

Shaping India's aquaculture further

By P.E.Vijay Anand and R. Umakanth

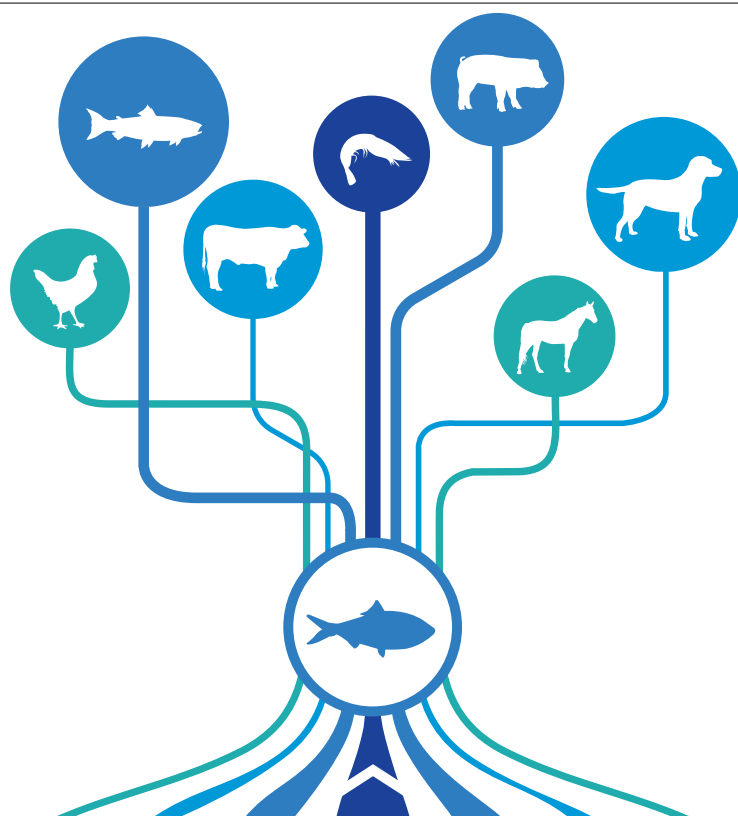
Strategies and actions that will significantly steer towards positive growth in aquaculture and utilise feed production capacity.

India is recognised as a large contributor to global aquaculture production. It enjoys the status of being the second highest in aquaculture production after China with a production of 4.20 million tonnes in 2012 (FAO, 2014). It is also the fourth largest shrimp producing country. Even with these hallmarks, the country's aquaculture production can be better. This will need speedy strategies and actions that will significantly steer it towards positive growth.

The country has undergone significant changes in its aquaculture development. In the past, it has relied on a single group of farmed fish, namely carps, which are still farmed using traditional management practices. The majority of fish production is sent to a single market, namely West Bengal which has large demand for fish. However, the setback is that transport of farmed fish is still using traditional methods. Fish are packed in plastic boxes and ice added. The transportation time is 24-48 hours depending on the destination. In shrimp aquaculture, until recently, India has relied on a single species of shrimp *Penaeus monodon*. This describes the rather narrow base on which Indian aquaculture depended upon.



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Towards modernisation

Changes have come but in a slow way. Since 2008, farmers have begun to use extruded feeds to feed fish and allowed pond resources to be better utilised to increase productivity. Owing to the influx of extruded floating feeds, a small quantity of pelleted feed is now being used. The single group of farmed fish is gradually transformed to about four groups of fish which are packed more hygienically in insulated boxes and transported to different markets.

There has been a total shift in shrimp farming since the Indian Government allowed the farming of *Penaeus vannamei* in 2010. In addition, India now has a small quantity of shrimp and fish which are processed and sold in the domestic market in contrast to the previous practice of exporting almost all of its production. The industry started believing that India with its huge population base and rapidly changing life styles and better incomes, will gradually demand convenient and hygienic fish products.

There have been significant changes in fish feed production. Between 2010 and 2013/14, fish feed production showed a 59% increase in actual feed sales from 430,000 tonnes in 2010 to 684,000 tonnes in 2013. However, there has been an unplanned growth in fish feed mill capacity. The capacity grew by 306% from 507,000 tonnes per year (tpy) in 2010 to 1.55 million tpy in 2013/14. Looking at the figures for feed sales versus milling capacity, a huge discrepancy is evident. In order to utilise excess feed milling capacity, there should be some planning and strategies.

The change to farming vannamei shrimp has spurred growth in the last 2-3 years. Shrimp seed demand has seen increases from 7 billion to 20 billion (186%), shrimp production from 160,000 tonnes to 325,000 tonnes (87%), shrimp feed production from 272,000 tonnes to 572,000 tonnes (110%), installed capacity of shrimp feed



Cages for carp

from 390,000 tpy to 1.33 million tpy (241%); processed shrimp from 130,553 tonnes to 228,620 tonnes and revenue from shrimp exports increased from USD 735 million to USD 1.803 billion (MPEDA, March 2013). The main concern is to ensure sustainability in this sector.

