



刺五加多糖对脂多糖免疫应激断奶仔猪生长性能和血液生理生化指标的影响

韩杰^{1,2}, 边连全¹, 张一然¹, 刘显军¹, 张飞³

1. 沈阳农业大学畜牧兽医学院, 沈阳 110866;

2. 洛阳师范学院生命科学系, 洛阳 471022;

3. 沈阳农业大学科研种猪场, 沈阳 110866

Effects of *Acanthopanax senticosus* Polysaccharide on Growth Performance and Blood Physiology and Biochemistry Indexes of Weaner Piglets Challenged with Lipopolysaccharide

HAN Jie^{1,2}, BIAN Lianquan¹, ZHANG Yiran¹, LIU Xianjun¹, ZHANG Fei³

1. College of Animal Husbandry and Veterinary, Shenyang Agricultural University, Shenyang 110866, China;

2. Department of Life Science, Luoyang Normal University, Luoyang 471022, China;

3. Breeding Pigs Field for Scientific Research, Shenyang Agricultural University, Shenyang 110866, China

- 摘要
- 参考文献
- 相关文章

Download: PDF (986KB) HTML (1KB) Export: BibTeX or EndNote (RIS) Supporting Info

摘要 本试验旨在探讨饲料中添加刺五加多糖(*Acanthopanax senticosus* polysaccharide, ASPS)对脂多糖(LPS)免疫应激断奶仔猪生长性能和血液生理生化指标的影响。试验采用2×2两因素设计,即饲料处理(添加0或800 mg/kg ASPS)和免疫应激处理(注射LPS或生理盐水)。将64头(28±3)日龄、平均体重为(7.22±0.46) kg的“杜×长×大”三元杂交断奶仔猪随机分为4个处理,其中处理1和2饲喂基础饲料(添加0 mg/kg ASPS),处理3和4饲喂试验饲料(添加800 mg/kg ASPS),试验第14和21天,处理2和4仔猪腹腔注射100 μg/kg BW LPS,处理1和3仔猪腹腔注射等量生理盐水。注射后3 h采血,测定血液生理生化指标。试验期21 d。结果表明:试验1~14 d,饲喂ASPS对未注射LPS的仔猪生长性能无显著影响($P>0.05$);试验15~21 d,饲喂ASPS显著增加仔猪的平均日增重(ADG)和平均日采食量(ADFI) ($P<0.05$),且饲喂ASPS使注射LPS的仔猪ADG和ADFI显著增加($P<0.05$),但对注射生理盐水的仔猪无显著影响($P>0.05$)。饲喂ASPS对仔猪ADG的影响与LPS刺激存在显著互作关系($P<0.05$)。试验第14天,饲喂ASPS显著提高了仔猪外周血淋巴细胞数量($P<0.05$),对外周血淋巴细胞数量的影响与LPS刺激存在显著的互作关系($P<0.05$),且饲喂ASPS能显著增加注射LPS的仔猪外周血淋巴细胞数量($P<0.05$),但对注射生理盐水的仔猪无显著影响($P>0.05$)。试验第14和21天,饲喂ASPS显著降低了仔猪血浆 α -酸性糖蛋白(α -AGP)、葡萄糖、前列腺素 E_2 (PGE₂)含量($P<0.05$),显著提高了血浆白细胞介素-2(IL-2)含量($P<0.05$),且其对 α -AGP、IL-2、PGE₂含量的影响与LPS刺激存在显著的互作关系($P<0.05$),饲喂ASPS能显著降低注射LPS的仔猪血浆 α -AGP、PGE₂含量($P<0.05$),但对注射生理盐水的仔猪无显著影响($P>0.05$)。由此可见,饲喂ASPS对非免疫应激断奶仔猪的生长性能无影响,但可以缓解免疫应激断奶仔猪的生长抑制,ASPS缓解免疫应激断奶仔猪生长抑制与降低其血浆 α -AGP和PGE₂含量,提高外周血淋巴细胞数量和血浆IL-2含量有关。

