

文章摘要

吕云云, 陈四清, 于朝磊, 常青, 秦搏, 王志军. 饲料蛋白脂肪比对圆斑星鲷 (*Verasper variegates*) 生长、消化酶及血清生化指标的影响. 渔业科学进展, 2015, 36 (2): 118-124

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The Effects of the Ratio of Dietary Protein to Lipid on the Growth, Digestive Enzyme Activities and Blood Biochemical Parameters in Spotted Halibut, *Verasper variegates*

投稿时间: 2014-04-26 最后修改时间: 2014-05-20

DOI: 10.11758/yykxjz.20150216

中文关键词: 圆斑星鲷 蛋白脂肪比 生长性能 消化酶 血清生化指标

英文关键词: Spotted halibut Dietary protein to lipid ratio Growth performance Digestive enzyme Blood biochemical parameters

基金项目: 山东省科技攻关项目 (2013GGA10028) 资助

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中文摘要:

为探讨饲料不同蛋白质和脂肪水平对圆斑星鲷生长、消化酶及血清生化指标的影响,以鱼粉和酪蛋白为蛋白源,鱼油和豆油为脂肪源,配制成蛋白水平为40%、45%、50%,脂肪水平为8%、12%、16%的9组试验饲料(分别表示为P40L8、P40L12、P40L16、P45L8、P45L12、P45L16、P50L8、P50L12、P50L16),每组设3个重复,每重复20尾鱼,经过83 d的饲养试验。结果表明,试鱼成活率不受饲料中蛋白质和脂肪水平的影响($P>0.05$)。增重率、特定生长率和摄食率随脂肪水平的增加而显著降低($P<0.05$),P50L8组试鱼增重率较P40L16组高33.63%,特定生长率高31%。饲料效率随蛋白水平的增加而显著增加($P<0.05$),P50L8组试鱼饲料效率较P40L8组高24.09%。P50L8组表现出最高的增重率、特定生长率、饲料效率及摄食率。胃蛋白酶随蛋白水平的增加呈现先增加后下降的趋势。胰蛋白酶以P50L8组最高,显著高于P50L12组6.91%($P<0.05$),和其他各组差异不显著($P>0.05$)。胃脂肪酶随饲料中蛋白水平的提高先降低后升高。肠脂肪酶以P50L8组最高,但各组间差异不显著($P>0.05$)。试鱼血清中总蛋白含量随饲料蛋白水平的增加显著升高($P<0.05$),P50L8组谷丙转氨酶、谷草转氨酶均高于其他组,但各组之间无显著差异($P>0.05$)。甘油三酯和总胆固醇以P50L8组最低,且显著低于P45L12和P45L16组($P<0.05$),与其他组差异不显著($P>0.05$)。由此可见,饲料脂肪水平增加未引起蛋白质节约作用,饲料中蛋白质、脂肪、蛋能比和蛋白脂肪比分别为50%、8%、104.31mg/kcal和6.63时,可满足圆斑星鲷的较快生长及其生理需要。

英文摘要:

Spotted halibut, *Verasper variegates* has been a target model in the studies of reproductive biology and molecular biology. However, little is known about the dietary requirements of this species. In this study, we determined the optimal ratio of protein to lipid for this fish and analyzed the combined effects on the growth, digestive enzyme activities and blood biochemical parameters in spotted halibut. Fish meal and casein were used as protein sources, and soybean oil and fish oil served as lipid sources. Nine experimental diets were formulated as combinations of three levels of crude

protein sources, and soybean oil and fish oil served as lipid sources. Nine experimental diets were formulated as combinations of three levels of crude proteins (40%, 45%, and 50%) and three levels of crude lipid (8%, 12%, and 16%), namely P40L8, P40L12, P40L16, P45L8, P45L12, P45L16, P50L8, P50L12 and P50L16. They were randomly distributed into 27 cement ponds (2 m×1 m×1 m) with 20 fish/pond for 83 d in an in-door flow-through aquarium system. The results showed that the survival rate of fish was not significantly affected by the levels of protein and lipid ($P>0.05$). The weight gain, specific growth rate and feed intake were significantly reduced along with the increase in the dietary lipid ($P<0.05$). Compared to P40L16, the weight gain in P50L8 was 33.63% higher and the specific growth rate was 31% higher. The feed efficiency was significantly boosted along with the increase in the dietary protein ($P<0.05$). The feed efficiency in P50L8 was 24.09% higher than P40L8, and the weight gain, specific growth rate, feed intake and feed efficiency in P50L8 were significantly higher than those in other groups. The activity of stomach protease was first increased and then decreased along with the increase in dietary protein. The protease activity in the hepatopancreas in P50L8 group was significantly higher than that in P50L12 group ($P<0.05$), but showed no significant differences with other groups ($P>0.05$). The activity of the stomach lipase was first decreased and then increased along with the increase in the dietary protein. The activity of intestine lipase in P50L8 group was higher than other groups, but there was no significant difference between all groups ($P>0.05$). The increase in dietary protein resulted in significantly higher level of total proteins ($P<0.05$). Glutamic pyruvic transaminase and Glutamic oxalacetic transaminase in P50L8 group were higher than other groups, but there were no significant differences between all groups ($P>0.05$). Triglyceride and total cholesterol in P50L8 group were significantly lower than P45L12 and P45L16 groups ($P<0.05$), but showed no significant differences with other groups ($P>0.05$). These results indicated that increased dietary lipid level might not cause the protein-sparing effect. Therefore the recommended formula for the best growth performance was 50% protein, 8% lipid, 104.31 mg/kcal P/E and 6.63 P/L.

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