Perspective

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Fish Meal by Soybean Meal on Growth Stinging Catfish

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Description

Due to its high protein and iron content, the carnivorous stinging catfish (Heteropneustes fossilis) has been highly prized and consumed. Its ability to survive longer in oxygen-depleted water has made it a promising species for aquaculture. H. fossilis also has a high fecundity, can tolerate varying salinities, and grows well on artificial diets at high temperatures. Due to these favorable production-related characteristics, the culture of H. fossilis has received a lot of attention over the past few years in Southeast Asia and the Indian subcontinent.

Fish nutritionists face a number of significant challenges in today's aquaculture industry because feeding costs account for approximately 70% of operational costs. Fish meal (FM), a major protein source in aquatic feed, is being replaced by less expensive and more readily available plant protein sources to address this issue. Due to its high protein content and relatively stable amino acid profile, soybean meal (SBM) is the best plant protein source. However, fish growth has frequently decreased when FM has been completely replaced with SBM. This could be because it contains more anti-nutrients and less methionine. Additionally, diets are most deficient in methionine and lysine. Ictalurus furcatus, a blue catfish, has seen an increase in growth and feed efficiency as a result of methionine supplementation; Oncorhynchus mykiss, rainbow trout; Oreochromis niloticus (L.) niloticus tilapia; Cirrhinus mrigala, an Indian major carp, but not catfish, grass carp, or Sciaenops ocellatus, a red drum. Fish's normal growth and development are influenced by the essential amino acid methionine. Methionine deficiency in the diet causes fat to build up in the body and reduces weight gain, feed efficiency, and protein content in the carcass. The differences in the fish species used in the experiments and the experimental conditions probably played a role in the varying degrees to which taking dietary supplements of free amino acids improved performance.

Probiotic Efficacy against Bacterial Challenge

In Bangladesh, there is a limited supply of FM, which can be of lower quality and cost more. As a result, farmers only employ SBM rather than FM. As a result, catfish and other fish species' growth performance is lower. SBM and L-methionine supplementation are essential for resolving this issue. Also, in a previous study, Nile tilapia fry (O. niloticus) and juvenile blue catfish (I. furcatus) were used to test SBM with methionine supplementation as a complete replacement for FM. SBM supplementation with L-methionine has not, however, been the subject of any published research on the stinging catfish H. fossilis. As a result, the purpose of this study was to optimize the use of supplemental L-methionine with SBM in stinging catfish diets and evaluate commercially available SBM as a complete FM replacement.

Two fish from each treatment were dissected for histological study. At the conclusion of the 14-week feeding trial, the ventral surface of each of the selected fishes was exposed, and the entire intestine was removed from the gastrointestinal tract in a clean manner. After the intestine was cleaned of blood, fat, and other undesirable substances, they were placed in a bottle containing Bouin's fluid for 24 hours and properly labeled. A series of varying amounts of alcohol dehydrated the preserved intestinal tissues. After that, infiltration was completed by baking for one hour in melted paraffin wax. The infiltrated tissues were then placed on a cool plate and covered with molten wax. Using a microtome machine, the prepared blocks were trimmed and cut to a thickness of 5 m. After that, the tissue sections that were prepared were kept for drying. A five-minute xylene treatment was followed by a series of progressively lower-graded alcohol treatments to remove the wax from the slides. To finally observe the morphological parameters of the intestine and muscle under an electronic microscope (MCX100, Micros Austria), the tissue sections were stained with haematoxylin–eosin. The villus length (m), villus width (m), villus area (mm2), crypt depth (m), and thickness of the intestinal wall (m) were measured using the described image analysis application software (Sigma Scan Pro5, SPSS INC). Because of various trial consumes less calories, histo-morphological changes in the digestive tissues were caught with the assistance of a camera (AmScope 1000) associated with a photomicroscope.

Isolation and Identification of Gut Bacteria

Five apparently healthy walking catfish, C. batrachus, with an average weight of 47.86 3.7 g, and five apparently healthy

stinging catfish, H. fossilis, with an average weight of 34.24 2.2 g, were taken from catfish farms in the Mymensingh region of Bangladesh at random. They were brought to the Fish Disease Laboratory, which is part of the Department of Aquaculture, Bangladesh Agricultural University, and kept in glass aquaria with a capacity The digestive tracts of the dead fish were collected and homogenized in sterile physiological saline (0.85%) at 4°C after being anesthetized with an overdose of clove oil (0.20 ml per 500 ml of water). To isolate gut microbiota and recover total heterotrophic bacteria (THB), the resulting aliquot (0.1 ml) was serially diluted and plated on nutrient agar (NA) and de Man Rogosa Sharpe (MRS) agar (HiMedia, India).

Each dilution was maintained with duplicates. The colonies that were observed, recorded, and expressed as the number of colony-forming units per milliliter (CFU/mL) were chosen for pure culture and additional analysis. They were well-separated, mostly available colonies with distinct morphologies. Using sterile NA and MRS agar plates, the phenotypic as well as colony characteristics were investigated. The standard reference of Bergey's Manual of Systematic Bacteriology was used for the biochemical characteristics (bile-esculin, indole, catalase, Voges-Proskauer, methyl red, citrate, hydrogen sulfide production, nitrate reduction, gelatin hydrolysis test, and sugar fermentation tests).