

An overview of shrimp feed industry in China

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With more than 50 years of culture history in China, shrimp is important seafood the country. Nowadays, the Chinese shrimp industry has caught the world's eyes, for its largest production and export, as well as the potential Chinese domestic market with a population of more than 1.34 billion.

The main species cultured in China are *Penaeus vannamei*, *P. chinensis*, *P. monodon*, *P. japonicus*, *P. merguensis* and *P. penicillatus*, of which more than 70 percent comprised the white leg shrimp, *P. vannamei*.

The modern shrimp farming industry in China has a history of only about three decades but it has gone through an extraordinary experience which can be roughly divided into four stages: beginning (1978-1984), rapid increase (1985-1992), recession (1993-1997) and recovery and development (1998-present). There were only 1,300 ha of shrimp ponds in China in 1978, however the area of ponds reached 300,000 ha in 2011. Total shrimp output increased by more than 6,900 times, from 450 MT in 1978 to 3,110,000 MT in 2011, and the average yield increased from 350 kg/ha to 7,000 kg/ha. The development of shrimp farming also promotes related businesses, such as broodstock, breeding, feed nutrition, animal health, processing, transportation and marketing.

The shrimp feed industry has been developing with the shrimp farming and boosts the development of the total Chinese shrimp industry conversely.

Ingredients and shrimp feed

The primary feed nutrition companies made Chinese shrimp feed with a high nutrition level. In order to produce feed with more than 40 percent protein, a lot of good animal

ingredients have to be used. There are many raw ingredients can be used in fish feed, such as carp and tilapia, but usually only fishmeal, soybean meal, peanut meal, wheat flour, shrimp shell powder, squid paste, some other raw materials and additives are popular in the shrimp feed. Although the ratio of fishmeal is decreasing yearly as its increasing price, it still holds more than 30 percent. China is the world's largest user of soybean meal and fishmeal and relies heavily imports; the high prices of these two ingredients in 2012 eat into Chinese feed manufacturers' profit.

Almost every feed producer has its quality control lab, no matter it is big or small to check and control the ingredients and feed quality, as the ingredients are expensive the producer need to buy them with reasonable price according to the quality level. Besides the government quality standards, some big feed producers have stricter standards to ensure every batch of raw materials can be checked before entrancing into the factory warehouse. Fishmeal takes up nearly 50 percent of the total cost of feed formulation and nobody wants to buy bad quality fishmeal which is supplied by illegal businessman, feed producer control the fishmeal quality with more than 15 items. With the microscope and amino acid analysis, the quality can be estimated more directly.

The steep demand of the end-users also needs a quality control lab in the feed factory to test the feed product regularly. Besides the nutrition items, crude protein, crude fat, fiber, ash, moisture, Ca, P and salinity, physical appearance items are more important to the farmers. As the shrimp feed has been over-supplied these years, when the farmers choose the shrimp feed they can put different kinds of shrimp feed together, feel the smell and dust with their noses and hands, compare the length and size together, test the water stabil-

ity and water colour with different cups. The feed factories need to check the feed physical carefully during the production course.

