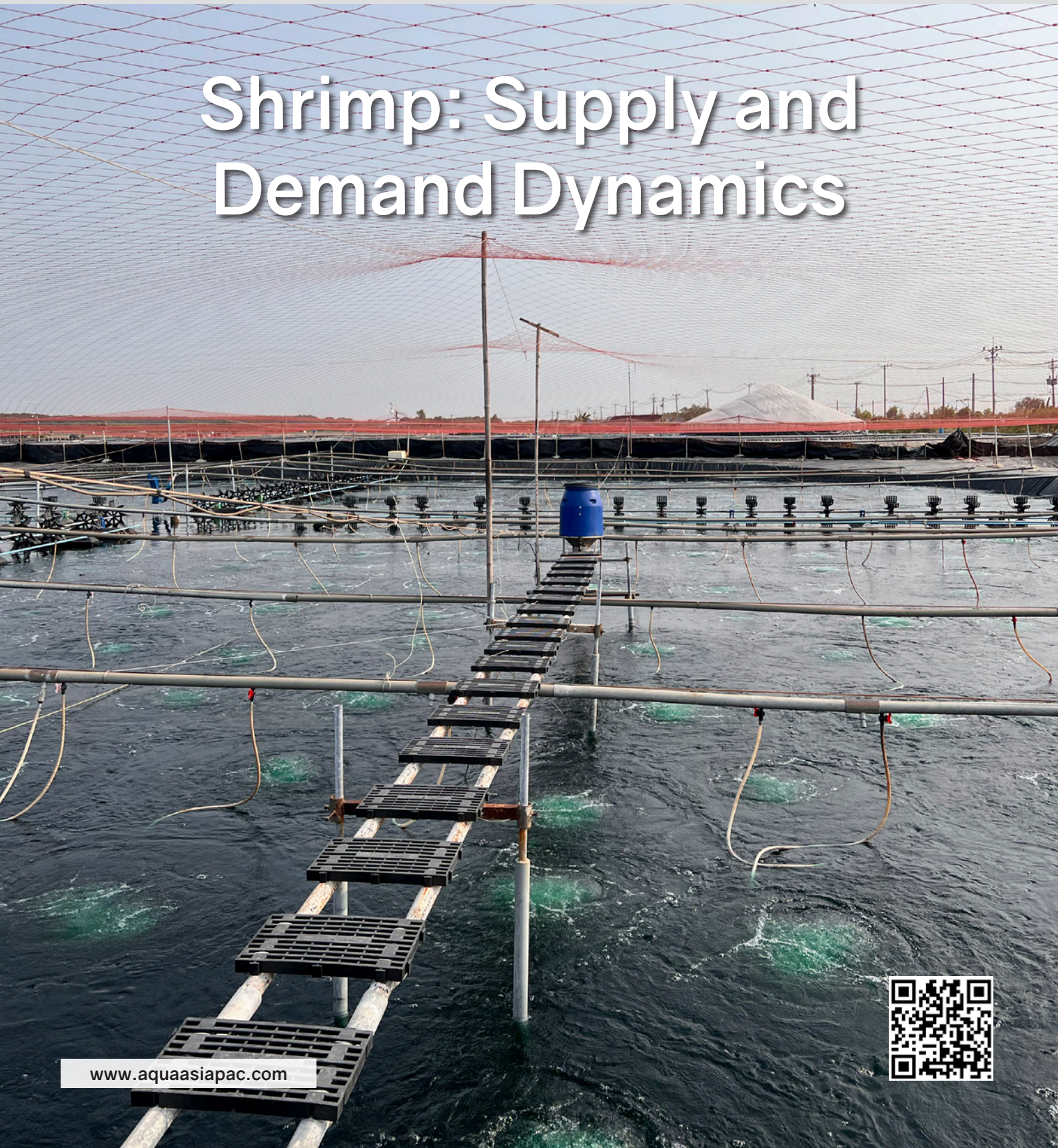
AQUA CULTURE
Asia Pacific

SEPTEMBER/OCTOBER 2025
Volume 21 Number 5

MDDI (P) 003/10/2025 PPS1699/08/2013(022974)
ISBN 1793 -056

Shrimp: Supply and Demand Dynamics



www.aquaasiapac.com

SHENG LONG

Quality Sheng Long
We Use Life Long

Sheng Long, your professional and trusted aquaculture partner. We are committed to supporting our valuable customers' success by providing innovation programs with high-performance feeds, healthy shrimp larvae, aquatic probiotics & healthy products and new farming models & technology.

SHENG LONG BIO-TECH INTERNATIONAL CO., LTD

Add: Block A5, Duc Hoa 1 Industrial Park,Duc Hoa District, Long An Province
Tel: (84-272) 3761358 - 3779741 **Fax:** (84-272) 3761359
Email: thanglong@shenglongbt.com **Website:** www.shenglongbt.com

SHENG LONG BIO-TECH (INDIA) PVT LTD

Add: Plot No. A-11/1, Part-A, SIPCOT Industrial Park, Thervoykandigai Village, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu 601202, India.
Tel: 91-44-6790 1001 **Fax:** 91-44-6790 1017
Email: info@shenglongindia.com **Website:** www.shenglongindia.com

HACCP CERTIFIED

GLOBALG.A.P.

Best Aquaculture Practices

CERTIFIED ISO 22000:2018 COMPANY

A culture pond in Can Gio, Vietnam. P13

Editor/Publisher
Zuridah Merican, PhD
Tel: +6012 205 3130
Email: zuridah@aquaasiapac.com

Editorial Coordination
Corporate Media Services P L
Email: irene@corpmediapl.com
Web: www.corpmediapl.com

Design and Layout
Words Worth Media Management Pte Ltd
Email: sales@wordsworth.com.sg
Web: www.wordsworth.com.sg

AQUA Culture Asia Pacific is published bimonthly by

Aqua Research

Aqua Research Pte Ltd
3 Pickering Street,
#02-36 Nankin Row,
Singapore 048660
Web: www.aquaasiapac.com
Tel: +65 9151 2420

Printed in Singapore by
Times Printers Private Limited
18 Tuas Avenue 5
Singapore 639342

Subscriptions
Subscribe via the website at www.aquaasiapac.com
Subscriptions can begin at any time.
Subscriptions rate/year (6 issues): SGD 70,
Email: subscribe@aquaasiapac.com
Tel: +65 9151 2420
Fax: +65 6223 7314

Volume 21, Number 5 September/October 2025 MDDI (P) 003/10/2025

Zuridah Merican

Ecuadorian vs Asian model

The Aquaculture Roundtable Series (TARS 2025) on Shrimp Aquaculture: Precision · Productivity · Profitability ended on August 21 in Chiang Mai, Thailand. It brought together 284 active participants from the shrimp value chain. For the first time, Ecuador's shrimp industry was well represented in both the presentations and the panel discussions. This brought a *Eureka* or 'Aha' moment to many. So one may ask what the major differences between the two models are. Firstly, a caveat that Ecuador's shrimp production is from one country while Asia comprises many producing countries.

Both regions may culture the same species *Peneaus vannamei* but that is where the similarity ends. How did we get here? Ecuador faced a challenging period during the outbreak of Taura syndrome in the 1990s but that allowed the industry later to build on the genetics of the survivors which were 'all pathogen exposed' and more robust. Today they are selecting for growth. Asia's origin was different as it emerged from the decimation of the *Penaeus monodon* phase and fortuitously brought in specific pathogen free (SPF) broodstock which was then immediately selected for growth. Today, Asia is selecting for robustness. In genetic selection, it is classic trade-off - growth and disease resistance are opposite traits. So, Asia must learn to balance this.

Geographically, Ecuador enjoys milder temperatures of 23-27°C, farming all year round while Asia (dependent on country) can range between 23-33°C with some countries having to shut down during the colder months. Ecuador's production is from 200,000ha concentrated within an imaginary circle around Guayaquil with a diameter of 400km. This also represents the maximum distance from genetics to export in terms of the value chain. Compare this with the Indonesian archipelago, this may be the distance from the farm to a processing plant, but the shrimp may have to travel by road and ferry taking a longer time.

Nearly all the shrimp cultured in Ecuador come from 3 phase farming with the use of nurseries. This shortens the grow-out cycle in the ponds and allows for up to 5 cycles per year and consequently better cash flow. Asia is embarking on nurseries, but implementation has been slow. Ecuador's densities may have increased from below 10 to above 20PL/m^2 over the past 7 years but it is limited by electricity supply, necessary for aeration and hence improved carrying capacity. Asia has a wide range of stocking densities from 60PL/m^2 to over 200PL/m^2 with a median of approximately 100PL/m^2.

Perhaps the most glaring difference of all is the organisation of the respective industries. In Ecuador today, ten largely integrated companies control more than 85% of the shrimp produced and is hence highly concentrated. In Asia, more than 70% of the farmers are small and both the farming sector and the value chain are highly fragmented. There are pros and cons in Asia. In general, Asia may have a lower cost of production per kg, but farmers have no loyalty to processing plants or vice-versa which can be a double-edged sword when the demand-supply equilibrium changes. This also has a profound effect on access to funding. The large Ecuador companies with bigger balance sheets find it easier to obtain bank loans while the smaller farmers in Asia depend on feed distributors to finance their cash flow. When the risk of failure due to disease increases, like in Vietnam, feed distributors tighten credit crimping the business cycle. When farmgate prices dip close to cost of production, farmers in India may skip cycles while waiting for prices to improve. Ecuador today is seeing increased integration or collaboration downstream between farmers and processors to buffer the value chain.

Innovation is pushing Ecuador forward with investment in technology such as acoustic feeding. One could argue that they have larger ponds sizes and hence the need is higher while Asia has smaller ponds and cheaper labour. The cost of such technology is also expensive for small farmers in Asia and hence adoption has been slow.

Ecuador has proximity to ingredients such as Peruvian fishmeal and the major shrimp market of the US, but it is a dollarised economy, making any value-added shrimp more expensive to produce compared to India, Vietnam or Indonesia. Asia on the other hand has proximity to the China market.

Granted all shrimp producing countries tend to see each other as competitors but TARS2025 concluded there is still the opportunity for Ecuador and Asia to learn from each other. There is also product segmentation where each country leverages on its own strengths and augmenting its weaknesses.

If you have any comments, please email: zuridah@aquaasiapac.com

THE SHRIMP FEED INGREDIENT FOR BETTER HEALTH

Krill meal contains a highly beneficial package of nutrients, attractants and proteins to improve shrimp immune defense and overall health.

QRILL™ AQUA
Aker QRILL Company

Visit **QRILLAQUA.COM**

TARS 2025 focused on metrics for precision, productivity and profitability in shrimp aquaculture

The presentation on the final report for the group - Processing, Marketing & Branding (PMB) at the Interactive Breakout Roundtable session was led by Cynthia Darmawan, Delta Marine Indonesia (group leader, left) and table leaders, from second left, Hervé Lucien-Brun, Jefo, Canada; Maria Filipa Castanheira, ASC, Singapore; Santhana Krishnan, Marine Technologies, India; Wan Nadhri Wan Fauzi, Malaysia and Ding Changwei, Hong Kong Fisheries Holdings Limited, China.

On August 21, the two-day 14th Aquaculture Roundtable Series (TARS) successfully concluded in Chiang Mai, Thailand. It brought together 284 participants, 93 of them from Thailand. This was the largest edition to date, with participants coming from 22 countries.

This seventh TARS on shrimp aquaculture centred around precision farming for higher productivity and profitability. It provided a platform to examine Asia's shrimp industry at a critical turning point, marked by low prices, rising costs, frequent disease outbreaks, and falling productivity.

"It is imperative for farms and businesses to adopt smarter and more precise farming methods to remain competitive. At the same time, we are seeing how data tools, AI and automation are transforming how we manage water quality, disease prevention and feed optimisation," said Dr. Thitiporn Laoprasert, Deputy Director General, Department of Fisheries (DOF) during her opening address. "Such innovations not only improve productivity but also ensure sustainability and long-term profitability."

Presenting to Dr Thitiporn Laoprasert, Deputy Director-General, Department of Fisheries, Thailand (right), a painting by artist, Dr Kim Tran, nutritionist at Grobest Vietnam (left).

Adisseo's Martha Aulia Mamora, Aqua Sales Manager, Indonesia (centre) and Vilas Autade, Regional Business Manager, Aqua, South Asia (third left) with the team from Avanti Feeds, India.

The program featured 10 sessions with 52 speakers, panellists and industry players navigating the multiple facets of Asia's industry. TARS 2025 was organised by Aqua Culture Asia Pacific and Corporate Media Services, Singapore.

This year's industry sponsors included dsm-firmenich, U.S. Grains Council, Jefo Nutrition, Auranta, Adisseo, ADM, SyAqua, Alltech, BioMar, Veramaris, Lucta, and Motiv.

TARS 2025 started with an assessment of the State of Global Shrimp Supply and Demand, and explored how Asia can better respond to shifting market needs (see pages 20-27). Participants learnt how Ecuador has a competitive shrimp industry by leveraging its professionalism, promoting investments and brand development. This showed that sustainable growth is possible through scale, innovation, and integration.

Ecuador's success is not directly comparable since distinct geography, politics, and business environments shape its unique model. The lesson from Asian producers on intensification was that Ecuador should not push the limits of carrying capacity. The message was not to see Ecuador merely as a competitor, but to learn from its fundamentals in genetics, hatchery and nursery management and production planning.

Asia's fragmented system, with 70% of production from small farms, limits cooperation. Meanwhile, Ecuador's integrated model encourages collaboration between farmers and processors. At Hard Talk, business leaders along the value chain from genetics and hatcheries to farms and feeds in Asia and Latin America, and processing and marketing, discussed dysfunctions in Asian shrimp aquaculture. Members agreed that small farmers are resilient in the face of challenges and emphasised that greater collaboration, with added value tailored to target markets, is needed rather than full integration.

For the long-term sustainability of the industry, it is the second-generation farmers who are stepping up, forming strong peer networks to support one another and driving the transition from founder-led enterprises to modern, science-driven aquaculture businesses.

The "Pondside Chat" brought together second-generation shrimp industry leaders—Rizky Darmawan from Indonesia, Chodpipat Limlertwatee from Thailand, Hai Nguyen from Vietnam, and Mayank Sharma from India—for a dynamic dialogue on their farming practices.

The session on precision farming and production planning highlighted that disease-free broodstock and *Vibrio* control are non-negotiable. Genetics drives ~50% of performance, but hatchery management and the delivery of robust post larvae ultimately determine field success. Science-based SPF breeding programs remain the standard in Asia, despite Ecuador's APE advances. Nursery systems enhance survival, inventory control, and profitability, but transfer logistics are critical. In Vietnam, Integrated systems are proving viable, with intensive, well-managed models demonstrating strong results.

In precision nutrition, the use of functional additives for gut health and immunity, as well as for health interventions, is effective. Awareness of the negative effects of mycotoxins and endotoxins in shrimp production is critical for feed efficiency. In terms of feed sustainability, fishmeal replacement with single-cell proteins and non-animal-based additives supports independence from marine ingredients in feeds.

Disease mitigation and control of transparent post larvae disease (TPD) in Vietnam require modular biosecurity to reduce spread and functional additives. Lessons on *Vibrio* control have also led to the use of functional additives to support gut health, microbiome, and immune modulation. While proven in salmon, adoption lags in Asia due to cost sensitivity. Early disease diagnostics, multi-pathogen management and lower stocking densities remain key to reducing disease risk.

The future-proofing session emphasised how retail downstream increasingly influences shrimp farming practices; focusing on provenance and health benefits. In securing post-harvest product quality, time and temperature control and an optimised supply chain, from producers to exporters, are critical.

For a sustainable feed strategy, priorities include lowering crude protein levels, shifting to byproducts/plant proteins, using novel inputs (insect and fermented meals) and pursuing certification.

There is an opportunity for growth with mathematical modelling to assess impacts of key factors, identify solutions, and formulate feeds to reduce marine ingredients and more sustainable protein/energy levels.

TARS 2025 also recognised the role of startups in advancing pond management, disease prevention, and climate adaptation—critical for farmers facing repeated crop failures.

At TARS 2025, Shrimp Aquaculture, the Interactive Roundtable Breakout session focused on "Future proofing: Precision shrimp aquaculture and the new deal".

Takeaways

The Interactive Roundtable Breakout session focused on "Future proofing: Precision shrimp aquaculture and the new deal". Participants proposed key performance indicators (KPIs) and metrics for precision shrimp farming, reinforcing TARS' hallmark of inclusive and solution-driven dialogue. Some takeaways are listed below.

Bespoke genetics and improved hatchery practices: A preferred combination of traits should be aligned with farming models (density, aeration level, salinity, etc). Emphasis is placed on traits for growth, robustness, and disease tolerance, with a KPI of over 70% survival after a challenge with various diseases. The metrics for female broodstock efficiency is 4 months and gravid ablation rates of 25-30%/day and gravid non-ablation rates of 15-20%/day.

Quality of post-larvae and juveniles: Recommended tests include those for antibiotics before stocking, PCR screening for pathogens at PL 5–7, size variation, and stricter stress tests leading to survival rates of 50–60%, rather than accepting an overall 90%.

Biosecurity and *Vibrio* control: These are vital for shrimp health. Broodstock must be healthy and pathogen-free, with regular audits and diagnostics. Bacteria load in water should be controlled at 10^3 CFU/mL. Probiotics and stringent testing protocols are recommended for *Vibrio* control. Fast-track disease monitoring and data collection on farming practices support future analysis and adaptation.

Stocking density and carrying capacity management: Carrying capacity depends on infrastructure and pond aging. Maintaining biomass at 80% of capacity was suggested. Key metrics include maintaining dissolved oxygen levels above 5.5 ppm and proper aeration.

Waste control and management strategies: Critical for sustainable shrimp farming are probiotics and regular monitoring of water quality parameters. The target for feed conversion ratio (FCR) is less than 1.2, achievable through the adoption of advanced feed management practices such as acoustic feeding.

Monitoring growth metrics: Critical KPIs are average daily growth (ADG) at between 0.23-0.25g from PL12, an FCR of 1.2-1.5 and a survival rate (SR) of over 80% is expected at 100 days of culture.

Optimal size for profit margins: The best size is based on market conditions, management styles and profitability. In Thailand, optimal sizes include black tiger shrimp at size 8/kg and white leg shrimp at size 28/kg. Flexibility is advised based on circumstances.

Precision nutrition with digestible nutrients: It is not only nutrient digestibility and ratio of digestible protein: digestible energy but also to define digestibility according to age. Metrics are apparent digestibility coefficients, digestible protein, amino acids, energy, lipid and carbohydrates. Standardised digestibility metrics and measurement *(in vitro* assessment) are needed.

Shrimp feed formulation: With high-protein/high-cost versus low-protein/low-cost feeds, cost-effectiveness should be measured not only by cost of feeds but also by growth performance metrics such as FCR. Others are economic indicators (feed cost per kg gain) and environmental factors (nitrogen retention/excretion), survival rate and water quality.

Nutrient balance and feed quality: Digestible ingredients and alternative proteins support shrimp nutrition, while enzymes, acidifiers, and palatability enhancers improve digestion and absorption. Tailoring feed by life stage boosts growth, minimises environmental impact, and improves water quality.

Functional benefits: Functional feeds are formulated not only for growth but also to enhance immunity, stress resistance, gut health, and overall shrimp performance. Palatability remains essential. The non-specific immune system of shrimp can be improved.

Feed intake and palatability: The metrics include apparent feed intake, daily feed intake, and specific feeding rate rate. The best practice is to combine palatability, stability and digestibility.

Feed management: Real-time systems optimise feeding and monitor conditions. Acoustic monitors track shrimp response to reduce waste. Combining automated and manual feeding improves consistency and water quality.

Environmental sustainability: Balanced feed formulations improve feed utilisation and can reduce waste output. Overfeeding and excess nutrient discharge may require additional water treatments, which increase production costs and impact ecosystems.

Production planning for improved productivity: Farmers often produce and harvest simultaneously, creating volatility in supply and demand. Knowledge sharing is needed to improve sourcing of quality post larvae, feed, and best aquaculture practices. Greater transparency, traceability, value chain synchronisation, and regular (annual/quarterly) planning are essential.

Harvesting techniques & shrimp quality: Special pre-harvest feed improves shrimp quality, while rapid chilling methods such as ice killing reduces stress and maintains freshness. Strict control of post harvest time and temperature is essential for quality maintenance.

Measuring incoming shrimp quality: Quality control must address varied buyer standards and logistics. Using standard checklists, lab testing, feedback, and tracking key attributes—such as hepatopancreas, appearance, size, taste, and moisture—is vital. Efficient farm access and transport prevent delays that reduce shrimp quality.

Market-specific needs: This is to develop premium products with consistent taste and quality for the US; ensure an integrated supply chain for quality assurance and compliance for the EU; and offer convenient, Ready to Cook products for China.

Certification: Few feedmills are ASC-certified due to high costs and low farmer awareness. ASC should highlight certification benefits, connect certified farms and feedmills, and promote its tools for greenhouse gas measurement.

TARS 2026 will focus on Aquafeeds and take place from August 19 to 20. Updated information will be available starting March 2026 at www.tarsaquaculture.com.

START STRONG. STAY STRONG.

Fast growing larvae require a top-quality feed, advanced nutrition, and proven effective additives. LARVIVA is specially formulated to support the demanding nutritional needs of fast-growing larvae and post larvae.

Our sophisticated production technology allows for optimal nutrient availability and the inclusion of a unique probiotic ensures their well-being. The result: robust post larvae in shorter production cycles.

LARVIVA fed larvae start strong and stay strong.

www.larviva.com

LARVIVA®
START STRONG. **STAY STRONG.**

BioMar

Probiotic wafers in aquaculture: Innovative application in shrimp farming

A technical examination of wafer-based probiotic delivery systems and their impact on commercial aquaculture operations

By Ermel Viteri Santana, Marcos Santos, Jan Koesling and Andrew Shinn

Modern aquaculture faces complex challenges which include production efficiency, animal health management, environmental sustainability, and biosecurity concerns. Traditional powdered probiotics, while offering proven benefits, have practical limitations. They often present difficulties in preparation and application consistency, with dosage constraints that limit their effectiveness in commercial settings.

Recent developments in probiotic delivery systems include the introduction of wafer-based formulations that address many of these operational challenges, widening the applicable dosage ranges while potentially improving biological outcomes. Leading this innovation is INVE's Sanolife™ PRO-TAB wafers, a unique departure from conventional approaches that offers producers an entirely new paradigm for maintaining healthy production systems while simplifying daily management protocols.

Technical innovation in probiotic delivery

Physical characteristics and design

The latest generation of probiotic wafers represents a fundamental shift in how beneficial bacteria are delivered to aquaculture species. As traditional powder formulations, these wafers contain multiple carefully selected bacterial strains, typically including *Bacillus subtilis*, *B. pumilus*, and *B. licheniformis*, encapsulated within a water-stable matrix designed for optimal performance in aquatic environments.

The wafers are engineered as thin discs, typically 1-2 mm thick, manufactured in two standard sizes: 2 mm and 5 mm diameter to accommodate different production stages and species sizes. A critical design feature is that, unlike shrimp feed pellets, the wafers are intentionally slow-sinking.

Bacterial composition and concentration

The technical specifications demonstrate sophisticated design approaches compared to probiotics top-coated on feed pellets. Each gram contains much higher concentrations of viable bacteria, typically exceeding 2 billion colony-forming units per gram (CFU/g), ensuring adequate bacterial populations for effective colonisation after ingestion.

Attractant coating and feeding stimulation

The wafers incorporate a specialised attractant coating that serves a dual purpose - enhancing palatability to stimulate active consumption, even in challenged shrimp; and ensuring optimal delivery of functional bacteria to the digestive system.

Hydrodynamic properties

The wafer format addresses fundamental limitations of traditional probiotic applications through its unique delivery mechanism. Slow-sinking wafers create an attractive, stimulating movement pattern that naturally draws shrimp's attention and triggers feeding responses.

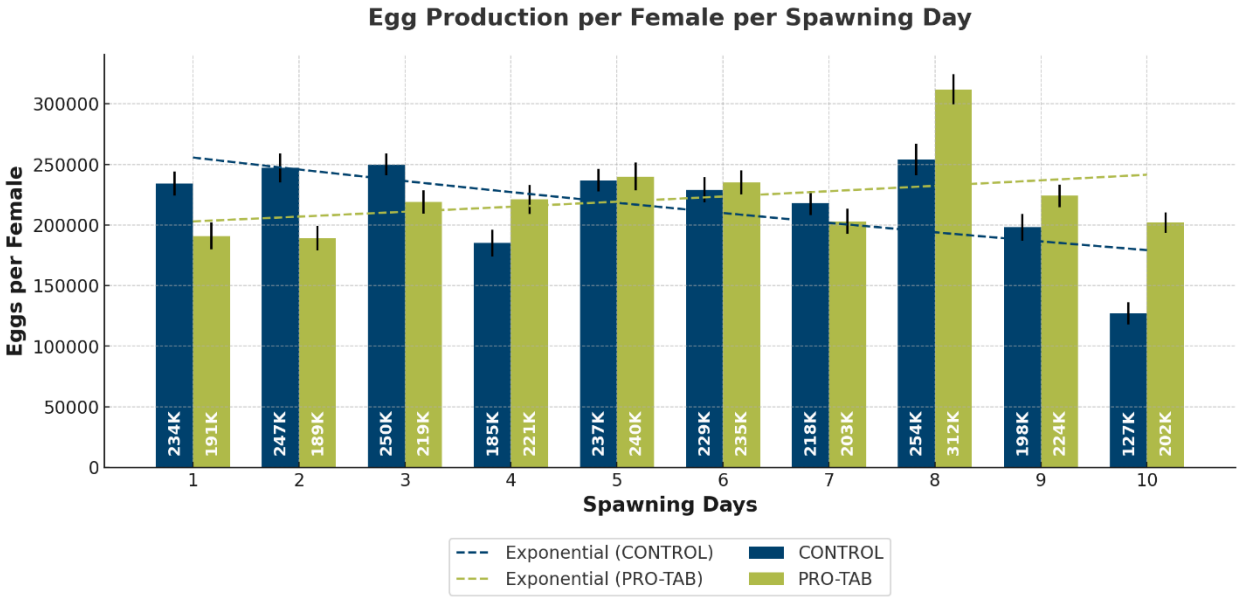


Figure 1. Egg production per spawning day in field trials conducted in Ecuador with *Penaeus vannamei* broodstock administered 0.4g of probiotic wafers per shrimp/day during a 30-day evaluation period.

Extended water stability testing reveals that wafers maintain structural integrity for multiple hours in aquatic environments. Even after three hours of submersion and exposure to gentle water currents, wafers retain their shape and functional properties. This controlled release ensures shrimp actively consume the wafers throughout the water column, maximising opportunities for consumption while maintaining structural integrity.

This targeted delivery approach enables "pulse applications" - periodic doses of high-concentration probiotics that rapidly influence gut microbiome composition. The concentrated nature appears more effective than continuous low-level exposure, as it can overwhelm pathogenic populations and establish beneficial bacterial communities more quickly.

Research results from commercial trials

Broodstock performance studies

Comprehensive field trials conducted in Ecuador have provided valuable quantitative data on the effectiveness of probiotic wafers in commercial aquaculture settings. In *Penaeus vannamei* broodstock facilities, researchers evaluated the impact of daily administration of 0.4g of probiotic wafers per shrimp during a 30-day evaluation period, during which multiple reproductive performance parameters were measured, using non-ablated females (Figure 1).

The results demonstrated statistically significant improvements across several key metrics. Survival rates of non-ablated females showed marked improvement with extremely high statistical confidence (p-value of 0.0000028), while daily copulation events nearly doubled from 5% to 9%. These reproductive improvements translated into measurable production gains, with egg production per female increasing by 6% and maintaining higher levels across consecutive spawning, while control groups showed declining egg production over time.

Total nauplii production demonstrated dramatic improvements, jumping by 37% compared to control groups. Perhaps most significantly from a biosecurity perspective, the use of probiotic wafers resulted in lower pathogenic bacterial loads in nauplii, providing healthier offspring for subsequent production stages and reduced *Vibrio* concentrations throughout the hatchery production cycle (Figure 2).

