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FARM MANAGEMENT PRACTICES AND THEIR IMPACT ON SHRIMP PRODUCTIVITY: A CASE STUDY

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ABSTRACT

Farm management practices play a decisive role in determining the productivity, profitability and sustainability of intensive shrimp aquaculture. In Pacific white shrimp (*Litopenaeus vannamei*) farming, proper pond preparation, quality seed selection, stocking density management, water quality monitoring, aeration, feeding and disease prevention directly influence growth, survival and feed conversion efficiency. Andhra Pradesh is one of India's leading shrimp-producing states, where intensive farming has expanded significantly because of favourable coastal conditions and established aquaculture infrastructure. This article examines the relationship between farm management practices and shrimp productivity, using commercial culture observations from Dugarajupatnam, SPSR Nellore district, Andhra Pradesh, as a case-study reference. Four commercial ponds were monitored over a 105-day culture period at a stocking density of 50 post-larvae (PL)/m². Reported survival ranged from 88 to 95%, final average body weight from 15.92 to 16.74 g and feed conversion ratio (FCR) from 1.25 to 1.36. These observations demonstrate the importance of coordinated farm management in achieving satisfactory production performance. The article also discusses practical strategies for improving productivity, reducing production risks and promoting sustainable shrimp farming.

Keywords: Shrimp Farm Management, *Litopenaeus vannamei*, Shrimp Productivity

1. INTRODUCTION

Shrimp aquaculture is an important component of India's fisheries and aquaculture sector, contributing significantly to seafood exports, employment generation and rural economic development. Among the commercially cultivated shrimp species, Pacific white shrimp (*Litopenaeus vannamei*) has become highly popular because of its rapid growth, adaptability to different salinity conditions and suitability for intensive production systems. Andhra Pradesh occupies

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a prominent position in Indian shrimp aquaculture. Coastal districts such as Nellore, Prakasam, Bapatla, Krishna, West Godavari, East Godavari and Srikakulam support extensive commercial shrimp farming. The availability of brackishwater resources, hatcheries, commercial feeds, technical services and processing facilities has encouraged the expansion of intensive production. However, shrimp productivity depends not only on stocking density or feed inputs but also on the efficiency of day-to-day farm management. Poor pond preparation, inadequate aeration, inappropriate feeding and irregular water quality monitoring can reduce growth, increase mortality and raise production costs. Therefore, scientific management practices are essential for maintaining a healthy culture environment and achieving consistent production.

2. STUDY AREA AND CASE STUDY BACKGROUND

The present case study uses published commercial shrimp farming observations from Dugarajupatnam, SPSR Nellore district, Andhra Pradesh. Ravuru and Mude (2026) evaluated four commercial *L. vannamei* culture ponds, each measuring approximately 0.4 ha, during the rainy season. The culture period extended over 105 days, with post-larvae stocked at 50 PL/m². The study included observations on pond preparation, seed stocking, water quality management, aeration, feeding, growth, survival and economic performance. The reported final average body weight ranged from 15.92 to 16.74 g, survival from 88 to 95% and FCR from 1.25 to 1.36. Production ranged from 2,348.45 to 3,013 kg per pond. These observations provide a practical reference for understanding the influence of farm management on shrimp productivity under coastal Andhra Pradesh conditions. The published results represent four commercial ponds and should not be interpreted as universal production averages for the entire region.

3. POND PREPARATION AND ITS INFLUENCE ON PRODUCTIVITY

Pond preparation establishes the initial environmental conditions required for successful shrimp culture. Inadequate preparation may result in the persistence of organic waste, undesirable organisms and potentially harmful microorganisms from previous culture cycles. After harvesting, ponds should be completely drained and dried. Accumulated sludge, especially black anaerobic sediment, should be removed from areas where organic matter has accumulated. Pond bottoms should be properly levelled to facilitate effective water movement and sludge removal. Soil and water testing should guide the application of agricultural lime and other amendments. Reservoirs and inlet channels should also be cleaned and prepared before filling. Water should be filtered through suitable screens to prevent the entry of unwanted fish, crabs and other organisms. Proper pond preparation improves bottom conditions, reduces the initial disease risk and provides a more stable environment for post-larvae.

4. QUALITY SEED SELECTION AND STOCKING DENSITY

Seed quality is one of the most important factors influencing shrimp productivity. Healthy and uniform post-larvae generally show better acclimatization, growth and survival. Farmers should obtain seed from authorised hatcheries and maintain appropriate health and procurement records. Seed assessment should include swimming activity, size uniformity, physical condition and relevant pathogen screening. Gradual acclimatization to pond temperature, salinity and pH is necessary before stocking to minimise physiological stress. Stocking density should be selected according to pond carrying capacity, aeration facilities, water exchange arrangements and the farmer's management capacity. Higher stocking density may increase total production, but it also raises oxygen demand, feed requirements and organic loading. In the Dugarajupatnam case study, stocking was maintained at 50 PL/m², demonstrating the importance of matching stocking levels with available farm infrastructure and management practices.

