

The way to feed larval and postlarval shrimp has changed.

Forever.



LiquaLife is the world's first liquid shrimp feed—a unique combination of pre-stabilized nutrient beads and direct-fed microbials in an easy-feeding liquid medium. LiquaLife is designed to replace conventional dry feeds—and complement live *Artemia* and phytoplankton.



With LiquaLife, you can enjoy a number of significant benefits:

- ✓ Cleaner, healthier tank water
- ✓ More consistent nutrition
- ✓ Faster larval development and PL growth
- ✓ Superior convenience and ease of use
- ✓ The opportunity for producing PL of higher value

LiquaLife is revolutionizing feeding programs in hatcheries around the world. Discover more about how LiquaLife can help improve the opportunity for profit in your shrimp hatchery.

Cargill
LiquaLife
LIQUID NUTRITION FOR SHRIMP

Better water quality LiquaLife pre-stabilized nutrient beads do not decompose in water—and with the help of LiquaLife's probiotic bacteria, help prevent the accumulation of toxic ammonia.

More consistent nutrition The essential nutrients in LiquaLife beads are already in a more natural hydrated state—making them more available to larval shrimp.

Faster development and growth LiquaLife helps increase the rate of metamorphosis and postlarval growth relative to conventional feeding programs—allowing producers to harvest sooner if they wish.

Easier feeding With LiquaLife, there is no weighing, grinding, sieving or hydrating. Just shake, twist open the spout, disperse the recommended volume in a small amount of water and pour into the tank.

Higher PL value LiquaLife shrimp tend to be larger, stronger and better-pigmented relative to those on conventional feeding programs—which can lead to increased survival and market value.

Headquartered in Minneapolis, Minnesota USA, Cargill Animal Nutrition is a recognized world leader in animal nutrition. Cargill Animal Nutrition has feed mills and facilities around the globe—providing innovation and quality animal nutrition products for the world's food producers.

Cargill Animal Nutrition has built a worldwide reputation for integrity and excellence. Our customers have come to expect the best from Cargill Animal Nutrition—and we are committed to fulfilling that expectation in every area of business.

For more information on LiquaLife and other Cargill Animal Nutrition products, contact:

Cargill
Animal Nutrition

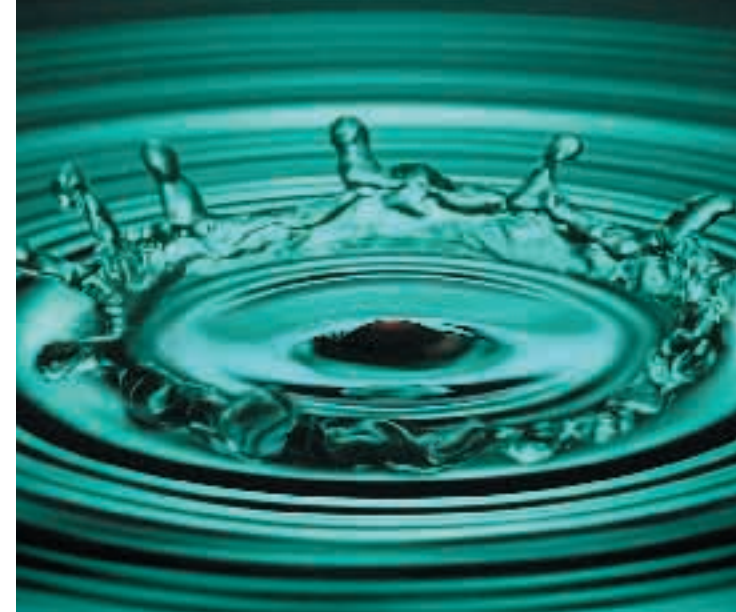
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LiquaLife
LIQUID NUTRITION FOR SHRIMP

The world's first liquid shrimp feed

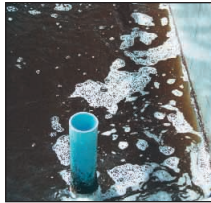
Cleaner water
Rapid growth
Stronger postlarvae



Better water quality. More consistent nutrition.

Larval shrimp require critical attention and care—especially in the feeding process. LiquaLife can provide a number of significant benefits for hatcheries—and help solve problems that affect production and profits.

LiquaLife is superior in many ways to conventional powdered, flaked or microencapsulated larval feeds—advantages that can help lead to improved PL production.



