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标准回肠可消化色氨酸和赖氨酸的比例对保育猪生长性能的影响

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本论文开展两个试验确定保育猪标准回肠可消化色氨酸（SID 色氨酸）需要量。试验日粮配方将赖氨酸设计为第二限制性氨基酸。试验一选用 255 保育仔猪（PIC 327 × 1050，初始重 6.3±0.15kg），随机分为 7 个处理组，每个处理 7 圈，每圈 6-7 头仔猪，试验期 14 天。试验日粮 SID 色氨酸:赖氨酸分别为 14.7、16.5、18.4、20.3、22.1、24.0%，SID 赖氨酸含量为 1.3%。试验二（11-20kg 体重）选用 1088 头仔猪（PIC 337 × 1050，初始重 11.2±1.35kg），按平均体重随机分为 7 个处理组，每个处理 6 圈，每圈 24-27 头仔猪，试验期 21 天。试验日粮 SID 色氨酸:赖氨酸分别为 14.5、16.5、18.0、19.5、21.0、22.5、24.5%，SID 赖氨酸含量为 0.97%，日粮中添加 30%DDGS。所有试验使用带非均匀残余方差的一般线性混合模型分析。异方差模型包括线性折线模型（BLL）、二次线性折线模型（BLQ）、二次多项式模型（QP）。使用贝叶斯准则判断最准确的生长性能的预测模型。试验一（6-11kg 体重阶段）结果表明随着 SID 色氨酸:赖氨酸提高，日增重和增重耗料比（G:F）都有线性提高（P＜0.05）。二次多项式模型能更准确的预测日增重，最佳 SID 色氨酸:赖氨酸为 23.9%（95%置信区间为 14.7-24.0%）。线性折线模型能更好的预测增重耗料比（G:F），最佳 SID 色氨酸:赖氨酸为 20.4%（95%置信区间为 14.3-26.5%）。试验二（11-20kg 体重阶段）结果表明随 SID 色氨酸:赖氨酸的提高，日增重和增重耗料比也有二次线性增加（P＜0.05）。二次多项式模型能更准确的预测日增重，最佳 SID 色氨酸:赖氨酸为 21.2%（95%置信区间为 20.5-21.9%）。线性折线模型能更好的预测增重耗料比（G:F），最佳 SID 色氨酸:赖氨酸为 20.4%（95%置信区间为 14.3-26.5%）。线性折线模型（BLL）和二次线性折线模型（BLQ）都能很好的预测增重耗料比，最佳 SID 色氨酸:赖氨酸分别为 16.6%和 17.1%（95%置信区间分别为 16.0-17.3%和 16.6-17.7%）。总之，试验一预测最佳 SID 色氨酸:赖氨酸为 20.4%（最佳增重耗料比）至 23.9%（最佳生长性能），而试验二预测最佳 SID 色氨酸:赖氨酸为 16.6%（最佳增重耗料比）至 21.2%（最佳生长性能）.这些试验结果表明 NRC（2012）的推荐标准可能低估了 11-20kg 保育猪的 SID 色氨酸:赖氨酸需要。

Effects of standardized ileal digestible tryptophan: lysine ratio on growth performance of nursery pigs

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Two experiments were conducted to estimate the standardized ileal digestible (SID) Trp:Lys ratio requirement for growth performance of nursery pigs. Experimental diets were formulated to ensure that lysine was the second limiting AA throughout the experiments. In Exp. 1 (6 to 10 kg BW), 255 nursery pigs (PIC327 × 1050, initially 6.3 ± 0.15 kg, mean ± SD) arranged in pens of 6 or 7 pigs were blocked by pen weight and assigned to experimental diets (7 pens/diet) consisting of SID Trp:Lys ratios of 14.7%, 16.5%, 18.4%, 20.3%, 22.1%, and 24.0% for 14 d with 1.30% SID Lys. In Exp. 2 (11 to 20 kg BW), 1,088 pigs (PIC337 × 1050, initially 11.2 kg ± 1.35 BW, mean ± SD) arranged in pens of 24 to 27 pigs were blocked by average pig weight and assigned to experimental diets(6 pens/diet) consisting of SID Trp:Lys ratios of 14.5%, 16.5%, 18.0%, 19.5%,21.0%, 22.5%, and 24.5% for 21 d with 30% dried distillers grains with solubles and 0.97% SID Lys. Each experiment was analyzed using general linear mixed models with heterogeneous residual variances. Competing heteroskedastic models included broken-line linear (BLL), broken-line quadratic (BLQ), and quadratic polynomial (QP). For each response, the best-fitting model was selected using Bayesian information criterion. In Exp. 1 (6 to 10 kg BW), increasing SID Trp:Lys ratio linearly increased ($P < 0.05$) ADG and G:F. For ADG, thebest-fitting model was a QP in which the maximum ADG was estimated at 23.9%(95% confidence interval [CI]: [<14.7%, >24.0%]) SID Trp:Lys ratio. For G:F,the best-fitting model was a BLL in which the maximum G:F was estimated at 20.4% (95% CI: [14.3%, 26.5%]) SID Trp:Lys. In Exp. 2 (11 to 20 kg BW),increasing SID Trp:Lys ratio increased ($P < 0.05$) ADG and G:F in a quadratic manner. For ADG, the best-fitting model was a QP in which the maximum ADG was estimated at 21.2% (95% CI: [20.5%, 21.9%]) SID Trp:Lys. For G:F, BLL and BLQ models had comparable fit and estimated SID Trp:Lys requirements at 16.6% (95%CI: [16.0%, 17.3%]) and 17.1% (95% CI: [16.6%, 17.7%]), respectively. In conclusion, the estimated SID Trp:Lys requirement in Exp. 1 ranged from 20.4% for maximum G:F to 23.9% for maximum ADG, whereas in Exp. 2 it ranged from 16.6% for maximum G:F to 21.2% for maximum ADG. These results suggest that standard NRC (2012) recommendations may underestimate the SID Trp:Lys requirement for nursery pigs from 11 to 20 kg BW.