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Phytogenic solution for *L. vannamei* performance

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Crustacean production reached 9.4 million tonnes in 2018, with marine shrimps dominating the production of crustaceans typically farmed in coastal aquaculture. Besides this, they are also an essential source of earnings for several developing countries in Asia and Latin America.

Whiteleg shrimp (*Penaeus vannamei*) is the most produced species with 4.9 million tonnes, accounting for 52.9 percent of total crustaceans produced. Compared to finfish production, it is only surpassed by grass carp (Ctenopharyngodon idellus) with 5.7 million tonnes. In comparison, Nile tilapia (Oreochromis niloticus) reaches 4.5 million tonnes and Atlantic salmon (*Salmo salar*) 2.4 million tonnes (FAO, 2020).

Therefore, we can see the importance of shrimp species in the aquaculture sector, not only in volume but also in value. The prediction is that the overall increase will be 15 percent by 2030 (FAO, 2020).

Optimising shrimp production performance is crucial to the success of the sector. The theory is that with efficient diet formulation, combined with successful health and welfare management, will determine higher production output.

An effective tool to boost shrimp performance

As part of a proactive approach to production health and performance, the use of functional and sustainable additives, such as phytogenics, has proven to be an effective tool to boost shrimp performance.

Two experiments with a new phytogenic formulation in whiteleg shrimp (*P. vannamei*) were performed to confirm the

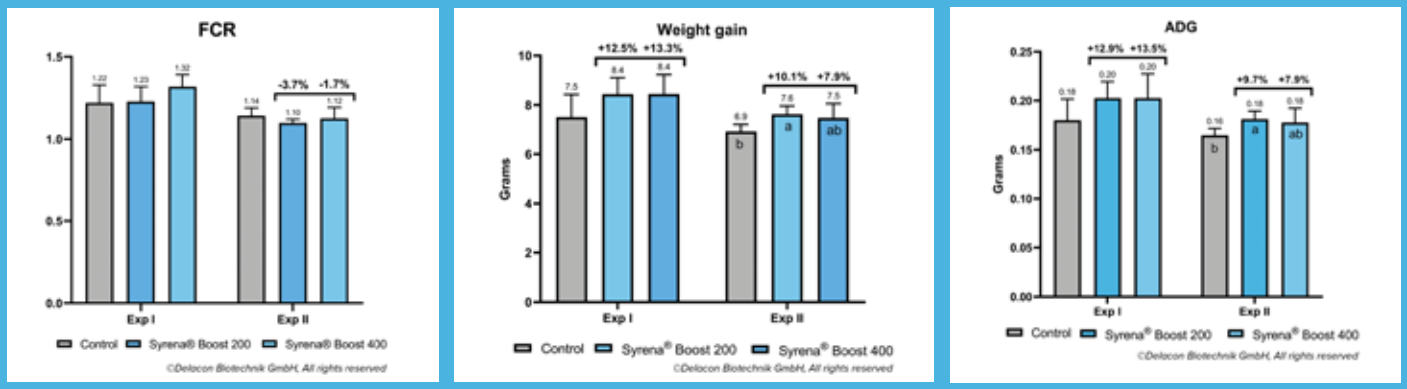

Figure 1: Shrimp biological and feed utilisation parameters at the end of the feeding trials. Different letters mean a statistically

effect on growth performance parameters and feed efficiency.

The first trial (EXP I) was conducted at Minh Phu AquaMekong Co, Ltd in Vietnam.

Six hundred specific pathogen-free (SPF) shrimps with an average initial weight of 1.9±0.26g were randomly divided into three groups in a complete randomised block design (CRD) with four replications for each treatment in 350 L tanks: one control group (basal diet) and two groups receiving Syrena Boost included at 200 & 400 mg/kg of feed, respectively.

All tanks were outfitted with an activated coral filter, aerated, and covered with plastic film to reduce the risk of cross-contamination. Water temperature was 28.2°C, salinity was maintained at 20 ppt, and dissolved oxygen (DO) above 6.5 mg/L. Feeds were produced by cold extrusion. Shrimps were fed on a biomass basis, four meals per day with their respective diet for six weeks.

After six weeks of feeding, shrimp survival did not differ between treatments, being above 80 percent. Shrimp fed well-formulated phytogenic feed additives at both inclusion rates showed an increase in weight gain of 12.5 & 13.3 percent respectively, with an increase in average daily growth (ADG) of 12.9 & 13.5 percent. The Feed conversion ratio (FCR) was similar between diets (Figure 1).

The second trial (EXP II) was conducted in Crevetec, Belgium. Two hundred and forty shrimps with an average initial weight of 1±0.01g were randomly allocated into three groups in a complete randomised block design (CRD) with four replications for each treatment: a control group (basal diet) and two groups receiving Syrena Boost included at 200 & 400 mg/kg of feed, respectively.

A total of 12 baskets of 20L each received 20 shrimps, with all baskets placed in a larger tank maintained with bioflocs. In this way, all baskets had the same water quality parameters, a temperature of 25.8°C, salinity kept at 28 ppt, and dissolved oxygen (DO) above 7.2 mg/L.

Each basket was equipped with an automatic feeder. Feeds were produced by extrusion, and the feed supplied to each basket was adjusted daily according to the expected growth curve and average weight from the initial sampling and each sampling every two weeks until week six.

After six weeks, shrimp survival did not differ between treatments, being above 94 percent in all treatments. Shrimp fed Syrena Boost at both inclusion rates showed an increase in weight gain of 10.1 & 7.9 percent respectively, being statistically significant ($p \leq 0.1$) at the lowest dose. ADG was also improved by 9.7 & 7.9 percent respectively, again being statistically significant ($p \leq 0.1$) at the lowest dose. FCR was reduced by 3.7 & 1.7 percent respectively (Figure 1).

A positive effect on growth performance

Both trials showed a clear indication that the inclusion of phytogenic feed additives in whiteleg shrimp diets, at both inclusion levels, positively effects growth performance parameters. These results are very similar to those obtained previously in Nile tilapia (O. niloticus).

These studies indicate the benefits of employing a specific formulation of selected phytogenics in whiteleg shrimp to promote growth performance and optimising feed efficiency, whilst also demonstrating that the farmer can harvest shrimps earlier or even yield larger ones during the same culture period.

All of these results confirm that phytogenic products can enhance the profitability of whiteleg shrimp production in a cost-effective way.