

Responses of Finisher Boars and Gilts to Dietary Lysine and Ractopamine

C.V. Rikard-Bell¹, J.R. Pluske², R.J. van Barneveld³, B.P. Mullan⁴, A.C. Edwards⁵, N.J. Gannon⁶, D.J. Henman⁷ and F.R. Dunshea⁸

¹Elanco Animal Health, Macquarie Park, NSW 2113. ²Murdoch University, Murdoch, WA 6150. ³Barneveld Nutrition Pty Ltd, Springwood, QLD 4127. ⁴Department of Agriculture and Food WA, South Perth, WA 6151.

⁵ACE Livestock Consulting Pty Ltd, Cockatoo Valley, SA 5440. ⁶University of Queensland, Gatton, QLD 4343.

⁷Rivalea Australia Pty Ltd, Corowa, NSW 2646. ⁸The University of Melbourne, Parkville, VIC 3010.

The minimum total lysine requirement for pigs between 80 and 120 kg has been reported as 0.65 g/kg (National Research Council, 1998) whilst the current recommended lysine requirements for pigs fed a diet supplemented with ractopamine (RAC) is 0.70 g/kg of total lysine (approximately 0.56 g available lysine/MJ digestible energy (DE)). More recently (Rikard-Bell *et al.*, 2009) reported that the improvements in growth performance elicited by RAC were similar for pigs offered diets with 0.56 or 0.65 g available lysine/MJ DE. The aim of this experiment was to investigate the performance responses of finisher pigs offered a wider range of dietary lysine levels and three levels of dietary RAC.

The experiment involved 360 individually penned pigs in a 2x5x3 factorial design comprising two sexes (gilts, boars), five levels of dietary lysine (0.40, 0.48, 0.56, 0.64, and 0.72 g available lysine/MJ DE respectively) and three RAC doses (0, 5 and 10ppm Paylean[®], Elanco Animal Health, Macquarie Park, NSW) for 28 d. Pigs were weighed at -7, 0, 7, 14, 21 and 28 d. Voluntary feed intake (VFI) was measured at d 7, 14, 21 and 28. Backfat at the P2 site was determined using ultrasonics at d 0, 14 and 28. Data were analysed by analysis of variance.

Table 1. Effect of ractopamine (RAC) dose and dietary lysine level on average daily gain (ADG), feed conversion ratio (FCR), voluntary feed intake (VFI), carcass weight (HSCW) and P2 in finisher pigs.

| | Sex (S) | | RAC (ppm) | | | Available lysine (L; g/MJ DE) | | | | | Significance | | | |
|----------------|---------|------|-----------|------|------|-------------------------------|------|------|------|------|--------------|-------|-------|-------|
| | Gilt | Boar | 0 | 5 | 10 | 0.40 | 0.48 | 0.56 | 0.64 | 0.72 | SED | S | RAC | L |
| Start Wt (Kg) | 64.3 | 65.4 | 64.8 | 64.8 | 64.9 | 64.7 | 65.0 | 64.6 | 64.9 | 64.9 | 1.69 | 0.009 | 0.964 | 0.981 |
| ADG (kg/d) | 1.07 | 1.18 | 1.08 | 1.14 | 1.16 | 0.98 | 1.09 | 1.18 | 1.18 | 1.20 | 0.070 | <.001 | 0.002 | <.001 |
| FCR | 2.54 | 2.27 | 2.49 | 2.38 | 2.35 | 2.80 | 2.44 | 2.25 | 2.27 | 2.27 | 0.135 | <.001 | 0.005 | <.001 |
| VFI (kg/d) | 2.67 | 2.65 | 2.62 | 2.68 | 2.68 | 2.69 | 2.63 | 2.62 | 2.66 | 2.70 | 0.140 | 0.502 | 0.333 | 0.529 |
| HSCW (kg) | 77.9 | 79.4 | 77.9 | 78.9 | 79.2 | 76.4 | 78.4 | 79.2 | 79.8 | 79.4 | 2.41 | 0.015 | 0.175 | 0.007 |
| P2 (mm) | 10.5 | 10.3 | 10.6 | 10.3 | 10.4 | 10.8 | 10.2 | 10.5 | 10.3 | 10.2 | 1.27 | 0.451 | 0.755 | 0.776 |

SED, Standard error of difference; DE digestible energy;

The results indicate that 0.56 g available lysine/MJ DE is sufficient to maximize ADG, FCR and carcass weight in boars and gilts (Table 1). Increasing levels of dietary lysine increased ADG in a linear ($P < 0.001$) manner. Similarly a linear ($P < 0.001$) response occurred for FCR with increasing dietary lysine. Likewise increasing dietary RAC further improved ADG ($P < 0.001$) and FCR ($P = 0.002$) linearly. A notable interaction ($P = 0.016$) between dietary lysine and RAC for FCR occurred. The response to 5 ppm dietary RAC diminished on diets containing 0.64g and 0.72g available lysine/MJ DE, however, these diets supported a response when supplemented with 10 ppm RAC. Responses to dietary RAC were noted when dietary lysine was at or below the current recommendations for RAC diets. HSCW increased with increasing dietary lysine whilst dietary RAC tended to increase HSCW linearly ($P = 0.075$). A Sex x RAC interaction ($P = 0.027$) occurred for carcass P2. The higher RAC dose reduced carcass P2 in boars but not in gilts. These data suggest that 0.56 g available lysine/MJ DE is optimal for maximising ADG, FCR and carcass traits in boars and gilts between 65 and approximately 90kg liveweight whilst RAC improves all traits across a wide range of dietary lysine levels.

NATIONAL RESEARCH COUNCIL. (1998). In "Nutrient Requirements of Swine", (National Academy Press: Washington, DC).

RIKARD-BELL, C.V., VAN BARNEVELD, R.J., MULLAN, B.P., EDWARDS, A.C., GANNON, N.J., HENMAN, D.J. and DUNSHEA, F.R. (2009). In "Manipulating Pig Production XII", p.182, ed R.J. van Barneveld. (Australasian Pig Science Association: Werribee).