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Pigs kept under commercial conditions respond to a higher dietary tryptophan:lysine ratio immediately after weaning

M.M. Capozzalo¹, J.C. Kim², J.K. Htoo³, C.F.M. de Lange⁴, B.P. Mullan², J.W. Resink⁵, C.F. Hansen⁶, P.A. Stumbles¹, D.J. Hampson¹, N. Ferguson⁷ and J.R. Pluske¹

¹Murdoch University, Murdoch, WA 6150. ²Department of Agriculture and Food WA, South Perth 6151. ³Evonik Industries AG, Hanau, Germany. ⁴University of Guelph, Guelph, ON N1G 2W1, Canada. ⁵Nutreco R&D, Boxmeer, 5830 AE The Netherlands Boxmeer 5830, The Netherlands. ⁶University of Copenhagen, Copenhagen, Denmark. ⁷Westpork Pty Ltd, Maylands, WA 6051.

The recommended standardised ileal digestible (SID) ratio of tryptophan to lysine (Trp:Lys) is 0.16 for 7-11 kg pigs (NRC, 2012). However, Simongiovanni *et al.* (2012) showed the requirement for dietary Trp increases during inflammatory states, such as in the post-weaning period, suggesting that NRC (2012) recommendations might be insufficient. This study hypothesised that weaner pigs kept in commercial conditions will show a positive response to increased Trp:Lys ratios above the NRC (2012) recommendations.

Mixed-sex weaner pigs (Landrace x Large White; n=2,430; seven pens/treatment) were distributed to one of six treatments according to body weight (BW) and sex. Two wheat-based diets were formulated (15.0 MJ digestible energy/kg, 1.4% SID Lys) for SID Trp:Lys ratios (after Sauviant *et al.*, 2004) of 0.16 and 0.26, with synthetic Trp added to the 0.26 diet. Diets were then blended to obtain intermediate SID Trp:Lys values of 0.18, 0.20, 0.22 and 0.24. The analysed Trp:Lys ratios were 0.18, 0.19, 0.21, 0.22, 0.24 and 0.26. Pigs were fed experimental diets for two weeks after weaning. Pig BW and feed intake were measured weekly and blood samples taken on d 4 and 11 (eight pigs/pen) for analysis of C-reactive protein (CRP), an inflammation marker. Data were analysed using GLM procedures in SAS (Ver 9.3), and linear and quadratic polynomial effects were examined.

Table 1. Effect of Trp:Lys ratio on performance and CRP levels of pigs from weaning until 14 d after weaning. Values are expressed as least square means with pooled SEM.

| | Analysed Trp:Lys | | | | | | SEM | Significance | | |
|--------------------------|--------------------|--------------------|--------------------|--------------------|-------------------|--------------------|-------|--------------|--------|--------|
| | 0.18 | 0.19 | 0.21 | 0.22 | 0.24 | 0.26 | | Linear | Quad | ANOVA |
| ADG, g | | | | | | | | | | |
| d 0-7 | 194 | 194 | 171 | 198 | 230 | 217 | 13.6 | 0.036 | 0.235 | 0.059 |
| d 8-14 | 397 | 384 | 402 | 369 | 424 | 418 | 14.7 | 0.136 | 0.184 | 0.119 |
| d 0-14 | 296 ^{ab} | 289 ^{ab} | 287 ^a | 283 ^a | 327 ^c | 317 ^{bc} | 9.81 | 0.012 | 0.073 | 0.014 |
| ADFI, g | | | | | | | | | | |
| d 0-7 | 282 | 299 | 289 | 282 | 288 | 328 | 12.9 | 0.091 | 0.144 | 0.151 |
| d 8-14 | 548 ^a | 542 ^a | 532 ^a | 498 ^a | 523 ^a | 646 ^b | 23.1 | 0.047 | 0.001 | 0.003 |
| d 0-14 | 415 ^a | 420 ^a | 411 ^a | 390 ^a | 406 ^a | 487 ^b | 12.7 | 0.010 | <0.001 | <0.001 |
| FCR, g/g | | | | | | | | | | |
| d 0-7 | 1.47 | 1.57 | 1.71 | 1.46 | 1.31 | 1.51 | 0.093 | 0.297 | 0.445 | 0.074 |
| d 8-14 | 1.39 ^{ab} | 1.43 ^{bc} | 1.33 ^{ab} | 1.37 ^{ab} | 1.24 ^a | 1.56 ^{bc} | 0.064 | 0.495 | 0.036 | 0.034 |
| d 0-14 | 1.42 ^b | 1.47 ^b | 1.44 ^b | 1.39 ^{ab} | 1.24 ^a | 1.54 ^b | 0.052 | 0.818 | 0.114 | 0.007 |
| CRP, µg mL ⁻¹ | | | | | | | | | | |
| d 4 | 16.2 | 15.8 | 19.6 | 14.1 | 19.5 | 18.4 | 2.12 | 0.364 | 0.882 | 0.382 |
| d 11 | 14.7 | 15.8 | 14.2 | 10.4 | 17.3 | 11.6 | 2.00 | 0.384 | 0.982 | 0.161 |

^{a, b, c, d}Means in the same row with different superscripts differ; ADG: average daily gain; ADFI: average daily feed intake; FCR: feed conversion ratio; CRP: C-reactive protein.

A linear effect was observed for BW at d 14 (P=0.034; data not shown) and ADG (P=0.012) in the first 14 d after weaning. The ADFI showed linear (P=0.047) and quadratic (P<0.001) effects for d 8-14 and the entire 14 d period. Pigs fed Trp:Lys ratios of 0.22 and 0.24 were most efficient at converting feed to body gain between d 8-14 (P=0.034) and in the entire 14 d period (P=0.007), respectively. The CRP levels suggested that a minimal inflammatory challenge occurred in this study. In agreement with Capozzalo *et al.* (2012), these data suggest a Trp:Lys ratio of 0.22-0.24 for optimal feed efficiency in commercially housed pigs immediately after weaning.

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