Higher survival, higher yield: Delivering more harvest biomass in shrimp grow-out through probiotic application

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Figure 1. Experimental units used during the shrimp grow-out trial.

A recent study conducted by the Federal University of Santa Catarina, Brazil, demonstrated how improvements in survival can translate into significant gains in harvest biomass. The trial evaluated the effects of INVE Aquaculture's probiotic Sanolife™ PRO-2 in Pacific white shrimp (*Penaeus vannamei*) and found that higher inclusion levels resulted in significantly improved survival, increased final biomass and positive trends towards increased immune activity during grow-out.

Looking beyond growth

A 60-day trial evaluated three dietary treatments containing 0,5 and 10g of Sanolife™ PRO-2 per kg of feed. Shrimp were stocked in nine 500L tanks (three per treatment) (Figure 1) at a density of 56 shrimp/m^2 and an average initial weight of 3.3 g (Figure 1). Total ammonia nitrogen (TAN) and nitrite concentrations were maintained below 1 mg/L, water temperature was maintained at 28 ± 1°C, and dissolved oxygen remained above 5 mg/L.

While growth performance remained similar across treatments, a different pattern emerged when survival was evaluated over time. Mortality remained low during the first weeks of culture. However, from approximately day 35 onwards, shrimp receiving the highest probiotic inclusion levels consistently maintained higher survival than those fed the control diet.

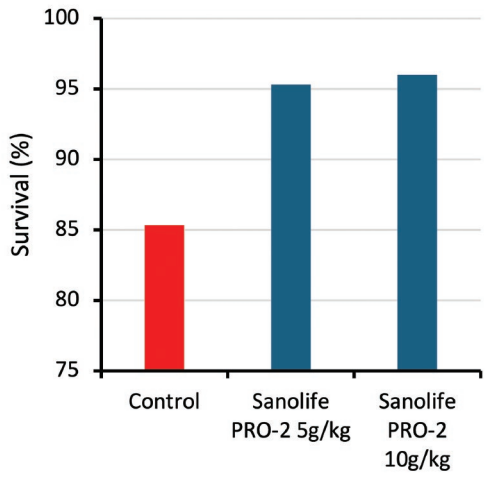


Figure 2. Survival of Pacific white shrimp fed increasing levels of Sanolife™ PRO-2.

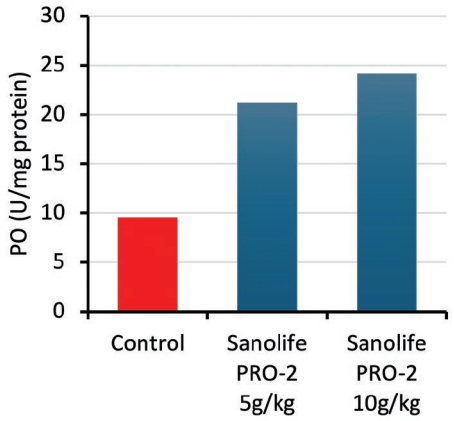


Figure 3. Phenoloxidase activity in Pacific white shrimp after 60 days of feeding.

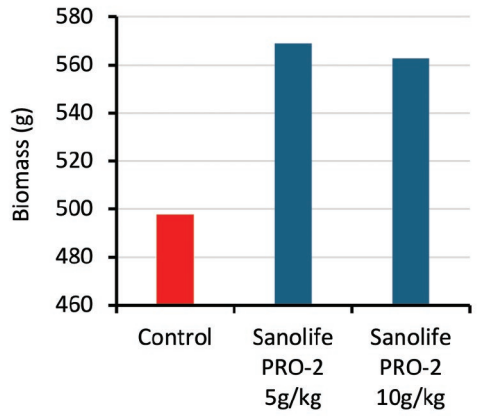


Figure 4. Final harvest biomass of Pacific white shrimp after 60 days of feeding.

By the end of the trial, shrimp fed 5g and 10g of Sanolife™ PRO-2 per kg of feed achieved survival rates of 95.3% and 96.0%, respectively, compared with 85.3% in the control group (Figure 2).

Another important parameter that thrived beyond growth in the animals that received probiotics was phenoloxidase activity (PO). This is a critical enzyme that acts in the defense line of shrimp against pathogens, being responsible, among several metabolic processes, for trapping and eliminating the invading microorganisms.

At the end of the trial, phenoloxidase activity was numerically higher than in control across all treatments (Figure 3). Higher PO activity may suggest that the shrimp could be more immunocompetent to cope with a disease challenge. Although the difference may appear modest at first glance, its impact on production was substantial.

