

Forms of feeds

Wet feeds

- Feeds containing moisture levels in the range 45-70% are prepared from high moisture ingredients such as fishery waste, slaughter - house waste etc.
- The feeds are made at the farm shed on a day - to - day basis and fed mainly to carnivorous fish such as sea bass, sea bream, eels etc.

- **Moist feeds:** Moist feeds contain moisture level in the range 25-45% and are made from a mixture of high moisture ingredients, as in wet feeds, and dry pulverized ingredients.
- **Semi-moist diets:** contain moisture in the range 15 to 25% and have a minor contribution from high moisture ingredients.

- Wet, moist and semi-mist diets are considered to be more palatable to most species because of the soft consistency, and good growth and feed efficiency are achieved
- The major disadvantages of these feeds are
 - (i) The transportation and storage under refrigeration until use to prevent spoilage
 - (ii) Irregular availability of fresh raw fish and other animal wastes in adequate quantities

- (III) Introduction of pathogens, particularly from fishery wastes, if not adequately pasteurized
- (IV) Improper transportation and storage damages certain labile vitamins and lipids in such feeds
- (V) Unconsumed feeds may affect the water quality.

- **Dry feeds:** Dry feeds contain moisture in the range 7-13%.

Advantages

- They are relatively easy to manufacture, transport, store and convenient to dispense into the culture systems.
- Include bulk purchase and storage of ingredients, option to select a wide variety of ingredients with specific nutritional characteristics, and the possibility of a quality controlled, least-cost, feed production programmed.

- Dry feeds can be produced in different sizes to suit the specific needs of the grow-out stages of the cultured species, weaning diets for larvae to specialized diets for brood stock.
- Dry feeds also permit production of specialized feeds, such as medicated feeds incorporated with specific medicines/ antibiotics, required to control any disease out-breaks, hormones incorporated feeds to reduce mono sex individuals or for growth promotion or to induce maturation in fish and prawns.

- Dry feeds may be either prepared using dry ingredients alone or a mixture of wet and dry ingredients, adequately processed and dried. Dry feeds may be made as meals, pellets, flakes etc.
- Meals or mashes are simple mixtures of dry ground ingredients, these could be made into a dough or paste or balls just before feeding at farm site and the feed could be fed to fish and prawns in trays or baskets or feed bags tied to poles in ponds, as is practiced in carp culture systems in India.

➤ Two types of dry pellets are normally produced

❖ Floating pellets

❖ Sinking pellets

➤ Floating pellets for fish species which predominantly feed in the water surface or column, e.g. tilapia, trout, grouper, sea bass, carp etc.

➤ Floating pellets enable observation on feeding activity and, to some extent, the health of the fish. But, overheating as required in the extrusion manufacturing process of floating pellets may reduce their nutritional value.

➤ Sinking pellets are required for bottom feeders like prawns. Pellets could be crumbled and graded through screens of different mesh to obtain granules required for feeding the different growth stages of fish and prawns.

- **Larval feeds:** The various types of artificial diets that have been considered for larvae are
- **Minced diets:** A feed paste is prepared by homogenizing wet or wet and dry ingredients with additions of mineral and vitamin premix and binders and fed as such.
- **Wet microparticulate diets:** A custard diet prepared with chicken eggs, prawn flesh, clams, fish solubles, vitamins, minerals, feeding stimulants and wheat flour and homogenizing to get fine particles. The desired particle size can be obtained by sieving.

- **Dry micro particulate diets:** Preparation of a water-stable matrix of dry ingredients or a mixture of dry, moist and wet ingredients followed by suitable drying (freeze-drying, vacuum drying, oven-drying), grinding and sieving to get desired particles. This is the most widely used type of artificial diet for larval rearing.
- **Spray dried diets:** Well mixed finely ground materials are sprayed into air and then dried. Particles ranging in size 50-100 microns are produced and used for rearing marine fish larvae in Japan.

- **Microbounds diets:** Powdered diets with a binder, Carrageenan, agar, zein, alginic acid and gelatin microbound diets have been proposed.
- **Microcoated diets:** Prepared by coating microbound diets with some materials such as zein and cholesterol-lecithin.
- **Microencapsulated diets:** The concept of a miniature packaging assembly (a microcapsule) in which liquids or particulate dietary components are reenclosed in a carefully engineered wall, with release under specific macro or micro environmental conditions has broad applications in fish culture.

- Release of the internal nutrient components at active sites can be accomplished by rupture (enzymatic action, pH change or bacterial action) of the capsule wall.
- **Advantage:**
 - There is minimal loss of nutrients within the aqueous environment thus minimizing organic load in the system and alterations in oxygen and pH levels.
- The capsules can be produced in a range of size (5 to 700 micron capsules) thereby, suitable sizes can be offered to the fish larvae and fry as they grow.

Flake diets

- Flake diets prepared through a double drum dryer processing unit is a potential feed for fish.
- Flakes can be reduced to small particle sizes by grinding and sieving without reducing the basic stability characteristics.
- Ingestion rates of the feed could be enhanced by using suitable binders, flavours and colors. Larval stages of striped bass, perch, and Atlantic silverside have been reared on flake particles.

Thank you