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Development of diets for *Penaeus aztecus, P. setiferus, P. vannamei* and *P. stylirostris* juveniles and postlarvae

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Abstract. — *Laboratory Studies of penaeid feeding and nutrition were performed at the Galveston Laboratory of NMFS between 1963 and 1985. Earliest studies used field-collected* ***Penaeus aztecus*** *postlarval and juvenile stages of both wild and laboratory-spawned* ***P. aztecus*** *and* ***P. setiferus*** *and laboratory-spawned* ***P. vannamei*** *and* ***P. stylirostris*** *were later included.*

A standard cold-extruded laboratory diet containing sun-dried shrimp meal, defatted rice bran, menhaden meal, ¿-soy protein, soybean lecithin, vitamins, menhaden fish solubles (as attractant) in an alginate binder was formulated (with Dr. Samuel Meyers, LSU) and tested in various shapes and forms with both native species. This standard diet later modified by the addition of squid meal.

Penaeid species apparently differed in their growth responses to squid meal. ***P. setiferus*** *juveniles required somewhat lower percentages than* ***P. aztecus.*** *Cheaper vegetal proteins (¿-soy, treated soy meal, cottonseed meals) were increased at the expense of marine animal sources), varying the ratio of animal : vegetal protein.* ***P. aztecus*** *required an increase in total protein as vegetal protein increased. Responses to altered A : V protein ratios differed between species and among size groups within species, smaller sizes within species usually requiring a higher proportion of marine animal protein. Neither short-term protein and carbohydrate assimilation nor attractivity of various feeds to larger* ***P. stylirostris*** *correlated with growth over a longer time period. Fatty acid analysis, though suggestive of need for polyunsaturates, did not correlate well with growth.*

Of various live and natural organisms tested as replacements for ***Artemia,*** *rotifers showed the most promise for postlarval* ***P. setiferus.*** *Other studies of this penaeid species and* ***P. vannamei*** *suggested that reducing total* ***Artemia,*** *but supplementing with high quality animal-protein feeds (A :V = 4.5 :1) for a limited period (13 days) could be followed successfully with prepared feed with lower animal protein (A : V = 1.5 : 1). Such a feeding regime, seemingly more efffective at temperatures of 30° both reduces dependence on live feed and limits total feed cost.*

The apparent changes in protein requirement with size and species may be correlated with the biology of the species cultured. More detailed knowledge of the biology of these organisms and their responses in nature will inevitably result in better nutritional understanding.