

Vietnam project produces synbiotic soybean derived feed for white leg shrimp farming

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A group of scientists at the Institute of Biotechnology (Vietnam Academy of Science and Technology) have embarked into a project in response to the need to use synbiotic products for sustainable and economical shrimp farming in Vietnam.

In order to develop a probiotics fortified synbiotics feed to help white shrimp (*Litopenaeus vannamei*) grow, synbiotic feed is formulated to help white shrimp improve their immune systems and assist them in growing. According to Dr. Hoang Phuong Ha, who is leading the project, soybean meal, a by-product of oil processing, contains many nutrients and is a good prebiotic ingredient and a good food fiber for creating synbiotics.

The addition of synbiotic products helped the survival rate of shrimp reach over 85%, the shrimp yield increased about 1.34-1.37 times. The product is also resistant to pathogenic bacteria, so it helps to reduce the use of synthetic antibiotics, thereby reducing environmental pollution.

Oligosaccharides components present in dietary fiber and some nutritional inhibitors such as trypsin inhibitors contained in soybean meal will be converted into short-chain fatty acids and eliminated inhibitors. This nutrition is achieved through fermentation by probiotic strains. The probiotic strains used in the mission are capable of producing digestive enzymes such as amylase, cellulase, protease, etc., which are resistant to *Vibrio parahaemolyticus* and are also very good biofilm-forming strains, which can survive for a long time on the intestinal wall of shrimp.

Moreover, soybean meal also contains a lot of nutrients and protein (crude protein content in soybean meal accounts for 48%, fat 1-2%; fiber 4.5-6%) so when fermented directly with beneficial microorganisms can take full advantage of the nutritional value of soybean meal as a nutritious food source for aquatic animals. Some nutritional inhibitors such as trypsin inhibitors contained in soybean meal will also be converted into short-chain fatty acids by fermentation by beneficial microorganisms. The solution does not need to use complex technological problems, so the investment cost is not high and the product price is also suitable to expand the application scale.

More specifically, the team has developed a process to produce inoculants in the form of synbiotics at the scale of 50 kg/batch. The synbiotic product after formation is dried at 40 degrees Celsius to reach a final moisture content of 9 - 11%, ensuring the cell density of probiotic bacteria 10^8 CFU /g and maintaining digestive enzyme and antibacterial activity. After drying to make inoculants, ensuring the effectiveness of immunity enhancement and growth stimulation for shrimp in aquaculture.

In addition to the specifications of suitable conditions for semi-solid fermentation (pH, temperature, humidity, substrate content, substrate thickness), synbiotic preparations have been evaluated for safety, potency, and efficacy. growth stimulant and immune function in vannamei shrimp in an *in vivo* 150 L model. Supplementing with synbiotic products had a protective effect (RPS) of 36.36%, increasing the survival rate of shrimp by about 20% when toxic to *V. parahaemolyticus* at dose LD50. The research team will further expand the application scale for other aquatic species such as fish, bivalves, etc. to increase the efficiency of aquaculture with continued support from Department of Science and Technology.