

## Pacific Whiteleg Shrimp (*Litopenaeus vannamei*)

Pacific whiteleg shrimp (*Litopenaeus vannamei*) is the most cultured crustacean species worldwide due to its fast growth, tolerance to high stocking densities, disease resilience relative to other shrimp species, and adaptability to varying salinity levels. Additionally, domesticated strains of this species are widely available. Global production of Pacific whiteleg shrimp reached nearly 5 million tonnes in 2018, valued at approximately USD 26.7 billion (Tacon, 2019; FAO, 2020). Though native to the eastern Pacific coast of Central and South America, the majority of production now occurs in Asia and Latin America, with China, Vietnam, Indonesia, India, Ecuador, and Thailand being key producers.

The production cycle involves two main phases: hatchery and grow-out. In the hatchery phase, shrimp larvae are reared in controlled environments for 20 to 30 days until they reach the juvenile stage. Some farmers use a nursery phase between hatchery and grow-out to provide additional controlled conditions for young shrimp. In the grow-out phase, shrimp are cultured to market size (typically 20–30 grams) over approximately three to four months. After harvest, shrimp are often sorted, graded, and processed, which may include peeling or removing heads depending on market preferences. Most Pacific whiteleg shrimp is sold frozen, with the United States being the largest importer.

Pacific whiteleg shrimp are predominantly produced in pond systems, though other production systems, such as recirculating aquaculture systems (RAS), tanks with biofloc technology, and cages, are gaining popularity. Production methods range from extensive to super-intensive systems, with stocking densities varying accordingly. In extensive systems, post-larval shrimp are stocked at low densities (4–10 PL/m<sup>2</sup>), while semi-intensive, intensive, and super-intensive systems support densities of up to >300 PL/m<sup>2</sup>. Feed input and water management differ significantly across these systems. Extensive systems primarily rely on natural pond productivity, whereas semi-intensive to super-intensive systems depend on compounded aquaculture feeds (Tacon, 2013).

Feed formulations for *L. vannamei* vary by life stage. Starter feeds generally contain 34–36% crude protein, while grower and finisher feeds contain 32–34% crude protein. Lipid content in shrimp feed ranges from 5% to 10%, providing energy for growth and development across all life stages.

Pacific whiteleg shrimp continues to dominate global shrimp aquaculture due to its relatively low production costs, high demand, and stable market. Global demand for shrimp is driven by strong consumption in North America, Europe, and Asia, with the U.S. being the largest importer of shrimp. In 2020, the average farm-gate price for Pacific whiteleg shrimp varied depending on the region, but prices ranged from USD 3.50 to USD 6.00 per kilogram, influenced by factors such as shrimp size, quality, and market dynamics (FAO, 2020). Production costs vary based on the intensity of farming systems and local conditions. Intensive and super-intensive systems incur higher feed and management costs, but they also generate higher yields, contributing to profitability.

Pacific whiteleg shrimp farming faces several challenges, including disease management, environmental concerns (such as mangrove destruction and pollution), and the development of cost-effective, nutritionally balanced feeds. Disease outbreaks, such as those caused by white spot syndrome and early mortality syndrome, have impacted production in key regions. Moreover, the use of antibiotics and other chemicals must be carefully managed to ensure sustainable farming

practices. Research, technological innovations, and the integration of sustainable practices are crucial for the continued growth of this industry.

**References:**

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