LiquaLife helps prevent tank pollution.

The LiquaLife tank on the left exhibits considerably less accumulation of foam scum on water surface than the tank on the right in which conventional powdered feeds were used.

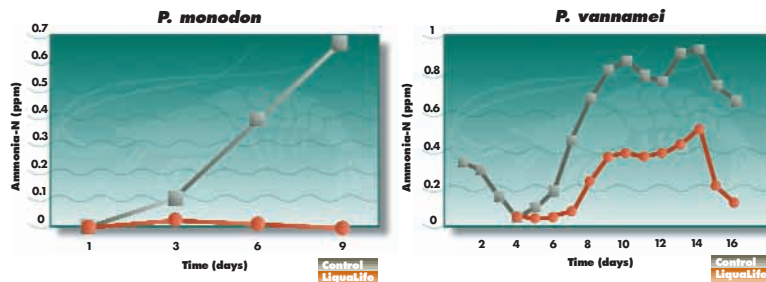


Improve water quality and provide a healthier environment for your larvae.

Water quality is one of the biggest problems affecting aquaculture production today. In hatcheries, most dry feeds immediately begin decomposing during initial wet-mixing and sieving. This leads to rising concentrations of decomposing organic matter in culture tank water—as feeding rates increase, the concentration of ammonia can rise to harmful levels. Additionally, the decomposing feeds become unavailable to larval shrimp and can promote growth of harmful bacteria.

LiquaLife pre-stabilized nutrient beads stay intact in the water until eaten by larval shrimp—and with the help of LiquaLife's exoprobiotic bacteria, can help avoid toxic ammonia build-up that can occur with conventional feeds. Cleaner

water lowers the opportunity for proliferation of potentially harmful microorganisms such as *Zoothamnium*. The result is a healthier environment for your growing shrimp.



LiquaLife helps prevent the increase of ammonia concentration.

When compared to conventional feeding programs, the LiquaLife hatchery program can help prevent the accumulation of ammonia-N in culture tank water. In each graph, gray indicates the mean for treatments receiving commercial standard feeding programs (live food organisms with or without dry feed supplements) and orange indicates mean for treatments receiving LiquaLife plus live food organisms. (*P. vannamei* water samples taken from four to seven replicate tanks per day sampled. *P. monodon* water samples taken from three replicate tanks per day sampled.)

More consistent nutrition.

The tedious pre-preparation of conventional feeds and their tendency to decompose in tank water can lead to inconsistent nutritional quality in a feeding program.

With LiquaLife, nutrients are highly available to shrimp with no pre-preparation required.

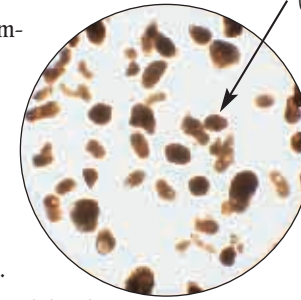
LiquaLife nutrient beads are pre-stabilized in the hydrated state so they more closely resemble the natural food of larval shrimp.

Each drop of LiquaLife contains nutrients from squid, fish, brine shrimp and poultry eggs—and is supplemented with omega-3 fatty acids from fish oil plus essential vitamins, minerals and plenty of astaxanthin for good pigmentation and health. LiquaLife also contains direct-fed microbials to be consumed by shrimp.

LiquaLife nutrient beads are sized to complement the natural feeding mechanisms of larval shrimp. And because the beads

stay intact in the water, the nutrition is more consistently available to your shrimp—unlike conventional dry feeds that break down quickly in water, making nutrients unavailable to shrimp.

LiquaLife Z-M Nutrient Beads
 (Appr. 50-150 microns)



What makes LiquaLife unique? LiquaLife is made up of two components: **nutrient beads** which contain essential nutrients plus endoprobiotic bacteria (direct-fed microbials) to be ingested by shrimp; and a **liquid medium** which contains exoprobiotic bacteria to help keep tank water clean and fuel to help these beneficial microbes proliferate in the tank.



Easy to feed.

LiquaLife is packaged in a convenient, easy-feeding pouch. Just shake the pouch, open the spout, mix the recommended amount of LiquaLife with a small volume of water, and pour into the culture tank water. With LiquaLife, there is no tedious weighing, grinding, sieving or hydrating required.

