



Effects of Dietary Lysophospholipids on Growth Performance, Digestive Enzymes Activity, and Intestinal Morphology in Pacific White Shrimp

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Abstract

Lysophospholipids play an important role as emulsifiers in livestock production and aquatic animals. However, the optimal requirements of dietary lysophospholipids based on replacement of fish oil with vegetable oil in the shrimp diets have been limited. This study evaluated the efficacy of a natural emulsifier, dietary lysophospholipids, with a partial replacement of 1% dietary fish oil, on the growth performance, digestive enzyme activity, and intestinal morphology of Pacific white shrimp (*Litopenaeus vannamei*). A 56-day feeding trial was conducted on white shrimp with an initial weight of 1.55 ± 9.93 gram/individual. Healthy twenty-five shrimp were randomly distributed into each of 16 aquariums, $0.53 \times 1.22 \times 0.37$ m, at density of 140 shrimp/m³. The experiment was assigned CRD with 4 treatments and 4 replicates. Four diets were prepared: a positive control (PC) with 2% fish oil, b) negative control (NC) with 1% fish oil, c) a negative control with 0.03% lysophospholipids (Lypotech EC.™) (T1), and d) a negative control with 0.06% lysophospholipids (Lypotech EC.™) (T2). The results showed that shrimp fed diets in T1 and T2 had significantly increased in growth performance such as total production, total weight gain, average daily gain, and protein efficiency ratio compared to shrimp in the NC group, whereas feed conversion ratio was significantly lower ($P < 0.05$). There was no significant difference in the survival rate for each treatment. Lipase and total amylase activity showed no significant differences compared to experimental diets. However, shrimp fed with 0.06% lysophospholipids (Lypotech EC.™) in T2 diet had an improved numerical value of trypsin and chymotrypsin activity compared to PC ($P < 0.1$), and protease activity was significantly higher compared to the others ($P < 0.05$). The villus height in shrimp fed the NC diet was substantially lower than the others ($P < 0.05$). In summary, supplemented lysophospholipids in shrimp diets could improve growth performance and enhance feed utilization, especially under partial fish oil reduction.

Keywords: Natural Emulsifier, Lysophospholipids, Fish Oil Reduction, Growth Performance, Digestive Enzymes Activity,

Villus Height, Pacific White Shrimp