Comparative performance data

Field trials in Thailand using half-hectare ponds (22ppt salinity) demonstrated significant production improvements. Control ponds required 102 days culture period while Sanolife™ PRO-TAB treated ponds achieved harvest in 98 days with 14% higher yields.

Scientific mechanisms and mode of action

Bacterial colonisation and competition

The effectiveness of probiotic wafers stems from multiple biological mechanisms that work synergistically to improve both animal health and production outcomes. The *Bacillus* strains employed are spore-forming bacteria that possess the ability to survive environmental stresses and establish stable populations within the gut environment.

A very high concentration of viable bacteria delivered through each wafer enables rapid colonisation of the digestive tract through a "probiotic pulse " effect. This concentrated delivery approach appears significantly more effective than continuous low-level exposure because it can quickly establish beneficial bacterial populations that maintain themselves through normal reproduction and colonisation processes.

Laboratory studies demonstrated clear zones of inhibition around *Bacillus* cultures when challenged with various *Vibrio* isolates, with *B. pumilus* showing particularly strong antagonistic activity. This competitive exclusion effect helps maintain balanced intestinal microbiomes that favour beneficial bacteria over potentially harmful species.

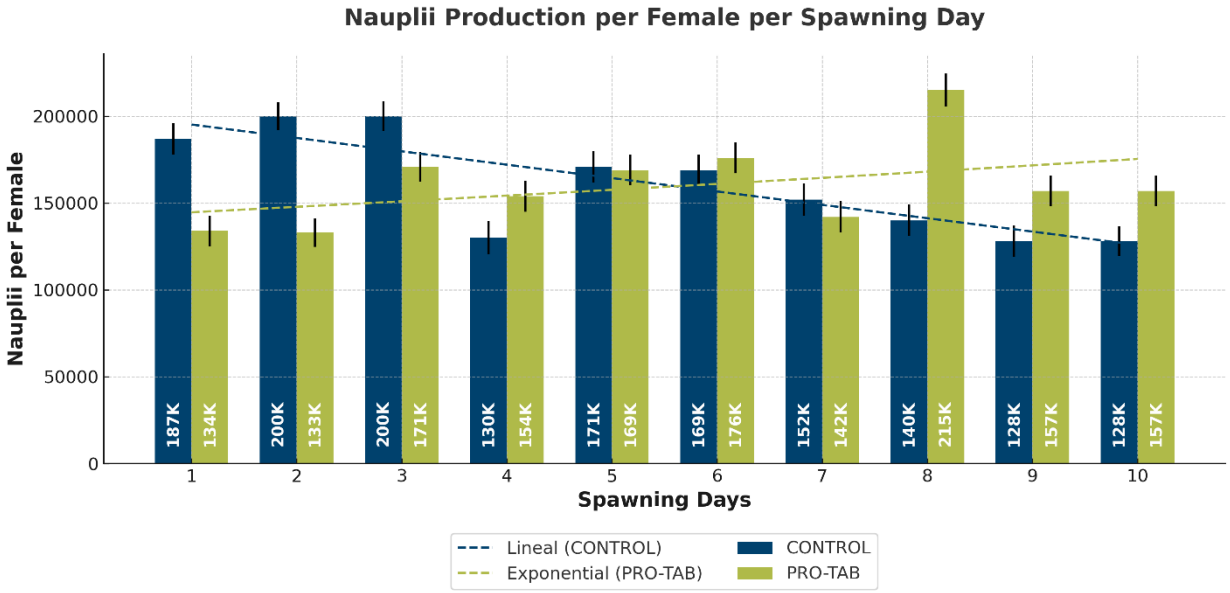


Figure 2. Nauplii production per spawning day in field trials conducted in Ecuador with *Penaeus vannamei* broodstock administered 0.4g of probiotic wafers per shrimp/day during a 30-day evaluation period.

Enzymatic activity and nutrient utilisation

Additionally, the selected *Bacillus* strains synthesise various digestive enzymes (both exoenzymes and endoenzymes) that improve nutrient absorption and feed conversion efficiency. This enzymatic activity benefits the host animal and contributes to reduced organic loading in production systems through more efficient nutrient utilisation.

Environmental bioremediation

The breakdown of organic matter by these bacteria extends beyond the gut environment, as viable bacteria continue to function even after passing through the digestive system, contributing to improved water quality in pond environments. Observations indicate that shrimp often carry consumed wafers to different pond areas, effectively distributing their parallel bioremediation activity throughout the culture system rather than concentrating it in traditional feeding zones.

Operational advantages and environmental benefits

Application simplicity

The transition from traditional powder-based probiotics to wafer formulations represents a significant innovation in probiotic application, offering operational simplicity for commercial aquaculture operations. Wafer-based probiotics eliminate many preparation steps required by traditional formulations, including mixing, suspension preparation, and timing considerations that can introduce variability in application protocols.

These ready-to-use wafers can be mixed directly with commercial feeds without additional preparation, making them compatible with both automated feeding systems and manual feeding protocols. The standardised wafer format eliminates calculation errors and ensures consistent dosing, removing human error factors that can compromise probiotic effectiveness.

Feeding behaviour modification

The attractive properties of wafers create additional management benefits beyond probiotic delivery. The highly palatable wafers encourage active consumption, potentially reducing bottom-feeding behaviour that can expose shrimp to sediment-associated pathogens and elevated *Vibrio* loads. This behavioural modification contributes to overall health management strategies.

Multi-species applications

While primarily developed for shrimp applications, the wafer format demonstrates versatility across multiple aquaculture species. Ongoing research in fish culture applications suggests broader potential for wafer-based probiotic delivery systems across diverse aquaculture operations.

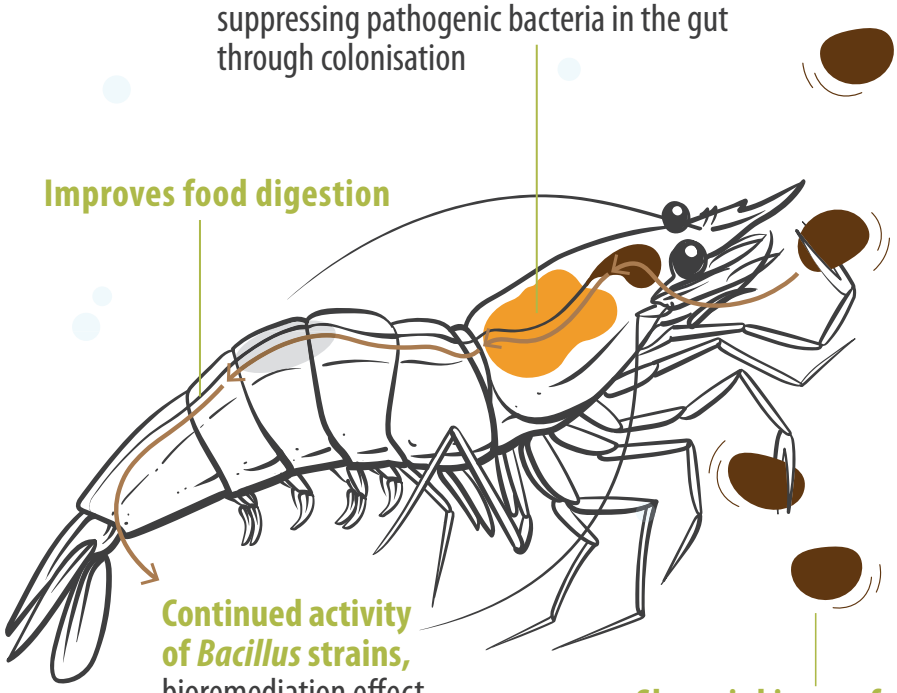
Sanolife™ PRO-TAB

INVE'S PROBIOTIC WAFERS:
PROMOTING SHRIMP HEALTH FROM WITHIN

Probiotics with **high performance**, in edible and **slow-sinking wafers**, for shrimp culture

Ingestion of beneficial *Bacillus* strains, suppressing pathogenic bacteria in the gut through colonisation

Improves food digestion



Continued activity of *Bacillus* strains, bioremediation effect in water and soil

Slow-sinking wafers, attractive to all stages of shrimp

Dual action: Supports both shrimp gut and pond environment

Probiotic pulse: Targeted highly concentrated probiotic therapy

Effortless ingestion: Engineered to suit the shrimp's mandibular anatomy

High attractiveness: Eaten by shrimp, even when stress reduces appetite

Delivering **10^9 CFU/g**

Available in two sizes:
2 mm: 445 wafers per gram
5 mm: 55 wafers per gram
(Averages of 3 replicates)

INVE AQUACULTURE

A Benchmark Company

CARE FOR GROWTH

Supports **sustainable** shrimp farming

Stress management

The water stability of probiotic wafers makes them particularly suitable for use during critical periods when shrimp may be under stress from environmental changes, handling, or disease pressure. Strategic applications during moulting cycles, transportation, or other stressful events can help maintain gut health and immune function when animals are most vulnerable.

Economic impact assessment

Field trial economics consistently demonstrate substantial profit improvements across diverse production systems. Trials conducted at multiple nursery sites with *P. vannamei* demonstrated economic benefits ranging from 12% to 54% above standard practices, with one notable case achieving returns that exceeded typical farm performance by more than half. These consistent economic gains across multiple sites in Ecuador validate the commercial viability of wafer-based probiotic systems and highlight their potential to transform aquaculture profitability while maintaining high standards of animal health and biosecurity.

Conclusion

Probiotic wafers represent a significant technological advancement in aquaculture management, offering improved probiotic delivery with demonstrated benefits in commercial settings. The enhanced application consistency and biological effectiveness of wafer formulations address many practical challenges faced by modern shrimp producers.

The combination of scientific innovation and practical application demonstrated in these systems illustrates the potential for technology to improve both animal welfare and production efficiency in aquaculture operations. The documented success in commercial trials, combined with operational advantages and environmental benefits, positions wafer-based probiotic systems as valuable additions to the toolkit available to modern aquaculture producers.

The integration of attractive design features, controlled-release mechanisms, and high-concentration bacterial delivery creates a paradigm shift extending traditional probiotic applications with a more targeted delivery system that supports both individual animal health and broader system-level including e.g. water quality management.

Ermel Viteri is Regional Technical Support Latin America

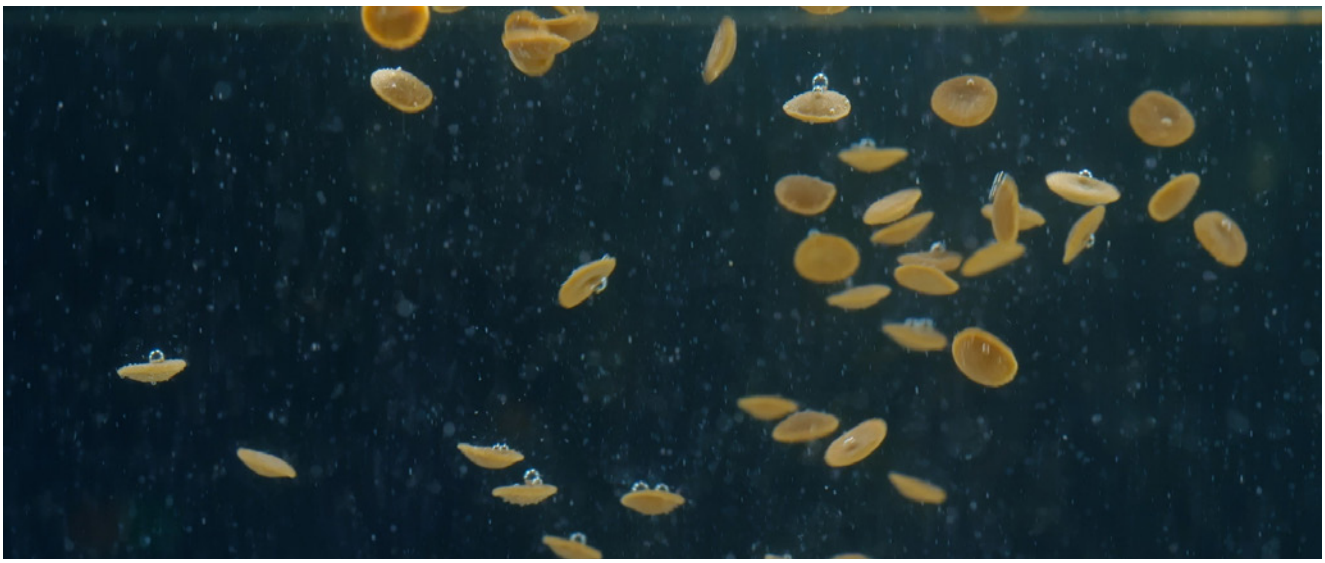
Marcos Santos is Global Technical Expert Shrimp Farm

Jan Koesling is Product and Business Development Manager Health

Andrew Shinn is Global Technical Expert Health

Email: customer.support@inveaquaculture.com

Connect with INVE



A culture pond at the farm of Nguyễn Thanh Thế in Can Gio, Vietnam.

Passion and logic lead to success and expansion in Can Gio, Vietnam

With critical thinking, science and a 3-phase model, Nguyễn Thanh Thế achieves success

By Zuridah Merican, Kit Yong and Nguyễn Trần Thiên Thư

Can Gio is situated around 40km away from Ho Chi Minh City, where shrimp farming is a leading economic activity. With diseases running rampant in the area, such as *Enterocytozoon hepatopenaei* (EHP) and early mortality syndrome (EMS) or acute hepatopancreatic necrosis disease (AHPND), several farmers have decided to call it a day. Meanwhile, successful ones continue farming and become buyers of farms that have ceased operations.

One such farmer is Nguyễn Thanh Thế, who has been farming vannamei shrimp over the last 15 years. During a visit in March with the team from Forte Biotech, he was celebrating a recent purchase of a neighbour's farm. With this latest addition, he now has ten production ponds, four in the current farm and six in the new farm.

Thế, who studied information technology and was encouraged by his brother and sister-in-law to start a farm together, said that many of the successful farmers did not really learn aquaculture. "After almost 20 years in shrimp farming, all that is needed is critical thinking, logic, and passion. For each problem, science and logic are always there."

Critical thinking and adherence to SOPs

"Each farm will have different problems and issues; success comes with finding the logic since the science is there already. There is not much that we can do with EHP. We need to continue farming, and so we must try to reduce costs."

While acquiring farms, his approach is to keep them manageable. EHP is everywhere, said Thế, "But we have to continue to farm anyway."

He manages EHP with his well-thought-out water treatment system. His farm has three reservoir ponds covering 3,000m^2. Incoming water slowly moves around baffles, settling organic matter. In the final treatment pond, chlorine gas is added. In less than 2 days, the water can be used for the grow-out ponds. Cautious of the optimal water quality, Thế tests water parameters before beginning to channel water for the grow-out stage.

"This amount of technology is sufficient for us. Whatever technology a farmer needs, it should be around water treatment and quality. Regarding autofeeders, we need to reset them after the rains. We kill EHP spores by using lime to bring up the water pH to 9. My message is to learn to optimise first, or else technology will fail you," emphasised Thế.

At the farm, his staff are very disciplined and professional in following the standard operating procedures (SOPs). They have at their disposal assistance from their feed suppliers, as well as analysis of water parameters and disease pathogens. When Forte Biotech approached Thế with its on-site PCR tests, Thế became an advisor to the young startup team on requirements for farms in Vietnam.

"For each problem, I find that science and logic are always there," says Farmer Nguyễn Thanh Thế

A well aerated culture pond with an autofeeder.

The farm has three reservoir ponds covering 3,000m².

Absence of shared biosecurity

However, Thế also faces several challenges in his farming operations. In Can Gio, the high density of shrimp ponds has led to water pollution, with EHP levels rising as infected farms discharge untreated water into the environment. Another issue is biosecurity, where many farmers, including those nearby, still show negligence and weak implementation of preventive measures. In addition, the cost of water treatment has increased sharply compared to the time before EHP became widespread, and the expenses for preventive medicines have also added to the financial burden.

Managing EHP and *Vibrios*

Thế believes that algae acts as a carrier of EHP spores. Therefore, his first step is to thoroughly disinfect incoming water using chlorine gas. Then, an artificial colourant, Marine Blue (Unity, Thailand), is added to the pond water during the first 60 days to prevent algae blooms. Adding colourant to shrimp ponds is an age-old practice in Asian farms, primarily aimed at improving water quality and controlling unwanted plant growth. This method helps manage algae by reducing sunlight penetration with blue dyes, which limits photosynthesis and suppresses the growth of filamentous and blue-green algae that can disrupt pond ecosystems.

Furthermore, by shading the pond, the dye can help stabilise water temperature, which is beneficial for shrimp health. Thế says that this step helps to suppress the *Vibrio* population. His aim is to prevent shrimp from eating algae and developing Vibrio-linked diseases.

Thế is not afraid of *Vibrio* pathogens, as there are checks every 5 days for *Vibrios*. The farm monitors the CFU/mL levels of *Vibrio*. "I am more afraid of EHP."

Another strategy is to exchange only 30-40% of the pond water. He gained most of his knowledge on shrimp farming with CPF Thailand. Today, he is working together with CP Vietnam. Recently, Thế innovated the shrimp toilet at the farm, which he installed 6 years ago.

Incoming water slowly moves around baffles, settling organic matter. In the final treatment pond, chlorine gas is added.

During the visit in March, the Forte Biotech team, from left, Phan Thị Thanh Tâm, Nguyễn Trần Thiên Thư and Kit Yong with Nguyễn Thanh Thế.

A 3-phase model

From these four ponds, Thế harvests 20 tonnes. This is the result of a three-phase farming system: nursery, pre-grow-out, and grow-out. Thế has learnt from CP Vietnam on setting up a semi-closed nursery pond. Here, post larvae from Ninh Thuan and Vung Tau are stocked at 1500-1800PL/m² and are reared over 20 days. Subsequently, shrimp from one nursery pond are transferred to an outdoor pond for the first pre-grow-out stage. The stock is transferred to two ponds and subsequently to four grow-out ponds. The stocking density in the final grow-out stage is 100PL/m².

The final output is size 25/kg shrimp after 111 days of culture. The cost of production is VND110,000/kg (USD4.16), at a survival rate of 90%.

Marketing live shrimp

At this farm, harvesting depends on the broker. Approximately 10 tonnes are harvested over four days. Each day, the broker delivers live shrimp to markets in Hanoi, where prices are much higher than in the local market, which hovers around VND230,000-240,000/kg (USD8.2-9.1).

Kit Yong is Founder, Forte Biotech Pte Ltd, Singapore.
Email: kit@fortebio.tech

Nguyễn Trần Thiên Thư is responsible for Business Development at Forte Biotech, Vietnam.

Enduring against all odds – The story of Indian shrimp farmers

Farmers are facing multiple challenges, including increased production costs, ongoing disease outbreaks, competition from other producing regions, recent tariffs, and lower farmgate prices

By Pankajkumar Hanmantrao Mugaonkar and Jose M. Fernandez Polanco

The introduction of *Litopenaeus* vannamei in Indian shrimp farming attracted small as well as large-scale farmers. Advantage of economies of scale were particularly seen with vannamei shrimp farming. Lower risks of disease outbreaks, mainly white spot syndrome virus (WSSV), compared to *Penaeus monodon* or the black tiger was seen in *L. vannamei*. Farmers took advantage of the key characteristics of the vannamei shrimp such as wide tolerance to salinity and high stocking density which enhanced profitability.

When vannamei shrimp farming was in full swing, farmers faced issues due to the attitude of 'when enough is never enough'. Mistakes included stocking more than the carrying capacity (high-density culture and poor management), lack of quality post larvae, and cross contamination across farms and ponds and poor best management practices (BMP).

By the time farmers realised their errors, some had already faced huge losses. Farming in several sites was discontinued due to frequent disease occurrences. Several farmers gave up shrimp farming, divested their investments and a few switched to other businesses.

Leading shrimp farmers and hatchery professionals are considering reviving black tiger shrimp culture, particularly in Gujarat. Due to the massive WSSV outbreaks in 1995, farming of this shrimp stopped. This followed the major drop in shrimp production which was the first setback for the industry. This situation was an opportunity for the farming of the vannamei shrimp. Even today, India's shrimp farming industry is on a turbulent path.

Best seed quality and harvest of black tiger shrimp Penaeus monodon

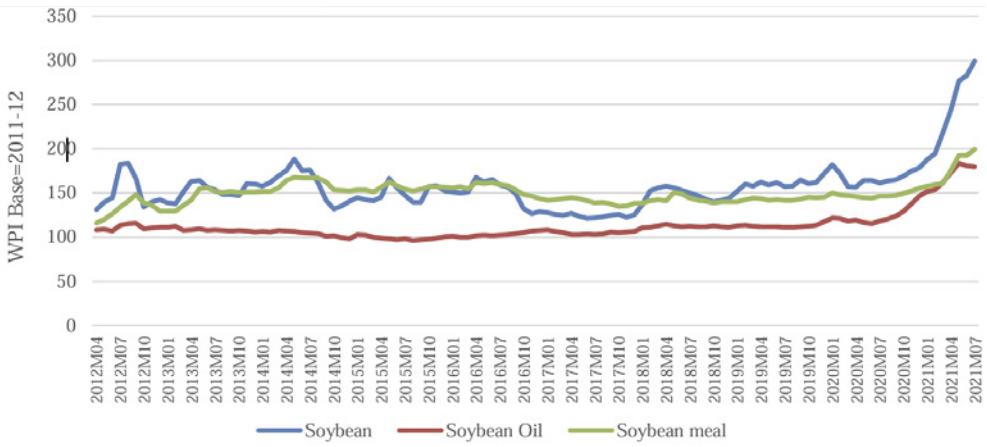


Figure 1. Wholesale price index of soybean and products (Source: Office of the Economic Advisor, Ministry of Commerce and Industry, Government of India)

Seed availability from SPF broodstock

Today, specific pathogen free (SPF) black tiger and vannamei post larvae are readily available in India. In the case of black tiger shrimp, two major companies provide SPF post larvae i.e. Unibio and Moana. Post larvae from both these companies have shown excellent results. For the vannamei shrimp, there are several hatcheries providing SPF post larvae. Presently, the majority of Andhra Pradesh's farm production is of vannamei shrimp. Other eastern states, Odisha, West Bengal and Tamil Nadu are also culturing the vannamei shrimp. In Gujarat, black tiger shrimp culture accounts for 85% of the production with 15% vannamei shrimp.

Feed prices and rising cost of ingredients

Feed millers are striving to provide winning feed formulas to shrimp farmers across India. Continuous development is taking place with feed formulations and feed ingredients, to ensure long term sustainability of the industry. An increase in feed cost was indirectly transferred and shared with shrimp farmers. Higher feed prices result in reduced margins from harvests. However, this is a common issue faced by shrimp farmers worldwide, not only those in India.

Rising soybean prices in India

In 2019 and 2020, soybean prices saw a moderate rise while 2021 was challenging for all feed millers due to the sharp rise in prices (Figure 1). The impact was mainly in the aquaculture and poultry feed segments. This shortage of soybean was mainly due to the unprecedented rainfall during the sowing season which affected production. According to the Ministry of Agriculture, India harvested 12.9 million tonnes of soybean; this amount was 16.6% less year on year during 2021-2022.

With a rise in feed cost shared with farmers, the Indian government decided on a temporary policy change and imported 1.2 million tonnes of soybean meal and soy cake (GE –Soybeans).

Fishmeal prices

Sourcing quality fishmeal from a certified sustainable fishery source is getting expensive year on year. The commitment of feed millers for sustainability carries a cost (Figure 2).

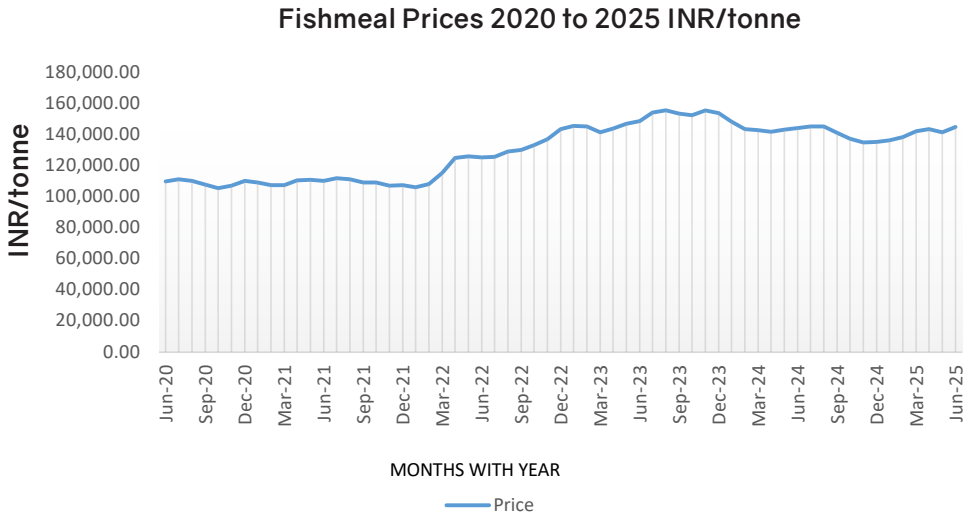


Figure 2. Fishmeal prices 2020 to 2025 INR/tonne (Source – World Bank).

Figure 3. Fishmeal prices in USD per tonne (Source – World Bank). https://www.indexmundi.com/commodities/?commodity=fish-meal&months=60

The price data maintained by BCRP or Central Reserve Bank of Peru, Central Office of Economic Studies documented the fishmeal and fish oil prices – on an average of USD1,496/tonne and USD2,348/tonne, respectively.

Fishmeal price in USD

Over the last three decades, global supply of fishmeal was a concern. There was a reduction in fishmeal supply from the warm Peruvian coastal waters due to the impact of climate change. Overfishing was regulated with quota systems and systematic 'mini bans' on fishing. The uncertainties of fishmeal supply and stock exploitation are expected to continue and affect prices (Figure 3).

Peruvian anchovy is widely regarded as the gold standard in fishmeal and fish oil production due to its high protein content and favourable fatty acid profile. In 2023, the Peruvian government closed the first anchovy fishing season in 2023 to ensure sustainability of the stock. Consequently, the availability of Peru's fishmeal decreased by 10%, while fish oil declined by 30%. According to IFFO, in the first 11 months of 2024, cumulative fishmeal production rose nearly 16% compared to the same period of 2023 (Chase, M., 2024, IFFO Market Intelligence Report). Feed millers are seeking all possible alternative ingredients to contribute to sustainability and helping farmers to remain profitable.

Rising costs for shrimp farming

Inflation and raw material costs are adding to increasing costs of production. To provide SPF post larvae, hatcheries require stringent protocols and real-time monitoring to avoid contamination and infections. These requirements increase operational costs. Other added costs for hatchery operators comprise improved logistics, use of expensive micro feeds, live feeds and clean water systems with high-tech water parameter monitoring protocols. Post larvae prices have gone up by nearly 0.60 paise per post larvae to INR 1.30/PL. This is a rise of 35% to 45%.

To overcome diseases and achieve an optimal growth rate during culture, aqua health care products are being used extensively across the country. Given the uncertainty of diseases and adverse climatic conditions, probiotics, vitamin C, tripalsalt, and oxygen enhancers are being used regularly.

New hope again with black tiger shrimp

This is achieved with good quality post larvae. Moana's post larvae have shown faster growth and higher returns in a relatively short period. Unibio's post larvae, however, show the highest survival, uniform colouration and equally good growth. Achieving 50g ABW (average body weight) is possible for most shrimp farmers. This size 20/kg brings a price of INR480 to INR530/kg. During November 2024, prices were INR630/kg for 50g ABW – a price not often attained.

Farmers practiced low stocking density (12 to 15 PL/m^2). Input cost is less in terms of water management, and feed management is easier; the carrying capacity of the pond is not exceeded.

