动物营养学报 » 2011, Vol. 23 » Issue (08) :1394-1401 DOI: 10.3969/j.issn.1006-267x.2011.08.019

三聚氰胺在肉鸡体内的消化代谢及其对饲粮养分利用率和流通速率的影响

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Melamine: Digestion, Metabolism and Effects on Nutrient Availability and Feed Passage Rate in Broilers

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摘要 本研究旨在通过2个试验探讨三聚氰胺(MEL)在肉鸡体内的消化代谢及其对饲粮养分利用率和流通速率的影响。试验1旨在考察MEL在肉鸡体内的表观排泄率和表观回肠消化率。选用240只1日龄健康的科宝雏鸡，设2个组，分别在饲粮中添加0和100 mg/kg MEL，每组6个重复，每个重复20只鸡，分别在15~21 d和36~42 d进行代谢试验。试验2旨在探讨MEL对肉鸡养分利用率和饲料流通速率的影响。选用48只1日龄健康的科宝公雏，设4个处理，MEL的添加量分别为0、500、1 000和2 000 mg/kg，每个处理6个重复，每个重复2只鸡，分别在21和42 d进行24 h饲料流通速率试验。结果表明：肉鸡对饲粮中MEL的表观回肠消化率和表观排泄率均较高，21、42 d表观回肠消化率分别为93.71%和96.44%，表观排泄率分别为68.72%和69.45%，均差异不显著（P>0.05）。1 000 mg/kg MEL组肉鸡饲粮能量的表观利用率显著低于其余各组（P<0.05）；饲粮中添加MEL对其粗蛋白质、钙、磷的表观利用率没有显著影响（P>0.05）。21 d时，肉鸡采食2 h后，各处理食糜的流通较快；采食6 h后，1 000 mg/kg MEL组的累积回收率显著低于对照组和2 000 mg/kg MEL组（P<0.05），与500 mg/kg MEL组差异不显著（P>0.05）。42 d时，采食2 h后，各处理食糜的流通较慢；1 000和2 000 mg/kg MEL组的24 h累积回收率显著低于对照组和500 mg/kg MEL组（P<0.05）。由此可知，饲粮中添加的MEL易被肉鸡吸收和排泄，且随着日龄的增加，肉鸡的吸收和排泄率提高；短期采食添加MEL的饲粮，可降低肉鸡对饲粮能量的利用率，但不影响其对粗蛋白质、钙、磷的利用率；随MEL添加量的增加，饲料的流通速率减慢。

关键词： MEL 肉鸡 养分利用率 饲料流通速率

Abstract： Two experiments were carried out in this study. The first one was conducted to study the apparent excretion rate and apparent ileal digestibility of melamine. A total of 240 one-day-old Cobb broiler chickens were randomly divided into 2 groups: basal diet group, and basal diet+100 mg/kg melamine group (6 replicates per group and 20 chicks per replicate). Metabolic trials were carried from d 15 to 21 and d 36 to 42. The second trial was conducted to study the effects of melamine on nutrient availability and feed passage rate in broilers. A total of 48 one-day-old Cobb broiler chickens were randomly divided into 4 groups with 6 replicates per group and 2 broilers per replicate. Broilers in different groups were fed with the diets containing 0, 500, 1 000, and 2 000 mg/kg melamine, respectively. At d 21 and 42, a 24 hours trial was carried to determine the effects of melamine on feed passage rate in broilers. The results showed that the apparent excretion rate and apparent ileal digestibility of melamine in broilers were higher, and they were 93.71% and 68.72% at d 21, 96.44% and 69.45% at d 42, respectively, but there was no significant difference between d 21 and 42 (P>0.05); the energy apparent availability in 1 000 mg/kg group was lower than that in the other groups（P<0.05）; there were no significant differences in the availabilities of protein, calcium and phosphorus among all groups (P>0.05). At d 21, the feed passage rate was fast after feeding for 2 h, and the cumulative recovery rate after feeding for 6 h in 1 000 mg/kg group was lower than that in the control group and 2 000 mg/kg group (P<0.05), and there was no significant difference between 1 000 mg/kg group and 500 mg/kg group (P>0.05). At d 42, the feed passage rate was slow after feeding for 2 h, the cumulative recovery rates after feeding for 24 h in 1 000 and 2000 mg/kg group were significantly decreased than those in the control group and 500 mg/kg group (P<0.05). It is concluded that melamine added to the diet is easily absorbed and excreted in broilers, and its absorption and excretion are improved with the day of age increasing; the energy availability in broilers fed the diet containing melamine in short period will be decreased, but there are no significant differences on the availabilities of crude protein, calcium and phosphorus; the feed passage rate becomes lower

with the dietary melamine level increasing. [Chinese Journal of Animal Nutrition, 2011, 23（8）：1394 -1401]

