

Protein Maintenance Requirement of Sows is Greater than Estimated by NRC

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The amino acid requirement of sows for maintenance is poorly documented. The current recommendation by NRC (1998) is based on two experiments, one of them conducted in growing pigs. Indicator amino acid oxidation is a rapid method to determine amino acid and protein requirements. This method has not previously been applied to adult sows. Successful determination of amino acid requirements requires sufficient adaptation to a dietary treatment. The objective of this experiment was to determine the minimum adaptation time after a change in protein intake, and to obtain information about the adequacy of current recommendations for amino acid requirements.

Study Design and Results: Four non-pregnant sows (241 kg SE 6) were fitted with venous catheters. Isoenergetic semi-synthetic diets provided 2.0, 1.0 or 0.5 times the daily intake of essential amino acids (NRC, 1998) for sows at maintenance. Essential amino acids provided 45% of the animals' nitrogen intake. Energy intake was 10% greater than the NRC (1998) recommendation. Phenylalanine oxidation was studied at 2.0 times the amino acid maintenance requirement, and subsequently at 1, 2, 5, 6, 9 and 10 day after changing the amino acid intake to 1.0 and 0.5 times the maintenance requirement.

Phenylalanine oxidation increased significantly ($P < 0.001$) from 3.4% (SE 0.58) to 4.8% (SE 0.18) to 6.4% (SE 0.26) of the infused dose of L-[1-¹⁴C]-phenylalanine at 2.0, 1.0 and 0.5 times the maintenance amino acid requirement, respectively. Phenylalanine oxidation at the two latter intake levels did not change ($P > 0.1$) between 1 and 10 days after exposure to the new protein intake level.

Implications: The current recommendation of NRC (1998) underestimates the maintenance requirement for one or more essential amino acids. Protein metabolism in sows, measured by amino acid oxidation, reaches a new set-point within 24h of exposure to a new intake level. (Supported by Alberta Pork and Alberta Agricultural Research Institute.)