



饲料中三聚氰胺的添加对育肥猪肾脏结构与功能的影响

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Toxicity of Melamine: Damage on the Structure and Function of Kidneys in Finisher Pigs

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摘要 本文旨在研究饲料中三聚氰胺的添加在育肥猪肾脏中的残留及其对肾脏结构与功能的影响。试验选用体重为60 kg的杜洛克×长白×大白生长育肥猪36头, 随机分为3组, 每组6个重复, 每个重复2头猪。采用单因子试验设计, 试验饲料为玉米-豆粕型基础饲料中分别添加0、500和1 000 mg/kg的三聚氰胺。试验期47 d, 分2个阶段, 即42 d的残留试验和5 d的清除试验。结果表明: 1) 饲料中三聚氰胺的添加对育肥猪的生长性能没有显著影响 ($P>0.05$); 2) 饲料中三聚氰胺的添加可导致肾脏肾小管发生明显病理变化, 且较高剂量 (1 000 mg/kg) 的三聚氰胺会影响育肥猪血清中谷丙转氨酶的活性和肌酐的浓度 ($P<0.05$); 3) 育肥阶段饲料中三聚氰胺的添加会导致其在育肥猪肾脏中的残留, 且残留量超过美国食品药品监督管理局规定的食品中三聚氰胺2.5 mg/kg的限量标准, 而在进行5 d的清除试验后, 试验组育肥猪肾脏中三聚氰胺的残留量下降到安全限量标准以下, 但是肾脏损伤并未得到恢复。结果提示: 饲料中较高剂量 ($\geq 1\ 000$ mg/kg) 三聚氰胺的添加会对育肥猪肾脏造成损伤, 进行清除后, 肾脏中三聚氰胺残留量可下降至安全限量标准以下, 但肾脏损伤不可恢复。

关键词: 三聚氰胺 育肥猪 肾脏 结构与功能

Abstract: This study was conducted to investigate the effects of dietary melamine on structure and function of kidney and its deposition and depletion in kidney tissue of finisher pigs. Thirty-six Duroc, Landrace, and Large White finisher pigs were randomly assigned to 3 groups with 6 replicates in each group and 2 pigs in each replicate.

According to a single-factor experimental design, pigs in 3 groups were fed diets supplemented with 0, 500 and 1 000 mg/kg melamine in the basal diet, respectively. The experiment lasted for 47 d with two stages. Animals were fed the experimental diets for 42 d in the deposition experiment, and then pigs in all groups received the basal diet for 5 d in the depletion experiment. The results showed that 500 and 1 000 mg/kg melamine supplementation had no significant effects on the performance of the finisher pigs ($P>0.05$). The administration of melamine would lead to obvious pathological change in kidney, and higher dosage (1 000 mg/kg) of melamine would have significant effects on the glutamate-pyruvate transaminase activity and creatinine concentration in the serum of finisher pigs ($P<0.05$). Dietary melamine could lead to its deposition in the kidney of the finisher pigs, and the supplemental level at 1 000 mg/kg made the melamine residue in kidney tissue exceed the safety limit of 2.5 mg/kg, which was set by U.S. Food and Drug Administration. After withdrawal of melamine in the feed for 5 d, the melamine residues in pigs of two experimental groups were decreased to below the safety limit, but the lesion of kidney was not recovered. It is concluded that higher doses ($\geq 1\ 000$ mg/kg) of melamine in the diet can damage the kidneys of finisher pigs, and after eliminating, the melamine level can be under the safety limit, but the lesion of kidney is not recovered.

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Keywords: melamine, finisher pig, kidney, structure and function

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