REPRODUCTIVE PERFORMANCE AND OFFSPRING QUALITY IN CRAYFISH (Cherax quadricarinatus) BROODSTOCK FED DIFFERENT DIETS

Et-Bermawi, N.,
Department of Animal and Fish Production, Faculty of Agriculture (Saba Basha), Alexandria University, Egypt.

A study was conducted to determine the effect of the nutritional value on maturation of crayfish with the aim of establishing standard techniques for mass production of broodstock females producing high quality larvae. Three tested diets were composed of a mixture of fresh food items (shrimp, fish, shrimp meals, 30% Artemia biomass), compared with two types of artificial diets (30% A1 and 40% A2 protein). Five crayfish females in each experimental group were used. The control group was fed to the crayfish diet fed A2 had a significantly better hatching rate (25%) compared to the control, which failed to hatch. No significant effect of the different levels of n-3 PUFA in the diets on reproductive performance of crayfish broodstock. The results of this study suggested that the sole use of the artificial feeds tested could not improve reproductive performance.

Abstract

Typical feeding practices for maturation of broodstock shrimp still rely on a wide range of unprocessed or frozen marine animals including squid, various molluscs, crayfish, fish, roe, marine polychaetes, and crustaceans (shrimp, crab, enriched Artemia biomass). Recently however, crustaceans have been excluded from shrimp breeding regime due to the risk of disease transmission. Furthermore, no information was found concerning a rescue fresh food-based regime which could serve as a control diet for shrimp broodstock nutrition studies. Nevertheless, almost every attempt to completely replace fresh food with artificial diets, results in a decrease in ovaries maturation, a reduced number of spawners and an inferior egg quality. In most situations, a combination of fresh food and artificial diets gives better results than feeding regime that consists of fresh food only (Bray et al., 1990b; Galanti et al., 1989; Nascimento et al., 1991). Fresh food replacement levels are often higher than those applied in commercial facilities, which has had its consequences for spawner survival, spawn frequency, fecundity, egg fertilization rate, hatch rate and larval quality. Many authors have successfully used dry artificial broodstock diets at 80% of the total feeding regime, even when bloodworm and Artemia biomass were replaced partially (Coutteau et al., 1998) or completely (Wouters et al., 2000) in commercial-scale trials. Crayfishes like shrimp, crab and krill are also fed to shrimp spawners, but due to the risk of disease transmission, they are used less frequently nowadays. Bloodworms (marine polychaetes Glycera dibranchiata and Amelocomplidae nazooi) and Artemia biomass (enlarged Artemia) are used for diet supplementation. Artemia biomass usually boosted with specific nutrients. It has been reported to stabilize the spawn maturation and development directly from the juvenile phase until the larval stages, which greatly facilitates their production. The main contents to intensify astaxanthin crayfish coloration are carotenoids, and especially xanthophylls. Differences in color intensity and growth rates of 2200 juveniles during the first months of independent life (Taubgol and Skurlat, 1982; Celada et al., 1993; Szasz-Royuela et al., 2003). Experimental systems, including hatcheries and nurseries, the animals are totally depending on supplemental food. Three factors should be taken into considerations: food quality, food amount, and its availability to the crayfish. Prefered food reduced aggressive activity more than did less preferred food in 0.5, nucella (Capelli and Hamilton, 1964). Therefore, to improve the understanding of the important role of nutrition in maturation of crayfish, a series of studies was conducted with the aim of establishing standard techniques for mass production of broodstock females producing high quality larvae. In the present study, the nutritional status of diet composed of a mixture of fresh food items was compared with type of artificial diets.

Materials and Methods

The experiment was conducted in fiberglass tanks of 1.5 m3 using three PVC tubes (30cm). The tanks were filled with sea water and tap water to depth of 50 cm and aerated. Salinity was maintained at 15±2 ppt and temperature at 20±2°C in 2002. The fish were fed a mixture of fresh food (shrimp, mussel, 30% Artemia) until they spawned. After spawning, the crayfish were weighed. The spent spawners were randomly divided over six tanks and subjected to the dietary treatments. Fresh food mixture was used as the control treatment. The control diet was compared to two types of artificial diets, A1 and A2. Crude protein levels in diets were 35% and 40% (Table 1). The ingredients were ground to a 1.5mm mesh size. Water was added to make stiff-like dough that was passed through a meat grinder to palliate the mixture. The resulting 2-mm pellets were dried in a forced-air oven at 80°C for 8 h. Pellets were then packed in plastic bags and refrigerated at 4°C until use. Proximate composition of diets was determined according to AOAC (1995).  The experiment was carried out in fiberglass tanks of 1.5 m3 using three PVC tubes (30 cm). The tanks were filled with sea water and tap water to depth of 50 cm and aerated. Salinity was maintained at 15±2 ppt and temperature at 20±2°C in 2002. Before test initiation, thirty crayfish females with an average individual wet weight of 60. 88 ± 2 were acclimated to the laboratory condition and reared together in one experimental tank. They were fed a mixture of fresh food (crayfish, shrimp, mussel, 30% Artemia) until they spawned. After spawning, the crayfish were weighed. The spent spawners were randomly divided over six tanks and subjected to the dietary treatments. Fresh food mixture was used as the control treatment. The control diet was compared to two types of artificial diets, A1 and A2. Crude protein levels in diets were 35% and 40% (Table 1).  The ingredients were ground to a 1.5mm mesh size. Water was added to make stiff-like dough that was passed through a meat grinder to palliate the mixture. The resulting 2-mm pellets were dried in a forced-air oven at 80°C for 8 h. Pellets were then packed in plastic bags and refrigerated at 4°C until use. Proximate composition of diets was determined according to AOAC (1995).