

# Aquafarming and pacific white shrimp

[Business](#), [Industries](#)



## 1. Introduction

### 1. General

Aquaculture is the agriculture and active farming or production of aquatic beings such as fish, mollusk, crustaceans and aquatic workss in controlled environments. It is besides known as aquafarming. Nowadays, this animal-based food-producing sector has increased in footings of its importance due to the addition of planetary human population demand. The rush of aquaculture is besides due to it supply a batch of extra employment for the increased figure of under-employed fishermen or husbandmans every bit good as the rural inhabitants, increased fuel's monetary value which lead to the rise of angling operations cost, and the inclined figure of demand for crustaceans like runts and shrimps ( FAO, 1987 ) .

Asia as a whole accounted about 90 per centum of planetary aquaculture production with China being the chief manufacturers ( FAO, 2013 ) .

Aquaculture accounts 47 per centum of all fish supplies destined for non merely direct human nutrient ingestion, but besides processed into fishmeal and oil as animate being provender ; carnivorous aquatic species such as runt, trout and salmon, and for other animate beings such as hogs, poulets and family pets ( FAO, 2013 ) . Direct human ingestion used about 86 % of entire piscary production, while the staying 14 % was used in fabrication of fishmeal and fish oil ( FAO, 2010 ) .

Aquaculture system can be differentiated by its degree of direction ; extended, semi-intensive and intensive. Extensive civilization system fundamentally depends to the full on nutrients which occur of course in the

system such as planktons and did not have any knowing nutritional inputs. This type of system allows the stock to turn by itself as less attempt is applied into the civilization system. It besides depends on H<sub>2</sub>O flow to convey the nutrients, so normally it is done in the ocean, lakes and river. Other than that, extended system besides has a few negative effects as it depends on the surrounding conditions for the mortality and survival rate of the stocks. While for intensive civilization system, it requires the aquaculturists to hold high understanding about the stocks as they have higher control over the civilization system than extended system. Their provenders are besides need to be well-prepared with balanced nutrition and so pelleted to advance higher endurance rate. Although it requires higher cost and works, it produces highest output than both extended and semi-intensive civilization system which still requires unreal nutrient to be accompanied with natural nutrient supply.

Other than freshwater fishes, species that besides produced in aquaculture included mollusk ( 23.6 per centum ) , crustaceans ( 9.6 per centum ) , and other aquatic animate beings. While the production of crustaceans itself consists of fresh water and Marine species. Examples of commercial runt species are *Penaeus Monodon*, *Litopenaeus vannamei*, *Penaeus stylirostris*, *Phosphorus enaeus indicus*, *P enaeus merguiensis* and *Phosphorus enaues chinensis* . *Liter . vannamei* or besides called as Whiteleg shrimp rise as the most preferable species of Marine and fresh water for civilization crushing the tiger shrimp, *P. Monodon* as it lost its influence in this last decennary due to outbreak of diseases ( FAO, 2012 ) . As white topographic point disease ( WSD ) start to outbreak, it caused high desolation in economic as the

mortality rate increased dramatically and caused a large loss to the shrimp civilization ( Gunalan B. , et al. , 2011 ) . After uninterrupted hunt for the options for shrimp civilization, at 2001, *L. vannamei* is introduced in Asia. The species commercial civilization began in South and Central America and subsequently the aquafarming of *L. vannamei* go the most of import in Mexico. Although the commercial civilization of *L. vannamei* punctuated with its slope and diminution tendencies after the ‘ la Nina’ calamity, the production of the species has grown to over 270 000 metric tons by 2004 ( FAO, 2014 ) .

There are a few grounds as to why *L. vannamei* is more favorable than *P. Monodon* . One of it is it merely require low protein in its diet ( 30 per centum ) than *P. Monodon* ( 45 per centum ) which is more carnivorous, so the provender cost is a batch lower than the 1 with *P. Monodon* ( FAO, 2014 ) . Other than that, it besides has higher survival rate and is a batch easier to civilization ( SEAFDEC, 2005 ) . *L. vannamei* aslo can be cultured in low salt H<sub>2</sub>O as it can turn efficaciously and able to last at utmost salts status ( LukeA. & A ; D. AllenDavis, 2010 ) . However, many Asiatic states so unwilling to go on to bring forth these shrimp species as they fear on the possibility of the eruption of new alien disease that can be transmitted to native penaeid runts at their states. So, the civilization merely been applied in Malaysia, Cambodia, India, Philippines and Myanmar. Of all types of broodstock, merely Specific Pathogen Free ( SPF ) / Specific Pathogen Resistant ( SPR ) broodstock is allowed to be imported in Thailand and Indonesia ( FAO, 2014 ) .

