NUTRITION IN MILKFISH

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The practical importance of bangus nutritional studies was discussed in earlier papers (Camacho, 1975; Leary, 1976). Both authors agreed that supplemental feeding would be an effective tool to grow more milkfish per unit area of fishponds except that there is an extreme scarcity of information on the nutritional requirements of this fish. Without adequate knowledge on the nutritional requirements of bangus, feed formulation becomes a hit-or-miss affair. The techniques so far developed to increase the natural supply of food in the ponds (e.g. fertilization, polyculture, agro-fishery) must, indeed, strongly complement studies on nutrition.

Recent Developments

Nutritional studies in milkfish should be highly specific for a certain growth stage. To start with, there is wide recognition in the three main milkfish producing countries (Taiwan, Philippines and Indonesia) that increase in milkfish production, either by area expansion or by intensification, would heavily depend on the supply of fingerlings (Chen, 1976). Study trips in Panay revealed that a major constraint among many fishpond operators is the inadequate supply of fingerlings. Our low national yield of 600 kg/ha/yr is due partly to the under-utilization of pond areas on account of insufficient stocking.

The early developmental stages of milkfish have been recently documented (Chaudhuri, et al, 1978) and the milkfish industry would later on profit from this initial venture given the condition that the work is sustained. This "breakthrough" must become a practical means to solve the above-mentioned critical need of the industry. Obviously, the larval rearing aspect would require the provision of nutritionally adequate feeds, a research aspect that has barely started.

The research team at the Brackishwater Aquaculture Center has taken a slightly different but, nevertheless, complementary view regarding this problem area. The target are fry collected from the wild (15 mm total length) and how to best promote good growth and survival up to the stocking size of 1-2 grams per fish, using a total indoor system. It is a fairly new approach in our local industry but not in other places. Similar operations may be seen elsewhere, where private or government entities are engaged quite successfully in the large-scale production of shrimp juveniles, salmon or catfish fingerlings.

The premises on which the BAC project was based are as follows: (a) the milkfish fry fishery in the Philippines, involving a great number of small fishermen (fry gatherers) must be sustained for socio-economic reasons; (b) there is a need to define a new culture system to encourage high survival of the fry during a nursery phase or prior

to stocking in production ponds; (c) under controlled conditions, the fingerling supply would be assured on a whole-year basis; (d) there would be minimal constraint on feed cost since the selling price of fingerlings on a per unit weight basis is relatively high.

In 1978, with a grant from the National Science Development Board (NSDB), work was undertaken to formulate a chemically-defined artificial diet for growing milkfish fry to fingerlings. The development of an artificial test diet is a necessary prelude to studies on the nutrient requirements of other successfully cultured species, namely, salmon, trout, and prawns (Halver, 1976; Kanazawa, 1970). After examining the purified diets successfully formulated by the American and Japanese scientists, we were able to come up with a casein-gelatin mixture, fortified with vitamins and minerals. Thereafter work was concentrated on the determination of the optimum protein requirement by simply manipulating the components of this test diet. This project also envisions particular culture system that would allow the maximum exploitation of the test diet for this and subsequent objectives, i.e. optimum levels of fats, carbohydrates, vitamins and minerals. We have confidence that our simple design, consisting of all-glass aquaria, a recirculating unit and life-support systems (aeration and bio-filter) is fairly adequate as indicated by the physico-chemical characteristics of the water.

Some of the highlights of the work at BAC in 1978 are as follows:

1. The diet containing 50% protein (55% casein and 14% gelatin) produced the highest net gain (150 mg) and survival (90%) after a culture period of 28 days.

2. Acceptable levels of growth and survival were obtained at a high stocking density of 4,000/m^3.

3. Prophylactic treatment significantly contributed to greater survival during the feeding trial.

4. The fry were observed to readily accept the purified diet and to actually grow on it under an artificial environment without any soil substrate.

5. Syndromes, characteristics of avitaminoses, were observed during the growth phase (35 mg - 0.4g) and were attributed to some limitations in feed preparation and storage limitations.

This modest work has brought us closer to our main goal of eventually establishing a pilot milkfish fingerling distribution unit initially in Panay. The over-all culture operation would consist of indoor tanks and reservoirs, complete with the necessary life-support units and including fingerling counting, sorting and distribution facilities. Depending upon further results of our feeding trials we would be able to rationalize a feeding program using artificial diets or this in combination with natural food sources. Actual pilot testing is programmed by the middle of next year here in Iloilo in cooperation with a local resident who is willing to provide the appropriate facilities to hold about a million fingerlings during the fry season. A few representatives of banking institutions are now studying the possibility of granting loans for this type of project. It would be a happy sight to see a number of these fingerling distribution units established around the country to serve the needs of both the big and small fishpond operators.

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