关键词: 刺五加多糖 断奶仔猪 脂多糖 生长性能 免疫应激

Abstract: This experiment was conducted to evaluate the effects of dietary *Acanthopanax senticosus* polysaccharide (ASPS) on growth performance and blood physiology and biochemistry indexes of weaner piglets challenged with lipopolysaccharide (LPS). The experiment was a 2×2 factorial design with two factors: diet (supplementation with ASPS or not) and immunological challenge (LPS or normal saline injection). A total of 64 crossbred barrows (Duroc×Large White×Landrace), aged (28±3) days, with an initial weight of (7.22±0.46) kg were randomly allotted to 4 treatments, treatments 1 and 2 were fed a basal diet with 0 mg/kg ASPS, and treatments 3 and 4 were fed the basal diet with 800 mg/kg ASPS. On days 14 and 21, pigs in treatments 2 and 4 were given an intraperitoneal injection with 100 μg/kg BW of LPS, and pigs in the other treatments were given equivalent amount of normal saline. Blood samples were obtained at 3 h after injection to analyze blood physiology and biochemistry parameters. The experiment lasted for 21 days. The results showed as follows: on days 1 to 14, ASPS supplementation had no significant effect on growth performance of piglets without LPS challenge ($P>0.05$). On days 15 to 21, ASPS supplementation significantly increased average daily gain (ADG) and average daily feed intake (ADFI) of piglets ($P<0.05$), and there was a significant interaction between ASPS supplementation and LPS challenge on the effect of ADG ($P<0.05$). ASPS supplementation significantly increased ADG and ADFI in LPS

Service

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ Email Alert
- ▶ RSS

作者相关文章

- ▶ 韩杰
- ▶ 边连全
- ▶ 张一然
- ▶ 刘显军
- ▶ 张飞

challenged piglets ($P<0.05$), but did not in normal saline-injected piglets ($P>0.05$). On day 14, ASPs supplementation significantly increased the number of peripheral blood lymphocytes ($P<0.05$), and it had significant interaction with LPS challenge ($P<0.05$). ASPs supplementation significantly increased the number of peripheral blood lymphocytes in LPS challenged piglets ($P<0.05$), but did not in normal saline-injected piglets ($P>0.05$). On days 14 and 21, ASPs supplementation significantly reduced the plasma contents of α -acid glycoprotein (α -AGP), glucose and prostaglandin (PGE_2) ($P<0.05$) as well as significantly increased the content of interleukin-2 (IL-2) of piglets ($P<0.05$). ASPs supplementation significantly reduced the plasma contents of α -AGP, glucose and PGE_2 in LPS challenged piglets ($P<0.05$), but did not in normal saline-injected piglets ($P>0.05$). The results indicate that ASPs supplementation can alleviate growth-depression of immunological challenge weaner piglets by depressed contents of α -AGP, PGE_2 as well as increase IL-2 content in plasma and the number of peripheral blood lymphocytes, but has no effect on growth performance in normal weaner piglets.

Keywords: *Acanthopanax senticosus* polysaccharide, weaner piglets, lipopolysaccharide, growth performance, immune challenge

收稿日期: 2012-11-28;

基金资助:

国家"十二五"科技支撑计划项目(2011BAD28B01-02);科技部科技成果转化项目(2009GB2B000068)

通讯作者 边连全,教授,博士生导师,E-mail:bianlq@163.com


引用本文:

韩杰, 边连全, 张一然等. 刺五加多糖对脂多糖免疫应激断奶仔猪生长性能和血液生理生化指标的影响[J]. 动物营养学报, 2013, V25(5): 1054-1061

HAN Jie, BIAN Lianquan, ZHANG Yiran etc. Effects of *Acanthopanax senticosus* Polysaccharide on Growth Performance and Blood Physiology and Biochemistry Indexes of Weaner Piglets Challenged with Lipopolysaccharide[J]. Chinese Journal of Animal Nutrition, 2013, V25(5): 1054-1061.