Shrimp agriculture in Malaysia has started since 1930s, which so led to larger scale civilization production. Its life rhythm includes larval phase and full-blown phase, in which require both natural provenders and unrecorded nutrients. Due to authorities support, farmer's active engagement, intensive preparation to husbandmans, increased engineering and steady market's monetary value, the runt agriculture industry has rises systematically ( SEAFDEC, 2005 ) . Although its being patterns widely all over the universe, runt agriculture has a few impacts that needed to be taken attention of. These include its impact to environmental and its sustainability. The impacts can be categorised in direct or indirect impacts. Mangrove ecosystems being cleared out to do infinite for shrimps' civilization pool doing more than 50 per centum of it to decrease, and the nutrient webs besides will alterations due to the runt agriculture. Habitat loss besides is included in indirect consequence of runt farming toenvironment. Land required for it besides will subsequently go increased in monetary value particularly in Peninsular Malaysia. While for direct impacts, it include new species and familial stuff to be introduce. As the runt farming industry will let go of their waste and toxic substances to environment, it will dopollutionand eutrophication. Disease eruption, for illustrations White topographic point ( WSSV ) , Taura Syndrome and Vibriosis, besides will severely impact the environment as it will impact other wild penaeid runt populations ( RonnbackPatrik, 2001 ; SEAFDEC, 2005 ) . However, these will non do the industry to diminish because new runt farms will be developed at much higher rate than before ( RonnbackPatrik, 2001 ) . Overfeeding besides has chance to go on and this will take to protein beginnings being uneconomical.

Feed is an of import facet in success of shrimp aquaculture. During the disease eruption, antibiotics are used hyperbolically since it can battle infective beings. This lead to it being banned by European Union ( EU ) in 2006 as they found out that antibiotic can give harmful consequence to the host species, human as consumer and the environment itself. To avoid any losings, they decided to happen the options for antibiotics. Of all the options, organic acids seems to be most appropriate for the function as surveies has shown that organic acids and its salts can advance both growing and feed use and besides increase the species opposition towards diseases ( W. K. Ng & A ; C. B. Koh, 2011 ) . Still, there is non adequate survey has been done or published sing the usage of organic acids as aquafeeds for shrimp aquaculture ( Koh C. B. , et al. , 2013 ) . Therefore this survey is been conducted to understand the consequence of organics acids on the growing and wellness public presentation of *L. vannamei*, in footings of it weight and disease opposition.

### 1. Aim

Aim of this experiment include:

1. To find the consequence of dietetic organic acids in commercial runt provenders on the growing public presentation and wellness of the Pacific white runt, *Litopenaeus vannamei* station larvae.
2. To analyze the consequence of dietetic organic acids on provender use efficiency.
3. To measure the entire feasible bacterial and presumptive *Vibrio* counts in the hepatopancreas and intestine and

hepatopancreas histopathology

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4. Resistance to *Vibrio parahaemolyticus* challenge.

## 1. LITERATURE REVIEW

2. 1 *Litopenaeus vannamei*

Shrimp are marine crustaceans that can establish on the river beds and ocean floors around the universe, filtering sand and atoms in the H<sub>2</sub>O. As for *L. vannamei*, or its common name Whiteleg runt are under the order Decapoda. As the name Decapoda implies, all decapods have ten legs; five pairs of legs on the chief portion of the organic structure, plus five pairs of pleopods on the venters or tail. Differ from other Decapoda, this species tend to be larger than the Caridean runt species and are commercially of import.

*L. vannamei* is first described by Lee Boone in 1931. At that clip, this new species was rescued for scientific discipline from the native fish market in Panama City, March 25, 1926( Boone, 1931). *L. vannamei* are native to the eastern Pacific Ocean, from the Mexican province of Sonora as far south as northern Peru. It is restricted to countries where the H<sub>2</sub>O temperature remains above 20 °C ( 68 °F ) throughout the twelvemonth. Adults unrecorded and spawn in the unfastened ocean, while station larvae migrate inshore to pass their juvenile, stripling and sub-adult phases in coastal estuaries, lagunas or mangrove countries. This species is besides dominant at Guatemala and El Salvador( FAO, 1980 ).

