Estimates of energy requirements during gestation and lactation in sows

R.S. Samuel[1], S. Moehn[1], P.B. Pencharz[2] and Ronald O. Ball[1]

[1]Swine Research and Technology Centre, 4-10 Agriculture/Forestry Centre, University of Alberta, Edmonton, AB T6G 2P5, [2]Research Institute, Hospital for Sick Children, Toronto, ON.
Email: ron.ball@ualberta.ca

Energy expenditure in sows is predicted to increase in late gestation and as lactation progresses. Diets should be adjusted accordingly to optimize sow nutrition. However, data on energy metabolism in sows are scarce. Energy metabolism in gestating and lactating sows was studied by indirect calorimetry and body composition (e.g. body weight, backfat and loin thickness).

Gravid sows (n=7) were fed 2.4 ± 0.1 kg of a barley-wheat-SBM diet of 13.0 MJ DE/kg, 0.65% Total Lysine, and 15% crude protein. Lactating sows were fed ad libitum a diet of 14 MJ DE/kg and 1.02 % Total Lysine. Energy expenditure was measured by indirect calorimetry. Respiratory quotient (RQ) was calculated to determine nutrient utilization. Backfat and loin thickness were measured ultrasonically. All measurements were made at day 30, 45, and 105 of gestation and day 7 and 19 of lactation. Daily weight gain of sows (232 g/d) was lowest at day 30 of gestation compared to day 45 (532 g/d) or day 105 (574 g/d). Backfat thickness increased ($p<0.05$) from breeding (1.88 mm) to late gestation (2.15 mm) and tended ($p<0.10$) to decrease from early (1.91 mm) to late lactation (1.71 mm). The RQ for sows at day 45 was greater than 1, indicating lipogenesis. Lipid gain in gestation was 6.4 kg or 26% of maternal gain. Loin area was not different ($p=0.29$) from breeding to late gestation or from early to late lactation, indicating sufficient protein intake. Energy expenditure at day 105 (31.3 MJ/d) was greater ($p<0.05$) than DE intake (29.9 MJ/d) and greater than energy expenditure at day 30 (27.2 MJ/d) or at day 45 (25.6 MJ/d). During lactation, sow plus litter heat production (63.2 vs. 83.5 MJ/d) and milk production per piglet (656 g/d vs. 940 g/d) increased ($p<0.05$). Sow only heat production (40.5 MJ/d vs. 44.7 MJ/d) tended to increase ($p<0.10$) from early to late lactation.

Implications: DE intake was sufficient in early and mid, but not late gestation, where sows need at least 5% more DE per day. Lactation feed intake was sufficient to cover protein, but not DE requirement as shown by backfat loss.
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