

# Isoleucine requirement of pregnant sows

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Requirements of sows may change in pregnancy because of maternal tissue development and conceptus growth during the different phases of gestation. Isoleucine (Ile) is a limiting amino acid (AA) in corn-soy diets. The objective of this study was to determine the Isoleucine requirement in early (EG) and late (LG) gestation using the indicator AA oxidation method.

The same seven 4<sup>th</sup> parity sows were used in EG (d 37 to 61) and LG (d 89 to 109). Each sow received 6 diets based on corn, corn starch and sugar in both EG and LG at constant amount of 2.5 kg/d. Diets in EG contained Ile at 20, 40, 60, 80, 100 and 120 % of the Ile requirement (6.2 g/d, NRC 1998) for sows of similar body weight (BW), expected maternal gain and litter size, and 60, 80, 100, 140, 160 and 180% in LG. Dietary valine and leucine contents were 3.5 g/kg and 4.3 g/kg in EG and 5.6 g/kg and 6.9 g/kg in LG, respectively. Sows were fed 2 mg/(kg BW-h) of L[1-<sup>13</sup>C]Phenylalanine (Phe) over 4 h in 8 ½-hourly meals. Requirements were determined as the breakpoint in 2-phase nonlinear models. Sow BW was 246.5 kg in EG and 271.6 kg in LG. Daily gain was similar in EG (344 g/d) and LG (543 g/d). Sow maternal gain was 19.1 ±4.4 kg and litters of 17.7 ±0.75 piglets weighed 22.6 ±0.87 kg at birth. The Ile requirement was less in EG than LG (P = 0.001) at 3.6 g/d vs. 9.7 g/d. In EG, Phe retention (-0.59 g/d) and energy retention (-0.31 MJ/d) were not different from zero, indicating that the 4<sup>th</sup> parity sows had requirements close to maintenance (2.2 g/d) in EG. The Phe retention (3.30 g/d) in LG was almost entirely caused by fetal protein retention. Energy retention in LG was -1.45 MJ/d and similar to EG. The respiratory quotient decreased (P = 0.047) from EG (1.05) to LG (0.98) and decreased (P = 0.016) with increasing dietary Ile, indicating lipid mobilization in LG when Ile was at or above the requirement.

**Implications:** Ile requirements of adult sows increased more from EG to LG than tryptophan requirements in young, growing sows, and were driven mainly by maintenance in EG and by fetal growth in LG. The AA supply is more critical in LG than energy intake for adult sows. Therefore, phase feeding during gestation is necessary to meet the sows' requirements. (Supported by ALIDF, ACAAF, Alberta Pork, Ontario Pork and Ajinomoto)