Factors	Ecuador's strengths	India's response
Tariffs (U.S.)	Ecuador 10% vs India's 26% under new duties	Market diversification, trade talks
Shipment duration	~9 days	Improving logistics, port upgrades
Production scale & cost	Large-scale farms, automation, lower costs	Reducing input costs
Value-added products	Commodity, mostly raw shrimp	Pivoting to processed/ready-to-cook formats
Market reach	Deep and wide reach in China and developed markets like Japan	Expanding footprint in South Korea, Russia, EU, China, Japan
Quality & traceability	Emphasis via Sustainable Shrimp Partnership (SSP)	Enhanced QC, certifications, traceability

Table 1. India's response and repositioning to provide quality shrimp to the world

Harvest of black tiger in Gujarat of size 20 and 30/kg

Measuring competitiveness with Ecuador

Ecuador is a major and growing competitor to India. We discuss the strengths of Ecuador's shrimp farming, with its low stocking density and market accessibility compared to India. Vannamei shrimp farming has been a boon in Ecuador. Gabriel Luna, founder of Glunashrimp once said that, between the years 2009 to 2022, Ecuador has witnessed an increase in the production to six-fold, contributed by small and large farms. It was seen that farmers were using several technological initiatives to maintain farm productivity - improving shrimp growth and increasing disease resistance with optimal use of other farm inputs. The reduction of feed wastage and use of efficient probiotics help to deal with degrading pond bottom.

Shrimp aquaculture in Ecuador has grown very rapidly and sustainably over the last decade. It is a leading competitor to Asian shrimp producers, including India, Vietnam, Indonesia and Thailand. Vannamei shrimp yields range from 6.67 tonnes/ha/year in India, 19.81 tonnes/ha/year in Indonesia while in Vietnam and Thailand, it is 10.92 tonnes/ha/year and 17.31 tonnes/ha/year, respectively. It is 7.03 tonnes/ha/year in Ecuador which makes yields in Ecuador and India closely similar, even though only about half of the Ecuadorian farms (46.5%) apply mechanical aeration. This is most probably due to lower stocking density and more crops per year in the case of Ecuador (Boyd et al., 2021).

Market advantages for Ecuador

Ecuador has the advantage of market access due to its proximity which helps to deliver goods in a shorter time. To export to the U.S. Ecuador needs only around 9 days, whereas India requires 40 days. Other countries like Vietnam, Indonesia and Thailand are in the same situation as India with regards to logistics. The vertically integrated production systems with automation in progress are helping to scale up efficiently the production in Ecuador. Ecuador is exporting to China and Japan markets too. This diversification is crucial for Ecuador, enabling it to increase production strategically.

The above factors shown in Table 1 has impacted India's shrimp farming industry and several farmers have almost given up on vannamei shrimp farming and are opting for the black tiger shrimp, particularly in northern India. This is despite a lower domestic demand for non-veg or shrimp category in the northern part of India and therefore a negligible opportunity for small sized shrimp. However, southern India is still a better place for production of smaller size shrimp compared to northern India. Reverting to black tiger shrimp farming remains the best alternative for states like Gujarat.

Indian shrimp farmers have frequently encountered challenges. The U.S. has recently announced 'reciprocal' tariff i.e. 25 %tariffs for India's shrimp imports to the U.S. Recently on August 27, a penalty tariff from U.S. was imposed. These tariffs are additional to current countervailing duty (CVD), 5.77% and anti-dumping duty 1.8%. These tariffs if they persist, would sum-up to 57.6%.

It is time to insulate the shrimp farmers from this shock, as they are the backbone of the industry. Exporters/processors and the government are key stakeholders who could help farmers during 'price fluctuations' and during uncertainties.

Managing diseases

Additional costs are incurred to prevent, manage and avoid diseases. There is WSSV, which is highly contagious and often fatal, causing 80–100% mortality in ponds. *Enterocytozoon hepatopenaei* (EHP) is a microsporidian parasite affecting growth rates and causing chronic losses. Bacterial diseases caused by *Vibrio* spp. exacerbate stress and mortality. Almost all aqua health care products have become expensive, and farmers cannot avoid using them.

Need domestic consumption of shrimp

Among non-veg foods, eggs and chicken are preferred over fish due to their lower prices, availability, ease of cooking and variations in dishes prepared (Figure 4). Shrimp and fish are generally more popular among people living in coastal regions. Shrimp in India still has an identity as a 'Lifestyle Food' and is expensive in several 3-7 stars restaurants. Shrimp has a niche market, but several initiatives by the government to boost domestic consumption of shrimp have paid off recently.

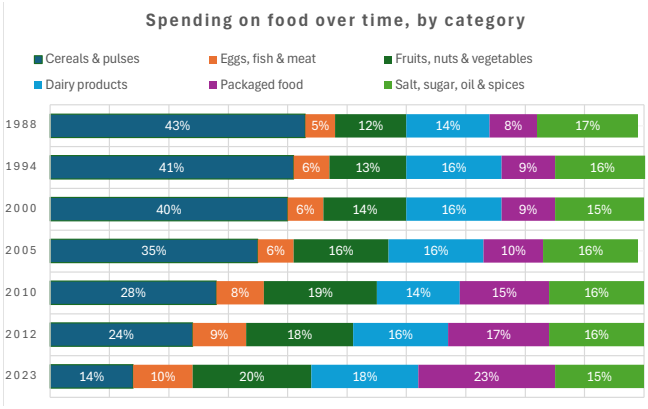


Figure 4. NSS rounds 38 to 79, household consumption expenditure surveys, National Sample Survey Office. Packaged food includes beverages and purchased cooked meals.

Developing domestic shrimp consumption could help stabilise demand, reduce farmer dependence on exports, and open new market segments. At present, at the private level, Zingalaa restaurants, Fresh to Home, Fish Fanatics, Captain Fresh etc are putting their efforts in the promotion of domestic shrimp and seafood consumption in India through direct selling, delivery option and restaurant dine-in. This needs to be supported and intensified soon.

Conclusion

India's shrimp farming industry is at a turning point. It holds great promise—not just for boosting exports, but also for improving aquaculture practices and supplying quality disease-free seed. Yet, the road ahead is not easy. Farmers are struggling with rising production costs, recurring disease outbreaks, and stiff competition from countries like Ecuador. Added to these, are trade restrictions and lower farm-gate prices. It is clear that the industry faces serious challenges that need urgent attention. Government initiatives such as imposing minimum support prices (MSP), crop insurance, promotion of domestic shrimp consumption, market innovations, farmer empowerment, and science-driven disease control — are essential to restore profitability and sustainability.

We believe that with a concerted effort from government, industry stakeholders, researchers, and farmers, India can reclaim its place as a global shrimp supplier.

Dr Pankajkumar Hanmantrao Mugaonkar is an Aquaculture Professional, India
Email: pankajmugaonkar@gmail.com/ pankajmugaonkar@yahoo.com

Professor Dr Jose M. Fernandez Polanco is with the Department of Business Faculty of Economics & Business, University of Cantabria, Santander, Spain.

Current dynamics of global shrimp supply and demand

At TARS 2025, what is Asia's position in the global context amid significant crop disruptions, increasing supply from Ecuador, and heightened attention on China?

The panel on the State of Global Shrimp Supply and Demand was moderated by Ronnie Tan, USGC (left). Speakers were from left, Robins McIntosh, CPF, Thailand; Pablo Montalbetti GT, Vitapro – Alicorp S.A.A; George Ding Changwei, Hong Kong Fisheries Holdings Limited, China and Yanisa and Khemika Klomsuwan, Krabi Kieang Seng – Kitchareon Farm, Thailand. S Santhana Krishnan, Marine Technologies Pvt Ltd, India (right) was the invited industry player.

The opening session, "State of Global Shrimp Supply and Demand," at TARS 2025 (see pages 4-6), outlined the prevailing circumstances in Asian shrimp aquaculture. The industry faces oversupply, intense competition, and declining prices, all of which challenge supply chain collaboration. While Asia contends with production instability, Ecuador continues to dominate as the primary supplier.

Shrimp and stress: Is the Asian shrimp model broken?

Shrimp has become cheaper year after year, even as consumption is higher than ever. **Robins McIntosh**, Executive Vice President, CPF, Thailand, responded to the question: is the Asian shrimp culture model broken? His answer—no, but it is misunderstood. He offered a diagnosis of how Asia, aquaculture's most dynamic region, risks sabotaging itself.

Prices down, production up

Reviewing the situation in the past three decades, Robins showed how inflation-adjusted wholesale prices for shrimp in New York have fallen relentlessly. Yet production has surged past 6 million tonnes annually. Neither low prices nor disease have deterred supply.

The model is not broken; there is just a huge variation. "World production has gone up and continues to go up at lower prices. This means that producers farming in the right way are making money and others are struggling. Unfortunately, we hear more of the strugglers than successful ones, especially in Asia. What we do hear is the Ecuadorian story, that's right," said Robins.

Both Asia and Latin America have contributed: India and China on one side of the Pacific, Ecuador on the other. Each region has grown at roughly 160,000 tonnes a year since 2018. "The paradox is concerning, depending on who you are. Shrimp is now cheapest when production is at its highest. For now, consumers are happy, but farmers less so."

Defining the Asian shrimp model

Asia's system is built on intensity. Two variants dominate. Intensive culture relies on aeration of 10–35HP/ha, balanced feeds, some biosecurity, and domesticated post larvae. Stocking densities run between 25-100 PL/m^2 and cost of production (COP) ranges from USD3–3.50/kg. The super-intensive culture models need aerators of >35HP, lined ponds, shrimp toilets, chemicals and probiotics. When stocking is above 150 PL/m^2, COP is more than USD4/kg. By 2024, nearly three-quarters of Asia's shrimp came from these two systems. Intensive alone accounts for close to 60%, meaning it effectively sets the industry's base price.

Robins observed that super-intensive farms, despite their technological allure, struggle to compete as higher costs erode margins in a sector where prices are falling.

Pushing boundaries

For many farmers, Robins noticed that the temptation is to chase yield by increasing stocking densities ever higher. "Yet ponds and regions have carrying capacities. It is possible to increase carrying capacity with higher aeration but there is a limit. As feed rates increase, nitrogen and carbon dioxide accumulate, dissolved oxygen falls, and bacterial loads spike. At a certain point, stress tips shrimp into health crises."

The view is that the cycle often begins in the hatchery. *Vibrio* bacteria, their plasmids and toxins, and *Enterocytozoon hepatopenaei* (EHP) infect post-larvae long before they reach ponds. Once inside, the combination of high density and abundant feed allows *Vibrio* to thrive. *Vibrio* is rarely lethal on its own, but it opens the door for everything else.

"Technology should be used to reduce costs, not to chase production at any cost," - Robins McIntosh

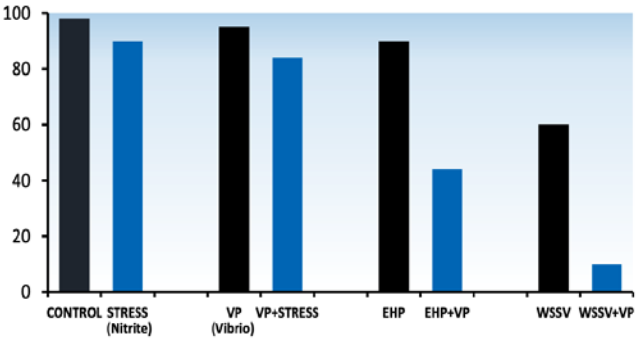
Pathogens in synergy

Shrimp exposed to both *Vibrio* and nitrite stress fare far worse than with either alone. Add EHP to *Vibrio*, and mortalities spike. White spot syndrome virus (WSSV) has not mutated dramatically. Robins claims that *Vibrio* reduces shrimp's tolerance to it, helping explain the resurgence of WSSV in India in recent years. In short: introduce *Vibrio* into any equation, and trouble follows.

Geographical factors

Geography makes a difference too. Ecuador is blessed with moderate temperatures, and they have built a model of steady, low-stress aquaculture. India, by contrast, grows shrimp in smaller ponds at similar stocking densities. India has been Asia's standout success story, demonstrating that careful management

Constantine Tanchan, CEO (right) and Neil Edwin Cabigon CTO, Aquatic Phoenix Asturias Corporation, Philippines (centre) and John Diener, CEO, Vertical Oceans, Singapore (left).



A comparison of shrimp survival rate with Vibrio alone against Vibrio plus stress, EHP, and WSSV. Source: Is The Asian Shrimp Model Broken? By Robins McIntosh, TARS 2025 Shrimp Aquaculture, Chiang Mai, Thailand, August 20-21, 2025

can deliver volumes. Southeast Asian farmers are less fortunate: high coastal temperatures favour *Vibrio*. Along the Gulf of Thailand, it is far harder to farm today than it was 20 years ago.

Adding to the strain is seawater quality. Coastal waters across Asia have deteriorated, making ponds ever more vulnerable. The environmental baseline which intensive aquaculture was built upon has shifted.

Growth or resilience?

Genetics pose another challenge. Robins said," CPF's "Turbo" strain can hit 50g in 100 days, compared with just 30g for its slower cousin "Kong". Yet the speedy Turbo proves fragile: its survival rates fall dramatically when confronted with nitrite stress, white faeces syndrome (WFS) or viral challenges. Kong, on the other hand, is slower but sturdier and holds up better." Immune markers confirm the trade-off. He asked if growth must come at the expense of resilience?

Robins also showed that the tolerance for WSSV comes with mid growth levels. "In the future, with genomics, we can delink growth from disease tolerance at individual levels. So, for now, farmers must balance growth against survival."

When stress is controlled

The data that Robins presented suggest that restraint works. In 2010, typical Asian farms stocked 75–100 PL/m², yielding 13 tonnes/ha with survival rates of 85%. By 2022, densities had risen to 300–450 PL/m². Yields rose to 33 tonnes, but survival collapsed to 65% and failure rates soared above 25%.

In 2023, farms that cut densities back to 100–120 PL/m² found a sweet spot. Yields remained high at 31 tonnes/ha, survival rebounded to 85%, and failure rates dropped below 2%. Feed conversion ratios improved, and average daily growth accelerated. Even EHP-positive shrimp performed well when stress was kept low. Robins' message was simple: high-stress farming is unsustainable; controlled stress is profitable.

Lessons for Asia

Robins' conclusions were clear. The Asian shrimp model is not broken; it is mis-applied. Technology should be used to reduce costs, not to chase production at any cost. In practice, this means focusing on balanced feed, adequate aeration, domesticated broodstock, and biosecurity. Hatchery sanitation must be re-emphasised.

Crucially, cost leadership will not come from super-intensive systems. The market's base price is set by intensive farms, and lower-intensity producers will continue to define competitiveness. Super-intensive ventures, with heavy capitalisation, risk losing flexibility: the pressure to stock at extreme densities to justify investment compromises resilience.

Robins reiterated that Asia remains the volume leader, but it faces a choice. It needs to recalibrate towards lower-stress, more robust production, or risk sacrificing competitiveness. The global shrimp industry will not shrink. The real test is whether Asia can adapt its model to remain on top.

The take-home message was succinct: stress kills. Reduce culture stress, and "no stress, just happiness" follows for farmers, shrimp and consumers.

The Kieangseng–Kitcharoen Farm is located on the Andaman coast and features 30 ponds, with 85% of the ponds measuring 3 rai (One rai = 1,600m²) and the rest ranging from 4 - 5 rai.

How the next generation in Krabi transformed their farm

In Thailand's Krabi province, **Yanisa** and **Khemika Klomsuwan** have quietly created a model that other farmers can learn from. The Klomsuwan sisters showed how their family-owned Kieangseng–Kitcharoen Farm, once struggling with diseases (particularly EHP and WFS), high waste output, and low yields, was transformed into a data-driven, biosecure, and globally aligned shrimp operation. The sisters' story is not merely about upgrading a farm; it was a critical mindset shift from being reliant on intuition towards adopting an industrial system of standard operating procedures (SOPs), metrics, and discipline. This shift successfully increased both output and credibility in global markets.

The old way: Trial and error

Yanisa reflected on the farm's performance before the overhaul. "We had a 120-day cycle, which produced only 2–3 tonnes per rai (1 rai = 1,600m²) and an average daily growth (ADG) of just 0.25g. Feed conversion ratio (FCR) was high, and there was limited data on FCR, survival, or pond-level variation."

"We could not manage waste well, and instead, water was exchanged heavily to keep ponds productive, increasing costs and biosecurity risks. Like many Thai farms, there was little awareness of global trends that are beginning to define market access," added Khemika.

	2018	2019	2020
Days of culture (DOC)	118	107	94
Average size (pcs/kg)	64	74	54
Production/ral (kg)	2,056	2120	2476
Average daily growth ADG)	0.13	0.13	0.2
Survival rate (%)	49	81	59
FCR	1.94	1.8	1.88

Kieangseng–Kitcharoen Farm's performance data before the transformation. Source: Strategic transformation in shrimp farming - Krabi Kieangseng–Kitcharoen farm by Yanisa & Khemika Klomsuwan, TARS 2025 Shrimp Aquaculture, August 20-21, Chiang Mai, Thailand.

A strategic pivot

The sisters created a new framework focused on four goals: risk reduction, cost saving, shorter days of culture (DOC), and higher efficiency. "Our targets were ambitious: to reach 5–8 tonnes/rai, reduce cycles to 90–110 days, and achieve an 80% success rate per cycle. We also implemented a vision to align with global sustainability standards," said Khemika.

Before the cycle: A biosecurity fortress

The foundation of their culture system is built on strict biosecurity, sediment control, water quality management, and ongoing laboratory testing for bacteria and post larvae (PL) health.

"The target set is 80% success rate per cycle," said Khemika (right). "The transformation has delivered remarkable results; the duration was reduced from 120 days to 90–110 days, and ADG improved from 0.25g to 0.4g," said Yanisa (left)."

Farm access is closely monitored. Net fences exclude carrier animals, and bird nets block airborne vectors such as white spot syndrome virus (WSSV). "We only allow the farm manager to lift feeding trays for each pond, each week," noted Khemika.

Sediment management remains a priority. Turbidity (NTU) must be below 2.5 before stocking, as it indicates water clarity and sludge levels.

At the Interactive Roundtable Breakout, Khemika led discussions at a GHF (Genetics, Hatchery and Farm) roundtable.

It all begins with good post larvae

PLs undergo forensic examination. Khemika states, "Specifically, we prefer that PL must show no broken rostrums, clean appendages, etc. Hepatopancreas checks confirm lipid integrity and the absence of melanisation (a disease marker). Laboratory plate counts confirm bacterial loads are below thresholds (<1,000CFU/mL for *Vibrio* strains). The visual PL inspection also confirms there are no dead, blue-coloured, or milky muscle shrimp.

During the culture: Discipline in motion

Once stocked, the farm shifts focus to measurement and adjustment. Yanisa listed detailed metrics. "Water parameters in terms of calcium, magnesium, and potassium are related to salinity and are kept within strict ranges. Particularly, alkalinity is kept at 160-200 until size 20g and at 140-160 when shrimp are larger." Dissolved oxygen must stay above 5.5mg/L. Transparency is maintained at 40cm throughout the culture period. The goal is to minimise sludge and keep water quality stable.

Bacterial load is constantly monitored in both pond water and shrimp hepatopancreas, with *Vibrio* counts maintained within strict limits (<100–1,000CFU/mL). Separate "treatment ponds" are tested to ensure that reserve water is free of pathogens. "With regards to probiotics, we only use certified strains screened for banned substances," said Yanisa. "Growth is tracked weekly starting from DOC 45 when PL is 10.5g. Sampling every Tuesday verifies feeding schedules. The target ADG is 0.45g/day. If PL is less than 10.5g, we investigate."

Numbers after the shift

Yanisa elaborated, "The transformation has produced impressive results. Our cycle duration decreased from 120 days to 90–110 days. We tripled the yield, from 2–3 tonnes to 5–8 tonnes per rai, with an average shrimp weight of 30–55g. ADG increased from 0.25g to 0.41g. Recently, to lower costs due to low prices, we used PL12, and our ADG was 0.40g."

The farm's data show consistent improvements year-on-year from 2021 to 2025, culminating in Q1 2025 with steady outputs of close to 6-8 tonnes per rai in less than 100 days.

	2021	2022	2023	2024	2025
Days of culture (DOC)	106	117	105	90	87
Average size (pcs/kg)	39	35	32	39	39
Production/ral (kg)	5,886	6619	5659	6,705	5,471
Average daily growth ADG)	0.24	0.24	0.37	0.36	0.37
Survival rate (%)	98	90	93	96	95
FCR	1.46	1.60	1.51	1.40	1.45

Kieangseng–Kitcharoen Farm performance metrics post transformation. Source: Strategic transformation in shrimp farming - Krabi Kieangseng–Kitcharoen farm by Yanisa Klomsuwan & Khemika Klomsuwan, TARS 2025 Shrimp Aquaculture, August 20-21, Chiang Mai, Thailand.

An anatomy of success

The sisters attribute their achievements to five elements:

- Pathogen-free post-larvae from certified hatcheries.
- High-quality feed with balanced nutrition.
- A data-driven approach with continuous data collection and adjustments.
- Maintaining KPI discipline to keep standards high.
- Collaborative teamwork, where staff share responsibility for outcomes.

The key takeaway is that the Klomsuwans' achievements are not just higher output but also how process-driven aquaculture can be profitable while staying sustainable.

"We set the KPIs and bonus for farm managers, and together, we see that everyone is working toward the same goals and vision," concluded Khemika.

How Ecuador became the global shrimp powerhouse

How did Ecuador, better known for oil and bananas and with only 220,000ha of shrimp area become the world's most efficient farmed shrimp producer? For more than a decade the country has defied forecasts of stagnation and instead has grown shrimp output at an astonishing 16% annually for the last 8 years.

In 2025, production is expected to reach 1.76 million tonnes, up 17% in a single year. For a country of just 18 million people and 260,000km², this is nothing short of a miracle.

"Every year I think we'll grow less, but every year the numbers surprise me," – Pablo Montalbetti Gómez de la Torre

"Every year I think we'll grow less, but every year the numbers surprise me," said **Pablo Montalbetti Gómez de la Torre**, Corporate Executive Manager for Market Strategy & Market Intelligence at Vitapro-Alicorp S.A.A, as he presented at TARS 2025 on the three forces that contributed to Ecuador's ascent: natural advantages, industrial organisation, and relentless innovation.

Natural geography and efficiency

The country's geography is a natural advantage. Around 80% of production comes from Guayas province, a compact coastal region where ponds are a short distance from ports. The proximity translates into faster harvesting, tighter quality control, and lower transport costs. A stable tropical climate allows for year-round production.

Farm efficiency rivals that for the salmon in Chile. Pablo added, "Feed conversion ratios (FCRs) have improved from 1.6 in 2019 to 1.3 today. For me, matching salmon farms which have a FCR of 1.23, is amazing.

"While pond sizes remain unchanged, stocking density is now 16-18 PL/m² up from 8-9 PL/m². Weekly growth rates have surged from 1.5g/week in 2019 to 2.75g in 2024 and now to more than 4g in 2025, while pond density has nearly doubled without reducing survival. Some producers now report 7,000 pounds (3.1 tonnes) per harvest cycle. With a 2-phase system, 60 days/cycle and 4-5 cycles/year, we have an extremely efficient production model," said Pablo.

Indicators	Range	Average 2019	Average 2024
Stocking density (PL/m²)	10 - 20	8 - 9	12 - 14
Pond size (ha)	7 - 12	11	11
FCRs	1.30 - 1.60	1.6	1.4
Growth rate (g/week)	2 - 4	1.53	2.75
Harvest per cycle (pounds)	3,000 - 20,000	4,284	6,800
Days of cycle (grow-out phase)	70 - 200	92	75

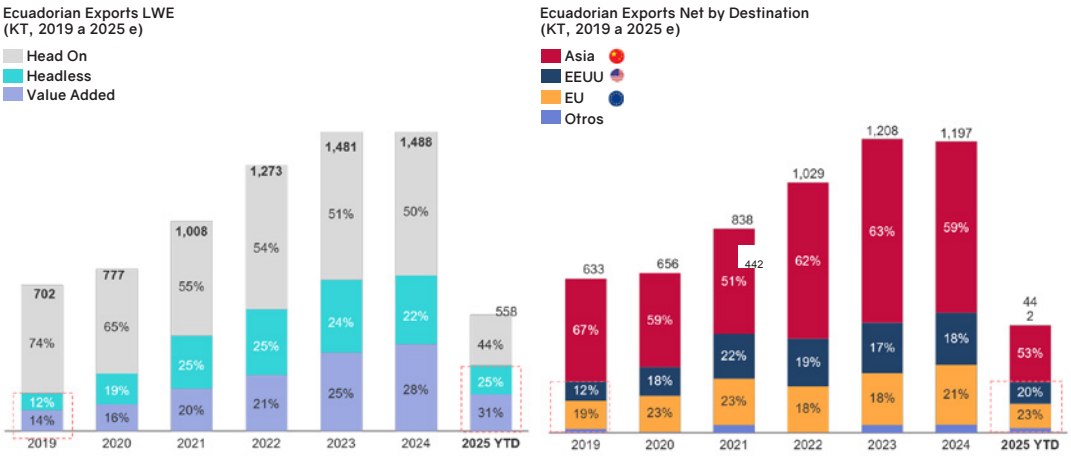
Production indicators in Guayas and El Oro in 2025, Ecuador. Source: Shrimp Powerhouse: Ecuador's Model for Competitive Aquaculture by Pablo Montalbetti Gómez de la Torre, TARS 2025 Shrimp Aquaculture, Chiang Mai, Thailand, August 20-21, 2025.

More processing and integration

Two transformations are reshaping Ecuador's shrimp trade. First, exports are moving up the value chain: processed shrimp has jumped from 28% of exports in 2019 to 55% today. Second, the country is reducing its dependence on China, which once absorbed two-thirds of shipments (67%) to 52%. Exports are increasingly diversified towards the EU and US, markets that demand traceability and higher processing standards.

Ecuador's exports have been transforming its nature and its target by increasing value added (processing plant capacity) and by diversifying its destination (reducing dependency on China). Source: Estadistic & Gluna Shrimp

VITAPRO



Source: Shrimp Powerhouse: Ecuador's Model for Competitive Aquaculture by Pablo Montalbetti Gómez de la Torre, TARS 2025 Shrimp Aquaculture, Chiang Mai, Thailand, August 20-21, 2025.

Integration between farms and processing plants is accelerating. Exporters are investing in farms to guarantee at least 50-60% of supply, while farmers are buying into processing plants to avoid price volatility. This blurring of boundaries stabilises margins and supports the shift into higher-value segments.

Pablo said, "If you ask any shrimp farmer on why they need to integrate, they'll tell you it is to keep consistent production, to keep the train going,"

Scale breeds professionalism

Unlike much of Asia's fragmented industry, Ecuador is dominated by large, professional companies. The top five together contribute more than a third of production. Their scale enables investment in hatcheries, feed mills, auto feeders, electrification and genetics, spreading best practices across the value chain. "Today, almost 20,000ha of farms are electrified, and auto feeders, almost unheard of a decade ago, now cover a quarter of the farmed area.

"The pandemic accelerated efficiency gains. Producers learned to cut costs, digitise operations, and adopt new technologies under pressure. The result is a sector that is leaner, faster, and more resilient than before," explained Pablo.

Weaknesses and threats

Ecuador's political fragility remains its Achilles heel. A dollarised economy, high labour costs, and frequent electricity outages (in 2023 farms endured just eight hours of power per day for months) expose vulnerabilities. Security concerns and trade disputes also loom. Climate shocks, particularly in May and June, can stress animals and disrupt cycles.

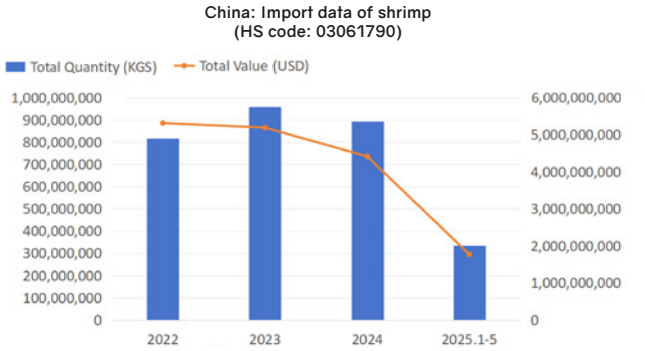
Keeping the train going

If current trends hold, Pablo estimates that Ecuador's growth may moderate to a still impressive 6–8% in 2026, supported by wider electrification, better genetics, and expanded automation. The compound annual growth rate (CAGR) is expected to be at 6% fuelled by technification, electrification and standardisation. The world's smallest shrimp giant looks set to stay on top.