More shrimp reaching harvest

Higher survival translated directly into higher biomass production. The control treatment produced an average final biomass of 497.8 g per tank (Figure 4). In comparison, shrimp receiving 5g and 10g of Sanolife™ PRO-2 per kg of feed achieved final biomasses of 568.9 g and 562.8 g per tank, respectively. This represents an increase of approximately 13-14% in harvest biomass.

Importantly, the increase was not driven by larger shrimp. Instead, more shrimp survived throughout the production cycle and contributed to the final harvest.

In commercial farming, profitability is determined not only by how fast shrimp grow, but also by how many successfully reach market size. Every additional shrimp harvested improves production efficiency and contributes to overall yield.

Survival economics

Survival is often discussed as a biological parameter, but its true value when it comes to shrimp culture, is economic.

In this study, an approximately 10-percentage-point improvement in survival resulted in roughly 14% more biomass at harvest. The exact economic return will vary depending on stocking density, market price, production costs, and farming conditions. Nevertheless, the principle remains the same: increasing the number of shrimp that reach harvest has a direct impact on production output.

In Ecuador, shrimp farmers typically invest between USD 0.10 and 0.30 per kg of shrimp produced to meet their health and biosecurity requirements, including the use of probiotics.

At a farm-gate price of USD 2.5–2.7 per kg for 20 g shrimp, even a modest improvement in productivity can generate substantial returns. For example, increasing harvested biomass by 15%, from 4.0 MT/ha to 4.6 MT/ha, translates into an additional 600 kg/ha of shrimp production. At current prices, this represents approximately USD 1,500-1,620 of additional revenue per hectare.

This highlights the strong economic leverage of effective health and biosecurity programs: relatively small investments can deliver significant value through improved survival, growth, and overall farm performance. As production margins continue to come under pressure globally, strategies that improve survival are attracting increasing attention from producers seeking greater efficiency from existing infrastructure and resources.

Benefits become more apparent over time: Investing today to harvest benefits tomorrow

One interesting observation from the study was that the survival advantage did not appear immediately. Survival remained high across all treatments during the early stages of the trial, with differences becoming increasingly evident during the later weeks of grow-out. This suggests that the benefits of probiotic supplementation may accumulate over time, becoming more apparent as production cycles progress and natural mortality begins.

Although this trial was performed under controlled conditions, such observation is representative under commercial conditions of shrimp production. In the later stages during the production cycle, the carrying capacity of the system operates under higher pressure. Therefore, animals are more often exposed to stressful and challenging situations, potentially leading to opportunistic disease outbreaks and mortality. For producers operating longer culture cycles, this finding may be particularly relevant, as small differences in daily survival can compound into meaningful differences in final harvest volume.

For this reason, investing in improving robustness and gut health by employing a targeted probiotics delivery through feed is essential. Especially under challenging conditions, high concentrations of probiotics can lead to effective prevention and rapid recovery when a curative application is needed. This will serve as a tool to mitigate potential negative impacts occurring during crop production.

A practical production outcome

The aquaculture industry often seeks innovations that deliver measurable improvements under real production conditions. While improvements in growth rate frequently attract attention, this study highlights another pathway to better performance: retaining more animals through the production cycle.

Under the conditions evaluated, shrimp fed diets containing 5 or 10 g of Sanolife™ PRO-2 per kg of feed consistently achieved higher survival and greater final biomass than shrimp fed the control diet.

The results reinforce a simple but powerful concept in shrimp farming: sometimes the most effective way to harvest more shrimp is not to grow them faster, but to ensure that more of them reach harvest.

Key results

- Survival increased from 85.3% in the control group to more than 95% in shrimp fed 5 or 10 g of Sanolife™ PRO-2 per kg of feed.
- Higher survival resulted in approximately 13-14% greater harvest biomass.
- Biomass increased from 497.8 g per tank in the control group to 568.9 g per tank in the 5g of Sanolife™ PRO-2 per kg treatment.
- The survival advantage became evident during the later stages of grow-out.
- More shrimp reaching harvest translated directly into higher production output.

About the study

Researchers at the Federal University of Santa Catarina evaluated the performance of Pacific white shrimp fed diets containing different levels of INVE Aquaculture's Sanolife™ PRO-2 over an eight-week grow-out period. The study assessed production performance under controlled culture conditions, with particular emphasis on survival and biomass development throughout the production cycle.

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