Keywords： melamine， broilers， nutrient availability， feed passage rate

基金资助:

农业部饲料中三聚氰胺限量制定专项和四川农业大学双支计划项目资助

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引用本文:

. 三聚氰胺在肉鸡体内的消化代谢及其对饲粮养分利用率和流通速率的影响[J]. 动物营养学报, 2011,V23(08): 1394-1401

. Melamine: Digestion, Metabolism and Effects on Nutrient Availability and Feed Passage Rate in Broilers[J]. Chinese Journal of Animal Nutrition, 2011,V23(08): 1394-1401.

链接本文:

http://211.154.163.124/Jweb_dwyy/CN/10.3969/j.issn.1006-267x.2011.08.019 **或**

http://211.154.163.124/Jweb_dwyy/CN/Y2011/V23/I08/1394

[1] BURNS K. Events leading to the major recall of pet foods[J]. Journal of the American Veterinary Medical Association, 2007, 230:1601-1604.

[2] PARRY J. Contaminated infant formula sickens 6200 babies in China[J]. British Medical Journal, 2008, 337:1738.

[3] CHAN E Y, GRIFFITHS S M, CHAN C W. Public-health risks of melamine in milk products[J]. Lancet Infectious Diseases, 2008, 372:1444-1445.

[4] LIPSCHITZ W, STOKEY E. The mode of action of three new diuretics: melamine, adenine and formoguanamine[J]. Journal of Pharmacology and Experimental Therapeutics, 1945, 83：235-249.

[5] MAST R W, JEFFCOAT A R, SADLER B M, et al. Metabolism, disposition and excretion of 14C melamine in male Fischer 344 rats[J]. Food and Chemical Toxicology, 1983, 21（6）:807-810.

[6] FILIGENZI M S, TOR E R, POPPENGA R H, et al. The determination of melamine in muscle tissue by liquid chromatography/tandem mass spectrometry[J]. Rapid Communications in Mass Spectrometry, 2007, 21:4027-4032.

[7] 吴彩梅，白洁，贾刚，等.液相色谱-串联质谱法测定鸡组织中的三聚氰胺和三聚氰酸[J].食品科学，2010，31（12）：185-192.

[8] BROWN C A, JEONG K S, POPPENGA R H, et al. Outbreaks of renal failure associated with melamine and cyanuric acid in dogs and cat s in 2004 and 2007[J]. Journal of Veterinary Diagnostic Investigation, 2007, 19（5）:525-531.

[9] REIMSCHUESSEL R, GIESEKER C M, MILER R A, et al. Valuation of the renal effects of experimental feeding of melamine and cyanuric acid to fish and pigs[J]. American Journal of Vemrmary Research, 2008, 69(9)：1217-1228.

[10] GAO C Q, WU S G, YUE H Y, et al. Toxicity of dietary melamine to laying ducks: biochemical and histopathological changes and residue in eggs [J]. Journal of Agricultural and Food Chemistry, 2010, 58:5199-5205.

[11] BAI X, BAI F, ZHANG K Y, et al. Tissue deposition and residue depletion in laying hens exposed to melamine-contaminated diets [J]. Journal of Agricultural and Food Chemistry, 2010, 58:5414-5420.

[12] 高民，冯宗慈.一种改进的铬的测定方法[J].内蒙古畜牧科学,1993,3:42-43.

[13] 张丽英.饲料分析及饲料质量检测技术[M].2版.北京：中国农业大学出版社,2004:49-55.

[14] BAYNES R E, SMITH G, MASON S E, et al. Pharmacokinetics of melamine in pigs following intravenous administration[J]. Food and Chemical Toxicology, 2008, 46:1196-1200.

[15] BUUR J L, BAYNES R E, RIVIERE J E. Estimating meat withdrawal times in pigs exposed to melamine contaminated feed using a physiologically based pharmacokinetic model[J]. Regulatory Toxicology and Pharmacology, 2008, 51:324-331.

[16] 燕磊，郭吉原，孙作为，等.饲喂不同含量三聚氰胺日粮后肉鸭组织中三聚氰胺的残留量分析[J].中国家禽,2009, 31（13）:16-19.

[17] LV M B, YAN L, GUO J Y, et al. Melamine residues in tissues of broilers fed diets containing graded levels of melamine [J]. Poultry Science, 2009, 88:2167-2170.

