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### 不同蛋白质和能量水平对建鲤幼鱼生长性能、体组成和消化酶活性的影响

#### Effects of dietary protein and energy levels on growth performance, body composition and digestive enzyme activities of juvenile Jian carp (*Cyprinus carpio* var. *jian*)

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中文关键词: 建鲤 能量 蛋白质 生长性能 体组成 消化酶活性

英文关键词: Jian carp (*Cyprinus carpio* var. *jian*) energy protein growth performance body composition digestive enzyme activities

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中文摘要:

探讨了饲料中不同蛋白质和能量水平对建鲤幼鱼生长性能、体组成和消化酶活性的影响。其中, 蛋白质(CP)的4个水平分别为26%、30%、33%和36%, 可消化能(DE)的两个水平分别为13.5 MJ/kg和14.5 MJ/kg。选用建鲤幼鱼960尾随机分为8组, 每组4个重复, 每个重复30尾, 养殖在规格为3.0 m×1.0 m×0.8 m的水箱中, 每日投喂3次, 试验期为8周。结果表明: 增重率和特定生长率随蛋白质水平的升高呈升高趋势, 但差异不显著(〔WTBX〕P〔WTBZ〕>0.05); 增重率、特定生长率和饲料系数随能量水平的升高显著改善(〔WTBX〕P〔WTBZ〕<0.05); 其中, CP36DE14.5组和CP33DE14.5组的增重率和特定生长率显著高于CP26DE13.5组、CP30DE13.5组和CP33DE13.5组(〔WTBX〕P〔WTBZ〕<0.05), 但与其他组间差异不显著(〔WTBX〕P〔WTBZ〕>0.05); 蛋白质效率和氮保留率随蛋白质水平的升高显著下降(〔WTBX〕P〔WTBZ〕<0.01); 此外, 氮保留率随能量水平的升高显著升高(〔WTBX〕P〔WTBZ〕<0.05); 摄食率、肝体比和全鱼脂肪含量随蛋白质水平的升高显著下降(〔WTBX〕P〔WTBZ〕<0.05), 而水分则表现出相反的趋势(〔WTBX〕P〔WTBZ〕<0.05); 肠道蛋白酶活性随饲料蛋白质水平的升高显著升高(〔WTBX〕P〔WTBZ〕<0.05), 而脂肪酶和淀粉酶活性受饲料组成的影响则不显著(〔WTBX〕P〔WTBZ〕>0.05)。由此可见, 蛋白质水平为33%, 能量水平为14.5 MJ/kg时, 建鲤幼鱼有较好的生长性能和饲料系数; 建鲤幼鱼能对无氮浸出物有很好的利用效果, 并对蛋白质有一定的节约效应。

英文摘要:

The objective of this study was to evaluate the effects of dietary energy and protein levels on growth performance, body composition and digestive enzyme activities of juvenile Jian carp (average initial body weight, 10±0.5 g). 960 fish were randomly distributed into 32 tanks (3.0 m×1.0 m×0.8 m) at a density of 30 fish per tank. Fish were fed eight practical diets with two digestible energy (DE) levels (13.5 and 14.5 MJ/kg) and four crude protein (CP) levels (26%, 30%, 33% and 36%) three times daily for 8 weeks. The results indicated that weight gain rate (WGR) and specific growth rate (SGR) increased with increasing dietary protein levels although no significant difference was observed ( $P>0.05$ ). WGR, SGR and feed conversion ratio (FCR) improved significantly ( $P<0.05$ ) as dietary energy levels increased. WGR and SGR of fish fed diets P36E14.5 and P33E14.5 were significantly ( $P<0.05$ ) higher than those of fish fed diets P26E13.5, P30E13.5 and P33E13.5, but showed little difference from those of the other groups ( $P>0.05$ ). Protein efficiency ratio and nitrogen retention efficiency (NRE) decreased significantly ( $P<0.01$ ) as dietary protein levels increased. In addition, NRE increased significantly ( $P<0.05$ ) as dietary energy levels increased. Contrary to moisture, relative feed intake, hepatosomatic index and whole body lipid content decreased significantly ( $P<0.05$ ) as dietary protein levels increased. Intestine protease activities increased significantly ( $P<0.05$ ) as dietary protein levels increased, whereas little difference was observed in lipase and amylase activities ( $P>0.05$ ). These results demonstrated that the diet which contains 33% protein and 14.5 MJ/kg energy is optimal for growth performance and feed utilization of juvenile Jian carp. Nitrogen free extract could be used effectively by juvenile Jian carp and has a protein sparing effect.

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