

高锌对仔猪肝脏脂肪代谢的影响

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Effects of High Dietary Zinc Levels on Hepatic Lipid Metabolism in Piglets

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摘要

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摘要 本研究旨在探讨高浓度硫酸锌对仔猪肝脏脂肪代谢的影响。试验选用120头平均始重为(26.66±2.45) kg的“杜×长×大”三元杂交仔猪,随机分成4组(对照组、试验组I、试验组II和试验组III),每组3个重复,每个重复10头猪,分别饲喂添加60、300、1 000和3 000 mg/kg锌的基础饲料。预试期7 d,正试期16 d。结果表明,与对照组相比,1)各试验组血清总甘油三酯和低密度脂蛋白胆固醇含量均显著提高(P<0.05);2)试验组III血清总胆固醇、C18:1脂肪酸含量显著升高(P<0.05),肝脏C18:0、C18:2脂肪酸含量显著降低(P<0.05),而C16:0脂肪酸含量无显著变化(P>0.05);3)试验组II和试验组III肝脏硬脂酰辅酶A去饱和酶1(SCD1)mRNA水平、血浆瘦素和胰岛素含量都显著升高(P<0.05)。随着锌浓度的升高,血浆四碘甲状腺原氨酸(T4)含量显著降低(P<0.05),三碘甲状腺原氨酸(T3)和胰高血糖素含量有上升趋势,但差异不显著(P>0.05)。由此可知,饲料中添加1 000和3 000 mg/kg锌上调了仔猪肝脏SCD1转录水平,促进了机体饱和脂肪酸(C18:0)的去饱和化,增加了机体甘油三酯和胆固醇的合成,且高锌可通过促进瘦素和胰岛素的分泌调节机体的脂肪代谢。

关键词: 硫酸锌;仔猪;脂肪代谢;硬脂酰辅酶A去饱和酶1

Abstract: The present study was conducted to investigate the effects of high dietary zinc levels on hepatic lipid metabolism in piglets. One hundred and twenty cross-bred (Duroc×Landrace×Yorkshire) piglets with initial body weight of (26.66±2.45) kg were randomly allocated into 4 groups (control group, trial groups I, II and III) with 3 replicates in each group and 10 piglets in each replicate. Pigs were fed corn-soybean meal-based diets supplemented with 60, 300, 1 000 and 3 000 mg/kg Zn, respectively. The trial lasted for 16 days after a 7-day adaptation period. The results showed as follows: compared with the control group, 1) total triglycerids and low density lipoprotein cholesterol (LDL-C) in serum were significantly increased in all dietary treatment groups(P<0.05); 2) in trial group III, serum cholesterol and oleate (C18:1) levels were significantly increased (P<0.05), and the concentrations of stearate (C18:0) and octadecadienoic acid (C18:2) were significantly decreased (P<0.05), but the concentration of palmitate (16:0) was unaffected (P>0.05); 3) in trial groups II and III, the levels of stearoyl CoA desaturase (SCD1) mRNA, plasma leptin and insulin were significantly increased (P<0.05), the level of T4 in plasma was significantly decreased (P<0.05), and increasing trends are shown in the levels of T3 and glucagon, but no significant differences were observed (P>0.05). The results indicate that high level of zinc up-regulate the transcription level of SCD1, and enhance the desaturation of C18:0 and synthesis of triglycerid as well as cholesterol. Moreover, high level of zinc can regulate the metabolism of hepatic fatty acids by stimulating the secretion of leptin and insulin. [Chinese Journal of Animal Nutrition, 2010, 22(5):1200-1206]

Keywords: ZnSO₄; piglets; lipid metabolism; stearoyl-CoA desaturase

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