



# Effect of Addition of Probiotics on Growth and Feed Conversion Ratio (FCR) in Vaname Shrimp (*Litopenaeus vannamei*)

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## ABSTRACT

Vannamei shrimp has high economic prospects, so an increase in production is needed. One of the constraints in the production of vaname shrimp is the feed that affects growth. Probiotics are used to break down leftover feed and make feed easier to digest so that growth can be optimal and the Feed Conversion Ratio (FCR) can be low in value and save expenses. The addition of commercial probiotics and RICA probiotics had an effect on increasing growth and FCR, but there was no significant difference between the two.

*Keywords: Litopenaeus vannamei, probiotics, Lactobacillus sp., Bacillus sp., FCR, growth*

## 1. INTRODUCTION

One type of shrimp that has high economic prospects is vaname shrimp (*Litopenaeus vannamei*). In shrimp farming activities in ponds, vaname shrimp has its own advantages such as high survival rates, faster growth, more resistance to disease attacks, high appetite, short maintenance time, and increasing demand (Afriyadi 2020). In shrimp farming, there are still many obstacles in terms of feed and shrimp growth. Feed is the most important element in increasing vaname shrimp production. So that the addition of probiotics in shrimp farming with the aim of decomposing the organic material from the remaining uneaten feed and improving water quality. In addition, feed is easier to digest because of the complex compounds that are converted

into simple compounds by probiotics (Citria 2018).

Additional beneficial microbes for the host by increasing the nutritional value of feed and improving response to disease and improving environmental quality are probiotics. Increased growth performance, dietary supplements, and increased disease resistance are the goals of using probiotics. With optimal levels of probiotics are also able to stimulate the development and growth of beneficial microorganisms (Azhar 2018). This article aims to determine the effect of probiotics on growth and FCR (Feed Conversion Ratio) of vaname shrimp (*Litopenaeus vannamei*).

## 2. VANNAME SHRIMP

The classification of vannamei shrimp is as follows.  
Filum : Arthropoda

Kelas : Crustacea  
Ordo : Decapoda  
Familit : Penaidae  
Genus : *Litopenaeus*  
Spesies : *Litopenaeus vannamei*

Vaname shrimp consists of two parts, namely the head (cephalothorax) and stomach (abdomen). The chitin layer encloses the head of the shrimp for protection, and consists of the antennulae, mandible, antennae, and two pairs of maxillae. Maxiliped three pairs and five pairs of walking legs (peripoda) or foot legs (decapoda). The abdomen consists of 6 segments, each of which has its own function. There are five pairs of swimming legs and sepasa uropods (like tails) which form a fan along with the telson in the abdomen (Kitani 1994). Vannamei shrimp fry have the advantage of having high survival rates, resistance to environmental shocks, and high density (Tahe 2011).

### 3. COMMERCIAL PROBIOTICS

Additional food in the form of microbes that are beneficial to the body is probiotics by increasing the balance of microbes in the digestive tract (Widanarni 2012), increasing the immune response, increasing the utilization of feed nutrition, improving environmental quality, and balancing biological conditions. Commercial probiotics are able to reduce post-larval mortality from tiger prawns, support the survival of sangkuriang catfish (Suwoyo 2010). The requirements of probiotic microbes are easy to maintain, can be maintained in a medium that allows them to be introduced into the intestines of fish, can live and develop in water, are not pathogenic in either the host or humans, do not disturb the balance of the ecosystem (Supriatna 2016). The addition of probiotics in vannamei shrimp culture shows that the highest growth is at the highest frequency of distribution due to the optimal performance of bacteria in regulating the balance of microbes in the digestive tract (Afriyadi 2020).

In the maintenance of semi-intensive systems, the growth of vaname shrimp is the fastest in the addition of probiotics than without probiotics. Feed consumption determines the input of nutrients into the body for growth and other purposes, so that growth is influenced by feed consumption (Susilowati 2017). In the intensive pattern system, the growth of vaname shrimp shows the same results, namely faster, this is because the enzyme activity in digestion will increase significantly compared to without the addition of probiotics (Gunarto 2009). In the biofloc system, the growth of vannamei shrimp with the addition of probiotics shows the highest results, because of the presence of microorganisms and probiotics that improve water quality and increase growth so that they can suppress cannibalism (Dahlan 2017). The increased growth of vaname shrimp is due to the increased activity of digestive enzymes by probiotics (Wang 2007).

