



## 酵母β-葡聚糖和杆菌肽锌对早期断奶犊牛生长性能和胃肠道发育的影响

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### Effects of Yeast β-glucan and Bacitracin Zinc on Growth Performance and Gastrointestinal Development of Early-weaned Calves

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**摘要** 本试验旨在研究在犊牛代乳粉中分别添加酵母β-葡聚糖和杆菌肽锌对早期断奶犊牛生长性能及胃肠道发育的影响。选取20头新生荷斯坦公犊牛, 随机分为4组, 每组5个重复, 每个重复1头牛。A组(对照组)饲喂基础饲料, B、C组饲喂基础饲料+75 mg/kg酵母β-葡聚糖, D组饲喂基础饲料+60 mg/kg杆菌肽锌。试验期28 d。每日记录犊牛采食量、每14 d逐一称重并计算平均日增重(ADG), 在试验第21天晨饲时, 给A、B、D 3组犊牛口服大肠杆菌肉汤培养基进行攻毒, C组继续正常饲养, 收集攻毒后3 d直肠内容物经稀释后做微生物计数。试验结束时屠宰, 取瘤胃前背盲囊、十二指肠、空肠和回肠做肠道组织切片。结果显示: 1) 大肠杆菌攻毒前, B组犊牛第1~14天和第15~21天ADG比对照组分别提高了26.17%和24.93%(P<0.05); 攻毒后, B、D组ADG比对照组分别提高了30.38%和30.81%(P<0.05)。试验各期饲料转化率(F/G)上, B、D组均显著优于对照组(P<0.05)。2) 与对照组相比, B、D组犊牛攻毒后12和24 h时直肠中大肠杆菌数量显著降低(P<0.05), 同时D组犊牛直肠中乳酸杆菌数量也显著降低(P<0.05); C组犊牛直肠中乳酸杆菌数量显著高于对照组(P<0.05)。3) 屠宰试验表明: 与对照组相比, B、C组可显著增加犊牛瘤胃乳头长度和乳头宽度(P<0.05)。C、D组犊牛十二指肠隐窝深度显著小于对照组和B组(P<0.05); 绒毛高度和隐窝深度比(V/C)也以试验B、C、D各组显著高于对照组(P<0.05)。由此可见, 在代乳粉中添加75 mg/kg酵母β-葡聚糖能缓解由大肠杆菌攻毒所导致的生长性能下降、小肠组织形态损伤, 从而保证犊牛健康生长, 并能在一定程度上替代或减少抗生素的使用。

**关键词:** 犊牛; 酵母β-葡聚糖; 杆菌肽锌; 肠道菌群; 生长性能

**Abstract:** This experiment was conducted to investigate the effects of yeast β-glucan and bacitracin zinc on growth performance and gastrointestinal development of early-weaned calves. Twenty healthy Holstein male neonatal calves were randomly allotted to 4 groups with 5 replicates per group and 1 calf per replicate. The control group (group A) was fed with a basal diet, groups B and C were fed with the basal diet supplemented with 75 mg/kg yeast β-glucan, and group D was fed with the basal diet supplemented with 60 mg/kg bacitracin zinc. The experiment lasted for 28 days. Feed intake (FI) was recorded every day, body weight was measured every two weeks and average daily gain (ADG) was calculated every two weeks. On day 21, the calves of groups A, B and D were challenged orally with Escherichia coli culture medium (O141 : K99), while group C was fed normally. The rectal content was collected after the challenge and diluted for microorganism counts. On day 28, calves were slaughtered and tissues from saccus cranialis, duodenum, jejunum and ileum were obtained and used in tissue slice. The results showed as follows: 1) compared with group A, the ADG of calves in group B was increased by 26.17% and 24.93% in the two phases before the Escherichia coli challenge (P<0.05), and the ADG of calves in groups B and D were increased by 30.38% and 30.81% after the Escherichia coli challenge (P<0.05); the F/G in groups B and D were significantly lower than that in group A (P<0.05). 2) Compared with group A, the amounts of Escherichia coli in rectum at 12 h and 24 h in groups B and D were significantly decreased (P<0.05), the amount of Lactobacillus in rectum in group D was significantly decreased (P<0.05), and the amount of Lactobacillus in rectum in group C was significantly higher than that in group A. 3) Compared with group A, the rumen papilla height and width of groups B and D were significantly increased (P<0.05). The crypt depth of duodenum in groups C and D were significantly lower than that in groups A and D (P<0.05). The villus height/crypt depth (V/C) in groups B, C and D were higher

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than that in group A ( $P < 0.05$ ). In conclusion, yeast  $\beta$ -glucan at the dosage of 75 mg/kg can ease the decrease of growth performance of early-weaned calves, improve the gastrointestinal development, and protect early-weaned calves challenged with *Escherichia coli*, indicating that the use of  $\beta$ -glucan in calves feed may decrease the usage of antibiotics. [Chinese Journal of Animal Nutrition, 2011, 23 (5): 813-820]

**Keywords:** calves, yeast  $\beta$ -glucan, bacitracin zinc, intestinal microflora, performance

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