

Threonine requirement of sows in early, mid- and late gestation

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Sow performance is the backbone of the swine industry. Ensuring optimal nutrition during gestation and lactation benefits the sow and offspring and affects the entire production cycle. Current NRC (1998) recommendations for amino acids (AA) do not account for different requirements in early vs late gestation due to changes in metabolism; recovery of body tissue from previous lactation, and fetal, gut and mammary growth in late gestation. These increases in gut and mammary tissue and gut mucin suggest that there is a higher requirement for threonine (THR) in late gestation.

The THR requirement in early (35–53d), mid- (63-70d) and late (92–110d) gestation was determined by indicator amino acid (IAAO) oxidation in six second parity sows fed THR from 60 % to 150 % of NRC (1998) estimated requirements. L[1-¹³C]phenylalanine was given orally at 30 min intervals for 8 meals and expired ¹³CO₂ was quantified. The nonlinear Mixed model in SAS was used to determine the THR requirement for each period by breakpoint analysis. Plasma THR was also used to estimate requirement.

Sows responded differently to increasing levels of dietary THR in early and late gestation. Preliminary breakpoint analysis resulted in a THR requirement of 6.1 g/d in early gestation ($R^2=0.59$), 7.0 g/d in mid gestation ($R^2=0.55$) and 13.6 g/d in late gestation ($R^2=0.56$). The THR requirement based on plasma THR was 7.2 g/d ($R^2=0.90$) in early gestation and 14.0 g/d ($R^2=0.76$) in late gestation. The current recommended THR intake during gestation is 10 g/d.

Implications: Feeding to a single amino acid requirement value during gestation will result in overfeeding in early gestation and underfeeding in late gestation. Feeding excess AA in early gestation will unnecessarily increase feed costs. Whereas, underfeeding AA in late gestation will have negative effects on sow body condition at parturition and on lactation performance. Phase feeding in gestation can reduce feed costs and may improve sow reproductive performance. Supported by AARI, Alberta Pork, Ontario Pork, ACAAF, Ajinomoto Heartland LLC.