Preecha Ekatumasuit, CEO, TRF Feed Mill (centre right) with participants from Thailand.

China's shrimp market: From white boxes to brands

The message on China's seafood trade by **George Ding Changwei**, General Manager at Hong Kong Fisheries Holding was simple. "China is now depending less on volume and more on quality, branding, and trust."



A demand overview, China's import data from 2022 to 2025 May. Source: Deep dive into China shrimp demand and supply by George Ding Changwei, TARS 2025 Shrimp Aquaculture, August 20-21, 2025, Chiang Mai, Thailand.

"For those seeking to develop in China, the opportunity lies not in chasing higher volumes, but in catering to a shifting consumer base."
- George Ding Changwei

Over the past three years, China's shrimp imports have been dominated almost entirely by the vannamei shrimp. Volumes have risen, from some 800,000 tonnes to nearly 900,000 tonnes, but values have fallen. Fierce competition among exporters has depressed prices, leaving many farmers and suppliers squeezed.

More recent figures tell a more nuanced story. In the first half of 2025, China imported 420,000 tonnes of vannamei shrimp, worth about USD2.3-2.4 billion—a sign, Ding notes, of a stabilising market. "For those seeking to develop in China, the opportunity lies not in chasing higher volumes, but in catering to a shifting consumer base."

Three new types of shrimp consumers

First are the post-1980s and 1990s generation, who have come of age with greater purchasing power and different priorities. Unlike their parents, who cared little beyond having shrimp on the table, younger consumers care about nutrition, food safety and sustainability. They are wary of chemicals, antibiotics and adulteration - issues often exposed on social media platforms such as Douyin (TikTok).

Second is geography. Previously, shrimp consumption was concentrated in wealthy coastal cities like Shanghai or Guangzhou. Today, inland metropolises such as Wuhan, Chongqing and Xi'an are driving growth. A new middle class is developing a taste for shrimp, broadening the consumer market.

Third is the emergence of a new high end consumer tier. Whereas the average consumer once treated shrimp as a homogeneous commodity, now a premium tier has emerged: buyers who will pay for scampi from New Zealand, cold-water prawns from Alaska, or well-branded vannamei. For them, price is secondary to source and perceived quality.

Ecuador's lead, India's push, Thailand's niche

On the supply side, Ecuador remains China's top shrimp supplier, particularly in head-on, shell-on form. India follows, with Thailand carving out a reputation in small, retail-packaged shrimp sold in high-end supermarkets. Prices reflect these dynamics: Ecuador's shrimp have fallen fastest in value, while Thailand's retail-oriented product has been more stable.

China's domestic shrimp sector, meanwhile, faces headwinds. Labour and feed costs have climbed. Imports exert downward pressure. Seasonality matters: demand peaks before Mid-Autumn Festival and Chinese New Year, but slumps in the hot summer months when seafood spoils easily. Traditional pond-based production lags in quality compared with newer greenhouse systems, which can supply live shrimp more consistently.

From white boxes to trusted brand

The implication for foreign exporters is clear. Competing in China's shrimp market requires more than shipping containers of "white box" commodity shrimp—the generic, unlabelled product that flooded the country in the past. Consumers, particularly younger ones, want traceability, antibiotic-free guarantees, and a brand they can trust.

Logistics, once a barrier, now make this feasible. Same-day delivery networks in cities such as Shanghai or Beijing allow live and prepared seafood to reach consumers at unprecedented speed. Prepared shrimp dishes, ready-to-cook packs, and branded retail offerings are also booming.

"Today our logistics system is changing very fast, now you can order something in the morning, and have it delivered in the afternoon"

Ding's advice is to rebuild supply chains, invest in branding, and focus on quality over quantity. With cities like Chongqing (population 31 million) matching entire countries such as Malaysia, the scale is undeniable. "The market is there," he says. "But the market you should develop is your brand."

During the followup panel session, panellists and speakers exchanged views with the audience on the future of shrimp farming, land use, feed trends, tariffs, bacterial management, and the shifting demands of global markets.

Industry player Santhana had this take home message, "We cannot change our location nor water quality of shared resources, but work at reducing stress to shrimp as much as possible. Improvements in crop cycles will come with a nursery phase and multiphase farming. On marketing, the move from HOSO to peeled shrimp will definitely be of value for Asian producers."

"On marketing, the move from HOSO to peeled shrimp will definitely be of value for Asian producers"
- S Santhana Krishnan

Feed trends

A decade ago, farmers had little choice beyond generic feed. Today, the feed industry offers stage-specific diets and more tailored formulations. Yanisa reported that crude protein levels in Thai feeds range from 35–42%. Robins added that Ecuador typically runs closer to 35%, with Thailand averaging 38%. He warned, however, that farmers' tendency to increase protein can backfire, raising mortality and pond nitrogen levels without improving growth. "Decoupling protein from growth is the real frontier," Robins argued.

Integration and farm structures

The panel diverged on integration models. Robins observed that in the Americas, large growers have absorbed smaller farms, leading to consolidation, while Asia remains highly fragmented, with farm sizes far smaller by comparison. Santhana added that in India, harvest timing is still determined more by disease outbreaks than market planning, making large-scale integration unlikely.

Market outlook and food safety concerns

Ding acknowledged that Chinese farmers face price pressure from imports but said government protection or intervention is unlikely given the fragmented nature of the industry. Pablo noted Ecuador's strategy is to diversify away from China by developing differentiated products and export markets. On consumer concerns, ranging from antibiotic resistance to carbon footprints, Santhana argued that adoption of certification standards is growing, though still uneven among smallholders.

Margins and regional variation

Finally, when asked about farmer profitability in Ecuador, Pablo stressed that margins vary widely by season and geography, emphasising the volatility of the sector.

Performance beyond label

A grip on the immunostimulant market

By Jean-Benoît Darodes de Tailly, Alban Caratis and Nadège Richard

Shrimp health needs reliability, not just claims

Shrimp farming has become one of the fastest-growing sectors in global aquaculture—but also one of the most vulnerable. Across Asia and Latin America, the industry continues to grapple with persistent and recurring diseases caused by a wide range of pathogens and environmental stressors.

Historically, antibiotics and chemotherapeutics have been the go-to tools for disease control. Today, however, stricter regulations, evolving export market requirements, and growing awareness of antimicrobial resistance are prompting feed millers and farmers to seek more sustainable, residue-free solutions to safeguard shrimp health.

Among the many tools now in use, immunostimulants, especially those based on beta-glucans derived from yeast cell walls (YCWs)—are well established in the industry and widely applied during farming operations. Their role in supporting shrimp health is well recognised. However, this widespread adoption has also led to a flood of market entrants offering products with varying quality standards and, at times, uncertain origins and performance.

This has resulted in commoditisation, where fundamentally different products are treated as interchangeable, fueling a race to the bottom driven by cost competition. It also includes technical commoditisation, where the nuanced, science-based attributes that determine a product's true effectiveness are often overlooked.

The race for β-glucans percentages – and why it misses the point

End users have traditionally been encouraged to choose β-glucan sources based on the percentage shown on specification sheets, assuming that 'the higher, the better.' However, this approach overlooks a range of critical factors, such as the yeast strain, production and extraction processes that define molecular structure, branching patterns, and the presence of additional functional components like mannan-oligosaccharides (MOS), which are essential for immune modulation and pathogen binding.

These overlooked aspects introduce significant variability in product effectiveness when used in shrimp aquaculture. To demonstrate these differences, we conducted a comprehensive disease-challenge trial comparing several yeast-based immunostimulants marketed for aquaculture and produced through distinct manufacturing processes.

The trial compared Safmannan®, a premium yeast postbiotic solution manufactured by Phileo by Lesaffre, using a carefully selected yeast strain and primary fermentation processes, with two other yeast cell wall (YCW) products. These were derived from spent yeast, typically by-products of the brewing or bioethanol industries. Table 1 provides a detailed overview of the tested products. All products were applied at their manufacturers' recommended inclusion rate of 2kg per tonne – despite their contrasting origins, production processes, and compositions.

The trial was conducted at the ShrimpVet Research Institute in Ho Chi Minh City, Vietnam, utilising specific pathogen-free (SPF) whiteleg shrimp (*Litopenaeus vannamei*) from a Shrimp Improvement System (SIS) genetic line, which were challenged with a virulent strain of *Vibrio parahaemolyticus* (strain No. LA 37), the causative agent of early mortality syndrome (EMS).

The products were administered in feed throughout the full 25-day trial, which was divided into three distinct phases: a 14-day pre-challenge period, a 1-day exposure phase during which *Vibrio* bacteria were introduced into the water, and a 10-day post-challenge infection period. Shrimp survival was continuously monitored to evaluate the protective efficacy of each product against the infective agent. Each treatment group included six replicates and was compared against both unchallenged controls and challenged shrimp that did not receive immunostimulants.


Join the fish revolution
Phileo's probiotics and active yeast fractions are designed for hatcheries and growing farms to support health, feed efficiency and growth performance . Our sustainable solutions bring innovative responses to fishmeal reduction stakes and environmental challenges.
Act with nature for animal care.
Phileo
by Lesaffre
phileo-lesaffre.com

	SAFMANNAN	YCW A	YCW B
Production	Selected strain of *Saccharomyces cerevisae* - Primary fermentation	*Saccharomyces cerevisae* - Spent yeast by product from the bioethanol industry	*Saccharomyces cerevisae* - Spent yeast by product from the brewery industry
Guarantees on datasheet	Beta glucan ≥ 20% MOS ≥ 20%	Beta glucan ≥ 30% MOS ≥ 17%	MOS ≥ 12%
Actual content (internal analyses)	Beta glucan: 28.7% MOS: 21.8%	Beta glucan: 45.4% MOS: 16.2%	Beta glucan: 19.1% MOS: 10.0%
Tested dosage in the challenge (kg/ tonne)	2	2	2

Table 1. Characteristics and tested dosages of the different yeast cell wall (YCW) used in the trial.

Shrimp supplemented with Safmannan® showed a clear protective advantage against EMS-induced mortality. Survival rates were significantly higher compared to yeast cell wall product A and consistently superior—though not statistically different—compared to product B (Figure 1).

After 10 days of challenge, Safmannan® achieved a survival rate of 67.4%, more than double that of the positive control (31.9%) and markedly exceeding product A (58.3%). Product B achieved a survival rate of 60.4%, representing an improvement over the control, yet remaining numerically inferior to Safmannan®

Interestingly, Safmannan® also conferred a marked protective effect during the critical first 48 hours of the challenge, when mortality pressure from EMS is typically highest, and management responses by farmers are still possible. In contrast, the two other yeast products offered little to no improvement over the positive control during this phase of acute mortality.

In line with the higher survival observed in the Safmannan® group, shrimp fed with this solution maintained notably higher granulocyte counts (key immune cells driving defence against infection) both before and after EMS challenge (Figure 2). At 48 hours post-challenge, Safmannan® sustained granulocyte levels close to pre-challenge values (119 vs 127 ×10³ cells/mL), whereas counts in both YCW products dropped sharply.

This sustained immune cell availability suggests that Safmannan® helps shrimp preserve immune competence during the critical early phase of infection, when cellular depletion is normally expected. By maintaining functional immune cell populations, Safmannan® not only limits acute mortality but may also help reduce the risk of secondary infections, prolong immune functionality, and mitigate exhaustion under prolonged disease pressure.

These results highlight the clear advantages of yeast cell wall (YCW) products derived from selected strains and primary fermentation over products from brewing or bioethanol processes.

Safmannan® stands out for the structural complexity of its β-glucans. Highly branched molecules forming triple-helix conformations are known to enhance immune stimulation, and Phileo's controlled extraction ensures consistency and preserves bioactivity. In contrast, spent yeast by-products often undergo harsher processing, degrading key structures and reducing efficacy.

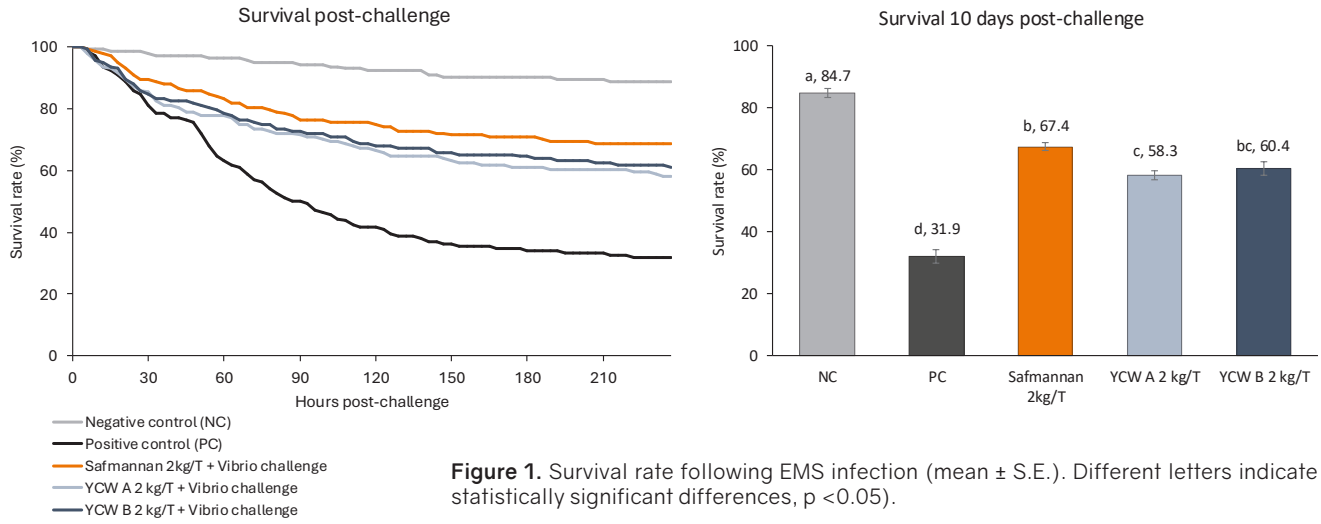


Figure 1. Survival rate following EMS infection (mean ± S.E.). Different letters indicate statistically significant differences, p <0.05).

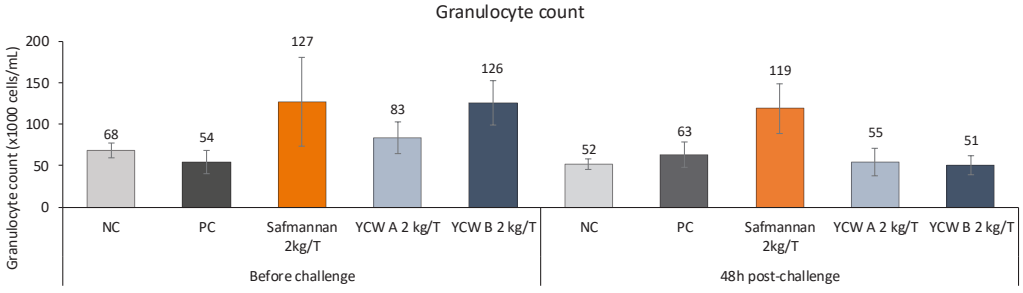


Figure 2. Granulocyte count immediately before and 48h after EMS challenge.

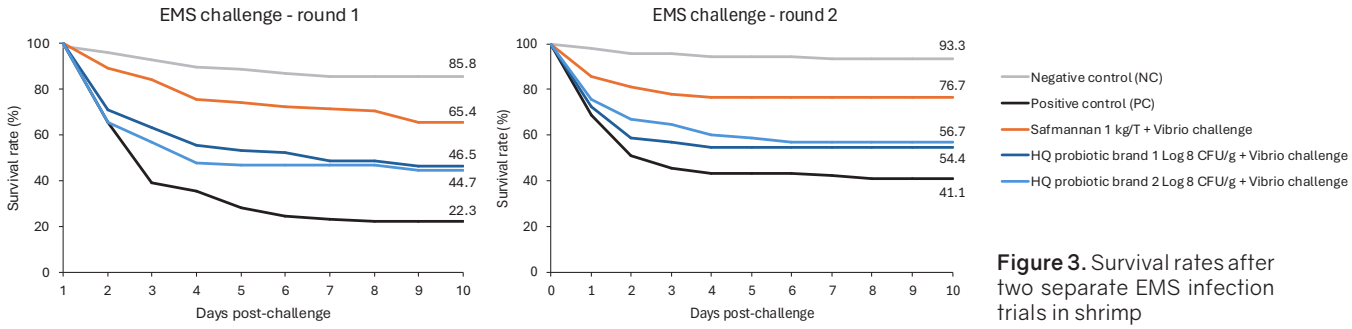


Figure 3. Survival rates after two separate EMS infection trials in shrimp

Beyond β-glucans, Safmannan® provides a balanced matrix of mannans and chitin that further supports immune function and pathogen binding. Secondary fermentation YCWs typically show weaker molecular profiles, with less consistent activity.

In practice, these differences explain why products that appear similar on paper can deliver very different outcomes in the field, reinforcing the need for thorough scientific validation rather than reliance on β-glucan percentages alone.

Probiotics vs immunostimulants: Complementary, not interchangeable

Another challenge arises when other product categories, such as probiotics, are positioned as direct substitutes for immunostimulants. While probiotics offer well-documented benefits, their broad and multifaceted mode of action differs from the targeted, rapid immune-priming effect that pure immunostimulants are specifically designed to deliver.

Commercial gut health probiotics used in aquaculture are derived from both bacterial and yeast origins. These products typically contain multiple species and strains, formulated to work synergistically through complementary mechanisms such as digestion support, competitive exclusion of pathogens, and anti-inflammatory effects. Gut health probiotics are valuable tools for maintaining intestinal health and enhancing performance under variable farming conditions.

However, their effectiveness tends to be limited when facing acute disease challenges, which often require more targeted and potent immune stimulation for shrimp to mount an adequate defence.

To assess these differences in practice, Phileo by Lesaffre carried out two EMS challenge trials at the ShrimpVet Research Institute in Vietnam (2023–2024), using whiteleg shrimp *L. vannamei*.

In both studies, Safmannan® was supplemented at 1 kg/tonne for 15 days before challenge and benchmarked against two renowned *Bacillus*-based probiotic brands applied at their manufacturers' recommended inclusion rates. After the 15-day supplementation period, shrimp were exposed to *Vibrio parahaemolyticus* (strain LA37).

Across both EMS challenge rounds, supplementation with Safmannan® consistently outperformed the two probiotic products (Figure 3). In round 1, Safmannan® achieved 65.4% survival compared with 46.5% and 44.7% for the probiotics, while the positive control dropped to just 22.3%. In round 2, survival with Safmannan® reached 76.7%, clearly higher than probiotic brand 1 (54.4%) and brand 2 (56.7%) and nearly doubling the survival rate of the positive control (41.1%).

Beyond biological performance, the economic interpretation is equally important. The cost-in-use of Safmannan® in these trials was more than ten times lower than that of the probiotics, yet it generated nearly double the survival benefit. This combination of higher efficacy and significantly lower cost underscores Safmannan®'s superior value proposition in practical farming conditions for this specific application.

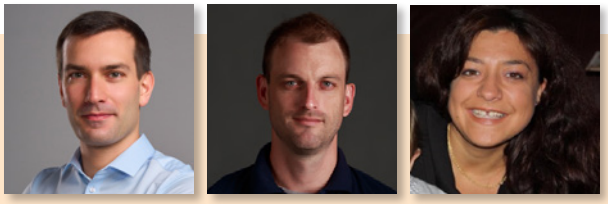
Taken together, these results show that probiotics and immunostimulants serve distinct and complementary functions. Probiotics support long-term gut health and performance, but in acute disease challenges, they offer little protection. Safmannan®, contrastingly, provided rapid immune support, consistent survival benefits, and a markedly more cost-effective solution—highlighting its role as a cornerstone in strengthening shrimp resilience.

Choosing wisely in a crowded market

In categories often viewed as commoditised, where products appear similar on paper, our results clearly show that meaningful differences exist in both performance and cost-in-use. Production origin, molecular structure, and processing methods can translate into distinct outcomes in terms of shrimp survival and resilience.

This highlights the need for a deeper understanding of product attributes and their application. In shrimp farming, especially where multiple additives are often combined, achieving the right balance between efficacy and economics depends on choosing solutions based on evidence rather than surface similarities. Moving beyond labels and percentages toward validated performance is essential for building a more resilient and sustainable future for shrimp aquaculture.

References are available on request



Jean-Benoît Darodes de Tailly is Global Business Developer - Shrimp
Email: j.darodesdetailly@phileo.lesaffre.com

Alban Caratis is Global Aquaculture Manager

Nadège Richard, PhD is Global R&D Manager - Aquaculture & Insects

All authors are with Phileo by Lesaffre.

Information on fermentation solutions for shrimp farming at Phileo's Program Aquasaf Shrimp.

Natural antimicrobials in shrimp aquaculture: Broad-Spectrum protection against WSSV, EHP and TPD

Commercial use in Asia showed reductions in WSSV prevalence, better survival and a broader role in hatcheries and nurseries with EHP and TPD management

By John Williamson

Shrimp farming faces a persistent trio of threats: white spot syndrome virus (WSSV), *Enterocytozoon hepatopenaei* (EHP), and *Vibrio parahaemolyticus* causing translucent post larvae disease (TPD). Each can devastate production, either with outright mortality or silently stunting growth.

A growing body of research shows that a natural antimicrobial blend based on organic acids and plant-derived compounds (AuraAqua, Auranta, Ireland), can provide robust protection on multiple fronts, offering shrimp farmers in Asia and beyond a sustainable alternative to antibiotic and chemical treatments.

The shrimp disease challenge

Global shrimp aquaculture now produces over five million tonnes annually, but profitability is constantly undermined by disease. WSSV remains the most notorious, capable of wiping out ponds within days. EHP infection rarely causes sudden mortality but weakens the hepatopancreas, leaving shrimp stunted and unprofitable. Meanwhile, 'new' *Vibrio parahaemolyticus* strains carrying highly virulent toxin genes cause TPD, a condition of hatchery and nursery stages, marked by high mortality of post larvae.

These three pathogens differ in biology, being viral, microsporidian and bacterial; yet they share a common target: the shrimp gut and hepatopancreas, where infection compromises immunity, nutrient use, and survival. This makes gut-focused strategies particularly valuable.

White spot syndrome virus

Laboratory studies show that natural antimicrobial blends can block WSSV replication at multiple stages of infection. In shrimp gut cell models, viral loads dropped sharply when the compounds were applied before, during, or after exposure. These effects were linked with reduced oxidative stress, particularly lower hydrogen peroxide (H_2O_2) accumulation.

New molecular insights confirm that WSSV triggers host NADPH oxidases to generate H_2O_2, overwhelming antioxidant defenses. Treatment sharply reduced this oxidative stress. It also upregulated HO-1 oxygenase, a protective enzyme whose metabolites (bilirubin, carbon monoxide) limit viral replication and suppress inflammation.

In addition, treated shrimp showed downregulation of the β-1,3-glucan-binding protein (LGBP) and LvECSIT, both involved in the Toll-like Receptor immune pathway and normally hijacked by WSSV to drive tissue damage.

At the same time, expression of mucin genes increased, strengthening the peritrophic membrane (PM), a frontline gut barrier. This barrier proved essential and in infected shrimp with the PM removed mortality remained 27.8% even with treatment, compared with just 7–9% when the PM was intact. (Table 1).

AuraAqua concentration(%)	% Mortality (PM+)	% Mortality (PM-)
0	100	97.4
0.1	63.0	85.0
0.5	18.0	67.3
2.0	9.34	27.8

Table 1. Mortality of *Penaeus vannamei*, two days post challenge after infection, with (PM+) or without (PM-) the peritrophic membrane.

Interestingly, treated shrimp also showed increased expression of carboxypeptidase B, a digestive enzyme, suggesting better nutrient use during infection. Together, these mechanisms explain why mortality in challenge tests fell from nearly 97% in untreated shrimp to less than 10% with treatment (Figure 1).

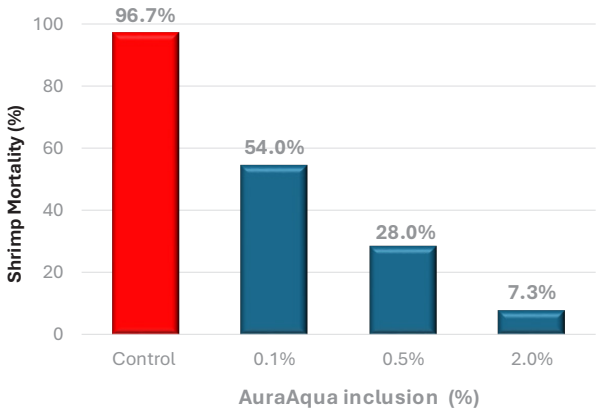


Figure 1. Shrimp survival rates with and without natural anti-microbial (AuraAqua).

A reduction in prevalence

On commercial farms in Thailand, consistent use of these natural antimicrobials since 2022 has reduced WSSV prevalence from above 30% to between 3–10%, delivering more reliable harvests and compliance with antibiotic-free export requirements.

Enterocytozoon hepatopenaei (EHP)

EHP has emerged as one of the most frustrating diseases in Asia - it rarely kills outright but leaves ponds full of small, slow-growing shrimp. EHP infects the hepatopancreas, draining host energy and impairing moulting, growth, and feed efficiency.

In vitro studies have shown that natural antimicrobial blends reduce spore activity at concentrations as low as 0.5% and infected shrimp gut cells exposed to treatment survived significantly better than untreated cells. Notably, pre-treatment offered stronger protection than co-treatment, suggesting that prophylactic use strengthens epithelial defenses before spores can invade (Figure 2).

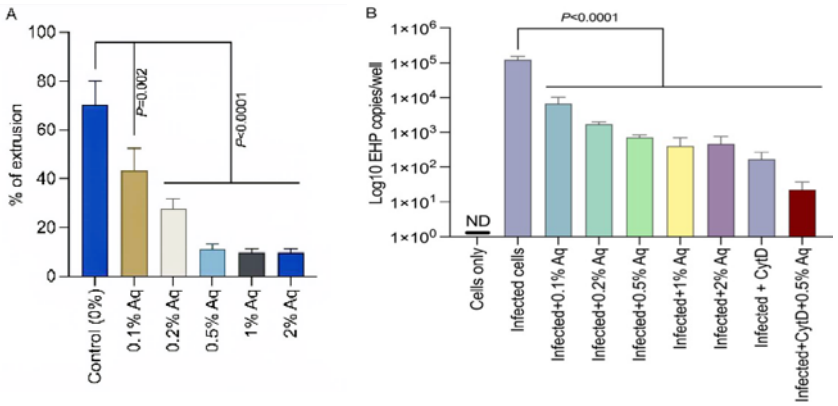


Figure 2. Inhibition of EHP spore activity and reduction in EHP copies after treatment with AuraAqua (Aq) after 24hr.).

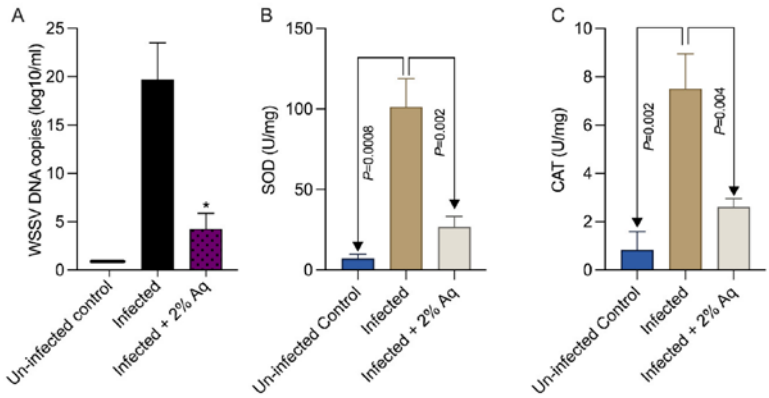


Figure 3. The effect of 0.5% AuraAqua (Aq) on the antioxidative capacity of *Penaeus vannamei*: (A) Percentage of mortality, (B) CAT activity and (C) SOD activity.

