ADM
Feed Ingredients

Lecithin in Aquaculture

Research has shown that crustaceans and fish cannot adequately synthesise the phospholipids they require for maximum performance. Therefore, phospholipids must be added to their diet.

Soya lecithin is a natural-sourced, consistent, superior feed ingredient that is an excellent source of dietary phospholipids.

Advantages of lecithin:

- Improves survival rate of shrimp and fish larvae
- Improves growth rate of fish and shrimp
- Improves feed utilization efficiency
- Increases resistance to stress
- Provides a consistent source of bio-available phospholipids
- Good energy source
- Mobilizes cholesterol
- Nutritionally superior source of choline, inositol and unsaturated fatty acids
- Reduces the leaching of water-soluble nutrients
- Acts as a natural antioxidant
- Acts as a feed attractant

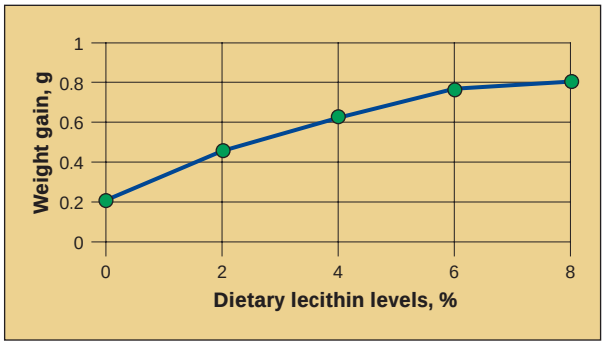
ADM offers a complete range of standardised and specialty lecithins, including fluid and deoiled (granular and powder) products. Each ADM lecithin product has its own unique functionality and nutritional value. Lecithin can be used as an emulsifier, a wetting agent, a release agent, a viscosity modifier, a mixing aid, an anti-dusting agent, and more.

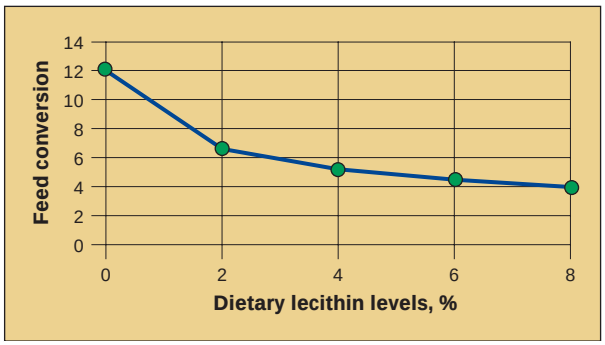
Nutritional functionality

Lecithin is known to be a consistent source of highly bioavailable phospholipids to crustaceans and fish. But there are a number of other nutritional benefits in aquaculture applications.

Lecithin has an interactive role in the intestinal absorption of cholesterol, which helps improve the growth and survival of aquaculture species. In crustaceans and fish, lecithin helps mobilise dietary cholesterol.

Lecithin is a nutritionally superior source of choline, an essential nutrient present in the biologically available form of phosphatidylcholine (PC). In this form, choline serves as a methyl donor for various methylation reactions, and as an active component of plasmalogens, sphingomyelins, and the essential neurotransitter acetylcholine.





Mean weight gain and feed conversion of Atlantic salmon fry (mean initial body weight of 0.18g) fed diets containing various levels of lecithin for 14 weeks. Lecithin (ADM) was supplemented as replacement for fish oil on a lipid content basis.

Reference: Poston H.A. 1991. Response of Atlantic salmon fry to feed-grade lecithin and choline. The Progressive Fish-Culturist, 53, 224-228.

