

# Protein and energy metabolism in non-pregnant sows

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The simultaneous measurement of protein and energy metabolism using calorimetry and isotope tracers can be used to predict nutrient requirements in sows. Preliminary data are reported for a group of sows that are being continuously studied during gestation, lactation and rebreeding.

Non-pregnant sows (180 kg BW) were fed for maintenance energy and protein intake according to NRC (preliminary data n=2). Energy expenditure and amino acid oxidation were measured for 24h. Sows were fed ½ hourly meals each consisting of 1/32 of the daily feed allowance, for the first 8 h of the study, followed by a bolus meal of half the daily allowance. Protein turnover was measured with L-[1-<sup>13</sup>C]leucine given orally in the feed at 1.0 mg/kg/h. Mean heat production was 28.9 ±1.2 MJ/d Heat production was lower (P=0.005) during fasting (14.8 ±0.4 kJ/min) than during frequent feeding (21.4 ±0.8 kJ/min) or following bolus feeding (18.5 ±0.5 kJ/min). The greater heat production during frequent feeding was caused by increased physical activity. The respiratory quotient (RQ) was lower (P=0.04) during fasting (0.87 ±0.03) than after bolus feeding (0.96 ±0.02) indicating that fat was mobilized to meet the sows' energy needs. After the bolus meal sows derived their energy mainly from dietary carbohydrates. The RQ during frequent feeding was intermediate (0.92 ±0.02), indicating neither a true fed nor fasted state. Mean daily leucine oxidation was 12.4 ±0.6% of dose. Leucine oxidation during frequent feeding (**9.4% ± 1.0**) was similar (P=0.49) to fasting (**7.1% ± 0.6**); oxidation following the bolus meal (**18.5% ± 1.2**), was doubled (P<0.001) indicating that more amino acids were used for energy.

## Implications:

These preliminary data show that: 1. frequent feeding spared dietary amino acids (ie reduced protein requirement) by reducing oxidation, 2. sow energy and protein requirements can be determined with these methods. (Supported by ALIDF, CARC, Alberta Pork and Degussa AG)