

Fish feed technology essay sample



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Good nutrition in animal production systems is essential to economically produce a healthy, high quality product. Feed is one of the major inputs in aquaculture and often the success of fish farming depends to a very large extent on the provision of adequate quantities of nutritionally suitable feeds in a form in which fish can utilize. Even in types of aquaculture where the main source of nutrition is natural food, produced by fertilization or other means, supplemental feeding with artificial feeds is necessary to obtain increased production.

In many developing countries agricultural or fisheries wastes are used to feed fish but a good proportion of the feed offered is wasted as they are not in a form in which fish can utilize. Such unused feed may sometimes serve as fertilizer but may more often cause the pollution of water and consequently unfavorable conditions for the growth and survival of the stock. While the availability of suitable feed is important in obtaining growth and survival and production of adult fish, it is of greater and crucial importance in the rearing of larvae and fry. The use of formulated aquaculture feeds, which are commercially designed and produced, is well-established in intensive aquaculture. Increased understanding of the nutritional requirements of fish, along with improvements in feed manufacturing technology and feeding techniques have allowed the expansion of modern aquaculture.

NUTRITIONAL REQUIREMENTS IN FISH FEED

Fish require proteins, lipids, energy, vitamins and minerals primarily while finished feeds must necessarily contain other feed additives to meet the physiological needs to growth, health and reproduction. These requirements vary for species, sex, age and reproductive status of the fish.

PROTEIN AND AMINO ACIDS

Protein is the most expensive part of fish feed. It is also very important to accurately determine the protein requirements for each species and size of cultured fish. Proteins are formed by linkages of individual amino acids. Although over 200 amino acids occur in nature, only about 20 amino acids are common. Of these, 10 are essential (indispensable) amino acids that cannot be synthesized by fish.

LIPIDS (FATS)

Lipids (fats) are high-energy nutrients that can be utilized to partially spare (substitute for) protein in aquaculture feeds. Lipids supply about twice the energy as proteins and carbohydrates. Lipids typically comprise about 15% of fish diets, supply essential fatty acids (EFA) and serve as transporters for fat-soluble vitamins.

Simple lipids include fatty acids and triacylglycerols. Fish typically require fatty acids of the omega 3 and 6 (n-3 and n-6) families.

Fatty acids can be: a) saturated fatty acids (SFA, no double bonds),

1. b) polyunsaturated fatty acids (PUFA, > 2 double bonds), or
2. c) highly unsaturated fatty acids (HUFA; > 4 double bonds).

CARBOHYDRATES

Carbohydrates (starches and sugars) are the most economical and inexpensive sources of energy for fish diets. Although not essential, carbohydrates are included in aquaculture diets to reduce feed costs and for their binding activity during feed manufacturing. Dietary starches are useful

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in the extrusion manufacture of floating feeds. Cooking starch during the extrusion process makes it more biologically available to fish.

VITAMINS

Vitamins are organic compounds necessary in the diet for normal fish growth and health. They often are not synthesized by fish, and must be supplied in the diet.

The two groups of vitamins are:

a) water-soluble and b) fat-soluble.

Water-soluble vitamins include: the B vitamins, choline, inositol, folic acid, pantothenic acid, biotin and ascorbic acid (vitamin C). Of these, vitamin C probably is the most important because it is a powerful antioxidant and helps the immune system in fish.

MINERALS

Minerals are inorganic elements necessary in the diet for normal body functions. They can be divided into two groups (macro-minerals and micro-minerals) based on the quantity required in the diet and the amount present in fish. Common macro-minerals are calcium (Ca), phosphorus (P), potassium (K), sodium (Na), chlorine (Cl), magnesium (Mg) and sulphur (S). These minerals regulate osmotic balance and aid in bone formation and integrity.

ENERGY AND PROTEIN

Fish use much less energy for protein synthesis than do warm-blooded farm animals because they do not need to maintain a constant body temperature,

need less energy to maintain position and move, and because the excretion of ammonia uses less energy in protein breakdown and excretion.

FEED PRODUCTION

TYPES OF FISH FEEDS

This can be broadly divided into two main groups namely:

1. Natural Feeds
2. Artificial Feeds

FEED MANUFACTURE CONCERNS

Commercial fish diets are manufactured as either extruded (floating or buoyant) or pressure-pelleted (sinking) feeds. Either floating or sinking feed can produce satisfactory growth, but some fish species prefer floating, others sinking. Shrimp, for example, will not accept a floating feed, but most fish species can be trained to accept a floating pellet. The feed miller must know the lower and upper limits of safety of the various feed ingredients. Other considerations are based on:

1. Nutrient composition and limitations
2. Digestibility of ingredients
3. Pelleting consideration
4. Prices

FEED MANUFACTURING EQUIPMENTS

Essential fish feedmills engaged in all the processes shall require the following equipments:

1) Screenless hammer mill

2) Mixer

3) Feed extruder

4) Switch box

5) Dryer

6) Bagging

7) Measuring scale:

FEED CARE AND STORAGE

Commercial fish feed is usually purchased by large farms as bulk feed in truckloads and stored in outside bins. Smaller farms often buy prepared feed in 50-pound bags. Bag feed should be kept out of direct sunlight and as cool as possible. Vitamins, proteins, and lipids are especially heat sensitive, and can be readily denatured by high storage temperatures. High moisture stimulates mold growth and feed decomposition. Avoid unnecessary handling and damage to the feed bags which may break the pellets and create „ fines³/₄ which may not be consumed by fish.

FEED ADMINISTRATION

Fish can be fed by hand, by automatic feeders, and by demand feeders. Many fish farmers like to hand feed their fish each day to assure that the fish are healthy, feeding vigorously, and exhibiting no problems. Large catfish

farms often drive feed trucks with compressed air blowers to distribute (toss) feed uniformly throughout the pond.

CONCLUSION

The issue of feeds in fish farming has been a controversial one. Many cultured fishes (tilapia, carp, catfish, many others) require no meat or fish products in their diets. Top-level carnivores (Most salmon species) depend on fish feed of which a portion is usually derived from wild caught fish (anchovies, menhaden, etc.). Vegetable-derived proteins have successfully replaced fish meal in feeds for carnivorous fishes, but vegetable-derived oils have not successfully been incorporated into the diets of carnivores. Use of antibiotics in food production is thought to increase the prevalence of antibiotic resistance in human diseases. The use of antibiotic drugs in aquaculture has decreased considerably in the last decade. Vaccinations and other techniques have virtually eliminated the need for antibiotics.

SOURCE: Southern Regional Aquaculture Center (1999): Trout Production: Feeds and Feeding Methods.