5. WATER QUALITY MANAGEMENT AND SHRIMP GROWTH

Water quality directly influences shrimp metabolism, feeding behaviour, moulting, immunity and survival. In intensive culture systems, large quantities of feed and faecal matter enter the pond environment, increasing the possibility of ammonia accumulation, nitrite formation and oxygen depletion. Regular monitoring of dissolved

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oxygen, temperature, pH, salinity, alkalinity, ammonia and nitrite is essential. Dissolved oxygen should receive particular attention during early morning hours, while salinity and pH should be monitored carefully during seasonal rainfall. Sudden changes in water quality may cause physiological stress, reduce feeding activity and increase susceptibility to disease. Farmers should therefore maintain a stable pond environment through controlled water exchange, appropriate aeration, reservoir management and regular sludge removal. Effective water quality management supports better feed utilisation and growth while reducing the risk of sudden mortality. It is particularly important in coastal Andhra Pradesh, where monsoon rainfall and seasonal temperature fluctuations can influence pond conditions.

6. AERATION MANAGEMENT AND OXYGEN AVAILABILITY

Aeration is essential for maintaining dissolved oxygen in intensive shrimp culture ponds. As shrimp biomass and feed inputs increase, oxygen consumption rises due to shrimp respiration and microbial decomposition of organic matter. Paddle-wheel aerators are commonly used to maintain oxygen availability and promote water circulation. Their positioning should support effective circulation and encourage the movement of organic particles towards suitable collection areas. Aeration schedules should be adjusted according to shrimp biomass, feeding activity, temperature and weather conditions. During cloudy weather, heavy rainfall and periods of high temperature, oxygen levels may decline rapidly. Farmers should increase monitoring during these conditions and maintain backup generators or emergency aeration systems. Adequate aeration supports feeding, growth and survival and helps prevent stress-related production losses.

7. FEED MANAGEMENT AND FEED CONVERSION EFFICIENCY

Feed management is one of the major determinants of shrimp farm profitability. Feed generally represents a substantial proportion of total operational expenditure in intensive shrimp culture. Therefore, accurate feed estimation and regular adjustment are necessary to minimise wastage and improve FCR. Commercial pelleted feeds should be selected according to shrimp size, nutritional requirements and culture stage. Feed quantity should be adjusted based on estimated biomass, average body weight, feeding response and environmental conditions. Feeding trays help assess consumption and identify overfeeding or reduced appetite. In the Dugarajupatnam study, commercial feeds containing approximately 35–42% crude protein were supplied four times daily. Regular monitoring of feeding response and shrimp growth helped support feed management throughout the culture period. Overfeeding increases organic matter accumulation and can deteriorate pond water quality. Underfeeding, on the other hand, may restrict growth and increase size variation. A balanced feeding programme therefore improves feed utilisation, supports uniform growth and reduces unnecessary production expenditure.

8. HEALTH MONITORING AND DISEASE PREVENTION

Disease outbreaks are a major constraint to intensive shrimp production. Viral diseases such as white spot syndrome virus (WSSV), bacterial infections associated with *Vibrio* species and EHP-associated infections can affect growth, survival and harvest performance. Regular health monitoring should include observation of feeding activity, swimming behaviour, body colour, gut condition and mortality. Periodic sampling helps identify growth variations and possible health problems. Laboratory diagnosis should be undertaken when abnormal behaviour, reduced feeding or unusual mortality is observed. Preventive management should include the use of tested seed, screened water, equipment disinfection, controlled farm access, crab fencing and proper disposal of dead shrimp. Probiotics and other permitted microbial management products may be used as part of an integrated programme, but they should not replace good water quality management, biosecurity or laboratory diagnosis.

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9. GROWTH MONITORING AND HARVEST MANAGEMENT

Periodic sampling is necessary to assess average body weight, growth rate, size uniformity and standing biomass. Cast nets are commonly used for sampling, with observations generally conducted at regular intervals throughout the culture period. Growth records help farmers adjust feeding quantities, estimate harvest biomass and plan the appropriate harvesting time. Harvest timing should consider shrimp size, market demand, water quality, health status and economic conditions. Partial harvesting may be considered when shrimp reach marketable size and pond biomass becomes difficult to manage. However, harvesting operations should be conducted hygienically to minimise contamination and preserve product quality.

10. PRODUCTION PERFORMANCE OF THE CASE STUDY

The reported performance of the four commercial ponds at Dugarajupatnam is summarised below.

