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Earthworm Powder as Potential Protein Source in Diets for Common Carp (*Cyprinus carpio* L.)

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Abstract

Earthworm culture is developing in many regions nowadays. Earthworms can be produced by simple methods from many kinds of organic materials. Products of earthworm can be used as an alternative protein source for many cultured animals such as pig, poultry, and fish and shrimp. However, the utilisation of earthworm powdwer as protein source in aquafeeds is poorly studied, and data on the digestibility of earthworm powdwer in carp and the resulting protein utilisation are missing so far.

An experiment was conducted to evaluate the potential of earthworm powder in replacement of fish meal and its digestibility. Triplicate groups of fish were fed a control feed (fish meal based protein), or experimental diets in which 30 % (EW1), 70 % (EW2), or 100 % (EW3) of fish meal protein were replaced by worm powder. The experiment was set up in a recirculation system at a constant temperature of 25°C for 8 weeks. 5 fish were stocked in each aquarium (40 l) and fed at feeding rate of 5 times of maintenance requirement. Fish growth was monitored weekly after 24 hour of starvation. At the end of experiment, fish were sacrificed, length and weight of intestine, weight of liver and chemical composition of the body were determined. Proximate composition and gross energy (GE) of fish and feeds were analysed according to AOAC (1990) standards and by bomb calorimeter respectively. The amino acid contents of the feed ingredients were determined according to EU standard methods 98/64/EG and 2000/45/EG.

Fish fed on earthworm containing diets had similar (EW1, EW3) or higher (EW2) growth rate, protein efficiency, energy retention than the control group. Protein digestibility in EW1, EW2 and EW3 was higher than in the fishmeal-based control diet. The viscera indexes did not show any significant difference which could give indication to nutritional stress. However, complete replacement (EW3) resulted in significantly lower lipid conversion compared to the control feed, the reasons for this and the effect of small supplements of earthworm powder to plant-protein based diets need further evaluation.

Keywords: Alternative protein sources, Aquafeeds, Common carp, Digestibility, earthworm

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