DEVELOPMENTS IN HATCHERY FEEDING SYSTEMS

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The digestibility and nutritional qualities of commercially available microdiets (MD) are advancing due to continuous research and development which has occurred over the past decade. However, MD are far from being the optimal feed for marine fish larvae. One reason for this is the availability of the MD to the larvae in the water column which is reliant on effective distribution and delivery to larvae. The best dry MD is as good as the method with which it is dispensed into the larvae tank.

Hand feeding is the simplest method and is currently the most widely used. Hand feeding is usually undertaken using spoons with relatively long periods between feeding events (30 to 60 minutes). This process results in sub-optimal feeding and accumulation of organic matter on the tank bottom.

Dosage system

The first requirement of a mechanical MD dispenser concerns its capacity to deliver one stable quantity per feeding event. Commonly used belt feeders are handy and cheap but are not designed for MD particles, resulting in the microparticle sticking to the belt, particularly in humid conditions.

Pneomatic horizontal drums have also been developed. The small cavities on the drum external area can be loaded with relatively consistent quantities given the microparticle remains dry and not sticky. However, often a thin layer of product accumulates between the rotating drum and its housing. This quickly becomes a contamination source, as well as a factor which can generate inconsistency in the distribution.

Vertical hoppers with a rotating disk are also commercially available. However, the self-compaction of the microparticles in the hopper, coupled with significant difficulties to clean the equipment, limits its applicability.

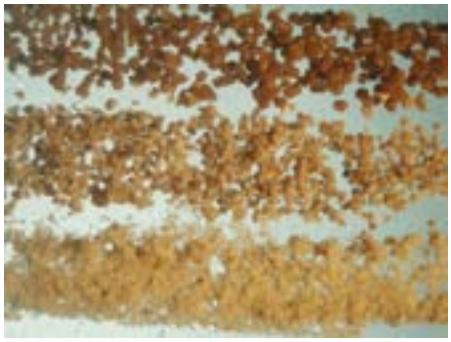
A different feeding mechanism was developed ('HFS' [Hatchery Feeding Systems], in which the dosage system is based on the opening of a slice-valve quickly moved by the means of a simple solenoid, allowing for a constant quantity of feed to be delivered at each feeding event. Fitted with a computerised controller, the HFS is a simple, labour-saving system designed to overcome many of the problems associated with dispensing MD.

Hatchery Feeding system (HFS)

The HFS body is ABS plastic moulded and is extremely strong and splash proof. The HFS can cope with MD particle sizes from 50 µm to 1 mm, dispersing as little as 20 mg ± 2%. The HFS mechanism is based on two slotted plates located below the hopper. One of the plates is static and fixed to the HFS body whilst the other plate is connected to a solenoid. In 'closed' mode, the two plates are located one above the other such that, the slots in the static plate cover the solid area between the slots of the 'active' plate. Once the solenoid is activated, the plate is pulled back and exposes the slots of the static plate. At that moment, MD particles are dispensed from the hopper through the slots. The active plate then returns to its 'closed' position and prevents particles from dispensing. An air 'knife' constantly jets beneath the plates to scatter the MD across the tank water surface and to break aggregated MD clumps.

The HFS Controller

The HFS can be catered for different feeding regimes during the day i.e. a greater amount of MD in higher frequency in the morning following by a reduction of feeding in the afternoon. The HFS can follow the larvae growth with an automatic daily increase of feeding according to larvae needs as they grow, saving reprogramming every few days. Additionally, the HFS can be programmed and controlled via a touchpad or a mobile device using an app.



Larvae have a limited 'window of opportunity' to catch the MD particles before they sink to the bottom and become unavailable. Optimally, tiny amounts of diet are dispersed in frequent feeding events. This gives larvae a chance to catch fresh microparticles in the water column.

In that respect, it is an advantage for a feeding system to deliver very small amounts, as low as 50 mg of MD, in short intervals (as short as every minute), reducing organic matter accumulation and reducing feeding costs.

Wet and Dry

A 'combo' system was developed to cater for all available hatchery feeds, dry MD, microalgae and live feeds. This system controls both MD feeders and peristaltic pumps and provides a solution to all hatchery feeding requierments.

The same principle is applied for programming the pumps. The pumping time during the day is fully adjustable and this automatic dosing eliminates the 'chain saw' effect and fluctuation in the green water concentration within the larvae tank when algae is added manually every few hours. A similar program can be applied for live feeding of rotifers and Artemia.