Mechanistically, EHP infection activates the NF-κB pathway, which overstimulates antimicrobial peptides such as crustins, penaeidins, and lysozyme. This uncontrolled immune burst causes collateral tissue damage. Natural antimicrobials prevented this over-activation, restoring balance and protecting host tissues.

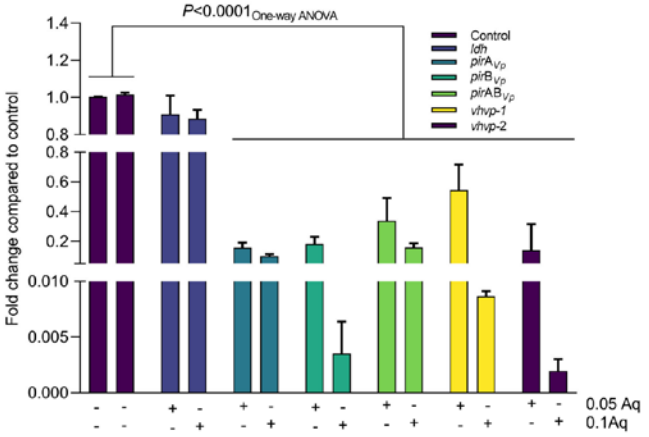


Figure 4. Effect of the antimicrobial mixture AuraAqua (Aq) on the downregulation of the expression of the TPD virulence genes vhvp-1, vhvp-2, vhvp-3, pirAVp, pirBVp, and pirABVp.

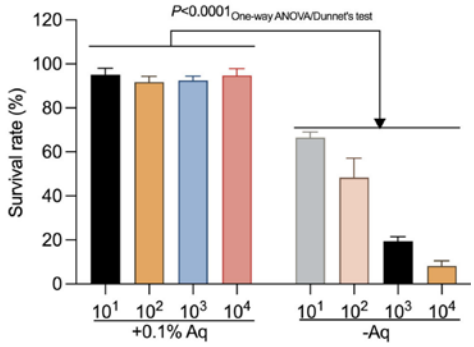


Figure 5. The survival rate of *Penaeus vannamei* challenged with VpTPD at 10^1, 10^2, 10^3, and 10^4CFU/mL when fed with AuraAqua (0.1% Aq).

In parallel, treatment reduced H_2O_2 release and boosted the activity of catalase (CAT) and superoxide dismutase (SOD) - enzymes that neutralise damaging free radicals. *In vivo* challenge tests confirmed the effect: treated shrimp showed lower mortality, reduced oxidative damage in gut tissue, and preserved epithelial structure (Figure 3).

Importantly, these benefits are not limited to laboratory conditions. In field trials across Asia, shrimp exposed to EHP but supported with natural antimicrobial blends maintained linear growth trajectories, in stark contrast to the stagnation normally seen under infection. The consistency of weight gain throughout the production cycle highlights the ability of these compounds to preserve performance under disease pressure, safeguarding both shrimp health and farm profitability.

Translucent post larvae disease (TPD)

TPD is a relatively new but highly destructive condition caused by *Vibrio parahaemolyticus* strains carrying multiple plasmid-borne toxin genes. Key among these are VHVP-1 and VHVP-2, a two-component toxin system where VHVP-1 supports attachment to the shrimp epithelial cell whilst VHVP-2 executes toxic effects inside shrimp cells. These strains also harbour pirA/pirB toxins and disrupt cytoskeletal proteins such as myosin, actin, and tropomyosin, leading to muscle and gut tissue breakdown.

Natural antimicrobial blends have shown striking activity against these pathogens. At sub-inhibitory concentrations (0.05–0.1%), they suppressed bacterial growth while specifically silencing virulence genes (vhvp-1/2/3, pirA, pirB), leaving metabolic functions intact (Figure 4).

In shrimp gut and hepatopancreas cells, treatment reduced bacterial adhesion and cut extracellular H_2O_2 release by about 50%, easing oxidative stress. Another effect was a time-dependent surge in alkaline phosphatase (ALP) activity, a marker of membrane destabilisation, suggesting the compounds weaken bacterial cell membranes directly.

In challenge tests, post larvae mortality reached 91% within 45 hours in untreated groups. With 0.1% treatment, mortality dropped to ~12%, at 0.2% to ~6%, and with 1% treatment survival reached ~98%. Importantly, protection was robust across a range of pathogen inocula, confirming value under variable hatchery conditions (Figure 5).

Shared mechanisms across pathogens

Despite their very different biology, WSSV, EHP, and *Vibrio* TPD are all vulnerable to natural antimicrobial blends because the compounds act on host–pathogen interactions rather than targeting a single organism.

The common protective mechanisms include:

- Direct inhibition of replication or virulence: blocking viral proteins, silencing bacterial toxin genes, suppressing spore activity.
- Reduction of oxidative stress: lowering H_2O_2, boosting CAT and SOD.
- Reinforcement of the gut barrier: upregulating mucin and enhancing peritrophic membrane integrity.
- Immune modulation: increasing HO-1 oxygenase, balancing NF-κB activation, controlling antimicrobial peptide over expression.

By addressing these shared pathways, natural antimicrobials provide broad-spectrum protection where conventional, single-target approaches often fail.

From laboratory to farm

What begins in cell culture and challenge trials is now translating into farm outcomes. Commercial use in Asia has shown clear reductions in WSSV prevalence and improved survival. The new evidence for EHP and TPD suggests a broader role, especially in hatcheries and nurseries where disease pressure is highest and antibiotic use is restricted.

For producers, the message is simple: natural antimicrobial blends offer not just pathogen control, but an integrated way to support shrimp health, growth, and resilience.

Conclusion

The future of shrimp aquaculture depends on tools that protect against multiple pathogens while meeting market demands for sustainable, antibiotic-free seafood. Natural antimicrobial mixtures have now demonstrated efficacy against WSSV, EHP, and *Vibrio* TPD, making them one of the most promising disease-management strategies available.

References available upon request

John Williamson is a specialist in aquaculture nutrition and health management with a focus on sustainable solutions. He has worked extensively on practical innovations to improve fish welfare and farm profitability.

New study: Krill meal supports salmon survival and growth during transfer phase

High-quality feeds with sustainable and functional ingredients play a critical role in enhancing the health and robustness of fish. The objective of the present trial was to compare feed intake, growth performance and survival of Atlantic salmon smolts (151±44 g) fed a commercial diet with 15% fishmeal with a diet containing 5% fishmeal + 10% krill meal (KM) after their transfer to seawater.

Aker QRILL Company announced a first commercial field trial of its kind showing benefits of krill meal during seawater transfer. The new study has found that feeds containing QRILL Aqua can help Atlantic salmon perform better during one of the most challenging phases of their lifecycle: the transition from freshwater to seawater.

Conducted by Skretting in collaboration with Aker QRILL Company, this is the first study on the impact of QRILL Aqua from a commercial-scale field trial during the seawater transfer period. A high-stakes stage for salmon farmers, the seawater transfer period is a known bottleneck in salmon farming, marked by appetite suppression, osmoregulation stress, increased disease risk, and higher mortality rates.

Industry figures show that a large share of losses occur during the first months at sea, creating both economic and fish welfare concerns. Kjetil Berge, R&D Leader, Skretting said,"By combining Skretting's feed expertise with QRILL Aqua's proven nutritional benefits, we were able to test under real farming conditions. This is a strong example of how collaboration can advance solutions for the industry."

Key results

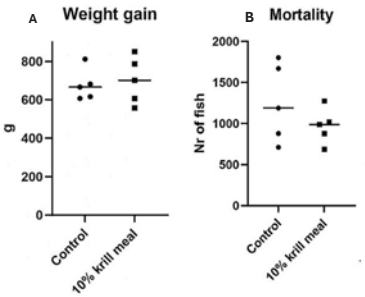
The 116-day trial, conducted at a commercial salmon farm in Harstad, Norway, compared a commercial diet containing 15% fishmeal to one in which 10% krill meal (QRILL Aqua) was used, thereby reducing the fishmeal by one-third.

Salmon fed the QRILL Aqua diet:
- Consumed 3% more feed
- Achieved 22% lower mortality
- Exhibited 4.8% higher growth

These results point to trends that could make a meaningful difference to both fish welfare and farm productivity.

"As feed formulations shift toward more plant-based proteins and novel ingredients, farmers face challenges like reduced palatability, nutrient imbalances, and competition with human food," adds Kiranpreet Kaur, Director of R&D, Aquaculture at Aker QRILL Company. "QRILL Aqua is a sustainable, functional marine ingredient that delivers high-quality protein, omega-3s, and essential nutrients, helping address these challenges so fish can stay healthy and perform well while supporting environmental goals."

The study: Krill Meal Boosts Growth and Survival in Atlantic Salmon Smolts After Seawater Transfer by Kiranpreet Kaur, David Knudsen, Frederike Keitel Gröner, Leidy Lagos, Lena Burri and Kjetil Berge is published in the Turkish Journal of Fisheries and Aquatic Sciences
https://doi.org/10.4194/TRJFAS27771

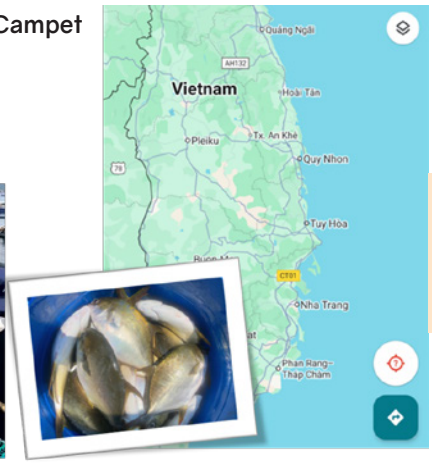


A. Weight gain (g) of control and 10% krill meal group during the 116 days of feeding trial. B. Mortality (%) of control and 10% krill meal group during the 116 days of feeding trial. Each dot represents one of the five cages in each group. The lines represent the respective means.

Yellowfin pompano – The rising star in Vietnam's mariculture industry

With fingerling supply from local hatcheries, next is embracing feed innovations for sustainable growth.

By Henry Cuong, Nguyen Hoang Vu and Marc Campet



Yellowfin pompano cage farming in Xuan Dai Bay, Phu Yen province, Central Vietnam (Source: Quan Anh photos, Xuan Dai company).

Over the past few decades, Vietnam's marine fish farming industry has experienced several ups and downs. Due to efforts and perseverance, farming for several main species has been established – most notably for grouper (various species), Asian sea bass (barramundi), and cobia – yielding a total marine fish production of 46,000 tonnes in 2023, according to the Directorate of Fisheries, Vietnam.

Despite its vast potential, mariculture in Vietnam is still lagging inland aquaculture due to several significant challenges. The sector is primarily composed of small-scale, family-run farms with limited capital, operating in sheltered coastal bays. Initially reliant on wild-caught seed sources, mariculture has since shifted to importing seedstocks from neighbouring countries such as Taiwan, China, and Indonesia. With the transfer of breeding technology from research institutions, there is now domestic seed supply from local hatcheries.

Feed has also transitioned from homemade to commercial pellets, except for some carnivorous fish which depend partly on trash fish such as cobia and certain species of grouper. Annual tropical storms from September to November in Central Vietnam often cause substantial losses. Moreover, as marine fish are often high-value species, they are primarily exported live to specialised markets such as Hong Kong and China. Domestic demand is often tied to tourism and festive seasons and prices can fluctuate rapidly when there are changes in consumer spending.

Yellowfin pompano: A breakout species

In the past two years, yellowfin pompano including short-fin species (*Trachinotus falcatus*), long-fin species (*Trachinotus blochii*) or their hybrids, have rapidly emerged as key species in mariculture, with an estimated production reaching 18,000 tonnes in 2024 (ADM team pers. comm.), ranking second only to the Asian sea bass. Yellowfin pompano farming has benefitted from years of accumulated experience in marine fish culture in Vietnam. In this article, we unravel factors contributing to its impressive growth.

Fingerlings

These are now entirely supplied by domestic hatcheries, in sufficient quantity and quality. Short-fin pompano is usually stocked during the main season (March–June), while long-fin variants are used in the second season (July–October). This species readily accepts commercial feed, with only a small number of farms still relying on trash fish, mainly when prices are low or by-products are available from processing companies. Compared to grouper and cobia, pompano has lower nutritional requirements and can be fed either sinking or floating pellets, depending on the farm's location, management style, and farmer preference.

Cage farming

Yellowfin pompano is ideally suited for cage farming in sheltered coastal bays, especially in Central Vietnam, where water quality is excellent. Recently, the government has officially zoned marine farming to balance the interests of various sectors and promote sustainable development.

Moderately priced fish

The fish is reasonably priced, versatile in preparation, suitable for daily consumption at home as well as restaurants with table sizes from 500-700g per fish. Compared to high-value species like grouper, barramundi and cobia, yellowfin pompano enjoys a more stable domestic market (Figure 1).

Strategic solutions for organic growth

To ensure sustainable development and future breakthroughs in yellowfin pompano farming, it is necessary to address a number of challenges with strategic solutions:

Expanding consumption market

To boost domestic consumption, it should be promoted through industry events and media campaigns, including cooking competitions. At the same time, if seafood processing factories can secure export contracts, the industry will gain stronger momentum for growth.

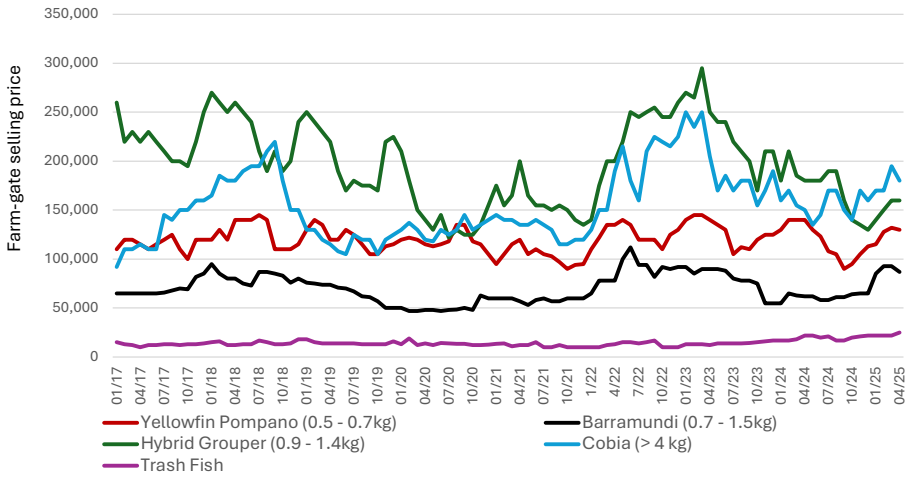


Figure 1. Fluctuations in farmgate prices of some common marine fish (ADM team statistics, 2017-2025).

Slow-sinking feed	Floating feed
Higher nutrition profile (protein 46-44%, fat 12-14%, high density pellet, wet-oil surface)	Lower nutrition profile (protein 44-43%, fat 10-12%, low density pellet, dry-oil surface)
Open bays with strong water currents	Closed bays with weak water currents
More time to feed, need to avoid feed loss due to pellets sinking to the bottom and fish cannot eat in time.	Less labour is required because the feed can be easily poured into the small net frame within the cage.
Need experienced workers, difficult to mix supplements/medicine with pellets.	Convenient feed management, easy to mix supplement/medicine with pellets.
Shorter farming time, reaches 500-700g/fish after 5.5–6.5 months; FCR 1.6-1.7 and survival rate 70-80%.	Longer farming time, reaches 500-700g/fish after 6–8 months; FCR 1.8-1.9 and survival rate 70-80%.

Table 1. Comparison between slow-sinking and floating pellet (ADM team discussion, 2025).

Improving fingerling quality

Successful breeding was first achieved in 2006. and the technology was transferred to local hatcheries. Presently, the fingerling supply chain is divided into two stages: broodstock conditioning for egg production, and nursery operations to supply 4–5cm fingerlings. Overall, it is crucial to develop fast-growing and disease-free fingerlings.

Optimising cage management

Inshore cage systems in sheltered bays are vulnerable to algal blooms during hot weather, and low oxygen levels during floods, when rainwater runoff affects coastal water quality. Therefore, cage placement, stocking time and stocking density are critical to minimise risks.

Recently, farmers have shifted from traditional wooden rectangular cages to more durable plastic round cages, which are both environmentally friendly (avoiding deforestation) and better able to withstand rough sea conditions.

Preventing diseases proactively

Fish health is highly dependent on environmental quality and influenced by local pollution levels and yearly weather patterns. Local authorities should monitor and issue warnings on stocking density, climate changes, and disease outbreaks. Farmers must adopt quarantine protocols for new fingerlings before transferring them to grow-out areas, and proactively prevent parasitic infections that can lead to bacterial outbreaks.

Using suitable commercial feed

Currently, it is estimated that farmers use about 60% slow-sinking and 40% floating pellets of different sizes (2, 3, 4, 5, 6, 7, 8.5, 10, 13 mm) suitable for fish mouth sizes at different farming stages. In addition to promoting fast growth and optimal fish health, pigments are often added to feeds to give the fish a desirable yellow colour for the domestic market (see Table 1).

Perspective

After a "hot growth" period, yellowfin pompano farming, like other species, will enter a phase of consolidation. Farming may decrease like cobia, level off like grouper, or increase like Asian sea bass. Its future hinges on collaboration and innovation to address current challenges and ensure sustainability.

ADM Animal Nutrition is strategically expanding its presence in the marine fish feed sector, with a strong focus on high-performance solutions. One of the flagship products in the Vietnamese market is NUTRILIS POMPANO – a trusted name among aquaculture professionals. Key benefits include:

- Enhanced growth performance;
- Improved fish health;
- Superior body colouration.

With proven results and consistent quality, it continues to support farmers in achieving optimal yields and premium-quality harvests.



Henry Cuong is Technical Manager Aqua Asia.
Email: cuonghuynh.tran@adm.com

Nguyen Hoang Vu is Technical & Commercial Product Manager Aqua Vietnam.

Marc Campet is Technical Sales Director APAC Aqua.
Email: Marc.Campet@adm.com

All authors are with ADM Animal Nutrition Asia.

From seed to scale

A conversation with Ravi Kumar Yellanki on integrating hatcheries into the larger industry in India

By Zuridah Merican

The indoor nursery at the farm in Tuni, Andhra Pradesh.

Ravi Kumar Yellanki, Managing Director of Vaisakhi Bio-Resources Pvt Ltd, is well-known for innovating the landscape in post larvae production in India. Today, the company has grown into an integrated operation spanning hatchery, farming and processing. At TARS 2025, held on August 20-21 in Chiang Mai, Thailand, Ravi Kumar was one of the business leaders at the Hard Talk session. The day after, we talked about his personal journey in India's shrimp hatchery business. As President of the All India Shrimp Hatcheries Association (AISHA), we asked him about shaping the future of the segment as well as the whole industry. AISHA will organise the second edition of HATCH India on October 30-31 in Visakhapatnam.

The beginning

You started with an engineering and management background. What made you venture into a shrimp hatchery business?

In 1994, I graduated as an engineer. Back then, shrimp aquaculture in India was just taking off. I initially worked for consultancy firms, Aqua Veritas and GEO Marine Systems, advising on hatchery projects. Around 100 to 150 hatcheries were coming up at the time.

In 2001, we started our own consultancy firm. At that time, most of the infrastructure had been completed, and the industry was facing a downturn due to outbreaks of white spot syndrome virus (WSSV). We decided to focus on management contracts with hatcheries. Hatcheries typically employed marine biologists and technicians, contributing to overhead costs.

Ravi Kumar Yellanki is Managing Director of Vaisakhi Bio-Resources Pvt Ltd, which which he founded with a group of 6 stakeholders in 2001.

Our model was simple: hatchery owners did not need to worry about hiring or managing technical staff. We provided technicians and charged only based on the number of post larvae (PL) produced and sold. We charged USD6-7/1,000PLs. This model proved effective, and we managed about five hatcheries under this system. During this time, we learned more on how the hatchery business worked.

How did you transition to owning your own hatchery?
Observing the success of the hatcheries we managed, we considered starting our own but lacked the funds to build a new one. Instead, we leased a small unit and pushed it to its limits, surpassing the annual 40 million PLs produced by bigger hatcheries through more production cycles.

However, we also learned that we need to access multiple markets. PL has no shelf life, and the window to sell is small: 4 days at most. I cannot sell PL8 or PL13, and relying on one region can be risky. We diversified geographically by selling to several regions in India, even with smaller volumes, to ensure stability.

By 1999, we decided to build our own hatchery. Our values were lean and functional, without unnecessary infrastructure. In Visakhapatnam (or Vizag), we constructed our own greenfield hatchery.

Investing to deliver disease-free PL

What expertise did you need to deliver disease-free PL?
Those were the days of farming the black tiger shrimp. Farmers started testing shrimp PL for diseases such as monodon baculovirus (MBV) and WSSV. Most wild broodstocks were infected, and vertical disease transmission was a major concern. We made a move to screen these broodstock and provide disease-free PL.

In India, eyestalk ablation was ineffective for maturation, so most hatcheries used gravid broodstocks. Since we did not want to use gravid broodstocks directly, we brought in Taiwanese experts to focus on maturation. We invested in two PCR machines to conduct disease checks before and after spawning, and we sourced test kits. By controlling everything from quarantine to individual spawning, we ensured high PL quality.

By 2001, our PL was in demand, and our hatchery gained a reputation for consistently producing disease-free PL. That was how we built trust. We learnt from Thailand and elsewhere and developed our own robust system for spawning and screening.

Scaling strategy with vannamei PLs

What was your production capacity and how did you scale further?
Initially, we had one hatchery in Vizag producing about 100 million PL/year. This was a big number back then. In 2004, when I was doing my MBA, I gained a better sense of business and began looking at expansion. We wanted to leverage our strong reputation, but transporting from Vizag to other regions, such as Tamil Nadu or Gujarat, was not viable due to logistics and costs.

So, in 2004, we expanded to Chennai and set up another hatchery. With better connectivity, production was 200 million PL annually. During a visit to Thailand, a small hatchery operator said he produced 500 million PL per year.

"It opened our eyes to the next level of scaling and operational efficiency."

That visit changed my approach and opened our eyes to the next level of scaling and operational efficiency. We realised the need to think beyond conventional limitations and innovate in business strategy too.

Vannamei shrimp in India

What made it such a game-changer compared to the black tiger shrimp?
By 2009, vannamei changed everything. The PL cycle for vannamei is shorter — only about 20 days compared to the 30 for black tiger shrimp. Farmers could go for higher stocking densities and faster turnarounds. When demand is high and the hatchery performs well, that speed makes a huge difference in volume and profitability.

The Indian government approved vannamei shrimp farming in 2009. Vaisakhi was among the 12 hatcheries permitted to import the broodstocks. We brought in a Thai technician for maturation, while we continued with Taiwanese expertise for black tiger shrimp.

The Vizag hatchery concentrated on black tiger, while the Chennai hatchery focused on vannamei. We were the first hatchery in India to sell vannamei PL on 9th September 2009.

That was a milestone, but was the market ready to switch to vannamei shrimp back then?
Not entirely. From 2009 to 2010, progress was slow. Farmers were hesitant, and we faced some resistance. Then everything changed in 2011 when early mortality syndrome (EMS) hit Vietnam and Thailand. The global shrimp supply fell, prices shot up, and India, being unaffected, suddenly found itself in a sweet spot. The demand for vannamei exploded, farmers made huge profits, and that triggered a massive expansion.

The boom times of 2011

How did you take advantage of this new wave?
It was insane in 2011-2012. Ponds were being dug across the country, and hatcheries were coming up fast. We did not want to miss the opportunity. We had to scale up quickly. Building new hatcheries would take a year or more, so we pursued acquisitions. Within 12 to 18 months, we acquired three large companies. One of them had one of India's largest shrimp farms, which we still operate today. This takeover was strategic, since it is nearly impossible to build a 250-acre (101ha) coastal farm from scratch in India. The other two acquisitions were hatcheries.

We also entered into joint ventures, leased or acquired facilities to quickly increase capacity. Around that time, the price of PL in 2011 and 2012 was $4.00/1000 PL. Even at that time, we thought of being vertically integrated, but then continued to focus on this hatchery business. Demand was high, prices were great—₹800/1,000 PL (USD18) at one point.

Success with efficiency, diversification and quality PL

Looking back, what made your model so successful?
Three things: First, operational efficiency – running lean and highly functional hatcheries. Second, market diversification – never relying on one region. Lastly, commitment to quality – disease-free PL was our promise, and we stuck to it with science and rigour.

During TARS 2025 Shrimp Aquaculture, at the Hard Talk with business leaders, Ravi Kumar Yellanki, representing the hatchery segment, joined four other business leaders, representing the feed, farm and processing segments to discuss dysfunction and collaboration in Asia's shrimp aquaculture. Other leaders were Preecha Ekatumasuit, TRF Feed Mill Co Ltd, Thailand; Henrik Aarestrup, BioMar Group, Denmark; William R Kramer, HP Aquafarm Inc, Philippines; and Christopher Tan, Mida Trade Ventures Pte Ltd, Singapore.

These helped us build credibility, and once that happened, demand followed. Four years ago, we built another greenfield hatchery in Pondicherry and expanded our existing ones. Today, we produce around 5 billion PL per year across eight hatcheries. We have five hatcheries in Vizag and three in Pondicherry. In 2024, we also acquired a new hatchery in Vizag.

Which were your most successful years?

2011 to 2017 were the honeymoon years for the industry in India. Demand for PL was sky-high, prices remained strong, and farmers achieved profitable returns. During this time, all hatcheries—including those offering poorer quality PL—performed well.

India benefited from fortunate timing, as new farms were profitable and vannamei shrimp was introduced just as EMS hit Southeast Asia and China's rising middle class increased imports. These global trends aligned by chance, giving India a major advantage.

Vertical integration

What was the push to be integrated?

We are now a vertically integrated company with hatchery, farming, and processing operations. In 2021, we started our processing operations in a leased facility. We completed a modern processing facility in Vizag that will be fully operational by October 2025. After gaining experience at a small plant near Calcutta over the past four years, we recognise that market fluctuations are part of this cyclical industry. Despite current low shrimp prices, our long-term plans remain unchanged. We are also exploring opportunities in the domestic market.

Growing the hatchery business in India is limited. It is a fragmented segment. A vertically integrated operation with farming and processing, gives us more scope to increase revenue. With our own farms, we control quality and post-harvest handling, especially maintaining the cold chain, which is critical.

Our processing plant is strategically located, just 25km from our farm. In India, such proximity is a dream, and it gives us a huge advantage in ensuring quality. Moving forward, we would like to increase our farming.

Drivers of success

Reflecting on your own success — what would you say made the difference for you?

Success requires perseverance, consistency, and honesty, as well as staying focused, seeking opportunities even during adversity, and always be truthful with yourself and your business. However, I have been fortunate to work with a strong team—most of us (partners, shareholders, and our senior staff) have been together since 2001. This level of trust is essential in our industry. One person alone cannot build all this.

We made smart decisions and remained committed, which enabled us to sustain our top position in the hatchery segment for over two decades. Our ongoing evolution and focus have been key to our stability and success.

Raising the bar with quality and disease-tolerant broodstock

As President of AISHA, what are your goals for the hatchery segment in India?

The hatchery is the bridge connecting breeding with farming, so strict protocols are necessary to produce disease-free PL. India already has advanced infrastructure, with 95% of its shrimp hatcheries meeting high standards.

At TARS, I brought up how our association can improve broodstock. We can learn from Ecuador's success with WSSV-tolerant broodstock, which reduces survival rates to 50-60% during outbreaks rather than causing total losses. Asia faces crop losses due to disease and adopting disease-tolerant and SPF-certified broodstock, as practiced in Saudi Arabia, is essential.

