In vitro branched chain amino acid oxidation by porcine mammary tissue. B. T. Richert*, R. D. Goodband, M. D. Tokach and J. L. Nelssen, Kansas State University, Manhattan.

Mammary secretory tissue from six (3 each of parity 1 and 2) lactating sows (d 10 to 17 of lactation) was obtained via biopsy for in vitro incubation to determine CO₂ production from individual branched chain amino acids. The first and second productive gland on the right side of the sow was biopsied to collect mammary tissue. Uniformly labeled ¹³C L-leucine, L-leucine, and L-valine were incubated in the media at 5 µL (100 µCi/mL) for 1 h incubation with mammary tissue. Sows were fed a diet containing .90% lysine, .85% isoleucine, 1.35% leucine, and 1.07% valine. Carbon dioxide production as a percentage of the ¹³C labeled amino acid metabolized by the mammary tissue was 2.57, 1.66, and 4.07%, for isoleucine, leucine, and valine, respectively (P < .03). The CO₂ production rates were greatest for valine, and least for leucine (P < .02), leading to the observed CO₂ production as a percentage of amino acid extracted. On a molar basis, tissue uptake rates were similar (P < .16) for each of the branched chain amino acids. However, isoleucine had the greatest uptake rate (1.11 verses .91, .89 pmol/mg/h for leucine and valine, respectively) of the branched chain amino acids. These results indicate that for the lactating sow mammary gland, valine has the greatest oxidation rate of the branched chain amino acids. Also, the branched chain amino acid content of the diet fed to sows prior to biopsy may have created large branched chain amino acid pools in the tissues, diluting the isotope uptake and utilization by the mammary gland, reducing the observed CO₂ production from the isotope. Of the previously reported 30 to 60% excess uptake of the branch chain amino acids by the mammary gland beyond secretion as milk protein, only a small fraction appears to be utilized strictly as an energy source, creating CO₂. This data suggests that the branched chain amino acids play a large role as C and N donors for synthesis of nonessential amino acids, lactose, or lipid.

Key Words: Carbon dioxide, Sows, Branched chain amino acids.

The response of 10-kg pigs to increasing dietary threonine levels. D. Ragland* and C. Adeola, Purdue University, West Lafayette, IN.

The purpose of the experiment was to assess the response of 10-kg pigs to increasing levels of dietary threonine when fed as part of an ideal protein for 28 days. The experiment consisted of a growth study and a nitrogen retention study. The basal diet contained 10 g lysine, 3.6 Meal DE and 3.8 g threonine per kilogram; to which 0, 5, 1.6, 2.4, 3.2 or 4.0 g of threonine was supplemented per kilogram of diet. Forty-eight crossbred pigs with an average body weight of 10 kg were blocked by weight and randomly assigned to the six experimental diets for a 28-day growth assessment. Increasing threonine levels resulted in linear (P<.05) and quadratic (P<.05) improvements in final body weight, ADG, and feed efficiency. No significant differences were observed for feed intake (P>.05). Twenty-four crossbred pigs with an average body weight of 15 kg were blocked by weight, randomly assigned to the six experimental diets and maintained in metabolism crates for a 10-day nitrogen balance study. Increasing threonine levels resulted in linear (P<.05) improvements in biological value and net protein utilization with a linear (P<.05) decrease in urinary nitrogen. Quadratic (P<.05) responses were observed for nitrogen absorption and nitrogen retention. No further improvement in performance and nitrogen retention was observed beyond 1.6 g of supplemental threonine per kilogram of diet. These data indicate that threonine supplementation improves growth performance and nitrogen retention in nursery pigs.

Key Words: Threonine, Ideal Protein, Nitrogen Retention.