链接本文:

http://118.145.16.228/Jweb_dwyy/CN/10.3969/j.issn.1006-267x.2013.05.021 或 http://118.145.16.228/Jweb_dwyy/CN/Y2013/V25/I5/1054

- [1] BARNETT K L, KORNEGAY E T, RISLEY C R, et al. Characterization of creep feed consumption and its subsequent effects on immune response, scouring index and performance of weanling pigs[J]. Journal of Animal Science, 1989, 67(10): 2698-2708.
- [2] MCGLONE J, POND W G. Pig production: biological principles and applications[M]. New York: Delmar Learning Inc., 2003: 23.
- [3] 韩杰, 边连全, 刘显军, 等. 刺五加多糖对断奶仔猪生长性能和免疫指标的影响[J]. 动物营养学报, 2012, 24(11): 2203-2209.
- [4] 韩杰, 边连全, 刘显军, 等. 刺五加多糖对断奶仔猪血液免疫指标的影响[J]. 动物营养学报, 2012, 24(12): 2444-2449.
- [5] JOHNSON R W, VON BORELL E. Lipopolysaccharide-induced sickness behavior in pigs is inhibited by pretreatment with indomethacin[J]. Journal of Animal Science, 1994, 72: 309-314.
- [6] JOHNSON R W. Inhibition of growth by pro-inflammatory cytokines: an integrated view[J]. Journal of Animal Science, 1997, 75(5): 1244-1255.
- [7] KEGLEY E B, SPEARS J W, AUMAN S K. Dietary phosphorus and an inflammatory challenge affect performance and immune function of weanling pigs[J]. Journal of Animal Science, 2001, 79(2): 413-419.
- [8] VAN HEUGTEN E, COFFEY M T, SPEARS J W. Effects of immune challenge, dietary energy density, and source of energy on performance and immunity in weanling pigs[J]. Journal of Animal Science, 1996, 74(10): 2431-2440.
- [9] ECKERSALL P D, SAINI P K, MCCOMB C. The acute phase response of acid soluble glycoprotein, α_1 -acid glycoprotein, ceruloplasmin, haptoglobin and C-reactive protein, in the pig[J]. Veterinary Immunology and Immunopathology, 1996, 51: 377-385.
- [10] WEBEL D M, FINCK B N, BAKER D H, et al. Time course of increased plasma cytokines, cortisol, and urea nitrogen in pigs following intraperitoneal injection of lipopolysaccharide[J]. Journal of Animal Science, 1997, 75(6): 1514-1520.
- [11] REEDS P J, FJELD C R, JAHOOOR F. Do the differences between the amino acid compositions of acute-phase and muscle proteins have a bearing on nitrogen loss in traumatic states?[J]. The Journal of Nutrition, 1994, 124(6): 906-910.
- [12] HILKENS C M, SNIJDERS A, SNIJDEWINT F G, et al. Modulation of T-cell cytokine secretion by accessory cell-derived products[J]. European Respiratory Journal, 1996, 22: 90s-94s.
- [13] 薛瑞, 苗一非, 杨吉春, 等. 前列腺素 E_2 对免疫细胞及炎症相关疾病的调控作用[J]. 生理科学进展, 2011, 42(3): 7-10, 165-168.
- [14] LING P R, BISTRIBAN B R, MENDEZ B, et al. Effects of systemic infusions of endotoxin, tumor necrosis factor, and interleukin-1 on glucose metabolism in the rat: relationship to endogenous glucose production and peripheral tissue glucose uptake[J]. Metabolism, 1994, 43(3): 279-284. 

