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Aquafeeds

# Effects of feed protein levels on redclaw production in Mexico

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## Diets containing 31, 37 and 43 percent crude protein gave the best results



A male redclaw (*Cherax quadricarinatus*).

The redclaw (*Cherax quadricarinatus*) is an Australian freshwater crayfish that was introduced to Mexico in the 1990s. It is commercially produced mainly in the northeast region of the country using aquafeeds formulated for fish, penaeid shrimp, and freshwater prawns.

Redclaw production has been limited, averaging about 15 tons per year in 1999 to 2000. An important limitation to industry expansion has been the lack of appropriate information on redclaw nutrient and feeding requirements, and feeding practices.

To help address this problem, a feeding trial was conducted at the

Nutrition Laboratory of the Center for Biological Investigation of the Northwest (Centro de Investigaciones Biológicas

del Noroeste, CIBNOR) in La Paz, Baja California Sur, Mexico to evaluate the effect of feed protein level on the growth, feed conversion, survival, and biomass of juvenile redclaws.

## Experimental diets

To develop a balanced diet, it is necessary to establish the minimum dietary protein level that will provide the required essential amino acids for the targeted species. In the case of redclaws, developmental stages must also be considered.

At CIBNOR, the authors tested seven diets containing different protein levels: 20, 25, 31, 37, 43, 49 and 55 percent crude protein.

### *Formulation and preparation*

The formulations of the diets were defined by the digestibility of the ingredients as evaluated for the crayfish species *C. destructor* and *C. quadricarinatus*. Major ingredients included sorghum and soybean meals, with added protein primarily in the form of sardine meal.

Each diet was prepared by mixing all macro- and microingredients (vitamin premix, mineral premix, choline chloride and calcium carbonate) in a food mixer. Fish oil and soy lecithin were homogenized and added to the mixture, along with sufficient water to provide 30 percent of ingredient weight.



Selected groups of juvenile redclaws were distributed in the test tanks.

### *Pelleting and analysis*

The dough mixture was passed through a meat grinder to make 2-mm pellets, which were then dried in an air flux oven at 40 degrees-C for eight hours. Proximate analyses of ingredients and diets were made in triplicate following American Organization of Analytical Chemists (1995) methods.

## Trial setup

Each of the 21 units in the experimental system had a capacity of 1,500 liters. Crayfish habitat was provided by weighted bundles of an open-weave, synthetic mesh placed in each tank.

### *Stocking*

Treatments were tested in triplicate, using juvenile redclaws ( $1.08 \pm 0.34$  g) selected from a production pond at CIBNOR. Juveniles were stocked at a density of 20 animals per square meter (60 animals per unit).

## Feeding

Animals were fed to apparent satiation twice a day over 60 days. Measurements were made every two weeks to evaluate animal growth.

## Water quality

Water quality parameters were monitored daily during the feeding trail. Photoperiod was natural, with water temperature maintained at  $27 \pm 1$  degrees-C. Dissolved oxygen levels were kept above 5 milligram per liter.

## Results

As shown in Table 1, the diets containing 31, 37, and 43 percent crude protein gave the best results in terms of growth, biomass and survival. Estimates of protein requirement, obtained by fitting dose-response data to a quadratic model, indicated an optimal protein level for maximum growth of 34 percent for juvenile redclaws.

## Cortes, Growth response and feed utilization of juvenile redclaws, Table 1

Diet	Survival (%)	Final Weight (g)	Biomass (g/m <sup>2</sup> )	Feed-Conversion Ratio
20% crude protein	65.0	8.09	105.2	1.39
25% crude protein	78.9	8.60	128.8	1.26
31% crude protein	80.0	9.60	153.6	1.04
37% crude protein	85.6	9.14	156.6	1.06
43% crude protein	85.0	9.19	156.3	1.07
49% crude protein	86.1	7.61	131.2	1.31
55% crude protein	87.8	6.43	112.7	1.56

Table 1. Growth response and feed utilization of juvenile redclaws after 60 days of feeding on experimental diets.

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