terramycine have been used to promote growth in carp.

**G**lucosamine has been shown to increase growth in crustaceans.

**E**nzymes like papaine and some other amylolytic and proteolytic enzymes have also been used.

**N**itrovine (trade name Payzone) containing growth promoting compound has accelerated growth.

**Miscellaneous additives:** Additives like aspirin@ 1g/Kg of

- Feed have been used as anti-stress agents in feed for tilapia while transferring fry to seawater raceways.
- Sorbitol (Sugar alcohol) is for liver health, anti-stress agent
- Carnitine is used for better utilization of dietary lipid, Sodium polyphosphate is used as antioxidant and also as anti-viral agent in feed.