Debate on data

There is a serious gap in the country on the availability of aquaculture production data. Estimates between FAO data and the Indian Government differ substantially. Moreover, the industry has to rely on data that are one or two years old. This makes business planning and market assessments ineffective especially with this rapidly changing aquaculture scenario. The only current option for industry operators is to 'deduce' and to depend on calculations and best estimates.

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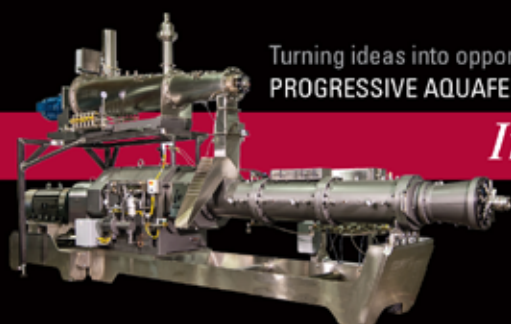
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Shrimp ponds



Fish feed pellets

Aquafeed demand

Due to rapid changes seen in the shrimp and fish farming sectors, India's ability to produce commercial aquafeeds has grown significantly. The country has 26 feed mills with a total capacity of 2.88 million tpy of both shrimp and fish feeds. However only 1.25 million tonnes was sold in 2013 (43.40% capacity). The difference between what can be produced at 85% efficiency and what was sold in 2013 was 1.19 million tonnes. This is the available opportunity/potential. The industry should work on strategies to better utilise feed milling capacity and through this, help modernise aquaculture further.

The country has 13 shrimp feed mills. The total installed capacity for these mills is 1.33 million tpy and 572,500 tonnes of shrimp feed was sold in 2013. The capacity utilisation is 43%. If we project 85% utilisation, production is 1.13 million tonnes. This means that there will be an additional 558,000 tonnes available for the expansion of this sector.

In fish feed production, the total installed capacity is 1.55 million tpy. In 2013, 684,000 tonnes was sold and this translates to 44.12% of capacity. If these mills were to run on 85% efficiency then 626,000 tonnes of feed exists as additional opportunity. Therefore the country has adequate aquafeed capacity and what would be needed to harness this capacity will demand building strategies. It would help if the government can support some development strategies on these lines.

Feed utilisation plan

A strategic approach to utilise existing feed capacity is to relook at possible aquaculture sub-sectors. We suggest that the industry considers a plan to utilise aquafeed in these ways;

- new markets (200,000 tonnes);
- feeding more carps on commercial feeds (50,000 tonnes);
- feeding more *Pangasius* on commercial feeds (80,000 tonnes);
- feeds for new fish species (45,000 tonnes);
- expansion in shrimp farming (200,000 tonnes)
- 50,000 tonnes of processed fish will require additional fish production and use 150,000 tonnes of feed
- feeding juvenile fish (50,000 tonnes);

Following this strategy, about 775,000 tonnes of additional feed could be used over 2-3 years.

Small fish feed sub sector

Feed production for juvenile fish in India is an important subsector. The current practice is that only fish in the grow-out systems are fed. If the country is producing more than 4 million tonnes of fish then a corresponding number of fish seed/fingerlings are produced. If these

fingerlings were to be fed, the sector will definitely require feed. In addition to feed utilisation, the aquaculture industry will benefit with healthier fish seed stock which would perform better during grow-out.

Fed versus non-fed species

According to FAO (2012) the non-fed groups of fishes in aquaculture in the world has dropped from 50% in 1980 to 33.30% in 2010. In India, there is a major reliance on just a single fish group; the Indian major carps. Carps, form 71.9% of world farmed fish (FAO, 2012) and 27.7% of the carps fall into the non-fed class because they are predominantly filter feeders. However, the majority of carps are farmed with feed especially in China.

India could expand production by diversification of farmed fish species, and in particular focus on more high value species such as the tilapia, sea bass, cobia and pompano. The walking catfish, climbing perch and the snakeheads too are high value species. Many Asian countries farm these species which offer a huge opportunity for the feed sector. The key to encouraging the farming of such species is the development of commercially viable hatcheries.

Post-harvest handling and marketing

Logistics and post-harvest handling processes especially for farmed freshwater fish in India is in a very poor state. In contrast, the shrimp industry uses internationally accepted norms for processing, preservation and transport. For example, fish from Andhra Pradesh (where fish is commercially grown in large quantities) is transported by about 250-300 trucks every day, over 1,248 km to markets taking about 25-35 hours. Daily, about 2,500 tonnes of fish are packed in ice and transported. There is an urgent need for aquaculture stakeholders in the country to address this issue, add value, take advantage of modern markets and earn additional revenue.