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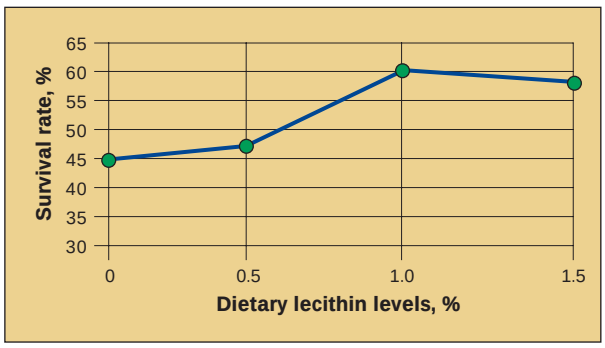
The phosphatidylinositol (PI) in lecithin is also a good source of myoinositol, which is required in most aquaculture species as a co-factor in the production of certain enzymes (cholinesterase and transaminase). Myoinositol also boosts such basic body functions as gut emptying and fin integrity.

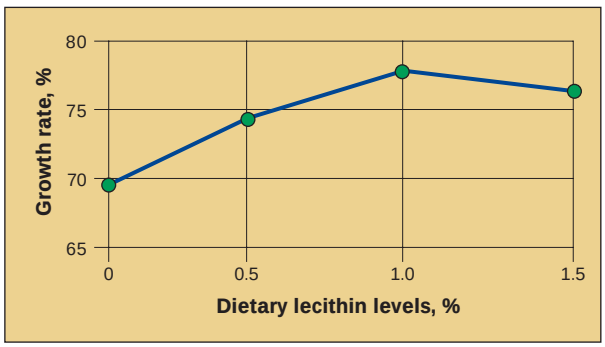
A known chemo-attractant, lecithin can also reduce or eliminate the need for fishmeal and fish oil as a source of dietary fats and as an attractant in feed formulations.

Biological functionality

Lecithin provides the same feeding energy value as animal fat or feed-grade vegetable oil. Lecithin's synergistic effect on lipid metabolism results in improved feed utilisation efficiency, growth, and survival rates in fish and crustaceans.

The benefits of lecithin are especially pronounced in the diets of young aquatic species. The underdeveloped digestive tracts of these young creatures are very limited in their ability to synthesise adequate quantities of phospholipids. Supplementing with lecithin as a source of phospholipids, choline and inositol enhances growth and survival in larval fish such as bream, sturgeon, salmon, trout and juvenile crustaceans.





The effect of dietary lecithin on survival and growth rate of tiger prawn 'Penaeus monodon' postlarvae.

Reference: Paibulkichakul C., Piyatiratitivorakul S., Kittakoop P., Viyakarn V., Fast A.W. and Menasveta P. 1998. Optimal dietary levels of lecithin and cholesterol for black tiger prawn 'Penaeus monodon' larvae and postlarvae. Aquaculture 167, 273-281.

Aquacultural species efficiently absorb and utilise the biologically active nutrients in lecithin. Thus, the use of lecithin can reduce the nitrogenous waste that can elevate BOD (Biological Oxygen Demand) levels and hamper performance.

In addition, various water-soluble pollutants can interfere with phospholipid metabolism, especially in the young. Lecithin works to accelerate lipid transport, increasing survival rates in those critical early stages of aquatic life.

Physical functionality

The physical functionality of lecithin imparts a number of advantages to aquaculture operations. For instance, because phospholipids can reduce the oxidation of vitamins A, C and E, they enhance the utilisation of these vitamins in aquacultural species. Enrobing feed with fluid lecithin prevents the leaching out of water-soluble nutrients.

Lecithin also improves the handling characteristics of feed. In its fluid form, lecithin acts as a dust inhibitor. In both its fluid and granular forms, it helps bind pelleted feeds and increases the throughput of mechanical pelleting equipment.

ADM lecithin is produced to food manufacturing standards, assuring consistent nutrient and energy values as well as high biological activity, especially in PC and PI. The consistency of lecithin's nutrient values enables nutritionists to take advantage of the growing number of agricultural co-products available for feed formulation.

Recommended products

- **Yelkinol™** is a deoiled lecithin available in granular form, so that it can be added to the formulation as a dry ingredient. Alternatively **Ultralec®**, ADM's ultrafiltered, deoiled powder or granular grades may be used.
- **Adlec™** and **Yelkin™ TS** are high-quality standardised liquid lecithins, whilst **Adlec E** is an enzymatically hydrolysed grade.
- **Adlec COP** (Controlled Origination Programme) is available from ADM's Non GMO-Programme.