In any industry, there are bad apples. How can AISHA support self-regulation among hatcheries?

It comes down to individual reputation. If a hatchery does not operate responsibly, it will not survive in such a competitive market. Market forces drive better operational practices. On top of that, regulatory bodies like the Coastal Aquaculture Authority (CAA) conduct regular inspections.

We also invest in awareness programs. HATCH India brings together all 550 hatcheries every two years, and even hatchery technicians are involved and benefit.

What support do you expect from broodstock suppliers to develop shrimp farming in India?

I am not a big fan of BMCs (Broodstock Multiplication Centres) which grow imported parent lines with relatively less biosecurity compared to nucleus breeding centres. Disease can easily slip through. Besides, broodstock imports only cost around INR120 crores, while our shrimp exports are worth INR35,000 crores. That's less than 1%—so why take the risk?

Breeders must work closely with hatcheries and understand India's field conditions. Currently, they run selection programs mostly in the U.S. and ship broodstock without any local selection. In contrast, entire farms act as genetic testing grounds in Ecuador. They select the best performers across 200,000ha. Selection should occur in India using data to identify appropriate lines with markers.

India needs to run sentinel trials and develop region-specific lines, especially ones that show tolerance to EHP. Today, no breeding company has a truly EHP-tolerant line. It is a challenge not just for India, but for all of Asia. SPF has helped us scale, but it is no longer sufficient. There's a need for improvement. Every breeding company must be willing to test and validate its claims in Indian conditions.

What about more engagement with farmers?

The success of aquaculture in India depends on collaboration, communication, and continuous improvement across all sectors—hatcheries, farms, feed, and genetics.

At HATCH India 2025, we will have dedicated sessions for farmers. Often, when a farmer has a bad crop, they blame the PL, while the real issue is usually management practices—biosecurity, pond preparation and post larvae handling.

We need to stop working in silos. We must start breeding for the success of farmers, formulate feed for the success of farms, and educate farmers so that every part of the value chain contributes to the final outcome.

Use of antibiotics

What are the steps to educate hatcheries around antibiotic usage?

Antibiotics are covered under the National Residue Control Program (NRCP). The Export Inspection Council (EIC) takes hatchery samples and checks for residues. However, the testing method is flawed—especially in PL—because metabolites in the shrimp shell mimic antibiotics, resulting in false positives. Instead, authorities should inspect storerooms for antibiotic inventories.

We are also running sensitisation programs to explain that antibiotics no longer work due to antimicrobial resistance (AMR). Even in hatcheries, the bacteria are already resistant. Probiotics and microbiome management are more effective, and we have seen a huge shift toward probiotics in India's hatcheries. The goal is to stabilise the microbial ecosystem, not fight it. Maintaining a balanced microbiome means fewer disease outbreaks and better PL quality.

Fostering collaboration

Can industry players, including government agencies, collaborate well?

India's industry cannot match Ecuador's vertical integration, but we can compete through collaboration. Broodstock suppliers should work with feed mills to create nutritionally compatible diets. Feed companies should partner with farmers to provide support and knowledge. Government and industry bodies, such as CAA and AISHA, should align on practical regulation and training. Only through cross-sector collaboration can we raise standards and stay globally competitive.

What is pushing India is competition. Let me give you some numbers:

- Hatcheries: 550 hatcheries with installed capacity of 200 billion PLs vs 80–90 billion required.
- Feed mills: 3 million tonnes/year capacity vs 1.5 million tonnes/year demand.
- Processors: More cold storage and freezing capacity than needed. More numbers of cold storage facilities are chasing limited shrimp raw material.

The hatchery in Srikakulam, Andhra Pradesh, has a production capacity of 1.2 billion post larvae/year.

Excess capacity forces players to boost quality or lose business. That is India's invisible advantage. Whoever gives effective and efficient feed rules the roost.

Is there a need for collaboration in feed formulation?

Feed formulation cannot remain generic anymore. With 65% farms with low saline waters and with different genetic lines requiring different protein levels, it is vital for feed millers to collaborate with breeding companies. Only by aligning formulations with both environment and genetic lines can we achieve consistent growth, better FCR and profitability.

Shift to domestic consumption

Can India realistically build up local consumption?

The Indian shrimp industry should prioritise the domestic market. Farmers can sell fresh shrimp directly to nearby markets while processors should reach out markets in the hinterland with IQF and ready to cook products. Success depends on how our industry brings awareness to the public at large.

Generation Z represents 26% of India's population and accounts for 47% of consumption. They are health-conscious and prefer high-protein, ready-to-eat and IQF shrimp. We need to educate and promote shrimp consumption directly to this demographic cohort as there is a clear match.

Larval rearing tanks in the hatchery in Srikakulam, Andhra Pradesh.

Looking ahead, how do you see India's role globally?

India has the potential to become the Ecuador of production and the China of consumption. Only about 10% of India's potential shrimp-farming land is used, while Ecuador has little room to expand. With a large domestic market and a growing middle class, India can scale up sustainably by maintaining low densities and innovating.

So, the future is bright—but only if we act now.

Allan Cooper, Director of Strategy, Marketing and Value Creation, Vitapro (third left) moderated a panel on Global Shrimp Production. Speakers were from right, Professor Guozhi Luo, Shanghai Ocean University, China; Nguyen Hoang Liem, General Director, Minh Phu Seafood Export, Vietnam; Ravi Kumar Yellanki, Managing Director, Vaisakhi Bio Marine Pvt Ltd., India; Hendi Yanto Effendy, Head of International Business Development, PT Central Proteina Prima, Indonesia; Sandro Coglitore, General Manager, Omarsa S.A., Ecuador and Erwin Termaat, Kontali Analyse.

Global shrimp production: An overview for 2024 and outlook for 2025

Disease and rising costs slowed global production, but there is an opportunity for growth

In June, at the TCRS Shrimp Summit 2025, held in Bali, Indonesia, Erwin Termaat, Shrimp Production Analyst at Kontali Analyse, gave a presentation on shrimp production trends in 2024 and provided a production outlook for 2025, using numbers for the first half of 2025 and then estimate for the full year.

In 2015, production of both vannamei and monodon shrimp was 3. 45 million tonnes, and in 2024, it was just over 6 million tonnes. The compound growth rate (CAGR) over the last 10 years was 7%. Growth has slowed: from 2015 until 2019, the growth rate was at 9%.

Global production of vannamei shrimp in 2024

Vannamei shrimp remains the leading species with slightly over 5.5 million tonnes forecasted at the end of 2024 and showing a 2% Y-o-Y growth. Asia is the largest producing region at 73% in 2015 and 64% in 2024. Latin America, particularly Ecuador has been catching up. It had 26% share of global production in 2015 which grew to 34% in 2024 (Figure 1).

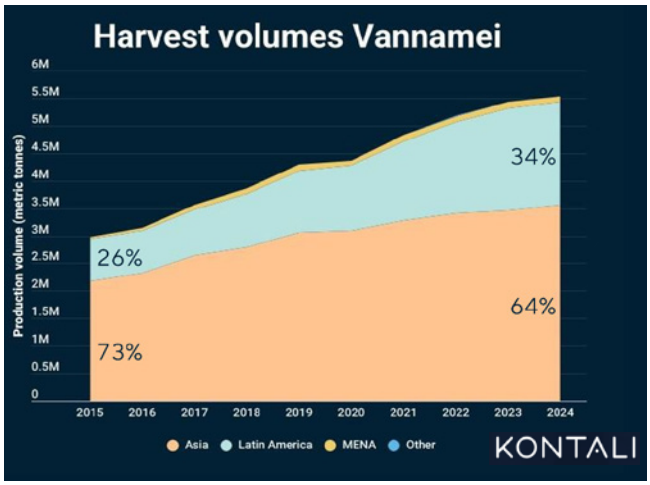


Figure 1. Share of vannamei shrimp volumes in 2024. Asia was the largest producing region at 73% in 2015 and dropped to 64% in 2024. Latin America, particularly Ecuador has been catching up rising to 34% share in 2024. Source: Presentation on Global Shrimp Production by Erwin Termaat, Kontali Analyse, TCRS Shrimp Summit 2025. June 22-25, 2025, Bali, Indonesia.

Erwin explained in detail the methodology Kontali Analyse uses to make these predictions. "We use export data, trade data, and feed sales wherever reliable and available. For example, we link the Ecuadorian exports compared to trade. In India, feed companies that are publicly traded, publish their numbers on quarterly feed sales. We transform export numbers to live shrimp equivalent to produce production volumes. We verify with partners on the ground." He added that knowledge of production parameters, stocking dates, harvest periods, and disease occurrences is crucial for accurate analysis.

During the Shrimp Summit in 2024, Kontali had predicted growth in **China** slowing to 2%. This did not happen. "In fact, in 2024, China's vannamei shrimp production grew by 5%. The new technology, greenhouse farming, continued to rise, though disease incidences remained a challenge. This means that China will reach the one million tonnes in production," said Erwin, adding that local production for festivals, Chinese New Year and the Golden Week in May are very big drivers for local production. Imported shrimp goes to channels such as ecommerce.

Ecuador's shrimp production trends showed that in 2024, growth slowed to 2%, significantly lower than the expected 8%. Exports to China, Ecuador's main market were down, and producers started to look at market diversification. Shrimp growth rates were slower during the cold period influenced by La Niña.

During the Global Markets US session, following a presentation by Ragnar Nystøyl, Kontali Analyse (second left) on global demand, a panel led by Travis Larkin, Seafood Exchange (left) and comprising Eric Bloom, Eastern Fish Company; Matt Livesay, Red Lobster and Robert DeHaan, National Fisheries Institute, shared their perspectives on the uncertainty due to the shifting situation regarding US tariffs.

India's production in 2024 grew by 5%, as expected rising to 1.1 million tonnes. This analysis was supported by feed sales and spread-out production cycles throughout the year. Production matched steady demand from the US for value added Indian shrimp. Feed sales in India have a strong correlation with production, with a relationship exceeding 60%.

In **Indonesia**, harvest volumes for vannamei shrimp declined by only 3% in 2024 to 360,000 tonnes, whereas Kontali predicted a 5% drop during the 2024 Shrimp Summit. Erwin said, "The reason for the relatively lower decrease is that Indonesia was finding new markets such as Japan. That led to them having a bit more need for supply for export."

Vietnam produced 500,000 tonnes in 2024. Domestic marketing is with live shrimp. "The growth was 6% from 5% with higher production at the end of 2023 spilling into 2024," said Erwin. Vietnam also has quite a huge domestic market for live shrimp. "We adjusted our expected 5% increase to 6%, even though the trade data showed an 80% increase during the year."

Erwin Termaat said, "In 2024, China's vannamei shrimp production grew by 5%. This means that China will reach the one million tonnes in production,"

Erwin also discussed Kontali's farming price index, which is a weighted index of farming pricing on a global scale. "We saw an uptick in Q4 2024 as well as in Q3 and in the first quarter of 2025. This pushed farmers to stock. A prime example is India, which had more stocking in Q4 of 2024, but which leads to a relatively high supply in the first half of 2025. There are already signs indicating that in Q3 2025 prices are going to be down. In China when supply is high, prices will come down."

Outlook for 2025

Allan Cooper, Vitapro, moderated a panel on Global Shrimp Production. He set the stage by highlighting differences in the farming systems used in the leading shrimp producing countries, China, Ecuador, India, Indonesia, and Vietnam (Table 1).

Allan commented that pond sizes vary greatly between countries, large 5-10ha farms in Ecuador, to small greenhouses in China. "Genetics shows a regional difference; Ecuador uses local genetics and in Asia, a focus on SPF and growth. Obviously, there are different challenges with each farming system and country. How do we grow our production to ensure high quality, be cost efficient, and handle challenges?"

Kontali projected that by the end of 2025, global shrimp production will be 5.836 million tonnes, reflecting a 6% growth (Figure 2). Erwin noted, however, that disease outbreaks and rising costs have slowed the growth rate over the last five years. Allan added that this is probably the first year after the pandemic that global shrimp production is growing at 6%.

KPI	Ecuador	China	India	Indonesia	Vietnam
FCR	~1.3–1.8	~1.0–2.0	~1.2–1.5	1.55–1.59	1.4–1.6
Weekly growth	2.3–2.7g	1.3–1.7g	1.5–2.5g	1.54–1.75g	~1.5–2.5g
Pond size	Large: >5 ha (avg. ~7–10 ha)	0.4–0.6 ha	0.4–2 ha	0.2 ha	1000 m² (~0.1 ha)
Genetics	*L. vannamei*, local genetics	*L. vannamei*	Several imported SPF lines	SIS (Hardy Line)	Imported, SPF, fast growth
Survival rate	70%–90%	65%–75%	70%–90%	83%–85%	40%–60%
Yield (tonnes/ha/year)	Avg. ~12	20–70	5–7.5	67–74	~40–60
Cost per kg (USD)	2.2–3	3–4	2.5–3	2.6–2.9	3–4

Table 1. Data on different production systems, presented by Allan Cooper, Vitapro S.A. at TCRS Shrimp Summit 2025, June 22-25, 2025, Bali, Indonesia.

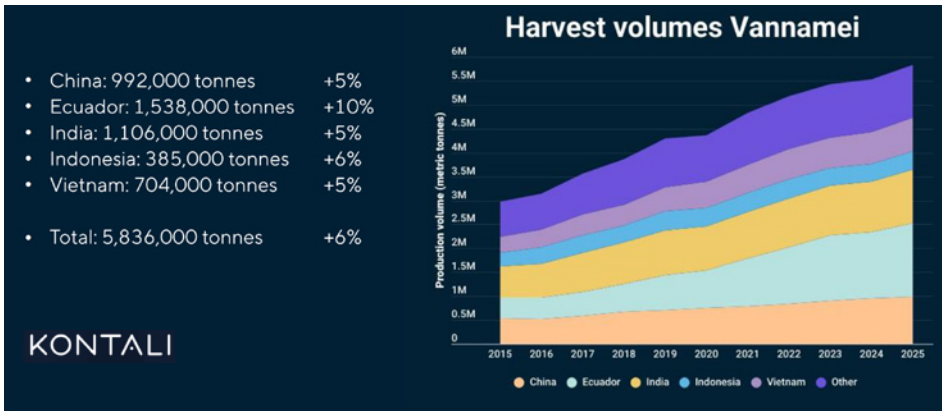


Figure 2. Shrimp Production outlook for 2025. Source: Presentation on Global Shrimp Production by Erwin Termaat, Kontali Analyse, TCRS Shrimp Summit 2025. June 22-25, 2025, Bali, Indonesia.

"In 2025, China's production is expected to reach 992,000 tonnes, reflecting a 5% growth," said Erwin. Guozhi Luo, Shanghai Ocean University explained that demand will continue to increase. Shrimp consumption is already high in coastal cities which are close to the producing areas. However, there is also demand in inland cities, but transporting fresh shrimp is a challenge. Higher supply means lower prices, affecting farmers facing rising production costs.

She expects a slowdown in production via intensive systems such as greenhouse models and recirculating aquaculture system (RAS) as the government has enforced effluent discharge standards. "These must meet standards such as nitrogen at less than 5mg/L and phosphates at 0.5mg/L due to the environmental impact of intensive aquaculture. We need to study the production cost across the whole supply chain," said Luo.

For Ecuador production is projected to reach 1,538,000 tonnes, reflecting a +10% growth. Ecuador remains heavily dependent on exports, with over 50% of production tied to trade. Kontali predicted that at the end of the year, Ecuador will show double-digit growth.

Sandro Coglitore, Omarsa S.A. agreed that Ecuador will continue to increase production, continuously. As the dollar is the currency in Ecuador, to keep growing, producers need to keep costs of production low. The expansion in Ecuador will be in existing land area, and more production will be with better genetics and feeds, integrating AI and feeding technologies. Limiting Ecuador is the lack of cheap labour to expand the peeled and value-added shrimp segment.

Kontali expects India to reach 1,106,000 tonnes, reflecting a 5% growth in 2025. Ravi Kumar Yellanki, Vaisakhi Marine Resources admitted that producers defied the usual practice of stopping culture during the colder months of October to December. Stocking continued in the last quarter of 2024 which then added to volumes in 2025. There are headwinds created by disease. Ravi sees a promising growth potential in the domestic market and estimated this to grow to 300,000 tonnes as India's economic growth is at 6-7%.

"Indonesia's production is expected to grow by 6% to 385,000 tonnes," said Erwin. Hendi Yanto Effendy, PT Central Proteina Prima, said that farmers in Indonesia continue to face endemic disease threats but large-scale farms have been able to manage at stocking density of 150-175 PL/m^2. The recent US tariffs remain a challenge. Indonesia needs to expand markets to Europe and Japan.

Vietnam's production is expected to increase by 5% to reach 704,000 tonnes. Nguyen Hoang Liem of Minh Phu Seafood Exports identified US tariffs and disease as key challenges to this growth. However, he expressed confidence that diversified production models may mitigate these obstacles. There is also an opportunity to further expand into value-added products.

Regarding the primary challenges confronting global shrimp production, in a poll, participants identified diseases as the leading concern (63%), followed by market prices (25%). Additionally, threats such as tariffs, environmental degradation, and sustainability expectations were each cited at 4%. Source: The Center for Responsible Seafood. info@responsibleseafood.org

At PT Tequisa's booth, Nguyen Hoang Liem, Minh Phu Seafood Export, Vietnam (centre left); Rubiyanto Haliman, PT Central Proteina Prima (centre right) and Tomota's Lang Vinh Dieu (left) and Monatjatur KD, PT Tequisa (second right).

A breather for Vietnam's shrimp industry through lower stocking density

A production strategy which aligns with environmental carrying capacity aims to return shrimp farming to its natural ecosystem

By Ha Thu

The advanced farming model requires no commercial feed, no aerators, and no chemicals.

Farmers in Vietnam are quite confident in their farming expertise. They are well-acquainted with various farming practices, including the application of chemicals to enhance pond conditions and pond and feed additives to mitigate shrimp diseases. A significant portion of their investments has been dedicated to these aspects.

However, faced with dwindling harvests and a daunting challenge of an overexploited environment, the shrimp industry is forced to break away from an intensive production mindset. Today, a brave few have chosen to challenge the status quo by reducing farming load and embracing sustainability, while accepting lower yields in the process. Interestingly, evidence shows that this shift not only safeguards their ecosystems but also leads to steady incomes. In the end, these pioneers proved that sometimes stepping back can lead to greater rewards.

Research conducted by Nguyen Thanh Long from the Faculty of Aquaculture at Can Tho University reveals that feed expenses account for 55.9%, while the average cost of chemical inputs comprises 19.3% of the total variable costs for a black tiger shrimp farming cycle in Ca Mau Province. Despite this investment, however, the actual mortality rate remains over 50%, with the average success rate hovering around 30 to 40%.

What farmers often overlook is the escalating virulence of diseases and the declining conditions of their farming environments due to the overexploitation of the natural ecosystems. These evolving factors outpace their traditional experience.

“Suppliers are primarily motivated by profit and often prioritise their own interests when providing inputs for the ponds. Farmers tend to focus more on income with a preference for higher amounts regardless of actual profitability and productivity. Their approach to increasing profitability and productivity has been through intensification, which unfortunately does not align with the carrying capacity of their farming systems,” said Nguyen Thai Binh, founder of Binh Minh Domesticated Shrimp Postlarvae (Binh Minh), a producer of 3 billion domesticated post larvae annually, comprising 1.8 billion black tiger shrimp *Penaeus monodon* and 1.2 billion *Penaeus vannamei* shrimp.

Productivity refers to the level of shrimp production in a farming system, while carrying capacity refers to the maximum amount of shrimp that can be sustained in the system.

Production according to environmental carrying capacity

A production strategy that aligns with environmental carrying capacity aims to return shrimp farming to its natural living conditions in the advanced extensive farming models. Binh Minh is promoting such an approach which introduces some management and supplementary factors to support shrimp growth, in contrast to traditional extensive farming, which has limited control over environmental conditions.

Intensive farming of black tiger shrimp

The average stocking density of black tiger shrimp in intensive farming in Vietnam is typically between 20-40 post larvae (PL)/m^2, while traditional extensive farming has about 2-3 PL/m^2. In the advanced extensive farming model, farmers typically maintain a density of just 1PL/m^2. Despite this low density, they can still achieve impressive yields, averaging between 500 and 800kg/ha /year.

This model significantly reduces the use of chemicals, supplements, and formulated feed, while also eliminating the need for water exchange throughout the entire cycle. As a result, farmers are less vulnerable to seasonal variations, enabling year-round shrimp harvesting. Through partial harvesting, farmers can market several sizes of shrimp.

The advanced extensive farming model enables farmers to harvest throughout the year and sort sizes through selective partial harvesting.

Selected domesticated broodstocks

Binh stated that the key to the success of his approach is to stock ponds with post larvae from broodstocks specifically selected for fast growth and larger harvest sizes.

"Domesticated post larvae have a survival rate of about 50%, which is comparable to that of regular black tiger shrimp sourced from wild-caught broodstock. However, it has the advantage of growing to larger sizes," he observed.

This finding was highlighted in a recent study by Dr Hoang Tung from CSIRO (Australia), in partnership with Binh. The study evaluated the performance of domesticated tiger shrimp and mud crab (*Scylla paramamosain*) across 90 rice-shrimp ponds in the Mekong River Delta of Vietnam from 2022 to September 2023. The results revealed that tiger shrimp produced by wild-caught broodstock averaged 46g at harvest, while those produced by domesticated broodstock grew to an impressive weight range of 62g to 77g.

Fifteen years ago, many were hesitant on switching to domesticated shrimp due to the significantly higher costs of post larvae compared to regular options and the absence of a dependable productivity model for comparison. To build their confidence, Binh Minh has offered free domesticated post larvae for grow-out trials, gradually winning over the farmers. In 2024, over 38,000 households in Vietnam were using domesticated post larvae supplied by Binh Minh. Post larvae from Binh Minh have the highest price in the market, reflecting its quality and the significant investment made in broodstock maturation, larval rearing, and strict quality control within its hatcheries.

"While domesticated shrimp is not a cure-all, it represents a promising high-yield post larvae option. However, achieving the desired output depends on several factors," Binh noted, highlighting the need to maintain environmental balance and encourage a thorough understanding of shrimp farming to promote optimal growth.

Balanced environment, natural food

The advanced extensive model avoids the use of commercial feed, chemicals, and aerators. Binh emphasises that the primary goal of enhancing shrimp health is not about eradicating bacteria or cleaning the environment but rather achieving a balance between harmful and beneficial bacteria. "Nature knows how to harmonise its populations best. We simply need to support this natural process," he explains.

The balance is achieved by creating an environment that supports the growth of beneficial algae using Phu Dien biograin - an organic fertiliser innovated by Binh Minh - during pond preparation and throughout the growing season. This approach aims to enhance the natural food sources available in the ponds.

The primary components of these bio-pellets are minerals and beneficial microorganisms. Their main purpose is to provide essential bacteria that help form natural floc, serving as food for shrimp. Additionally, these grains improve and restore the pond bottom, which fosters a better living environment for shrimp, crabs, and fish to thrive.

For optimal results, it is advisable to apply the biograin seven days prior to introducing the shrimp, using a dosage of 3 to 6kg per 1000m². After four days, it is reapplied at a rate of 2 to 4kg per 1000m². Subsequently, application continues with 1 to 2kg per 1000m² every seven days. The grain is spread directly over the pond surface without the need to soak overnight.

"We're proposing a model focused on the investment-to-profit ratio. With a total investment of 7.2 million/ha for purchasing post larvae and biological inputs.."
- Nguyen Thai Binh

Binh Minh's domesticated shrimp exhibits rapid growth and boasts a high resistance to diseases.

Shrimp farmers in the Mekong Delta are well-acquainted with advanced extensive farming practices and the implementation of domesticated shrimp varieties.

Larger-size shrimp tend to fetch a higher price in the market.

Costs and profits

This new approach presents several benefits that can yield profits comparable to those of intensive farming. "We're proposing a model focused on the investment-to-profit ratio. With a total investment of 7.2 million/ha for purchasing post larvae and biological inputs to establish a natural food source in shrimp ponds, farmers can reap the following advantages: a survival rate of 40-50%, with shrimp reaching a size of 20/kg after 3 months, and after 4 months, they typically weigh between 10 to 15 shrimp/kg. The expected productivity is 500 to 800kg/ha/year," Binh elaborated.

Tung noted that larger shrimp can command farmgate prices that are 54% higher and significantly boosts farmers' gross revenue. Another major benefit of this model is its alignment with nearly organic practices, involving minimal controlled farming factors. This ensures that the shrimp farming industry can thrive with less impact on the environment while remaining profitable.

"Vietnam boasts over 600,000ha dedicated to extensive farming (DG Fisheries, 2023). Even a slight improvement in survival and growth rates, which ultimately boosts harvest sizes, can lead to significant overall benefits," according to the reaserch by Tung and Binh.

Ha Thu is a contributing writer focussed on livestock production and aquaculture, based in Ho Chi Minh City. Email: hathu.vietagri@gmail.com

Shrimp culture pond with biosecurity in Andhra Pradesh.

A view on shrimp farming in India

The future will depend on its competitiveness in value addition, market expansion and application of new technologies

By Laxmappa Boini, Suresh Pudi and Ravinder Rao Bakshi

Shrimp farming in India plays a vital role in the country's seafood exports. Commercial shrimp farming began three decades ago, with the entry of corporations taking advantage of high demand, and support from the government. Entrepreneurs created the necessary infrastructures such as hatcheries, processing units, and grow-out farms. However, with recurring and devastating outbreaks of white spot syndrome virus (WSSV) since the late 1990s, shrimp farming suffered major production losses. Today, by taking necessary preventive steps regarding environmental protection, this industry is growing steadily in farms of less than five hectares, either owned or leased.

Shrimp farming in India initially focussed on two species – the black tiger shrimp *Penaeus monodon* and the white shrimp *Fenneropenaeus indicus*. Production increased consistently until 2005, when it stagnated during 2005-2010 due to susceptibility to diseases. Outbreak of diseases caused size variability and low yields. The main reason was the use of infected wild-caught black tiger shrimp broodstock, often with WSSV.

Subsequently, specific pathogen free (SPF) whiteleg shrimp *(Litopenaeus vannamei)* was introduced to India's shrimp farming industry in 2009. However, the introduction was done cautiously, allowing a few selected companies to import and perform trials, from which rules for further imports were framed and implemented.

To date, vannamei shrimp broodstock can only be imported from 14 approved genetic companies and must be quarantined in a government-run facility upon entry into the country. Development of broodstock multiplication centres is being allowed and the government has expressed its interest to allow groups that can complete the lifecycle of this shrimp within India in a fully contained and highly biosecurity facility and produce broodstock locally.

Consequently, vannamei shrimp farming expanded rapidly and dominated that of the black tiger shrimp due to the tolerance of vannamei shrimp to a wider range of temperature fluctuations and a growing global demand. Andhra Pradesh, in the south continues to show promising results in shrimp farming and is the major producer.

Cropping pattern and production trends

The distinct stocking and harvesting seasons in the coastal states of India are significantly influenced by seasonal variations. In technically more advanced farms, there are two crops for the black tiger shrimp: a monsoon crop and the major summer crop. On the other hand, when salinity increases following the monsoon, stocking is carried out at traditional farms.

Healthy vannamei shrimp harvested in Telangana.

Vannamei shrimp culture, on the other hand, is year-round, with no specific harvest season outside of a few locations. Since SPF vannamei shrimp was introduced, India has produced incredible shrimp volumes. Due to increased stocking densities from 25 PL/m^2 to 30 PL/m^2 and better growth rates that were on par or even higher than those of black tiger shrimp (up to 20g), farms that

had previously farmed black tiger shrimp saw an increase in productivity. Farmers quickly shifted to the vannamei shrimp, and today this species accounts for over 90% of shrimp production in India. To facilitate the growth of farming areas, investments were made in new hatcheries, feed mills, and processing facilities.