Production technology

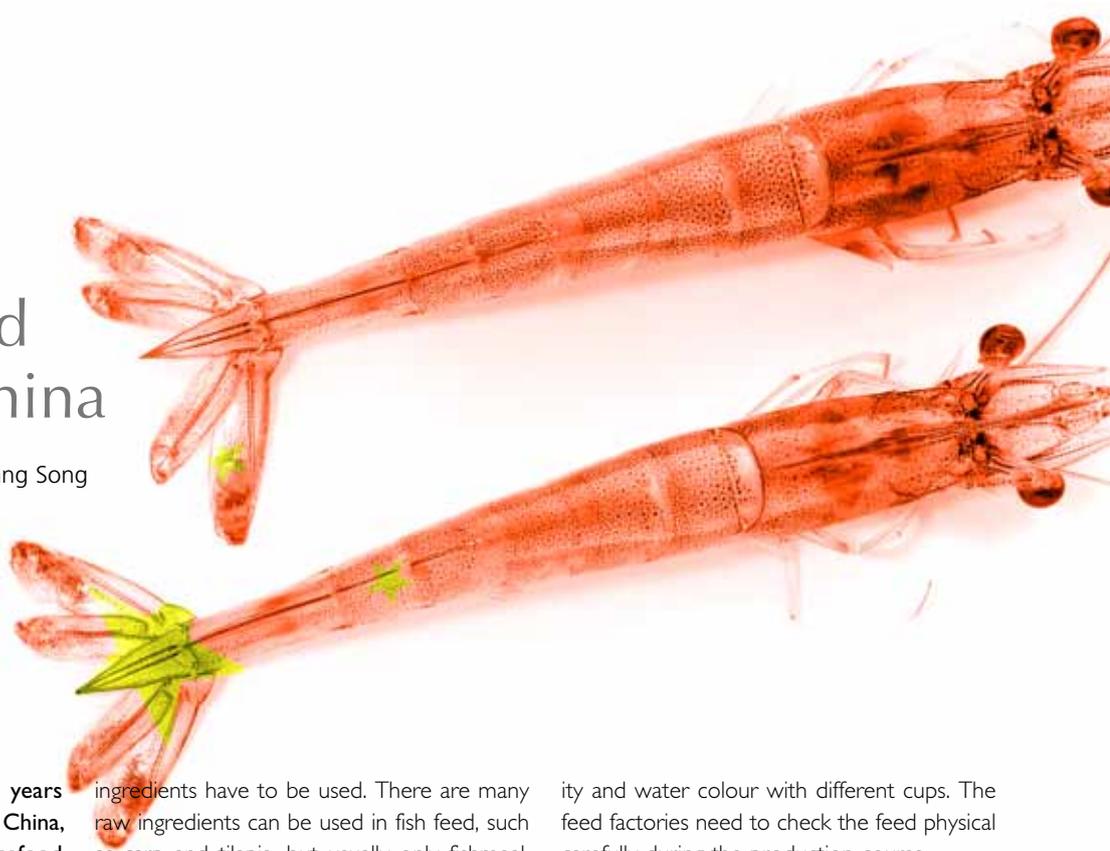
The Chinese feed production technology has developed speedily over the past years. The primary feed production machines were mostly imported from Germany and America and then from Taiwan. Today Chinese machine producers make practical and economic feed production lines. The local machine suppliers adjust their products continually according to the market demand, make the machines with high efficiency, high cost performance and lower energy consumption.

Chinese feed production lines have been exported to more than 100 countries since 1990s. Some larger feed makers optimise their machineries and equipment yearly with good production performance and feed physical appearance.

With the increased prices and the high ratio of fishmeal, fewer and fewer raw ingredients with starch can be used in the shrimp feed. 15 years ago in feed production formulation, more than 30 percent wheat flour with 32 percent wet flour gluten was used to give feeds at least two hours water stability (some producers had to use about 0.2% binder.) Nowadays, it is easy to produce shrimp feed with the same water stability, but with about 20 percent wheat flour with about 30 percent wet flour gluten, and no binder. This is due to the improvements in production technology.

Feed management and food safety

Before 2007, most of the Chinese farmed shrimp were exported and the Chinese shrimp industry had to be in line with the international remands and standards. So far most shrimp feed makers are certified with ISO management system, some ones are



with HACCP, Global GAP and some other certifications. The Chinese government legal regulations are continuously improving to keep path with the development of the shrimp industry. The new Administrative Regulations on Feed and Feed Additive was carried out in May 2012 with more specific and stricter restrictions. Some feed producers who can't meet the standards in this new law will be closed.

To ensure the food safety of shrimp industry, besides the laws for the domestic feed producers, there are also specific regulations for the import feed raw ingredients. From January 1, 2011, without the import registered license, all the listed animal source ingredients could not longer be imported as before.

Correlative industry

Some related industries are developing with the shrimp feed industry. In order to keep the shrimp feed market share, some feed producers are also involved in broodstock, breeding, animal health, shrimp farming and processing businesses. If a producer can supply good quality post larval (PL), animal health products and culture service, his feed with good quality just can be sold successfully.

Among the five Chinese largest PL suppliers, four are feed makers. Now the SPF/SPR

broodstock in China are almost imported from USA, but domestic broodstock and breeding research is under doing. About 90 percent of the 500 billion PL in China are domestic PL, the feed and PL suppliers need to improve the PL quality then to get better shrimp feed performance.

At the early stage of Chinese shrimp development, some medicines were over-used during the shrimp culture course. But after the cases of Taura Syndrome Virus (TSV), White Spot Syndrome Virus (WSSV) and other diseases, farmers have found that medicines can't treat all the diseases no matter how much they cost. Only improving the culture technology and management can help them to prevent the diseases.

