Role of Nutritionally Optimized Diets for Shrimps in Aquaculture

The rapid growth of aquaculture worldwide has become increasingly dependent upon the use of external feed inputs and upon the use of compound aquafeeds. Over the last 70 years, significant progress has been made to formulate nutritionally adequate feeds for fish and crustaceans.

These feeds are significant not only in terms of cost but also in nutrition, as some of them are the primary source of animal and plant protein required by cultured aquaculture species for normal development. Feed is the major component in aquaculture production, accounting for 50-60% of overall cost, hence any savings on feed can significantly lower total cost and increase return on investment.

Formulating aquaculture feed requires the use of combinations of several ingredients since most feedstuffs have been shown to have significant nutrient and functional limitations but cannot be used individually at very high levels in the diets of most aquaculture species. Associated with the rapid growth of aquaculture, new intensive cultivation techniques have been used which generally have a greater environmental impact than traditional culture techniques.

What are feeds

Shrimp, prawns as well as land animals have similar qualitative nutritional requirements. They require energy and various nutrients including proteins (essential amino acids), lipids (essential fatty acids), vitamins-minerals for growth and various physiological functions. Formulation of complete feeds for various species is dependent on understanding how much energy and each nutrient is required. The goal of meeting dietary requirements will be to formulate a feed that provides all essential nutrients at required levels in the proper proportions and necessary energy for their utilization.

Know your Feed

When buying feed for shrimps, one should be able to differentiate between good and bad feed. A feed is characterized as good feed if it has following characteristics:

- Has good physical quality and does not show any signs of mould growth
- Is dry with effective colour
- Provides optimal nutrition for specific species needs
- Has highly digestible protein content
- Has a distinctive aroma

- Has uniform shape of the pellets
- Should be stable in water for 2-3 hours
- Has strong palatability

Besides the above-mentioned characteristics, one also needs to know about the different types of feeds available in market to ensure right feeding to their animals. Types of feeds available are:

A. Hatchery feeds

These feeds are used for the larval development of shrimps. They are exclusively used in hatchery systems. They are manufactured based on a good maturation process and higher conversions of nauplii into postlarvae.

B. Natural feeds

Natural feeds are phytoplankton and zooplankton initial stages of larval forms depend on natural feeds in the surrounding environments.

C. Nursery feeds

These feeds are specifically made for shrimp nursery systems in controlled conditions and these feeds are manufactured for highly intensive farming and for better survival it contains immunostimulants, digestible marine proteins and prebiotics that enhance the shrimp juvenile growth and immune resistance.

D. Balanced Feeds for specific species

Balanced feeds promote growth and water quality in the pond environment, and these are generally species-specific and work in a wide variety of farming practice environments generally it contains all nutrients for specific species' needs.

E. Functional feeds

Functional feeds promote the growth and health of the organisms which improves their immune system and induce physiological benefits beyond traditional feeds functional feeds contain organic acids, yeast cell wall fractions, prebiotics and glucans.

Given the numerous feeds available in market, one should always look for proven product performance. White tiger shrimp or *L. vannamei* is the most cultured species of shrimp in India and for an optimal growth it requires a balanced nutrition that delivers optimal amino acid balance, immuno-stimulants, and attractants for high digestibility and bio-adsorbable nutrients. **Gamma,** the flagship shrimp grower feed from Skretting, is one such feed that is formulated with high precision to provide consistent results for better Feed Conversion Ratio (FCR) everytime.

In recent years, there has also been an increase in intensive and semi-intensive cultures which means that the number of shrimps being raised in the same hectare has increased. Further, there may also be requirements for reducing grow-out phase for early harvests with bigger sizes. In all of these conditions, it is important to feed high-performance functional feeds that can support the enhanced requirement of nutrition. **Xpand,** which is the outcome of

Skretting's R&D at Aquaculture Innovation (AI) centre in Norway, is one such feed with higher animal protein content and supports the development and immunity of animals while maintaining lower FCR.

With the rising competition from Ecuador, pricing fluctuations and disease outbreaks, many farmers have also been shifting the culture from White tiger to Black tiger or *P. monodon*. In order to achieve the maximum potential of culture, separate feed needs to be given which suits the nutritional requirement of Black tiger with higher digestible marine protein, phospholipids and right balance of amino acids. Skretting's **Kuroline** is one such product that offers optimal nutrition for Black tiger without compromising on the FCR.

Feed for nurseries also need to meet the requirements of the life stage with a special focus on immunity. The feed should be rich in immunostimulants that effectively work against bacteria in the gut, besides ensuring optimum digestible protein inclusion. **Lorica**, the functional feed from Skretting, is suitable for the entire lifecycle of *L. vannamei* especially under challenging conditions and is proven to provide good results in the nursery stage.

Summary

Using nutritionally balanced feed and adopting good feed management practices can improve production efficiency and reduce the environmental impact of the feed. It is recommended to use high-quality feed which will result in greater cost-effectiveness due to improved digestibility and reduced nutrient load on the culture system. The use of poorly formulated feeds would fail to meet the nutritional requirements of culture species causing inefficiencies and increased production costs. Nutritionally balanced feed is a prerequisite for cost-effective production.

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