FCR (Feed Conversion Ratio) of vaname shrimp with the addition of probiotics shows a decreasing number from each system, the flock system has a lower FCR value compared to the biofloc system (Arsad 2017). With the high frequency of adding probiotics, the FCR value will be lower because the remaining feed will be discharged into bacteria and the availability of bacteria becomes natural food for shrimp (Afriyadi 2020). Probiotic mixtures are promising in growth speed and immunostimulants for vannamei shrimp culture (Chen 2020).

#### 3.1 *Lactobacillus* sp.

One of the gram-positive bacteria used as probiotics in shrimp culture is *Lactobacillus* sp. These microbes can simplify protein compounds so that the absorption process of food is easier and optimal and can also nourish the intestines. In addition, suppressing the bacteria that cause shrimp disease can be done by *Lactobacillus* sp. this. The bacteria that cause the disease cause inhibition of shrimp growth because the

energy generated from the feed is used for the defense of the shrimp body. Probiotic *Lactobacillus* sp. provide a significant effect on shrimp growth, the more doses given the higher the growth increase of vaname shrimp. Protease enzyme owned by *Lactobacillus* sp. can make complex protein into simple protein so that it is easier to absorb and dilute feed.

In addition, the appetite of shrimp increases due to the production of attractants through the anaerobic fermentation process. Some of the enzymatic processes in the shrimp body are reduced due to the addition of this probiotic so that the energy contained in the shrimp is focused on the shrimp growth process. The FCR (Feed Conversion Ratio) of shrimp given probiotics gets a decreasing value, the lower the FCR value, the better the feed digestibility of vaname shrimp (Syadillah 2020). The absorption of fat by the shrimp body is easier because *Lactobacillus* sp. can secrete the enzyme lipase which hydrolyzes fat into fatty acids (Kurniawan 2016).

### 3.2 *Bacillus* sp.

*Bacillus* sp. is one of the gram-positive bacteria which is often used as a probiotic in aquaculture activities (Supriatna 2016). This probiotic is beneficial because it is resistant to pathogenic bacterial infections, improves growth performance, and can increase the immune response. The effect of adding the probiotic *Bacillus* sp. on the growth of vannamei shrimp, the best growth results were at the addition of 5 and 10 ppm, this shows that the dose of probiotic administration needs to be considered because it can reduce growth and disrupt the balance of microflora in the shrimp body if it is given too much (Novitasari 2017). The addition of the probiotic *Bacillus* sp to vaname shrimp causes increased growth and also the immune system to prevent viruses (Kewcharoen 2019). Probiotic *Bacillus* sp. Micro-encapsulated or freeze-dried form

that is put directly into water can increase the growth of vannamei shrimp but less effective in vannamei shrimp larvae, this depends on the quality of probiotics and the duration of probiotics to dissolve in water (Nimrat 2012).

## 4. RICA PROBIOTICS

Probiotics produced by the Maros Brackish Water Cultivation Research and Development Center isolated from pond sediments, sea and mangrove leaves are RICA probiotics. The results of this probiotic have been shown to increase survival and production of tiger prawns and have been tested in several traditional plus ponds. There was an increase in the growth of tiger prawns with the addition of RICA probiotics. The FCR value obtained was classified as low, with the addition of probiotics there was an increase in the activity of amylase and trypsin enzymes in the digestion of shrimp, so that the FCR value was quite low. However, there is no significant difference between RICA probiotics and commercial probiotics both in terms of growth, FCR (Feed conversion ratio, and tiger prawn survival rate (Tahe 2015).

## 5. CONCLUSION

The addition of probiotics to vannamei shrimp has an effect on growth and FCR (Feed conversion ratio) because the beneficial bacteria found in probiotics can break down the remaining feed and become natural feed for shrimp so that growth and feed conversion ratios become more optimal. There was no significant difference between commercial probiotics and RICA probiotics.

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