The LiquetaLife Advantage

Research and customer results indicate that LiquetaLife can have a dramatic positive effect on the health, vigor and growth of shrimp larvae. This represents a number of significant advantages for producers who are looking for ways to improve production, increase profitability and enhance the value of PL.

Larvae that grow faster; Postlarvae that grow larger.

How would you like to get your nauplii through larval development to marketable PL in fewer days?

With LiquetaLife, larvae can metamorphose sooner than with conventional feeding programs (see graphs). This means that your larvae can spend less time developing through the critical zoeal and mysis stages.

Following larval development, postlarvae raised on LiquetaLife can have dramatically greater dry weight than postlarvae raised on conventional programs. Larger, more active PL can mean greater value in the marketplace.

Postlarvae with greater stress tolerance.

Some of our customers measure the quality of the postlarvae they produce, in part, by their ability to survive salinity-temperature stress. LiquetaLife postlarvae tend to withstand this stress better than postlarvae raised on conventional feeding programs—and this could lead to higher survival in the pond.

LiquetaLife Products

LiquetaLife products are designed for optimum nutrition through all stages of larval and postlarval development.



LiquetaLife Z-M
Zoea-1 to PL6



LiquetaLife M-PL
Mysis-2 to PL14

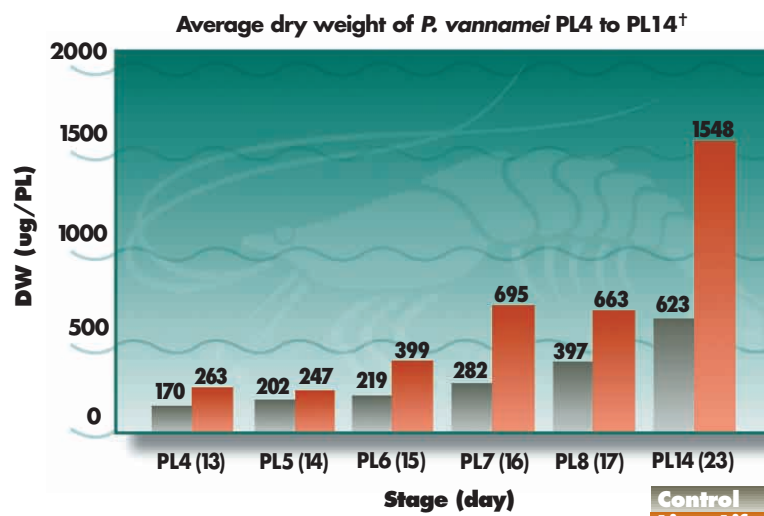


LiquetaLife PL
All PL stages in acclimation or nursery operations



Faster-developing larvae and larger, stronger postlarvae*

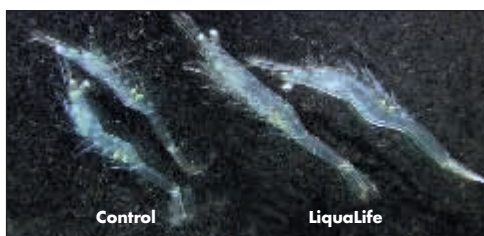
Greater dry weight



By PL14, LiquetaLife postlarvae were 2.5 times larger than control groups fed on a best-practice conventional program. Time (days) indicates age after hatching. Also note that LiquetaLife PL8 were approximately the same dry weight as control PL14. Larger PL can have an enhanced value which can lead to greater profitability.

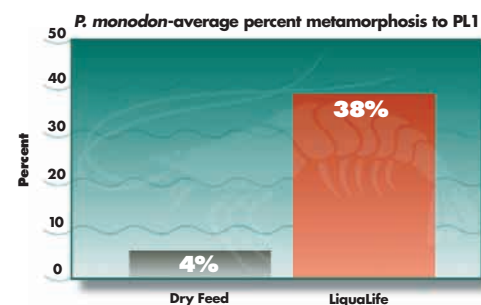
Produce larger PL with the LiquetaLife program.

P. vannamei PL8 fed on LiquetaLife program compared with *P. vannamei* PL8 fed on best-practice commercial control program. PL populations in shipping containers were sampled at random approximately 10 hours after leaving the hatchery. Though the same age as the two control specimens on the left, the two LiquetaLife PL on the right are clearly larger. (Specimens photographed at 6.4x.)