- [1] 徐晨晨, 王宝维, 葛文华, 张名爱, 岳斌, 史雪萍. 铜对5~16周龄五龙鹅生长性能、屠宰性能、营养物质利用率和血清激素含量的影响[J]. 动物营养学报, 2013, 25(9): 1989-1997
- [2] 张世忠, 王全溪, 王长康, 吴南洋, 江斌, 邵良平. 丁氨丙磷溶液对肉仔鸡生长性能和免疫功能的影响[J]. 动物营养学报, 2013, 25(9): 2111-2117
- [3] 张铁涛, 崔虎, 高秀华, 杨福合, 李光玉, 邢秀梅. 低蛋白质饲料中添加蛋氨酸对育成期蓝狐生长性能和营养物质消化代谢的影响[J]. 动物营养学报, 2013, 25(9): 2036-2043
- [4] 黄秀琴, 任周正, 曾秋凤, 张克英, 丁雪梅, 白世平, 罗玉衡, 刘永刚. 液态复合酶制剂对肉鸭生长性能及钙、磷代谢的影响[J]. 动物营养学报, 2013, 25(9): 2082-2090

- [5] 孙敏敏, 刘含亮, 王红卫, 孟晓, 王纪亭, 万文菊. 酵母铬对尼罗罗非鱼生长和糖代谢的影响[J]. 动物营养学报, 2013,25(9): 2143-2149
- [6] 荆祎, 李光玉, 刘晗璐, 杨雅涵, 鲍坤, 李志鹏. 不同乳酸杆菌添加剂对水貂生长性能、营养物质消化率、氮平衡及血清生化指标的影响[J]. 动物营养学报, 2013,25(9): 2160-2167
- [7] 叶慧, 郑玲玲, 雷建平, 冯定远, 左建军. 25羟基维生素D₃和1 α 羟基维生素D₃代替维生素D₃对42~63日龄黄羽肉鸡生长性能、血清生化指标和胫骨发育的影响[J]. 动物营养学报, 2013,25(8): 1752-1761
- [8] 向泉, 周兴华, 陈建, 黄辉, 李代金, 王文娟, 吴青, 周小秋. 饲料脂肪水平对白甲鱼幼鱼生长性能、体组成和血清生化指标的影响[J]. 动物营养学报, 2013,25(8): 1805-1816
- [9] 常启发, 白会新, 石宝明, 单安山, 魏传玉, 于长青, 仝宝生. 黄腐酸对生长猪生长性能、血清生化指标、血常规参数和免疫功能的影响[J]. 动物营养学报, 2013,25(8): 1836-1842
- [10] 周明, 刘波, 戈贤平, 谢骏, 万金娟, 崔素丽. 饲料维生素E添加水平对团头鲂生长性能及血液和肌肉理化指标的影响[J]. 动物营养学报, 2013,25(7): 1488-1496
- [11] 刘志, 张铁涛, 郭强, 吴学壮, 高秀华, 杨福合, 邢秀梅. 饲料铜水平对育成期蓝狐生长性能、营养物质消化率及氮代谢的影响[J]. 动物营养学报, 2013,25(7): 1497-1503
- [12] 张建禄, 余平, 黄吉芹, 吉红, 邱立疆, 杨克. 脱脂蚕蛹替代饲料中鱼粉对建鲤生长性能、体成分及健康状况的影响[J]. 动物营养学报, 2013,25(7): 1568-1578
- [13] 吴苗苗, 肖昊, 印遇龙, 李丽立, 李铁军. 谷氨酸对脱氧雪腐镰刀菌烯醇刺激下的断奶仔猪生长性能、血常规及血清生化指标变化的干预作用[J]. 动物营养学报, 2013,25(7): 1587-1594
- [14] 聂昌林, 姜建阳, 韩先杰, 宋春阳. 杜洛克与鲁烟白杂交断奶仔猪对可消化赖氨酸的需要量[J]. 动物营养学报, 2013,25(7): 1617-1623
- [15] 肖曼, 高振华, 李兴华, 张少成, 陈训银, 张晓慧, 董爱华, 曹赞, 陈广信. 酵母培养物对肉仔鸡生长性能、肠黏膜结构及肠道菌群的影响[J]. 动物营养学报, 2013,25(7): 1624-1631