In India, fish processing methods, marketing and fish consumption have a long way to go. However, given the fast changing life styles and customer demand, there is large potential for marketing hygienic and ready to cook fish products. Investors in the aquaculture industry should also realise that, in addition to the export markets for shrimp, there exists a good demand for fish within the country. Three prominent business groups with feed mills and fish farms have invested in fish processing plants and produce and market different products. The quantity sold was about 4,000 tonnes in over two years. This is a small volume now but is bound to catch up in future. Opportunities exist and India producers should take advantage of this emerging market. Creating a market for processed fish actually leads to higher feed consumption because more fish has to be produced to deliver a required amount of finished product.



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Shrimp pellets

Domestic market

The per capita fish consumption at 2.85 kg for India in 2010 (FAO 2014) is almost close to that of chicken meat consumption in India. While fish production existed historically and was far higher than chicken production in the country, the rate at which the per capita consumption of chicken meat rose is astonishing. Chicken is well marketed and is seen in every place but the same does not apply to fish. Indians have made chicken and milk available everywhere in the country but the same scale of success is not evident for fish. There is a desire among the consumers to buy and eat fish but many factors stop them from doing so. Overall per capita consumption of chicken and fish is very low in India compared to other countries and compared to protein intake standards. Addressing the need to bridge this protein gap definitely holds great opportunities for distribution and marketing of fish.

Fish protein

Although India is second in farmed fish production globally, ironically, the contribution of fish protein (per capita/day) to total animal protein consumption in India is less than 2g (FAO, 2012). This perhaps explains the poor per capita fish consumption and the rather low popularity of fish in Indian diets. USSEC (US Soybean Export Council) in one of its fact finding mission with customers in India listed the following reasons that contribute to a low popularity of fish. The reasons include: fish smell bad, too cumbersome to prepare and cook, fish markets are dirty and fish have bones. In addition, many respondents say that they do not know what fish to buy and how to buy fish. Demographic analysis for India predicts that the country will add 22 million young adults (15-34 age groups) in the next five years. Popular news also states that 50% of India's population is under the age of 25. Interestingly it is this part of the population that will determine customer demand and drive for various products, including fish.

Diversification of culture systems

Cage farming, both in inland waters as well as in coastal and deep sea waters has been discussed often. However, fish production from cages is still insignificant. Now that there is extra capacity for producing extruded floating feed, this should propel fish farming in cage systems. The slow uptake in cage farming is also due to the absence of data from demonstrations that could show returns on investments to entrepreneurs. India boasts of good reservoirs, and natural water impoundments but they have hardly been used to increase fish production. This is food for thought. Well planned development will help India augment its aquaculture production. This is a good solution to add to the road map on utilisation of available/additional feed milling capacity in the country.

New feed markets

Market diversification to sell feed is an option for feed mill investors to consider and increase feed capacity utilisation. Two markets accounting

for the highest fish production in the country are Andhra Pradesh and West Bengal. Feed sales in Andhra Pradesh is close to 57,000 tonnes per month (tpm) while all other states combined use 5,000 tpm. Among the latter, West Bengal uses 3,500 tpm but produces more fish than Andhra Pradesh. West Bengal has a lot of resources in terms of water, fish species and a steady market demand. It has the potential to expand production. Similarly, the opportunity is in establishing feed markets in other states.

Raw material input

Raw material risk management needs to be addressed by all feed millers. Many new feed millers lack the experience in raw material procurement especially on a volatile trading platform as we see in India. Ironically, feed mills are sandwiched between two very volatile processes. One is raw material input management and the other is to face the price and market fluctuation involved in marketing fish in India. Among these, input management surely can be addressed by adding tools, people and improving efficiency in dealing with this segment.

Water resources

Finally, the availability of good quality water is the biggest issue for aquaculture. India has 2.4% of world's land mass, 4% of the world's water resources and carries 17% of the world's population. The country cannot afford to waste or underutilise its water resources. The aquaculture industry has to rapidly adopt better farm management techniques, introduce better and efficient species, apply genetics in aquaculture, ensure optimal use of formulated feeds and improve water management systems.

Conclusion

In this article, we have addressed the most significant issues governing India's aquaculture industry. Some solutions are proposed. By analysing gaps and utilising opportunities, we believe that India could increase its aquaculture production, firstly to meet the domestic demand from its own growing population and its need for protein. Based on our industry experiences since the early 90's, a few segments of the aquaculture value chain have been addressed and it is hoped that all responsible Indian aquaculture stakeholders take note of these points and contribute towards the progress of the industry.

This article is based on the presentation by Dr. P.E. Vijay Anand (USSEC) at Aqua India 2014, Society of Aquaculture Professionals, Chennai, India, 24-25th January 2014.



degrees in animal and fisheries sciences.

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