[18] 黄小燕.三聚氰胺对断奶仔猪的毒性效应和血浆清除规律的研究[D].硕士学位论文.雅安：四川农业大学，2009.

[19] PARSONS A S, BUCHANAN N P, BLEMINGS K P, et al. Effect of corn particle size and pellet texture on broiler performance in the growing phase [J]. Journal Apply Poultry Research, 2006, 15:245-255.

[20] HETLAND H, SVIHUS B, OLAISEN V. Effect of feeding whole cereals on performance, starch digestibility and duodenal particle size distribution in broiler chickens[J]. British Poultry Science, 2002, 43:416-423.

[1] 吴睿,张敏红,冯京海,郑姗姗.**日循环高温对肉鸡组织锌离子浓度及金属硫蛋白含量的影响**[J]. 动物营养学报, 2011,23(08): 1273-1279

[2] 张琼莲,贾刚,吴秀群,王康宁.**1~21日龄黄羽肉鸡饲料净能值测定及其对生长性能和氮利用率的影响**[J]. 动物营养学报, 2011,23(07): 1094-1100

[3] 郭元晟,闫素梅,史彬林,付果花,张和平.**发酵乳酸杆菌对肉鸡小肠绒毛形态的影响**[J]. 动物营养学报, 2011,23(07): 1194-1200

[4] 陈文,闵于明,黄艳群.**玉米油和猪油对肉鸡生产性能、屠宰性能及血清生化指标的影响**[J]. 动物营养学报, 2011,23(07): 1101-1108

[5] 郑爱娟,刘国华,董晓玲,李勇,陈桂兰.**甲状腺素、胰高血糖素和表皮生长因子对肉鸡小肠Ⅰ型肽转运载体**mRNA**表达量的影响**[J]. 动物营养学报, 2011,23(07): 1161-1166

[6] 郭元晟,闫素梅,张和平,付果花,史彬林.**发酵乳酸杆菌对肉鸡胰腺和小肠消化酶活性及营养物质消化率的影响**[J]. 动物营养学报, 2011,23(07): 1225-1232

[7] 王亮,丁雪梅,张克英,白世平,吴彩梅.**三聚氰酸和三聚氰胺对肉鸡生长性能的影响及其组织残留的研究**[J]. 动物营养学报, 2011,23(06): 1019-1026

[8] 李文立1,2，路静2，孙振钧1*，姜建阳2，李方正2，任慧.**谷氨酰胺对热应激肉鸡抗氧化性能的影响**[J]. 动物营养学报, 2011,23(04): 695-702

[9] 张华，蔡辉益*，刘国华，常文环，郝晓洁，周晓.T-RFLP**分析技术在肉鸡肠道微生物研究中的应用**[J]. 动物营养学报, 2011,23(03): 364-369

[10] 马现永，周桂莲*，林映才*，蒋宗勇，郑春田，陈芳.**饲粮中添加谷氨酸钠对黄羽肉鸡生长性能及肉品风味的影响**[J]. 动物营养学报, 2011,23(03): 410-416

[11] 刘伟龙1，占秀安1*，王永侠1，郄彦昭2，武如娟1.**肉种鸡补充硒代蛋氨酸对后代肉鸡肉质的影响及作用机理**[J]. 动物营养学报, 2011,23(03): 417-425

[12] 王俊峰，王龙昌，唐志刚，王恬，周岩民*.**凹凸棒石黏土对产气荚膜梭菌攻毒肉鸡抗氧化功能及血清一氧化氮含量和一氧化氮合酶活性的影响**[J]. 动物营养学报, 2011,23(03): 440-446

[13] 席鹏彬，林映才，蒋守群，郑春田，周桂莲，蒋宗勇*.**饲粮蛋氨酸水平对**43～63**日龄黄羽肉鸡生长性能、胴体品质、羽毛蛋白质沉积和肉质的影响**[J]. 动物营养学报, 2011,23(02): 210-218

[14] 蒋桂韬1,2，胡艳1，王向荣1，张旭1，张石蕊2，戴求仲1.**不同来源木聚糖酶对黄羽肉鸡小肠绒毛形态结构和黏膜生长抑素**mRNA**表达的影响**[J]. 动物营养学报, 2011,23(02): 266-273

[15] 张正帆，王康宁*，贾刚，吴秀群.**1～21日龄黄羽肉鸡豆粕净能预测模型**[J]. 动物营养学报, 2011,23(02): 250-257