With the strict government supervision, more and more medicines are listed in prohibited drugs list. Aquatic medicines and chemical producers develop new medicines with new technology. Microecologics and medicinal herb are popular in China now. Probiotics, prebiotics and biofloc are hot key words in Chinese aquaculture. Some feed makers are also conducted related research to promote the sales of their shrimp feed.

Fierce competition

Chinese shrimp farms are distributed along

almost 18,000 km of coastline from Hainan Province in the tropics to Liaoning Province in the temperate zone. The shrimp feed factories are also located along the coastline, more than 70 percent factories are in South China as the large shrimp farming area is there.

In China, the shrimp feed market is about 1,250,000 MT, but there are more than 100 shrimp feedmills with a total production capacity at 2,500,000 MT and four shrimp feed magnates hold nearly 70 percent of the market share. The Chinese shrimp feed market competition is very fierce and it makes this industry move faster.

With the strong competition, the price is much lower than before with a net profit no more than 100 USD/MT for *P. vannamei* feed now. To get the marketing tickets, the feed makers need to produce good feed with a nice appearance and ensure the farmers compare the physical and culture performance with the feed from some other competitors. Homogeneous competition makes some small feed companies supply the shrimp feed on credit; the farmers can pay for the feed in a certain times, such as a month or three months. But it is a dangerous market operation and almost every shrimp feed maker knows it. Some feed suppliers try to increase their market share by offering a higher dis-

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service. With the service to the farmers, most of them can get greater profits from shrimp culture than before and feedmills can sell feed with more cash than debt.

The future of the Chinese shrimp feed industry

With the upswing of Chinese feed industry, some issues have been concerned publicly. The Chinese vannamei shrimp feed protein is generally between 39-41 percent, the monodon shrimp feed even with higher protein and some farmers are feeding their vannamei with monodon feed. The shrimp feed protein in other countries is mostly between 30-35 percent, and some research papers have reported that decreasing the protein level by increasing reasonable energy and balanced nutrients can maintain the similar growth performance.

Furthermore, lots of research about the substitution of fishmeal is carried out every year and many available methods can relieve the pressure which is caused by fishmeal. However, fishmeal still accounts for greater than 30 percent of feed and the Chinese feed makers are now finding fishmeal expensive. With the ever-increasing price, the ratio of fishmeal in Chinese shrimp feed will be decreased one day. We forecast that the environmentally friendly and healthy shrimp feed will be popular in China.

Another issue is that although the Chinese shrimp feed industry is already over-supplied, total production capacity is increasing more than 100,000 MT yearly. The cut-throat competition will manage this industry, but it still needs the government guidance. With strong capital, technology, human resources and market share of the large feed groups, the suitable acquisition is good to the industrial restructuring and can make the shrimp feed industry move healthily.

The development in China and a domestic market of more than 1.34 billion spells great potential for shrimp consumption. About 70 percent of the total Chinese farmed shrimp are sold locally at present and this number will go on increasing. However, with limited land and increasing farming cost, it seems Chinese shrimp production won't increase as quickly as in the past and the shrimp feed industry will develop more regularly.

References available on request

count to the distributors and farmers, but that kind of market share can't last long as a healthy enterprise needs profit.

But increasing feed sales with cash is a hard job; the Chinese feed salesmen are always under high pressure. Since 2006, some big feed producers have promoted service marketing, that is selling the feed to the farmers with good service and help them to create values. Guangdong Haid Group is a good service-marketing example with a strong technical service team with more than 2000 members who are highly educated. Haid has a strong training system to make every service-marketing member hold the necessary knowledge, an efficient management system, available good quality PL and animal health products can keep the service-marketing program goes well.

The service members are distributed into different areas, but most of their work is going to the farming ponds to communicate with the farmer, do the technical training, deliver the new culture information, help them to

prepare the ponds and treat the diseases and some other services work. There are more than eight different shrimp farming modes in China, Haid has its members to study and promote the successful modes in different farmed areas. With this powerful service-marketing system, Haid has held the biggest shrimp feed market share with more than 300,000 MT last year.

For the market, more feed companies are following Haid although every boss knows it is so difficult to build an effective service team. Anyway, it is not easy to produce feed in China now; feedmills also need to be involved in hatchery, water quality treatment product and farming technology

