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P.L. size, source strong early measures of shrimp grow-out performance

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Procure from bio-secure SPF hatcheries with a track record of disease-free operation

It is widely accepted that the quality of shrimp postlarvae (P.L.) has a critical bearing on subsequent performance during grow-out at farms, but hard evidence to prove this assertion is difficult to find. The problem is compounded by a lack of agreement on how best to measure PL quality.



Visual observations of shrimp postlarvae are better indicators of initial quality than long-term performance.

Limited accuracy

Most people rely on one or a combination of observations of P.L. on their behavior, morphological development, osmotic capability, nutritional condition, and absence of pathogens. Sometimes a condition or quality index is used by combining a series of individual measures of quality into a single value.

Stress tests

Stress tests are popular and practical tools that give information on the postlarvae's ability to withstand osmotic, temperature, or chemical shock. However, the ability of such tests to measure innate quality is questionable because larger P.L. almost always resist better than smaller P.L. This implies that it would be simpler to just measure average PL size than to run a stress test.

Fig. 1, which illustrates the strong correlation between stress test survival and P.L. size, leads to the conclusion that Pacific white shrimp (*Litopenaeus vannamei*), P.L. above over 9 mm in length are "good quality" because they perform well in a salinity stress test.

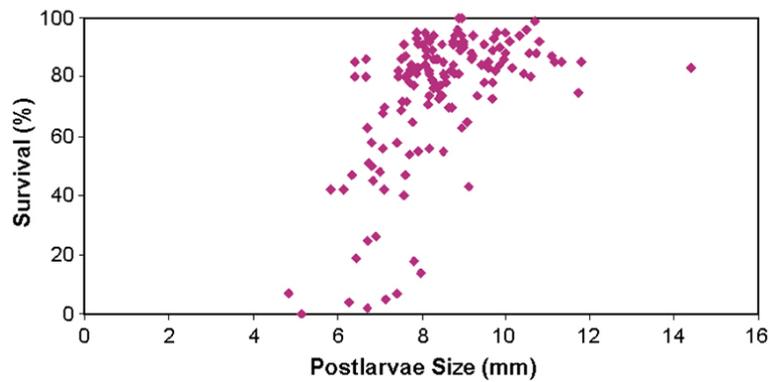


Fig. 1. Comparison of stress test survival with P.L. size.

Gill development

Gill development has also been touted as a useful measure of P.L. quality, but again, this characteristic is closely correlated with P.L. size. The data in Fig. 2 suggests that nearly all P.L. above 8 mm are “good quality.” Such information implies that a random sample of P.L. and a ruler might yield as much information about P.L. quality as a salinity stress test and microscopic examination of gill morphology.

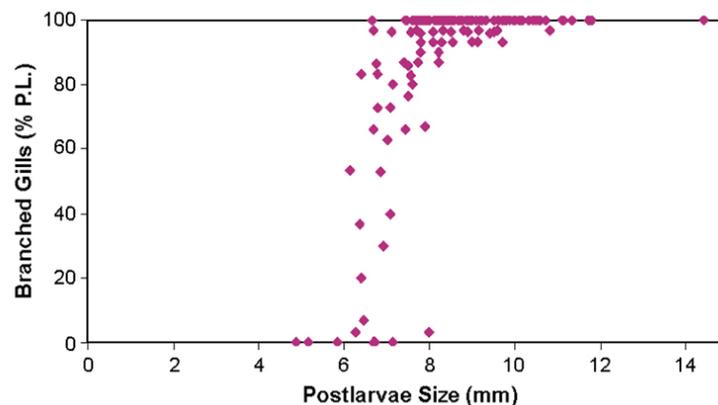


Fig. 2: Comparison of gill development with P.L. size.

Assessing P.L. quality

So how should P.L. quality be assessed? Beyond straightforward gross observations on the size, appearance and behavior of postlarvae – which all good farm managers perform before accepting a batch of P.L. – it could be that the most important aspects of P.L. quality are genetic factors and the absence of viral pathogens.

To illustrate this, Table 1 contrasts results obtained with P.L. at two very different hatcheries and times – one in Ecuador operated in 1986 and the other in the Dominican Republic operated in 2003. By far, the better results were obtained with the progeny of the selectively bred, specific-pathogen-free (SPF) Dominican Republic stock.

Lee, Linking postlarvae quality and performance, Table 1

	Hatchery Broodstock	Hatchery Disease Status	P.L. Growth Mean (mm/day)	P.L. Growth C.V.	P.L. Survival Mean	P.L. Survival C.V.	Link Between P.L. Growth, P.L. Survival	Farm Survival Mean	Farm Survival Range
Ecuador (1986)	Wild	IHHNV infection	0.37	14%	59%	36%	Yes	45%	25-70%
Dominican Republic 40-90%	Domestic SPF	SPF, biosecure	0.37	10%	51%	30%	No	75%	40-90%

Table 1. Linking postlarvae quality and performance.

Although this data is somewhat disparate and would not satisfy a statistician, it does illustrate the benefits of using selectively bred SPF stock in the recent history of the shrimp-farming industry. Unfortunately, however, the majority of today's P.L. quality tests are not designed to detect these important determinants of performance.

Only two methods of measuring P.L. quality were consistently applied at the older hatchery and the modern one: average P.L. growth rate and overall hatchery survival rate. When these numbers and accompanying coefficients of variation are compared, no major differences are apparent, so they may not contain much information about P.L. quality.

There is, however, one interesting difference between the two sets of data. In the hatchery with Infectious Hypodermal and Hematopoietic Necrosis Virus (IHHNV), P.L. growth and survival were positively correlated, but in the hatchery with SPF animals, they were not. In other words, in the hatchery with the virus problem, poor postlarvae survival was usually associated with poor growth, but in the SPF hatchery this was not the case. The presence of such a correlation could be an indicator of IHHNV infection.

Know your source

Positive genetic factors and the absence of viral pathogens clearly improve shrimp performance. With the increasing availability of SPF shrimp larvae, particularly in areas with known viral problems, it certainly makes sense to use them. To increase the likelihood of good grow-out performance, farmers should make sure the *L. vannamei* postlarvae they stock are sourced from a biosecure SPF hatchery with a long track record of disease-free operation, as well as stock them at 9 mm in total length or greater.

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