Black tiger shrimp production has fluctuated significantly over the last five years, dropping by 22.0% from 2020–2021, most likely because of disruptions brought on by the pandemic. However, production experienced a robust recovery from 2021-2022, growing at consecutive rates of 46.7%, 55.7%, and 36.1% to reach 85,752 tonnes in 2023-2024 (Table 1). A 142% overall increase from 2019-2020, indicates improved farming methods, increased market demand, and a growing preference for this shrimp, possibly because of increased market value and consumer interest in premium shrimp products.

Year	Shrimp production (tonnes)		Total
	Litopenaeus vannamei	*Penaeus monodon*	
2019-2020	711,674	35,437	747,111
2020-2021	815,745	27,616	843,361
2021-2022	976,213	40,504	1,016,717
2022-2023	1,097,481	63,041	1,160,522
2023-2024	1,076,970	85,752	1,162,722

Table 1. Shrimp production in India from 2019 to 2023-2024.

Vannamei shrimp farming has also displaced many brackish water and freshwater fish farmers, attracted by its high stocking density and fast growth. With appropriate management techniques, high-quality pelleted feed, and aeration systems, farmers can now produce 5–6 tonnes of shrimp/ha in extensive or improved extensive farming.

Over the last five years, *vannamei shrimp* production was on a strong upward trend, rising from 711,674 tonnes in 2019-2020 to a peak of 1,097,481 tonnes in 2022-2023. The overall increase was 51%. The year 2021-2022 saw the highest annual growth (+19.7%), which most likely was due to improved farming practices and higher demand during the post-COVID recovery period.

Nonetheless, production fell (-1.87%) to 1,076,970 tonnes in 2023–2024, either as a result of economic issues, international competition, or market saturation (Table 1). The long-term trend is still favourable despite this slight decline, indicating that the industry is still growing while adjusting to market needs.

Over the past ten years, the production of shrimp has increased by 255%, reaching 1,162,000 tonnes in 2023 compared to 330,000 tonnes in 2014. With the export of vannamei shrimp surpassing native species such as the black tiger shrimp, which was formerly the most common farmed species, the nation's shrimp production is undergoing an unprecedented shift.

The vannamei shrimp's increasing prominence is attributed to its advantageous commercial traits, which include faster growth rate, ease of breeding, greater adaptability to production environments, and comparatively higher demand in the global market. As a result, the vannamei shrimp has replaced the production of black tiger shrimp, which is more susceptible to viruses, leading to an increase in shrimp exports over time. Figure 1 shows the production trends for both shrimp from 2019 to 2024.

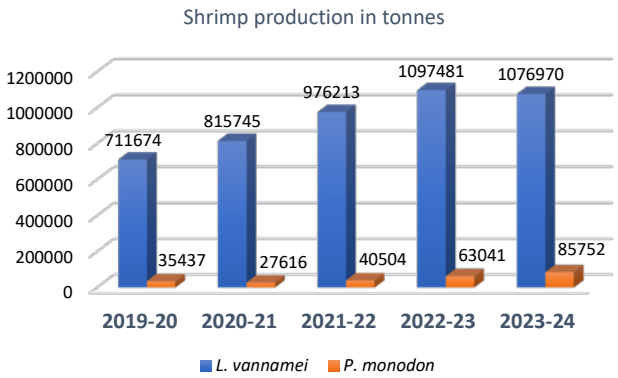


Figure 1. Shrimp production trends in India from 2019-2020 to 2023-2024. (Note: In India, the government's financial year runs from 1 April to 31 March the following year).

Healthy black tiger shrimp harvested in Andhra Pradesh.

According to the most recent government data, India has 621 processing units with a daily processing capacity of 36,572 tonnes, of which more than 68% are approved by the European Union (EU). Five states account for the majority of India's shrimp production, with Andhra Pradesh accounting for 81% in 2023, followed by West Bengal (6%), Gujarat (4%), Odisha (4%), and Tamil Nadu (4%). With a combined area of almost 78% of all the territory in India dedicated to shrimp culture, Andhra Pradesh and West Bengal are the two states with the largest areas under shrimp farming. West Bengal's proportion of the world's shrimp production fell precipitously over the past ten years, from 21.8% in 2012 to 6.1% in 2023, primarily because of low productivity in black tiger shrimp farming.

Disease outbreaks

Diseases such as WSSV, *Enterocytozoon hepatopenaei* (EHP), infectious hypodermal and hematopoietic necrosis virus (IHHNV), running mortality syndrome (RMS), early mortality syndrome (EMS) or acute hepatopancreatic necrosis disease (AHPND), loose shell and white faeces syndrome (WFS), and several other pathogens pose serious problems for shrimp farmers in India.

Shrimp size/kg	Farmgate prices in INR/kg for vannamei shrimp in 2025				
	February	March	June	July	August
30	470	420	410	460	395
40	415	350	340	385	345
50	375	335	310	355	325
60	345	315	295	335	305
70	310	285	265	305	285
80	290	255	245	280	260
90	270	235	225	260	240
100	260	225	215	250	230

Table 2. Recent farmgate prices for *Litopenaeus vannamei* in Andhra Pradesh. The average exchange rate to USD was INR 86.1.

Shrimp size/kg	Farmgate prices in INR/kg for black tiger shrimp in 2025			
	March	June	July	August
20	680	620	600	570
30	570	510	500	470
40	480	420	400	380

Table 3. Some farmgate prices for *Penaeus monodon* in Andhra Pradesh in 2025. The average exchange rate to USD was INR 86.1.

Even after 25 years since it first appeared in India, WSSV still causes significant crop losses; its virulence has not decreased. WSSV has an impact on the vannamei as well. Peak WSSV outbreaks occur during the winter months (January to March) and the monsoon season (June to August). Since warmer temperatures provide a natural defence against WSSV, there are comparatively fewer outbreaks of this disease throughout the summer. White faeces syndrome (WFS) seriously harms shrimp crops. Shrimp impacted by WFS develop slowly and have lower survival rates; this leads to poor harvests and low farmer profits. WFS is prevalent throughout the nation in a variety of geographical areas with a wide range of environmental factors and cultural customs.

Market trends and price fluctuations

India's seafood industry which is a major contribution to the country's economy, depends on farmed shrimp production. Despite rising tariffs and international competition, India, the second-largest producer and exporter of shrimp, saw its exports flourish. Estimates were USD8.3 billion in 2024 and USD20.9 billion by 2032. India is able to take advantage of this expanding market, particularly in markets such as the U.S., China and the EU, due to its competitive pricing and improvements in processing technology, as well as the rising global demand for healthy seafood.

Farmgate prices depend on several variables, such as seasonality, consumer demand, and global trade dynamics. In Andhra Pradesh, farmgate prices are often at their highest in January and at their lowest in April and July. Prices are greatly affected by both domestic and foreign demand, notably from the US and China (Tables 2 and 3).

Government support

The Indian government has increased its budgetary allocations for aquaculture. The nucleus breeding centres aim for better broodstock quality, and has provided quality broodstock to hatcheries. A 5% basic customs duty on feed imports has significantly reduced grow-out costs.

Challenges and future potential

Poor production efficiencies and disease outbreaks are the major causes of low productivity in this sector. Best Management Practices (BMP) and improving the biosecurity in hatcheries and farms must be followed by individual firms. Crop planning by choosing the right season, functional feeds and probiotics are necessary for sustainable shrimp farming. India's future in shrimp production will depend on its ability to maintain its competitiveness in value addition, market expansion and application of new technologies for strengthening the industry.

A high-value domestic market for shrimp is emerging in India, targeting a growing urban middle class and younger consumers. Ease of cooking shrimp and perceived health benefits of seafood are being promoted. Thanks to government initiatives and young entrepreneurs, India's shrimp export industry is currently expanding. Demand from consumers both domestically and abroad is being driven by the growing popularity of cuisines based on shrimp and the strong preference for seafood high in protein.

Indian shrimp is becoming more competitive in international markets because of the adoption of sustainable practices and technological changes such as contemporary breeding and farming methods, which are improving production efficiency and quality. India is in a strong position to maintain its position as the world's top exporter of shrimp - thanks to these combined factors.

References

https://mpeda.gov.in/
https://caa.gov.in/
https://www.globalseafood.org/advocate/how-india-became-the-worlds-top-shrimp-producer/
Riding the Waves: Shrimp Industry Resilient amidst Global headwinds, CARE Ratings Limited, Mumbai - 400 022.
Potential and Challenges in P. monodon culture in India: Seafood Expo Bharath, 1-3 July 2025, Chennai, India.



Dr. Laxmappa Boini is Assistant Director of Fisheries, Department of Fisheries, Wanaparthy, Telangana, India.
Email: laxmappaboini@gmail.com

Dr. Suresh Pudi is Joint Director of Fisheries (Marine), O/o Commissioner of Fisheries, Vijayawada, Andhra Pradesh, India.

Dr. Ravinder Rao Bakshi is Assistant Professor, Department of Zoology, MVS Govt. Arts & Science College (A), Mahbubnagar, Telangana, India.

How tariffs, shifting demand, and overproduction are redrawing global seafood trade

These shifts have transformed global pricing dynamics, especially for Ecuador and India, the two titans of global shrimp supply

For more than a decade, shrimp has quietly become one of the world's fastest-growing protein categories. Since 2010, global seafood consumption has steadily outpaced that of beef, pork, and poultry. Pork consumption, long dominant in parts of Asia, is expected to decline, particularly due to cultural preferences in the Middle Eastern and Muslim-majority regions where population growth is strongest.

At the heart of this seafood revolution is shrimp, which has doubled its global production in the last 10 years, but has stalled since 2022. These developments suggest the tide may be turning.

As the global demand for seafood accelerates, so does the complexity of navigating it. At Seafood Expo Global, held in Barcelona, Spain from May 6-8, S&P Global Commodity Insights offered a deep dive into shrimp market pricing including impacts — from tariffs and anti-dumping duties to shifting demand in key markets - US, EU and China.

The China factor: From buyer to competitor

Willliam Bland, Manager, Ags & Food EMEA S&P Global Commodity Insights, painted a sobering picture. "At the centre of this shift is Ecuador, now the world's largest shrimp exporter. Ecuador's growth is partly due to its push into China, the world's largest shrimp importer—until now." Ecuador is the global leader at 34% of the global shrimp trade in 2024 (Figure 1).

China is now the primary source of market anxiety. The source of shrimp's looming challenge is China's shift from importer to domestic producer. For years, Ecuador, the world's leading shrimp exporter has relied on China to export its surging production. In 2024, a staggering 73% of China's shrimp imports was sourced from Ecuador (Figure 2).

"China has historically been the driver of global shrimp demand. However, in 2024, domestic shrimp production in China began to surge, reducing the country's reliance on imports," said Bland. According to S&P Global analysts, the estimate is that China's shrimp farming output is growing at 5% per year, while consumption is rising more slowly, only between 2% and 3% annually (Figure 3).

"This growth in domestic production will displace millions of tonnes of potential imports over the next decade. This strategy now looks increasingly fragile for Ecuador. As China ramps up its own domestic shrimp production, import demand is starting to flatten," added Bland.

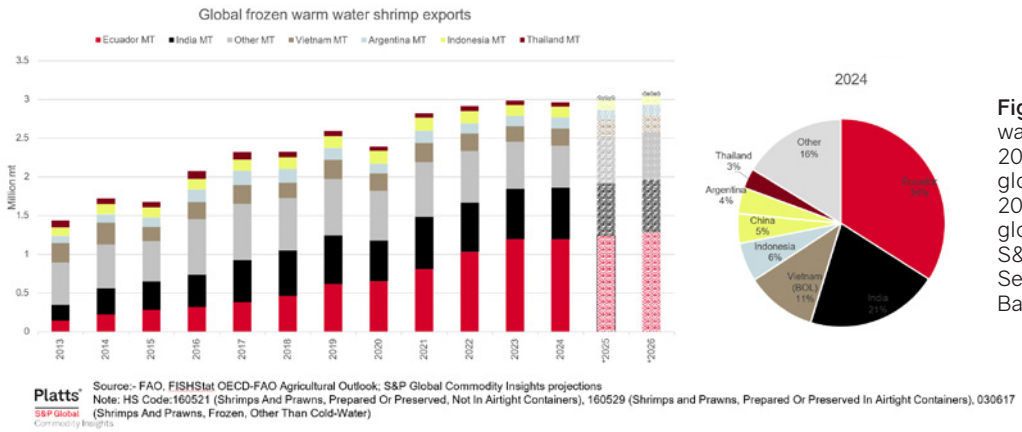


Figure 1. Global frozen warm water shrimp exports: 2013–2026. Forecast shows Ecuador's global leadership position in 2024 accounting for 34% of global shrimp trade. Source: S&P Global Commodity Insights, Seafood Expo Global 2025, Barcelona, Spain.

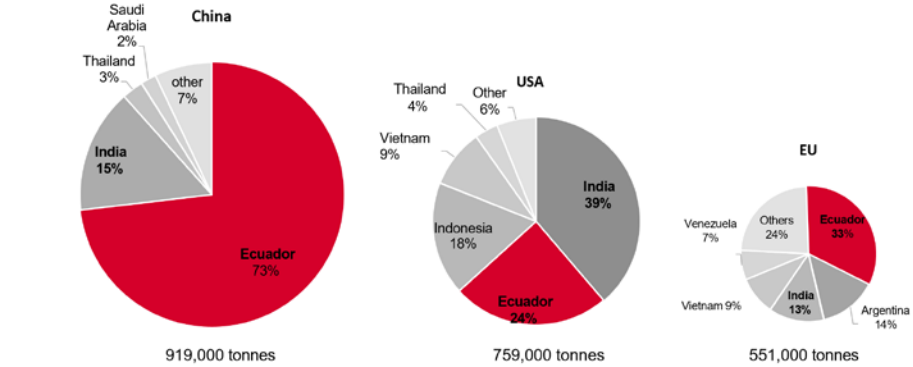


Figure 2. Shrimp imports from Ecuador by country/region: 2024—shows Ecuador's reliance on China. Source: S&P Global Commodity Insights, Seafood Expo Global 2025, Barcelona, Spain.

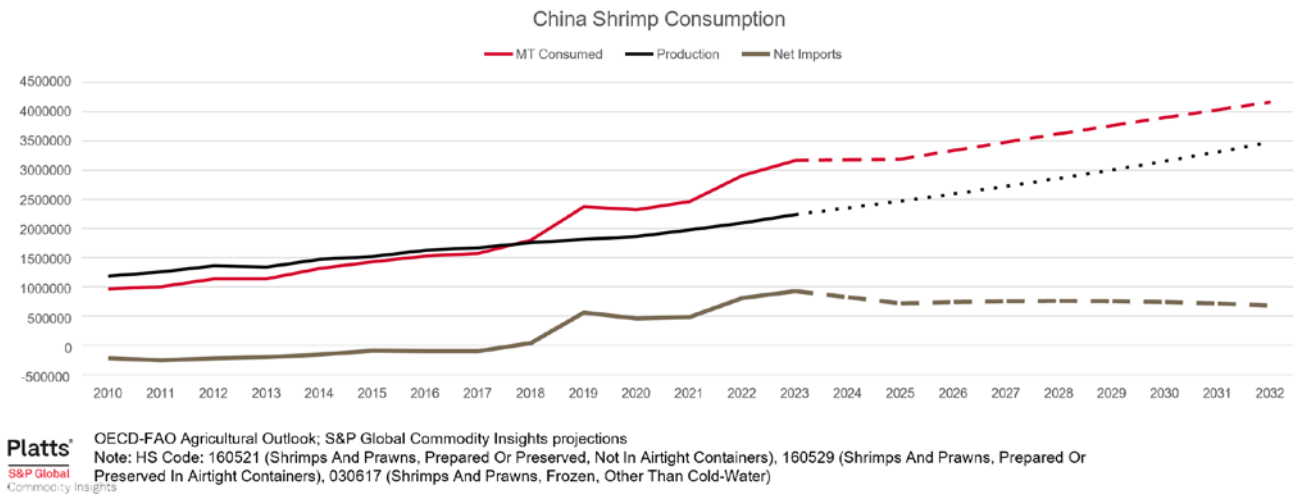


Figure 3. China domestic production vs import demand: 2024–2030. Forecast shows the worrying trend: domestic supply catching up with and soon overtaking demand. Source: S&P Global Commodity Insights, Seafood Expo Global 2025, Barcelona, Spain.

"The question now haunting Ecuador's shrimp exporters is simple: Where will all the shrimp go if China slows its buying?" asked Bland.

Prices: From predictable to volatile

Furthermore, when S&P launched its benchmark shrimp price assessments in late 2023, the market followed a predictable pattern. Prices rose ahead of the December holiday period, driven by demand from Europe and China. In March 2024, something unusual happened: prices fell when they were expected to climb further. The disruption was due to weakening Chinese demand and surplus production capacity, particularly in Latin America.

"Perhaps this sudden dip reflects the new reality. China's self-sufficiency ambitions are colliding with global oversupply. " said Bland.

If China cuts imports further, Ecuador's producers may flood other markets particularly Europe, with cheap shrimp. For European and US buyers, this might seem like good news. Cheaper shrimp could be on the horizon. However, this is not a certainty. S&P analysts caution that, "Ecuador is more likely to idle production rather than sustain losses. The S&P analysts stop short of predicting a price crash, noting that "production cutbacks in Ecuador are likely if margins erode."

A shift in global trade dynamics

The implications extend beyond Ecuador. For India, Vietnam, and Indonesia, China's inward pivot reshuffles the global shrimp map. India has long focused on processed shrimp for the US and EU markets, but even there, growth is slowing.

America's tariff trap

"In the US, the second largest shrimp importer, demand is showing signs of saturation (Figure 4). After a decade of rapid growth, US shrimp imports have plateaued. Worse still, Washington's trade policies have made matters more complicated," said Bland.

The US imposed a suite of tariffs in 2024 and 2025, ranging from anti-dumping duties to countervailing tariffs on shrimp imports. India, historically the U.S. top shrimp supplier, has been hit the hardest. With combined tariffs reaching 34.26%, Indian shrimp has become significantly less competitive. Vietnam faces an even steeper wall, with tariffs on some products reaching 74.6%.

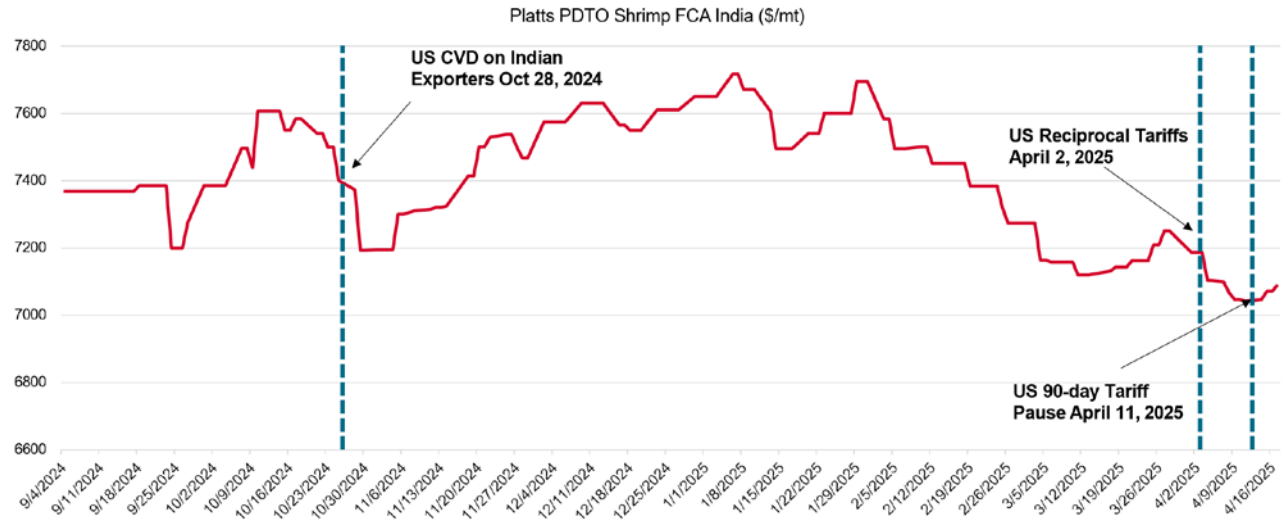
These levies have distorted trade flows. Ecuador, facing no anti-dumping duty and lower countervailing tariffs, has seized the moment, gaining a "tariff advantage". However, even for Ecuador, the advantage may prove temporary if US demand continues to stagnate.

(Editor's notes: In the latest update on shrimp tariffs on August 7, S&P Commodity 's Felipe Peroni and Ignacio Garcia reported that Ecuador's tariff when exporting to the US was raised to 15% from 10% previously. New tariffs took effect for major shrimp-exporting countries to the US, with India facing a 25% tariff, Indonesia 19%, and Vietnam 20%. Additionally, India had a further 25% tariffs, leading the total tariff on the country to 50%.)

India's exporters under pressure

Elvis John, Senior Price Reporter, Ags & Food, APAC explained how the broader shrimp market is grappling with a classic problem: too much supply chasing uncertain demand. For India's shrimp industry, the past year has felt like navigating a storm in uncharted waters.

Figure 4. China vs US quarterly shrimp imports: 2023-2025 shows stagnating demand from the US as the US imposed a suite of tariffs in 2024 and 2025. Source: S&P Global Commodity Insights, Seafood Expo Global 2025, Barcelona, Spain.



Source: S&P Global Commodity Insights
Note: Platts PDTO Shrimp FCA India assessment is for peeled, deveined, tail-on individually quick frozen 31-40 count/lb Vannamei shrimp on FCA Visakhapatnam basis to shipped 30-60 days from the day of publication.

Figure 5. Peeled deveined, tail-on vannamei shrimp prices: 2024-2025 show that the US tariffs have pulled Indian shrimp prices down. Source: S&P Global Commodity Insights, Seafood Expo Global 2025, Barcelona, Spain.

As John bluntly put it during his presentation, "The mood can be summed up in two words: "chaos and uncertainty." He claimed that the cues were always there. Since 2022, global shrimp imports have plateaued, with China surpassing the US as the world's largest shrimp importer. This shift has transformed global pricing dynamics, especially for Ecuador and India, the two titans of global shrimp supply.

More than 40% of India's shrimp exports go to the US, leaving its farmers and processors highly vulnerable to fluctuations in American demand. "That demand has stagnated at around 20,000 tonnes per month for the past year," said John.

India, the second-largest exporter, has primarily focused on value-added processed shrimp for the US and EU, taking advantage of their processing infrastructure and cheap but yet skilled labour.

Tariffs: The unwanted shock

The real shock, however, came on April 2nd, 2025, when the US announced countervailing duties (CVDs) on Indian shrimp exports, a move mirrored by reciprocal Indian tariffs on US goods. For Indian exporters, this was not just a policy change; it was a financial gut-punch.

On October 28th, 2024, farm-gate prices in India dropped by 17% in a single week, as traders scrambled to price in the sudden cost of tariffs (Figure 5). Contract prices were somewhat shielded, but the spot market collapsed forcing Indian farmers to sell at a loss.

John said, "The pain on the ground was immediate. Shrimp producers in India, many of whom are smallholders, found themselves squeezed between rising costs and falling revenues. Even after the US paused reciprocal duties on 11 April, prices rebounded only partially."

The cost dilemma

Despite India's vast shrimp farming capacity, raising production is no longer financially viable for many farmers. This is because of feed costs, which account for 50–60% of total production expenses to produce size 40/kg vannamei shrimp "Even as global soybean prices fell, Indian feed prices remained high through early 2025, prompting farmer protests," added John. Other costs were post larvae, chemical and labour at 10%, respectively.

"In 2025, farmers reported an average 15% decline in unit value compared to Q4 2024. In 2025, production costs hover at USD3.50 for size 40/kg in Andhra Pradesh. Farm-gate prices were stuck at around USD3.80 -4.00/kg —a razor-thin margin in April 2025," said John.

Diversification or decline?

Unlike Ecuador, whose competitive edge lies in raw shrimp exports, India's advantage is in value-added processing. Cheap labour and decades of experience give Indian processors the ability to produce peeled, deveined, cooked, and ready-to-eat shrimp at scale—a critical distinction in a saturated market.

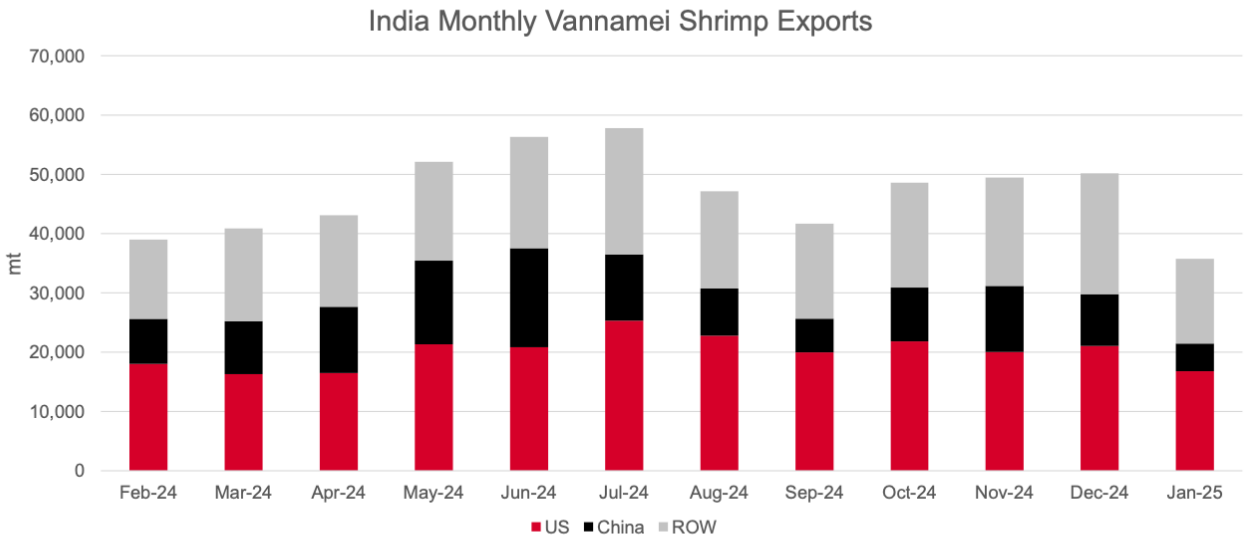
John pointed to Belgium's rising imports of value-added Indian shrimp as a sign of shifting trade patterns. The EU, China, Japan, Southeast Asia, and the Middle East are also emerging as viable alternative markets, but Indian exporters must pivot quickly if they are to make inroads. Figure 6 shows this diversification. India relies on the US market due to erratic demand from China, but growth is visible in Europe and the Middle East, particularly in high-end processed products.

The road ahead

"The Indian shrimp sector employs over 1 million people, including 100,000 small-scale farmers, making this more than a trade issue—it's a livelihood issue," said John. As US demand stagnates and Chinese imports slow, India faces a critical moment.

"Without diversification into value-added products and alternative markets, expansion will remain financially unsustainable. But if India leverages its processing capabilities, it may yet hold onto a competitive edge, at least until countries like Ecuador attempt to catch up in the value-added game, "added John.

For now, India's shrimp industry is caught between opportunity and peril. As John noted, the industry has the capacity to grow, but "from a price level, it doesn't seem viable." Whether it can transform capacity into profitability remains to be seen.



Source: Ministry of Commerce, Govt of India
Note: HS Code: 03061720 (India, I&E) Vannamei Shrimp (Litopenaeus Vannamei)

Figure 6. India's shrimp export destinations in 2024–2025. Source: S&P Global Commodity Insights, Seafood Expo Global 2025, Barcelona, Spain.

Reference

Felipe Peroni and Ignacio Garcia, 2025. CNA estimates US tariffs cost Ecuadorian shrimp producers $20 million a month. https://www.spglobal.com/commodity-insights/en/news-research/latest-news/agriculture/081825-cna-estimates-us-tariffs-cost-ecuadorian-shrimp-producers-20-million-a-month.

What the fall of eFishery means for the future of aquaculture and venture capital in Indonesia

By the AAP team

eFishery discussion panel, from left: Fred Puckle Hobbs (Tathva); Faizil Ikram (MDI Ventures); Doni Ismanto Darwin (Ministry of Marine Affairs and Fisheries, Indonesia); George Samuel (Advisor) and moderator, Cynthia Darmawan (Delta Marine Group). Photo credit: PMI 2025.

