J. Agric. Sci. Mansoura Univ., 34 (12): 10977 - 10990, 2009

EVALUATION OF SOME NON CONVENTIONAL DIETS FOR NILE TILAPIA FISH:

I- CONCERNING DIETARY COMPOSITION, WATER QUALITY, GROWTH PERFORMANCE, AND NUTRIENTS UTILIZATION OF THE FISH.

Abdelhamid, M. A.*; Nagwa, A. Maghraby, A. I. M. Mehrim*; A. A. A. Soliman** and H. M. Ali****

*** Anim. Prod. Dept, Faculty of Agriculture, Al-Mansourah University.**

**** Anim. Prod. Dept., National Research Center, Ministry of Scientific Research, Cairo**

ABSTRACT

The aim of this study was to evaluate some unconventional diets on water quality, diets composition, growth performance, feed utilization and whole fish and fish muscles composition of Nile tilapia fingerlings (7-8g). Glass aquaria were used in duplicate/treatment for 16 weeks. The basal diet contained 25% crude protein. The diets were offered daily at two meals at 3% of fish body weight. The experimental diets were nearly isocaloric and isonitrogenus. The 1st diet was a control, diets No. 2 – 5 are the control diet but their fishmeal was substituted by 25, 50, 75 and 100%, respectively with duckweed meal (DW), diets No. 6 – 9 included crayfish meal (C_rF_i) at the same previous replacement rates, and diets No. 10 – 13 included a mixture of DW + C_rF_i (1:1) as a substitute for fishmeal at the same rates. The obtained results revealed that DW contained higher crude protein and ether extract percentages as well as cadmium level than C_rF_i. The C_rF_i contained more nitrogen free extract, ash, lead and silica than DW. There were significant differences among the experimental diets in their dry matter, crude protein, ether extract, crude fiber and ash contents. Diet No. 13 included the highest crude protein percentage. The increased DW substitution rate up to 75% and C_rF_i up to 50% led to increase the dietary crude protein. The increased C_rF_i level from 25 to 100% gradually decreased the ether extract % in diets No. 6 – 9. The increased dietary inclusion of DW from 25 to 100% (diets No. 2 – 5) led to increase dietary crude fiber %. Diets No. 6 – 9 contained the highest ash %, with gradual increase proportional to the increase in C_rF_i substitution rate. Water quality parameters measured (temperature, pH and dissolved oxygen) did not differ among treatments. There were significant differences among dietary treatments in growth performance parameters including final body weight, body weight gain, and daily body weight gain. The highest values of these criteria were realized with diets No. 11 and 6, respectively. Specific growth rates did not differ significantly, but relative growth rates significantly differed among dietary treatment groups, being the highest with diets No. 11 and 6, respectively. The dietary treatments significantly affected feed intake, feed conversion, protein intake, protein productive value, protein efficiency ratio, and energy retention. The highest feed and protein intakes were found with diet No. 6, but the lowest were recorded for diet No. 12. The best feed conversion was calculated for diet No. 11 (the best treatment in fish bodyweight gain). The best protein utilization (protein productive value and protein efficiency ratio) was calculated for diet No. 13 although the superiority of diet No. 5 in energy retention. From the foregoing results, it would be clear that the 6th diet (25% freshwater crayfish meal as a partial replacer of dietary fish meal) was significantly the best concerning fish bodyweight gain, relative growth rate, and feed and protein intakes. This was followed by the 11th diet (50% substitution with mixture (1/1) of duckweed meal and freshwater crayfish meal), which was responsible for highest final body weight, bodyweight gain,

daily body weight gain, and feed conversion, which may reflect the economical diet by decreasing feed costs to produce one Kg fish bodyweight gain. This leads to recommend the partial replacement of fish meal in Nile tilapia diets with 25% crayfish meal or 50% mixture of crayfish meal plus duckweed meal (1/1). These diets were responsible for better results than control and it is to expect that they will reduce the costs of fish feeding and production for the lower prices of either duckweed meal or freshwater crayfish meal comparing with the very expensive price of fish meal.
Keywords: Tilapia- Duckweed- Freshwater crayfish- Performance- Nutrients utilization.

INTRODUCTION

Tilapia are the third most important cultured fish group in the world, after carps and salmonids (FAO, 2002). Tilapia production has increased greatly in the past two decades and world production of farmed tilapia exceeded two million metric tons in 2004.Tilapia are currently raised in different types of production systems ranging from pond, tank, cage, flowing water and intensive water reuse culture systems (El Sayed *et al.*, 2005). Commercial fish feeds utilized in aquaculture often contain fishmeal, which can comprise up to 65% of the diet. As long as protein component represents 55-75% of the total diet cost, protein alternatives have the first priority in formulating diet of tilapia as alternatives for the high cost of fish meal (Hanley, 2000). Little research was conducted on animal protein sources as alternatives for fish meal such as blood meal, earth worms, fish silage, silk worm pupae and processed meat soluble (Millamena *et al.*, 2000). The utilization of the cheaper sources such as freshwater crayfish meal or aquatic plants meal is promising and need further investigations. Optimal feeding regimes may result in reduced feed costs by minimizing expenditure of metabolic rate of fish. Studies on feed stimulants can provide information on physiology of the animals concerned and may also detect additives, which can be incorporated into aquaculture feeds. Attractive feed may be looted and consumed quickly, thus reducing losses by leaching of essential water-soluble components. An addition of chemo-attractants to pelletized feeds may increase ingestion rates and improve growth, survival and food conversion (El Sayed *et al.*, 2005). The objective of this study was to evaluate replacing dietary fish meal protein by plant and animal protein sources in tilapia fish diets and to investigate its effects on dietary composition, water quality, growth performance, and nutrients utilization of tilapia fingerlings.

MATERIALS AND METHODS

Experimental Fish:

A group of Nile tilapia (*O. niloticus)* with an average initial body weigh of 7 – 8 g were obtained from the stock of earthen ponds (from a private farm at AL Hamoul, Kafr El-Sheikh governorate) and transported to the aquaria located in the fish laboratory of Al Hamoul, Kafr El-Sheikh governorate. Fish were maintained in these aquaria for 2 weeks before the beginning of the experiment for acclimatization purpose. The fish were fed during the acclimatization period on the basal diet (25% crude protein) at a rate of 3% of