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饲料中添加屎肠球菌对断奶仔猪生长性能、肠道菌群和免疫功能的影响

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Effects of *Enterococcus faecium* on Growth Performance, Intestinal Flora and Immune Function of Weaner Piglets

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摘要 本试验旨在研究饲料中添加屎肠球菌对断奶仔猪生长性能、肠道菌群和免疫功能的影响。选用255头(35±1)日龄断奶的“杜×长×大”三元杂交仔猪,随机分为5个组,每个组3个重复,每个重复17头仔猪。对照组饲喂基础饲料(不添加抗生素和屎肠球菌);抗生素组在基础饲料中添加8 mg/kg黄霉素和90 mg/kg阿散酸;屎肠球菌3个试验组在基础饲料中分别添加100、300、500 mg/kg屎肠球菌。试验期为35 d。结果表明:1)与对照组相比,饲料中添加屎肠球菌对仔猪平均日采食量(ADFI)、平均日增重(ADG)、料重比(F/G)没有显著影响($P>0.05$),但添加100、300 mg/kg的屎肠球菌有提高仔猪ADFI的趋势($P>0.05$),添加500 mg/kg的屎肠球菌有降低仔猪F/G的趋势($P>0.05$)。与抗生素组相比,饲料中添加屎肠球菌对仔猪ADG、ADFI、F/G均无显著影响($P>0.05$)。2)与对照组相比,饲料中添加300、500 mg/kg的屎肠球菌显著增加仔猪盲肠中乳酸杆菌的数量($P<0.05$);与抗生素组相比,饲料中添加100、300、500 mg/kg的屎肠球菌对大肠杆菌的数量无显著影响($P>0.05$)。与对照组相比,饲料中添加500 mg/kg的屎肠球菌显著降低仔猪结肠中大肠杆菌的数量($P<0.05$),添加300、500 mg/kg的屎肠球菌显著增加仔猪结肠中乳酸杆菌数量($P<0.05$);与抗生素组相比,饲料中添加300、500 mg/kg的屎肠球菌显著增加仔猪结肠中乳酸杆菌数量($P<0.05$)。3)与对照组相比,饲料中添加300 mg/kg的屎肠球菌显著提高仔猪脾脏重量和脾脏指数($P<0.05$)。与抗生素组相比,饲料中添加300、500 mg/kg的屎肠球菌可显著提高仔猪脾脏重量($P<0.05$)。4)与对照组相比,饲料中添加300、500 mg/kg的屎肠球菌显著提高仔猪血液中淋巴细胞数量及淋巴细胞比率($P<0.05$),添加100、300、500 mg/kg的屎肠球菌显著提高血清中免疫球蛋白G(IgG)含量($P<0.05$),添加300、500 mg/kg的屎肠球菌显著提高血清中免疫球蛋白M(IgM)含量($P<0.05$)。与抗生素组相比,饲料中添加300、500 mg/kg的屎肠球菌显著提高仔猪血液中淋巴细胞比率及血清中IgM含量($P<0.05$),添加100、300、500 mg/kg的屎肠球菌显著提高血清中IgG含量($P<0.05$)。综上所述,仔猪饲料中添加屎肠球菌可以改善仔猪生长性能,维持仔猪肠道菌群平衡,有效增强仔猪免疫力,其中以添加500 mg/kg效果最好。

关键词: 断奶仔猪 屎肠球菌 生长性能 肠道菌群 免疫功能

Abstract: Two hundred and fifty-five weaner piglets [(35±1) days of age, Duroc×Landrace×Yorkshire] were used to study the effects of *Enterococcus faecium* on the growth performance, intestinal flora and immune function. These piglets were randomly allocated into 5 groups with 3 replicates per group and 17 piglets per replicate in a complete randomized design. The control group was fed a basal diet only, antibiotic group was fed the basal diet+8 mg/kg flavomycin and 90 mg/kg arsenilic, and the three *Enterococcus faecium* groups were fed the basal diet+100, 300, 500 mg/kg *Enterococcus faecium*, respectively. The experiment lasted for 35 days. The results showed as follows: 1) compared with the control group, average daily gain (ADG), average daily feed intake (ADFI) and feed/gain (F/G) had no significant difference among 5 groups ($P>0.05$); the addition of 100 and 300 mg/kg *Enterococcus faecium* tended to increase ADFI ($P>0.05$); the supplementation of 500 mg/kg *Enterococcus faecium* tended to reduce F/G ($P>0.05$). Compared with the antibiotic group, there were no significant differences in ADG, ADFI and F/G when piglets fed diets with *Enterococcus faecium* ($P>0.05$). 2) Compared with the control group, diets supplemented with 300 and 500 mg/kg *Enterococcus faecium* significantly increased the number of *Lactobacillus* in caecum ($P<0.05$), and there was no significant difference between the *Enterococcus faecium* group and the antibiotic group ($P>0.05$). Compared with the control group, the diet supplemented with 500 mg/kg *Enterococcus faecium* significantly reduced the number of *Escherichia coli* in colon ($P<0.05$), and the supplementation of 300 and 500 mg/kg *Enterococcus faecium* significantly increased the number of *Lactobacillus* in colon ($P<0.05$). Compared with the antibiotic group, the supplementation of 300 and 500 mg/kg *Enterococcus faecium* significantly increased the

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number of *Lactobacillus* in colon ($P<0.05$). 3) Compared with the control group, the supplementation of 300 mg/kg *Enterococcus faecium* significantly increased spleen weight and spleen index of piglets ($P<0.05$). The addition of 300 and 500 mg/kg *Enterococcus faecium* in the diets significantly increased spleen weight compared with the antibiotic group ($P<0.05$). 4) Compared with the control group, adding 300 and 500 mg/kg *Enterococcus faecium* significantly improved the number of lymphocyte and lymphocyte rate in blood of piglets ($P<0.05$); the supplementation of *Enterococcus faecium* significantly increased the content of immunoglobulin G (IgG) in serum of piglets ($P<0.05$); the supplementation of 300 and 500 mg/kg *Enterococcus faecium* significantly increased the content of immunoglobulin M (IgM) in serum of piglets ($P<0.05$). Compared with the antibiotic group, the addition of 300 and 500 mg/kg *Enterococcus faecium* in the diets significantly improved lymphocyte rate in blood and the content of IgM in serum of piglets ($P<0.05$), and the supplementation of *Enterococcus faecium* significantly increased the content of IgG in serum of piglets ($P<0.05$). It is concluded that *Enterococcus faecium* will be an ideal feed additive to improve the growth performance, regulate intestinal microflora balance and the immune function in piglets and the optimum supplemental level of *Enterococcus faecium* is 500 mg/kg.

Keywords: weaner piglets, *Enterococcus faecium*, growth performance, intestinal flora, immune function

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