*Liter . vannamei* has dais which reasonably long with 7-10 dorsal and 2-4 ventral length. Its coloring material is usually semitransparent white, but this can alter depending on its provender, substrate and H2O turbidness (FAO, 2006) . Its maximal entire length can make until 230 millimeters. While it's shell length can make until 90 millimeters maximal. *L. vannamei* can be wrongly thought as *Penaeus stylirostris* , but it really has distinguishable characteristic that differentiate them from *P. stylirostris*. *Liter . vannamei* is by and large less compressed laterally than *P. stylirostris* . Its average Carina of the shell besides does non widen rather to the posterior border. Its first three abdominal sections are sturdier and have more developed epimera than *P. stylirostris* (Boone, 1931) .

In *Liter . vannamei* mature males, its petasma is symmetrical and semi-open. Its spermatophores which are dwelling of sperm mass are complex. Males become mature from 20 g. While for the mature female, they have unfastened thelycum. Females become mature from 28 g onwards at the age of 6–7 months. Females *Liter . vannamei* normally grow faster and larger than the males (FAO, 2006) . Its life rhythm consists of an pelagic planktonic larval phase with its first phase larvae being termed nauplii. Nauplii live on their yolk militias, so it does non feed. The following larval phase which is protozoa, Mysis and early postlarvae remain planktonic for some clip. They feed on phytoplankton and zooplankton. Next are an estuarial station larva-to-juvenile phase, and a return to the marine environment as an grownup to get down feeding on benthal debris, worms, pelecypods and other crustaceans, mature and spawn (Valles-Jimenez, et al. , 2005 ; FAO, 2006) .



*L. vannamei* is used as introduced species in aquaculture. It has the ability to accommodate to alterations in salt, pH and dissolved O degrees (Rosenberry, 1999) . The production of the species in their native part is shown to be lower than that in the part where they were introduced. For illustration, their production in Asia and the Pacific part was 1. 1 million metric tons compared with in Latin America and the Caribbean which merely 266 000 metric tons. This can be happened as the switching from the usage of *P. Monodon* to *Liter . vannamei* happened in China and many of the states in Asia (FAO, 2006) . The shifting may be because of the provender costs for *Liter . vannamei* is by and large less than *P. Monodon* as *L. vannamei* merely necessitate 18-35 % of protein compared to 36-42 % for *P. Monodon* (FAO, 2006) . Other than that, *Liter . vannamei* are easier to reproduce and has unvarying growing rate than *P. Monodon* which lead to its success in selling.

As *L. vannamei* able to bring forth specific pathogen free ( SPF ) , it can easy come in in Asiatic market. But the production will lowered if they suffer from diseases like White Spot Syndrome Virus ( WSSV ) in which the septic runt shows reduced nutrient ingestion and Taura Syndrome which makes the juvenile shrimp become weak, has soft shell, empty intestine and its ruddy chromatophores in extremities to spread expand. There besides other diseases such as Infectious Hypodermal and Haematopoietic mortification ( IHNV ) which cause Runt Deformity Syndrome ( RDS ) , Baculoviral Midgut Gland Necrosis ( BMN ) , and Vibriosis ( FAO, 2006 ) . These diseases can be reduced by holding good direction of the H<sub>2</sub>O system, provenders, armored combat vehicles and the runt itself.

## 2. Use of organic acids in provenders

As the aquaculture production become intense, jobs and diseases besides increase. This finally led to over-use of antibiotics to forestall these diseases which so harmed the environment, human population and the animal itself. Since 1986, the utilizations of antibiotic growing boosters ( AGP ) are easy being banned around the universe as in Sweden entire prohibition were done. Later in 1997, European Union ( EU ) has banned the usage of avoparcin. While in 1999, bacitracin, spiramycin, tylosin and virginiamycin are banned in EU. This finally led to a entire prohibition of the usage of all antibiotics in EU at 2006 (Robert, 2011) .

After the forbiddance of antibiotics at 2006, organic acids are used as alternate to these AGP. Formic, lactic, benzoic and propionic acids are illustrations of organic acids. It is already been used as storage preservatives for nutrient and provender ingredients for a long clip (Ng, et al. , 2011) . The first proficient study sing the usage of these acidifiers appears even since 1960's where it is used in hog eating to see the consequence in their growing and public presentation. In this hog feeding experiment entirely ; more than 500 surveies have been published on the usage of acidifiers (Bernd, 2011) . These organic acids which have low pKa values are effectual at low environment pH and as microbic in acidic tummy part. It has been good documented that these organic acids can beneficially better provender consumption, growing and feed use efficiency when Federal at moderate degrees (Alp, et al. , 1999 ; Kluge, et al. , 2006 ; Robert, 2011) .

Study besides has been done to demo that although there is deficiency of impact on growing rate or provender use shown, the provender transition ratio ( FCR ) , and in-between bowel to organic structure weight ratio is increased significantly due to the presence of acerb salt blend (Ng, et al. , 2011) .