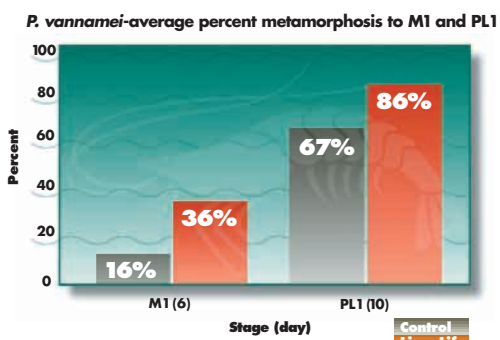


Faster development

Rapid larval development—combined with the rapid weight gain of PL raised on LiquetaLife—can help reduce time in the hatchery.



38% of LiquetaLife larvae reached PL1 on day 11 of life—compared to less than 5% of control groups. Gray indicates mean for controls receiving supplemental dry commercial feeds (microcapsules and flakes.) Orange indicates mean for populations receiving LiquetaLife. (Averages were from five different tank populations.)



By day 6, more than twice as many LiquetaLife larvae had reached Mysis-1. Time (days) indicates age after hatching. By day 10, 86% of the LiquetaLife populations had reached PL1, compared to just 67% of the control populations. (Averages were from seven to eight different tank populations.)

Stress test survival

Stress test survival (%)

| Control | LiquetaLife | PL Stage |
|-------------|-------------|-------------|
| 90% | 100% | PL7-8 |
| 95% | 100% | PL9-10 |
| 91% | 100% | PL11 |
| 90% | 100% | PL13-14 |
| Mean | 91% | 100% |

100% of LiquetaLife shrimp survived the stress test. *P. vannamei* PL (control and LiquetaLife treatments) were subjected to a stress test at harvest. The test consisted of challenging 100 specimens from each tank population with a 15 ppt and 10° C step reduction in salinity and seawater temperature and counting survivors.

Economic benefits of LiquetaLife

Feeding LiquetaLife can help shrimp producers in two direct ways:

Multi-PL™ Model: More PL in less time.

Research and customer results indicate that feeding LiquetaLife can lead to less time in the hatchery. When LiquetaLife is properly used as a complement to live phytoplankton and *Artemia*, postlarvae can be harvested two to four days sooner—up to six days in controlled feeding trials—than those raised on conventional feeding programs. Harvesting sooner can lead to more cycles of production, helping increase the total number of PL going to market in a year.

Additionally, many of our customers report higher survival rates when using LiquetaLife to replace dry feed. This can lead to more shrimp per cycle—further increasing the number of shrimp harvested in a year.

For producers, the Multi-PL model means that you can multiply the number of PL harvested—which can lead to increased profits.

Super-PL™ Model: Larger, stronger shrimp.

With this model, LiquetaLife shrimp are allowed to grow for the same amount of time as with a normal production schedule.

In that normal cycle time, when LiquetaLife is properly used as a complement to live phytoplankton and *Artemia*, your larvae can grow into much larger and more vigorous PL. These larger PL tend to be stronger swimmers and have higher tolerance for stress.

Producers who have their own grow-out facilities can use the Super-PL model to help create the opportunity for increased pond yields by stocking stronger PL. The Super-PL model can help hatcheries produce PL that are more valuable to grow-out farmers in a competitive marketplace.

Note: All performance and LiquetaLife usage statements in this brochure are estimates based on Cargill research results and are not warranties of product performance or results to be obtained. Your actual results will depend on many factors in addition to LiquetaLife.

* All of the results described herein are from best-practice vs. best-practice controlled feeding trials in research or commercial shrimp hatcheries. Nauplii were always from the same source (mixed spawns, as needed). Water management, temperature, salinity and handling were kept the same for treatments and controls to the extent normal hatchery conditions permitted. LiquetaLife was always used to complement a sound feeding program of live phytoplankton plus *Artemia*. Feeding concentrations of phytoplankton were always the same, but those of *Artemia* were lower for LiquetaLife treatments than for controls. LiquetaLife products completely replaced dry feeds (microcapsules and flakes) when these were part of a best-practice program.

† Dry weights of PL4-PL8, control and LiquetaLife treatments, were from groups of 100 individuals per tank sampled in triplicate from one or two different tanks per PL stage per treatment. Dry weights of PL14, control and LiquetaLife treatments, were from groups of 100 individuals from a total of two tanks sampled at harvest.