

The Effects of Dietary Administration of Two Sources of β -Glucan on Growth and Physiological Activity of Common Carp

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Abstract. A growth experiment has been established to estimate the influence of two diverse sources of β -glucan, fungal derived from baker's yeast *Saccharomyces cerevisiae* and vegetal derived from barley bran *Hordeum vulgare* as long-term effect on the growth performance, survival rate, and physiological status in fingerlings of common carp (*Cyprinus carpio*) after 60 days of feeding on artificial diets containing 3% fungal β -glucan (A group), 3% vegetal β -glucan (B group), as well as 0% β -glucan (C group) as a control in duplicate for each group. Some of the blood parameters such as Packed cell volume PCV, osmotic pressure OP, total protein content TP, glucose content GLU., enzymes of ALP, AST, and ALT were estimated. Results of growth performance including weight increase, growth rates, relative growth rates, and specific growth rates as well as survival rates showed no significant variances ($P > 0.05$) among the three groups, although there were rises in these values in groups of fungal (A) and vegetal (B) sources of β -glucan additives than the control group C. Contrariwise, most of the physiological parameters estimated in the fish blood showed a significant improvement in performance in group A and then B, where PCV, OP, TP, GLU, ALP, AST, and ALT values showed a significant decline ($P < 0.05$) for A group and for B group, from the control group C. The study confirmed that the addition of β -glucan, especially that derived from a fungal source to fish diets, led to a non-significant increase in growth and survival rates, while it guided to a significant improvement in the physiological activities of the parameters PCV, OP, TP, GLU, ALP, AST, and ALT in the fish blood. The study encourages adding the fungal source of β -glucan to the artificial diets of common carp as an immunostimulatory agent for its health enhancement

Keywords: β -glucan, Fungal source, Vegetal source, Common carp, Growth, Physiological indicators.

1. Introduction

There were great fears about the widespread usage of antibiotics in the treatment of fish diseases (Di Domenico *et al.*, 2017; Brudeseth *et al.* 2013), due to the gush apparition of antibiotic-resistant bacteria, and the harmful action of antibiotics Remnants in aquatic environments and in fish body. This prompted researchers to take alternative methods of treatment, including the use of vaccines and immunomodulatory materials to enhance the

immunity of fish to resist diseases (Bairwa *et al.*, 2012; Plant & Laptra, 2011; Bricknell & Dalmo, 2005; Sommerset *et al.*, 2005). Different sources of β -glucan, one of the immunomodulatory compounds, have been used to stimulate the immunity of cultured fishes (Meena *et al.*, 2013). β -glucans are polymers of D-glucose found in the cell walls of many plants, fungi, and bacteria (Hunter *et al.*, 2002). There are soluble and insoluble β -glucans depending on the β -glucan linkages side