Production parameter	Reported observation
Number of ponds	4
Pond area	0.4 ha each
Stocking density	50 PL/m²
Culture duration	105 days
Final average body weight	15.92–16.74 g
Survival rate	88–95%
Production per pond	2,348.45–3,013 kg
Feed conversion ratio	1.25–1.36

The results indicate satisfactory survival and feed utilisation under the reported management conditions. Pond B2 recorded the lowest FCR, whereas Pond B4 achieved the highest production and net profit (Ravuru & Mude, 2026). Differences among ponds may be associated with variations in environmental conditions, feeding response, aeration efficiency and other management factors. However, the study does not isolate the individual contribution of each management practice. Therefore, the results demonstrate the performance achieved under the combined management system rather than proving a separate causal effect for each practice.

11. ECONOMIC IMPORTANCE OF SCIENTIFIC FARM MANAGEMENT

The profitability of shrimp farming depends on the relationship between production output, market price and total operational expenditure. Major cost components include seed, feed, electricity, labour, water management, pond preparation, health monitoring and harvesting. Efficient feed management can reduce production costs by improving FCR. Adequate aeration and water quality monitoring can minimise mortality and protect the standing biomass. Similarly, good seed selection and preventive health management reduce the risk of crop failure. Economic evaluation should include total production, survival, harvest size, FCR, cost of production, gross revenue and net profit. Farmers should maintain pond-wise records to identify management practices that provide the best economic returns. High production alone does not necessarily indicate high profitability if it is achieved through excessive feed, energy or other input costs.

12. MAJOR CONSTRAINTS AFFECTING SHRIMP PRODUCTIVITY

Despite improvements in farming technology, shrimp producers in Andhra Pradesh face several challenges. Seasonal rainfall can cause sudden changes in salinity and pH, while high temperatures increase metabolic activity and oxygen demand. Disease outbreaks, seed quality variations and inadequate diagnostic facilities may also affect production. Rising feed and electricity costs increase the financial burden on farmers. Power interruptions can become particularly dangerous in high-density ponds with substantial biomass. In addition, poor sludge management and

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excessive water exchange may create environmental problems and increase disease risks. Limited technical knowledge and inadequate record keeping can prevent farmers from identifying the actual causes of poor performance. Strengthening extension services, diagnostic facilities and farmer training is therefore essential for improving farm-level productivity.

13. RECOMMENDATIONS FOR IMPROVING SHRIMP PRODUCTIVITY

Scientific farm management should focus on maintaining a balance between stocking density, feeding intensity, aeration capacity and pond carrying capacity. Farmers should use healthy seed from authorised hatcheries, conduct proper acclimatization and maintain regular growth records. Water quality should be monitored consistently, particularly during early morning hours and periods of changing weather. Feeding should be adjusted according to biomass and feeding response, while adequate aeration and sludge removal should be maintained throughout the culture cycle. Biosecurity measures, including screened water, controlled farm access, equipment disinfection and appropriate effluent treatment, should be implemented consistently. Digital monitoring systems and automated feeders can further improve management efficiency. Farmer groups and aquaculture clusters can support shared diagnostic facilities, technical training and coordinated disease surveillance.

14. CONCLUSION

Farm management practices have a substantial influence on shrimp growth, survival, feed efficiency and overall profitability. The Dugarajupatnam case study from coastal Andhra Pradesh reported survival of 88–95%, final average body weight of 15.92–16.74 g and FCR of 1.25–1.36 over a 105-day culture period. These observations highlight the importance of coordinated pond preparation, quality seed selection, appropriate stocking density, water quality monitoring, aeration, feeding and health management. However, sustainable productivity cannot be achieved through increased stocking or feed inputs alone. It requires a balanced production system supported by biosecurity, environmental management and accurate farm records. Adoption of scientific and locally adaptable management practices will help improve shrimp farm productivity, reduce production risks and strengthen the long-term sustainability of shrimp aquaculture in Andhra Pradesh.

REFERENCES

1. Coastal Aquaculture Authority (CAA). (2025). *Compendium of Act, Rules, Guidelines and Other Notifications*. Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, Chennai.
2. Network of Aquaculture Centres in Asia-Pacific (NACA), Marine Products Export Development Authority (MPEDA), Aquatic Animal Health Research Institute (AAHRI), and collaborating institutions. (2005). *Shrimp Health Management Extension Manual*. NACA, Bangkok, Thailand.
3. Ravuru, D. B., and Mude, J. N. (2026). Culture of whiteleg shrimp under high salinity during the rainy season at Dugarajupatnam, Andhra Pradesh, India. *International Journal of Aquaculture*, 16(5), 346–353. https://doi.org/10.5376/ija.2026.16.0026
4. Coastal Aquaculture Authority (CAA). (n.d.). *Guidelines for regulating hatcheries and farms for seed production and culture of Specific Pathogen Free Litopenaeus vannamei*. Government of India. https://www.caa.gov.in/