



晶体苏氨酸和微囊苏氨酸对幼建鲤生长性能和消化吸收能力影响的比较研究

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Crystalline and Microencapsulated Threonine in Juvenile Jian Carp (*Cyprinus carpio* var. Jian): A Comparison of Their Effects on Growth Performance, and Nutrient Digestion and Absorption

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摘要 本试验旨在通过60 d的饲养试验比较饲料中添加晶体苏氨酸和微囊苏氨酸对幼建鲤 (*Cyprinus carpio* var. Jian) 生长性能和消化吸收能力的影响。选取平均初重为 (13.61±0.02) g的健康幼建鲤300尾, 随机分成2组, 每组3个重复, 每个重复50尾, 分别饲喂在基础饲料中添加晶体苏氨酸和微囊苏氨酸的试验饲料, 试验饲料中苏氨酸的有效含量均为1.25%。结果表明: 微囊苏氨酸组幼建鲤的特定生长率 (SGR)、摄食量 (FI)、蛋白质沉积率 (PPV) 和脂肪沉积率 (LPV) 均显著高于晶体苏氨酸组 (P<0.05); 同时, 微囊苏氨酸组幼建鲤的肝胰脏和肠重及蛋白质含量、肠长、肝体指数 (HIS) 和肠体指数 (ISI) 亦显著高于晶体苏氨酸组 (P<0.05)。微囊苏氨酸组幼建鲤的各肠段皱襞高度和碱性磷酸酶 (AKP) 活性以及中肠、后肠Na⁺,K⁺-ATP酶和γ-谷氨酰转肽酶 (γ-GT) 活力均显著高于晶体苏氨酸组 (P<0.05)。微囊苏氨酸组肝胰脏和肠道胰蛋白酶以及肠道脂肪酶的活力均显著高于晶体苏氨酸组 (P<0.05)。微囊苏氨酸组肝胰脏和肌肉中谷草转氨酶 (GOT) 和谷丙转氨酶 (GPT) 活力以及血浆氨浓度显著低于晶体苏氨酸组 (P<0.05), 而血清中GOT活力则显著高于晶体苏氨酸组 (P<0.05)。体外溶解速率试验结果表明: 晶体形式的L-苏氨酸在15 min内完全释放, 而包被处理的微囊苏氨酸释放速率较慢, 在120 min后才完全释放。由此得出, 幼建鲤对微囊苏氨酸的利用效果优于晶体苏氨酸; 与晶体苏氨酸相比, 微囊苏氨酸能有效提高幼建鲤对营养的消化吸收能力。

关键词: 微囊苏氨酸 晶体苏氨酸 幼建鲤 消化吸收能力

Abstract: The effects of dietary crystalline threonine or microencapsulated threonine on growth performance, and nutrient digestion and absorption of juvenile Jian carp (*Cyprinus carpio* var. Jian) were investigated in the 60-day experiment. A total of 300 juvenile Jian carp with initial weight of (13.61±0.02) g were randomly allocated to 2 groups with 3 replicates per group and 50 fish per replicate, and fed diets supplemented with crystalline threonine and microencapsulated threonine, respectively. The available threonine content in the diet was 1.25%. The results showed as follows: the specific growth rate (SGR), feed intake (FI), productive protein value (PPV) and lipid production value (LPV) of microencapsulated threonine group were significantly higher than those of crystalline threonine group (P<0.05). In addition, microencapsulated threonine group had significantly higher hepatopancreas weight, intestinal weight and length, protein content, relative gut length (RGL), hepatosomatic indices (HSI) and intestosomatic indices (ISI) than crystalline threonine group (P<0.05). Furthermore, intestinal folds height and alkaline phosphatase (AKP) activity in all intestine segments, and the activities of Na⁺,K⁺-ATPase and γ-glutamyl transpeptidase (γ-GT) in midgut and hindgut of microencapsulated threonine group were significantly higher than those of crystalline threonine group (P<0.05). Besides, compared with the microencapsulated threonine group, the activities of glutamate-oxaloacetate transaminase (GOT) and glutamate-pyruvate transaminase (GPT) in hepatopancreas and muscle, and plasma ammonia concentration in crystalline threonine group were increased, and the serum GOT activity was decreased (P<0.05). The activities of hepatopancreas trypsin and intestine trypsin and lipase of microencapsulated threonine group were significantly higher than those of crystalline threonine group (P<0.05). Leaching trials suggested that leaching rates were so rapid for L-threonine (crystalline form) that all of them were lost via leaching after immersion for 15 min. By contrast, leaching of microencapsulated threonine

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(coated treatment) was different from the control (uncoated treatment), hence all of them were lost via leaching after immersion for 120 min. This results indicate that the microencapsulated threonine is utilized more effectively than crystalline threonine by juvenile Jian carp, and it can increase the digestion and absorption of nutrients in juvenile Jian carp. [Chinese Journal of Animal Nutrition, 2011, 23 (5) : 771 -780]

Keywords: [microencapsulated threonine](#), [crystalline threonine](#), [juvenile Jian carp](#), [nutrient digestion and absorption](#)

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