At the peak of its growth, eFishery symbolised everything investors hoped for in the "blue economy" agritech innovation: end-to-end aquaculture digitisation, AI-powered feeders, and embedded finance, all wrapped in the promise of boosting small farmer incomes and uplifting a developing economy.

The recent collapse of eFishery, once hailed as a USD one-billion beacon of Indonesia's tech-enabled aquaculture revolution, sent shockwaves through the ecosystem. As allegations of financial misreporting and governance lapses unravel the startup's once-lofty valuation, those closest to the sector are taking stock—not just of eFishery's rise and fall, but of the startup ecosystem it has shaped in its wake. At the Shrimp Aquaculture Conference (SAC 2025), organised by Petambak Muda Indonesia in May in Bali, a panel convened to dissect what went wrong.

Moderated by Cynthia Darmawan, COO at Delta Marine Group, the session brought together leading voices from the government, venture capital, advisory, and industry sectors. The discussion sought to extract lessons, diagnose systemic failures, and chart a sustainable path forward. "We're not here to assign blame," Cynthia reminded the audience at the beginning. "We're here to understand what happened and where we go from here."

Narratives can outplace reality

"eFishery was a symbol of transformation—stepping into the future of food and aquaculture," Cynthia began. "It showed us what was possible and, just as quickly, what could go wrong."

Fred Puckle Hobbs, co-founder of Tathva, a Singapore-based blue economy advisory firm, opened the discussion by addressing the investor community's failure to catch early warning signs. "Auditors are still digging into the details. In theory, it should be easy to detect any wrongdoing, but when you're with a high-growth startup, there's pressure placed on individuals and founders on a model that's not scalable in a way that's perceived. There's often pressure on founders to stretch the truth. Narratives can outpace reality."

Fred commented on the collective investor blindness and the insufficient on-the-ground due diligence. "Sometimes, the right questions weren't asked. The right people didn't go to the right places. Investors have to take accountability too. That said, the fundamentals of shrimp farming as an industry itself remain intact."

Faizil Ikram said, "We were all drawn by eFishery's thesis—using IoT to boost productivity, linking farmers to markets, suppliers, and capital. It was compelling." Photo credit: PMI 2025.

George Samuel drew attention to the need for corporate governance and transparency. "We need better internal reporting, checks and balances. Investors must do deeper dives—not just ride the wave." Photo credit: PMI 2025.

Investor enthusiasm and subsequent fallout

Faizil Ikram, Principal at MDI Ventures, brought the perspective of a corporate venture capital (CVC) investor. "We were all drawn by eFishery's thesis—using IoT to boost productivity, linking farmers to markets, suppliers, and capital. It was compelling." He noted that this has had far-reaching consequences. "Now, every time I meet investors, they ask: 'What happened to eFishery? Is Indonesia still safe for foreign capital?' This collapse has had a chilling effect on funding for the entire sector."

Faizil admitted that early-stage venture capital (VC) expectations often skewed toward unrealistic returns. "In SaaS (Software as a service) business models, we ask for 2X growth per year. But that does not always translate to agritech or other industries. We need to balance growth expectations with sector realities."

Government disappointment and reflection

Doni Ismanto Darwin, Special Staff to the Ministry of Marine Affairs and Fisheries, shared the government's disappointment. "When eFishery emerged, we were thrilled. It brought startup energy into an old industry. It was great seeing the younger generation get involved. We even used their innovations in our modelling systems."

Yet, the government was caught off guard. "They chased growth hacks. They couldn't manage the balance between financial pressure and sustainable scaling," he said. "In our government aquaculture centres, we have 1,000 units of their feeders. This collapse teaches us that in aquaculture digital transformation, the government must protect the ecosystem."

When asked about regulatory oversight, Doni clarified: "We do not regulate startups, but we must learn from this. eFishery built something impressive, from upstream to downstream, finance to innovation, but failed in managing finances. That is not the Ministry's job, but we have to ensure better governance moving forward."

Public and investor perceptions shift

George Samuel, Strategic Advisor to PT Agro Bahari Nusantara and a shrimp farmer himself, emphasised that the incident prompted overdue introspection. "The public reassessed. The business was overvalued, but the core value propositions—linking farmers to markets, driving productivity—were still valid. The fundamentals have not changed."

George drew attention to the need for corporate governance and transparency. "We need better internal reporting, checks and balances. Investors must do deeper dives—not just ride the wave."

Pivoting beyond core competency

Cynthia steered the conversation to the heart of the matter. "eFishery started as a hardware company with autofeeders, but it pivoted into a marketplace offering credit. Was this chasing revenue at the cost of sustainability?"

Faizil responded, "They did not abandon feeders. They tried increasing revenue per user by offering more solutions. However, when you introduce trading activities, you inherit working capital risks. The growth mindset we had as investors and founders—to double revenue, double valuation—did not match the industry's realities."

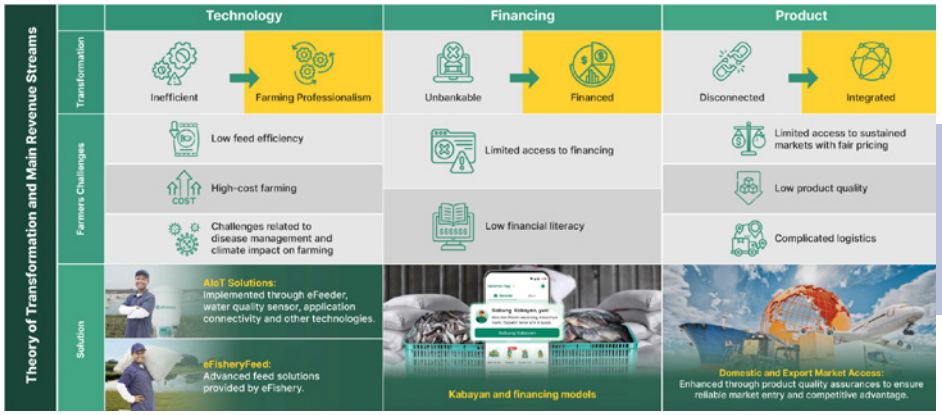
He acknowledged that there has been a significant shift in investor expectations recently. "Now, we emphasise sustainability over growth. We expect companies to have longer runways, and we are being stricter about due diligence, data validation, and governance."

Scale vs sustainability

Fred offered a more philosophical take. "Agtech is not fintech. You cannot force agriculture to behave like a tech startup. Any offer for financing must be grounded in industry realities."

Agriculture and finance have drifted apart and applying high-growth venture capital expectations to farming sectors, like shrimp aquaculture, often fails. Historically, agricultural finance served practical needs such as seed and input financing; however, today's investors frequently lack a real understanding of the industries they back.

Our Offer for Better Technology, Financing and Farming Ecosystem



eFishery's full-stack solution from feeders to financing and market access. Source: eFishery Impact Report 2023. https://issuu.com/efishery_ai/docs/efishery_impact_report_2023_-_for_print

He referenced Manor Impact's Ocean financing report, which found that only 10% of 700 funders were repeat investors. "That tells you how little the sector understands blue economy businesses."

Fred warned against imposing unicorn expectations on shrimp farming. "There's simply not enough market availability to scale like SaaS. If we continue to expect billion-dollar valuations, we will see more collapses. Financiers do not get to be celebrities in agriculture. They need to ask the right questions."

Where were the checks and balances?

On how this went undetected, Faizil cited structural issues. "Founders are incentivised to inflate valuations. Investors had limited oversight. It is common for the government to appoint commissioners as a formality rather than to provide real governance."

George picked up the thread. The keyword is 'overlooked.' Credit was a core part of their model, yet the fundamentals of credit that he learned in school, the 5Cs—character, capacity, capital, collateral, conditions—were not assessed. "Sometimes they have the right character, but not the right conditions. Other times, they have the right capability, but no character."

"However, in venture, we sometimes just ask who else is joining the round. That herd mentality ignores basics."

He shared a conversation with an agri-focused lender. "They did not check the capacity and conditions. These oversights lead to bad credit decisions. There is no harm in applying traditional discipline—in fact, it should be a requirement."

Fred brought in a historical lens and invoked *The Big Short*. "The investors who made money asked the right questions. Others did not. In our sector, some people knew something was wrong for years. But no one wanted to speak up."

Fred concluded with a warning and a call to action. "If eFishery becomes a footnote, everyone loses. The shrimp industry has built a platform for innovation. We need to focus on data, traceability, genetics—tools that already exist for solid credit analysis."

George agreed. "This is a learning moment. We have to tell better stories—about good businesses, responsible financing, and sustainability."

An illusion of scale

"People kept asking me: Do you trade with eFishery? What do you think of their model?" said George, when asked about whether he believed they were as large as they said they were.

"I had zero offers from eFishery. Nothing. So, it was tough to reconcile what we were seeing on the ground with what the articles were saying. If they were really delivering value, they'd be out here engaging the industry—not just investors. We never saw them at conferences like this. So that felt off."

Innovation or illusion?

"We might be victims of eFishery's campaign. They always came with research, data, and statistics that were backed by institutions, showing positive social impact. We saw their auto-feeders solve real problems—especially around production consistency."

For Doni, the challenge now is decoupling the useful from the questionable. "I cannot say much about the financing business model, but on the technology side, the feeders worked. Farmers used them. We used them. Now, we cannot continue with a partner who has legal issues."

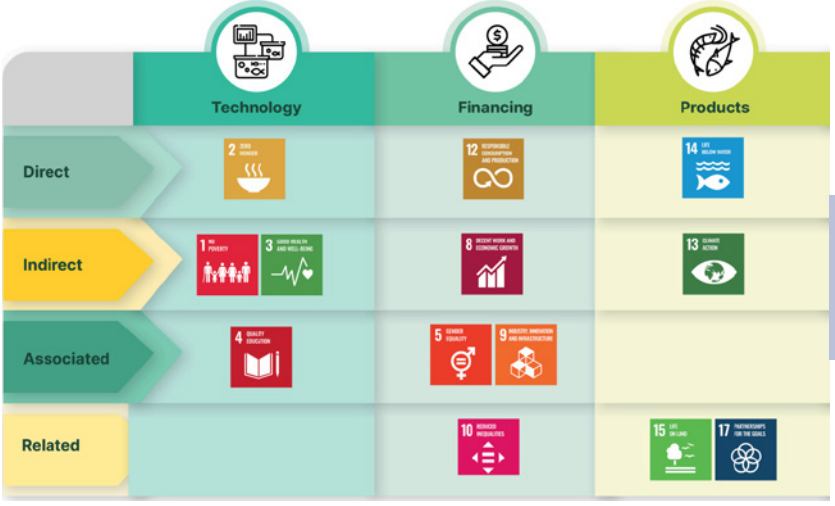
Indeed, the collapse of eFishery is not just a business story—it is also a trust crisis. "As someone who wants to attract more young people into aquaculture, this is a setback," Doni admitted. "Indonesia is the number three exporter to the U.S. Aquaculture is the future. But maybe people sensed something was fishy with eFishery."

Herd mentality, hollow hype

Fred offered a blunt post-mortem. "If you haven't built a business in the pond, and you built it from a pitch deck, you're going to have a bad time," he said. "Seven years ago, I didn't know the full picture of eFishery, but from my conversations within the industry, there was already suspicion."

He recalled the toxic positivity surrounding startup founders, particularly when eFishery was at its peak. "You couldn't say anything critical. If you told investors the business wasn't great, they'd assume you didn't know what you were talking about."

That dynamic made it nearly impossible for startups grounded in operational reality to compete. "People who spoke up got a bad reputation. Meanwhile, some of the largest global investors were pouring in money after 15-minute calls. That's unacceptable," Fred said.



eFishery's marketplace model combines financing, technology and products. Source: eFishery Impact Report 2023. https://issuu.com/efishery_ai/docs/efishery_impact_report_2023_-_for_print

"If you want to know whether a business is doing well, go to the pond. Talk to Indonesians, the customers, the users, and meet people. We have to be more critical of business models."

Was the growth sustainable?

George said, "The growth did not make sense. You need to understand aquaculture cycles. Shrimp takes 100 days to grow—there's no magic bullet. But investors raced toward deploying capital into dreams. Sometimes, those dreams turned into nightmares."

Yet the company's model—connecting farmers to inputs, markets, and credit—was widely copied and applied across poultry and agriculture sectors. "In 2020-2021, it attracted a wave of investment into 'agri-fintech' startups," George said. "Now, we have to ask whether the sector can really sustain that kind of trajectory."

However, investors are more cautious now. Faizil has seen the investors' mood shift dramatically. "Back in 2021, you had one month to close a deal. Today, it takes six. Investors now bring in third-party consultants, demand proper audits, review IP, and validate customer data. Governance matters now."

Can the vision be salvaged?

Indonesia has long championed a transition to a sustainable "blue economy". "We are too rigid with licensing," Domi conceded. "In North Java, many shrimp farms were abandoned. But foreign investors now demand ESG compliance. So, if our farmers meet blue economy standards, the funding will follow."

George agreed—starting with mindsets. "Owners need to stop window-dressing books. Investors need to do the work. There's no shortcut to cash cycles, and if we invest in dreams with fundamentals, we can move the industry forward."

For Faizil, the episode is a wake-up call. "We need long-term thinking. Startups should understand what works before scaling. It's still early days for us, and these things happen even in the U.S. and Vietnam. Hopefully, this teaches us to improve governance and due diligence."

From collapse to correction

Fred believes the moment demands three things: accountability, capital, and narrative.

"First, accountability. Senior leaders from eFishery are operating in other markets as if nothing had happened. They must be held accountable," he said. "Second, capital—but the right kind. Groups like the Sustainable Finance Initiative are asking: where's the sustainable debt? Well, it's right here."

"And third," Fred continued, "is the narrative. That's powerful. Red for product, green for practice, blue for economic value—we can build something better. If we do this right, we won't remember this as a collapse. It'll be a correction."

Rebuilding trust—from the pond up

Doni, pressed from a participant who asked why promised reforms around shrimp farm licensing had not materialised, said, "I'm not an expert with the bureaucracy that plagues government efforts. I came from the private sector. I cannot change the rules, but I can help you navigate them."

His bigger mission is to ground aquaculture in real, operational excellence. "We're developing a 58ha pilot farm in Kebumen Regency, Central Java, from farming to processing, costing USD15 million. We're still solving issues around fry and feed. But if you want to put money into shrimp, you better understand the problems on the ground."

Doni concluded. "Last year, Indonesia produced 1.1 million tonnes. The domestic market has room to grow. We need to forget financial engineering but need open, resilient, and sustainable aquaculture instead."

If that lesson sticks, eFishery's fall may yet leave behind a foundation strong enough to rebuild.

The panel did not end with blame, but rather with resolve. For all the disillusionment eFishery's fall has caused, a deep belief in aquaculture's potential remains—provided it is built on transparency, realistic expectations, and proper oversight. The panel wanted the audience to walk away believing that the industry may be shaken, but it is not broken.

Cynthia Darmawan with the organising team for SAC 2025; Petambak Muda Indonesia (also known as Young Shrimp Farmers Indonesia) comprising the second generation of shrimp farmers and entrepreneurs. Photo credit: PMI 2025.

Plenary speakers and WAS-APC awards program

World Aquaculture India 2025 (WAI2025) will be held November on 10–13, 2025 at the Novotel. Hyderabad Convention Centre, Hyderabad, India. The event will feature plenary sessions, technical presentations, an international trade show, and networking opportunities with industry leaders from around the world. Sponsorship and exhibition opportunities are available for organisations wishing to showcase their products, services, and innovations to a highly engaged aquaculture audience.

Plenary speakers

In September, the World Aquaculture Society and the National Organising Committee of World Aquaculture India 2025 announced **Dr Modadugu Vijay Gupta** as a plenary speaker at WAI2025. Gupta will deliver a keynote address on "Aquaculture Opportunities, Options and Optimism,"

Gupta has been a global leader in aquaculture research and development for over 50 years, with a strong focus on improving food and nutritional security in developing countries. He has implemented projects and programs across more than 20 countries in Asia, Africa, and the Pacific, with particular emphasis on empowering rural women and landless communities through aquaculture.

Dr Modadugu Vijay Gupta is a global leader in aquaculture research and development for over 50 years.

In May, WAS announced that Dr Manuel Barange will share his insights and experience that will offer valuable insights to attendees from over 100 countries.

Awards Program

WAS-APC is proud to introduce its Awards Program for WAI2025, recognising excellence in aquaculture research, innovation, and engagement, with a particular focus on students and women in the field. This year features the launch of a new Professional Merit Award, presented alongside the established Student and Women's Participation Awards.

These awards and plenary sessions reflect our commitment to nurturing the next generation of aquaculture professionals, recognising women's leadership, and honouring excellence across the industry. All awards follow the global WAS framework to ensure fairness, consistency, and recognition across regions.

Dr Manuel Barange is the Assistant Director General, FAO, and Director of its Fisheries and Aquaculture Division.

The award categories are

- Pre-conference Student Travel Awards (Best Abstracts): Three awards of USD400 each. Deadline: September 30, 2025
- Student Presentation & Poster Awards (During the conference): Prizes ranging from USD400–600
- Women's Participation Travel Awards: Two awards of USD600 each. Deadline: September 30, 2025
- Professional Merit Award (New in 2025): Honouring up to two individuals for outstanding contributions to aquaculture in Asia. Deadline: September 30, 2025

To be eligible, applicants must be current WAS or WAS-APC members. Abstract submission is required for Student Travel Awards. Past winners are not eligible. More Information: WASAPC website Asian Pacific Chapter World Aquaculture Society

Event sponsor partnership

WA2025 is proud to recognise the generous support of premier sponsors: Blue Aqua, Devee Group, dsm-firmenich, INVE Aquaculture, Merck MSD, SyAqua, Zeigler. Aker QRILL Company, DNV, ICC Brazil, and Avanti. WAS said that their commitment plays a vital role in the success of this global event and in advancing sustainable aquaculture practices.

VIETSHRIMP® ASIA 2026

Aquaculture International Fair

AQUACULTURE VIETNAM 2026

11»13 THÁNG 3, 2026

TRUNG TÂM HỘI CHỢ & TRIỂN LÃM SÀI GÒN (SECC)

TP. HỒ CHÍ MINH • VIỆT NAM

Triển Lãm Quốc Tế **Chuyên Ngành Thủy Sản** Việt Nam

This event is powered by Renewable Electricity

11»13 MARCH 2026

SAIGON EXHIBITION & CONVENTION CENTER (SECC)

HO CHI MINH CITY • VIETNAM

Đặt Gian Hàng
Book A Stand

Vietnam's International **Aquaculture** Industry Event

informa markets

Organised by
Tổ chức bởi

SES Vietnam Exhibition Services Company Limited

Ms. Sophie Nguyen
+84 988 107 703
Sophie.Nguyen@informa.com

A tripartite commitment in sustainable shrimp farming

On the opening day of the Global Shrimp Forum (GSF), **BioMar**, **Innovafeed**, and **Auchan** announced a significant industry commitment: the large-scale integration of insect protein into commercial shrimp feed in Ecuador.

This milestone marks a turning point for both the insect and aquaculture industries, demonstrating that insect protein is a viable part of the solution in responsible and resilient shrimp farming.

Insect meal is much more than a protein source; it contains functional nutrients like antimicrobial peptides. Recent research from BioMar showed a unique functional benefit in shrimp feeds, making it possible to substitute it with a similarly valued ingredient currently in use.

This discovery offers insect meal a viable market entry position in shrimp feeds at its current market value. From there, it's possible to scale insect meal and hopefully be market competitive in the protein ingredient segment in the future, but for now, it can play a vital role in the functional ingredient segment in aquafeeds.

As part of this industry-first initiative, Auchan, one of Europe's leading retailers, will support the rollout by integrating shrimp raised on this next-generation feed into its responsible sourcing strategy and product offering.

This tripartite commitment marks a significant leap toward scaling insect-based solutions as a cornerstone of tomorrow's food system. It reflects the shared ambition of key players in aquaculture, agritechnology, and retail to accelerate the shift toward a circular, resilient, and low-impact protein model, reducing dependence on wild-caught fish and conventional agricultural resources, while upholding rigorous sustainability standards and promoting responsible shrimp farming.

Clément Ray, CEO & Co-founder of Innovafeed and Elizaveta Le Floch, Chief Business Officer, said, "This partnership is a defining moment not just for Innovafeed, but for the entire insect and aquaculture industries. By combining our technology with BioMar's aquafeed expertise and Auchan's retail leadership, we're proving that sustainable shrimp farming can be scaled, economically viable, and consumer ready."

Henrik Aarestrup, VP LATAM Shrimp & Hatchery, BioMar Group, added, "In BioMar we believe in the sustainable future of the aquaculture industry and alternative ingredients like insect meal play a vital role in this. Working together with Auchan and Innovafeed we have established a viable commercial model for insect meal. It was important to design a scalable model that leveraged the unique functional benefits of black soldier fly in shrimp diets. Any shrimp farmer purchasing BioMar feeds from Ecuador can leverage this commercial opportunity."

Laurent Francony, Group CSR Executive Director at Auchan Retail, added, "We are committed to responsible sourcing and see this partnership as a tangible step toward better food for our customers and the planet. Supporting more sustainable aquaculture practices through our shrimp supply chains is perfectly aligned with our long-term vision."

Innovafeed is a global AgTech pioneer (B Corp™, Next 40, Impact 40, World's GreenTech Company 2025), specialised in producing insects (*Hermetia illucens* – black soldier fly) for animal and plant nutrition. innovafeed.com

Elin Kvamme, Global Aqua Director, Innovafeed, at its booth during GSF 2025 held in Utrecht, The Netherlands from September 2-4.

Appointment

Global Portfolio Manager, Aquaculture

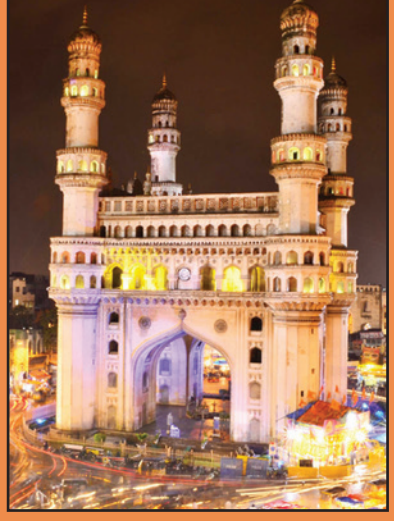
Luca Micciche' has joined **Novonesis** as Global Portfolio Manager, Aquaculture, since August 2025. "From the moment I connected with Novonesis' purpose — to better our world with biology — I knew this was a mission I wanted to be part of. Aquaculture holds immense potential to feed the world sustainably, and I'm thrilled to contribute to this transformation through biosolutions that make a real impact," said Luca.

In this role, Luca will be working globally to drive innovation, support strategic partnerships, and help shape the future of aquatic species health and productivity. "It's a challenge, I embrace with deep commitment, curiosity, and excitement. "I am grateful for the opportunity and looking forward to collaborating with brilliant minds across the globe. Let's make waves — sustainably."

Prior to this, Luca was Aquaculture Technical Director Global at Verdesian Life and was responsible for aquaculture products support/trainings, field development, marketing efforts, and overall sales global growth of Verdesian Aquaculture business. Luca also spent several years as Asia Sales Manager, Aquaculture for US based Pentair. novonesis.com

WORLD AQUACULTURE 2025

WA 2025



Aquaculture: Opportunities, Options, and Optimism

November 10 - 13, 2025

Hyderabad, India

Hyderabad International Convention Center - Novotel

Organized by

WORLD AQUACULTURE Society

Hosted by National Fisheries Development Board

NFDB

Supported by Indian Council of Agricultural Research (ICAR)

WAS Premier Sponsors

Devee Group · Zeigler (nutrition through innovation) · Syaqua · BLUE AQUA · BLUE GENETICS (Caring for life)

www.was.org or contact apcsec@was.org; worldaqua@was.org

Exhibition, sponsors – mario@marevent.com

AQUA CULTURE Asia Pacific

EDITORIAL CALENDAR 2026

Look out for AAP's annual report on trends in Asia's production of marine shrimp and aquafeeds

Volume 22	Number	1	2	3	4	5	6
		January/February	March/April	May/June	July/August	September/ October	November/ December
Deadlines - *Technical Articles*		*November 15, 2025*	*February 10*	*March 13*	*May 15*	*July 17*	*September 18*
Deadlines - *Advert Bookings*		*November 25, 2025*	*February 17*	*March 20*	*May 22*	*July 24*	*September 25*
Innovations		Experiences and opinions covering role models; clear and present needs of industry; innovations and digitalisation in aquaculture					
Interviews		Leaders driving change, innovations and sustainable aquaculture					
Issue focus		Nursery & Hatchery	Health & Disease Management	Sustainable & Responsible Aquaculture	Demand & Supply Equilibrium	Aquaculture Innovations	Health & Disease Management
Industry Review		Shrimp	Marine Fish	Aquafeed Production	Tilapia	Shrimp	Catfish & Freshwater Fish
Feed Technology & Management		Functional Feeds/ Additives	Fishmeal/oil	Sustainable Ingredients	Alternative Ingredients	Larval & Nursery Feeds/ Feed management	Feed Enzymes
Production Technology		RAS/Biofloc	Intensive culture	Hatchery Technology/ Waste management systems	Auto feeding/ Post harvest	Shrimp/Fish Nursery systems	Cage culture
Marketing and Certifications		Market and product developments, post-harvest processing, generic marketing, certifications, branding, food safety etc					
Company/Product News		News on activities at international, regional and local conferences and trade shows					
		VIV H&N/Victam Asia 2026 Bangkok, Thailand March 10-12 **VietShrimp International** Ho Chi Minh City March 11-13	**Seafood Expo Global** Barcelona, Spain, April 21-23	**World Aquaculture 2026** Singapore June 2-5	**TARS 2026, Aquafeeds,** TBA August 19-20 **Global Shrimp Forum 2026** Utrecht, The Netherlands, TBA	Contact Us	

For advertising/article contributions and guidelines contact: zuridah@aquaasiapac.com/enquiries@aquaasiapac.com

2025

October 6-9
LACQUA 2025
Puerto Varas, Chile
was.org

October 8-10
15th Philippines Shrimp Congress
Bacolod City, Negros Occidental
facebook.com/ShrimpCongressPH

October 28-30
11th International Conference of Aquaculture Indonesia (ICAI 2025)
Surabaya
mai.or.id/icai-2025/

November 3-5
5th World Tilapia Trade and Technical Conference Trade Exhibition 2025 (TILAPIA 2025)
Bangkok, Thailand
info@infofish.org

November 10-13
World Aquaculture India 2025
Hyderabad
was.org

2026

January 30-31
AQUAINDIA 2026
Mamallapuram, Tamil Nadu
aquaprofessional.org

February 16-19
Aquaculture America 2026
Las Vegas
was.org

March 10-12
Health & Nutrition Asia/ Victam Asia 2026
Bangkok
vivhealthandnutrition.nl/

March 11-13
VietShrimp Asia 2026
Ho Chi Minh City
vietshrimp.vn

May 18-21
The International Symposium on Fish Nutrition and Feeding (ISFNF 2026)
Darwin, Australia
gentur.eventsair.com/isfnf2026/

June 2-5
World Aquaculture Singapore 2026
was.org

ADM

WHERE PRECISE NUTRITION MEETS **PERFORMANCE**

Discover more at
adm-asia.com

- Enhanced growth performance
- Improved fish health
- Superior body coloration

Uni-President

CREATES THE VALUE OF AQUACULTURE

China
India
Taiwan
Viet Nam
Philippines
Thailand
Sri Lanka
Malaysia
Indonesia

Top quality aqua feed service in more 20 countries

No. 16-18-20, DT743 Road, Song Than 2 Industrial Park, Di An Ward, Ho Chi Minh City, Vietnam.

Tel: +84-274-3790811 (Ext: 1711) Email: Services@upvn.com.vn Website: www.uniaqua.com.vn