6 Isolation of sow's milk lysine free of non-lysine carbon in ɔ acid utilization studies. S. M. El-Kandelgy*, R. D. Goodrich, D. D. ɜr and G. C. Shurson, *University of Minnesota, St. Paul.*

sow lactation study using stable isotopes of lysine (lys), it was ıary to obtain isolated lys from sow's milk free of carbon (C) and en (N) contamination. Isolation of lys from sow's milk and feedstuffs ɜen reported (El-Kandelgy et al 1993. J. Anim. Sci. 71(Suppl. 1):64). ver, the isolates from the procedure contain non-lys-C from the citrate ·used in elution. This C affects the measurement of carbon enrichment lk lys samples. In order to remove most of the non-lys-C the original ion methodology was expanded. 1) Milk samples (total of 750 les) were collected from sows previously dosed with ^{15}N- and ɔs and lys was isolated in citrate according to the original procedure. he resulting lys preparation was placed onto a resin (PA-35 nan™) pre-equilibrated with acidic water (AW), pH 3.07 (made acidic CHI). 3) The citrate-C of the lys preparation was eluted off of the resin AW for 10 min. and discarded. 4) Either .01, .03 or .10 M NaOH was d onto the resin for 4 min. 5) The citrate-free lys was collected for 7 after washing the resin with AW for the second time. 6) Collected lys les were dried, dispensed in water and submitted for analysis of ^{15}N ^{13}C-enrichments.

Comparison of milk lysine isolates with a lysine standard

	N (μg)	C (μg)	N (% of C)	C:N
ıe standard	28	72	38.9	2.4 to 2.8
s milk lys eluted				
:				
M NaOH	31.6	100.4	31.5	3.17
M NaOH	77.9	226.7	34.4	2.91
M NaOH	70.5	224.0	31.5	3.18

double-step isolation methodology can be used to clear lysine arations of C and N contaminants.

Words: Sow's Milk, Lysine, Isolation

27 Effects of high dietary copper for sows on reproductive formance, milk copper, and liver copper in sows and nursing s. H. J. Monegue*, and G. L. Cromwell, *University of Kentucky, Lexington.*

ı previous study, feeding high Cu (250 ppm) diets to sows for six ation-lactation cycles had no detrimental effects (except for a reduced owing rate in first parity), although liver Cu levels were markedly ated in the sows (JAS 71:2996, 1993). In that study, birth and weaning ghts of pigs were increased in Cu-fed sows. Two experiments were ducted to further assess high Cu diets for sows. In Exp. 1, 36 Hampshire-kshire gilts (avg wt, 160 kg) were fed fortified corn-soybean meal diets ı 0 or 250 ppm added Cu (from $CuSO_4$) from breeding through two ities. The basal diet contained 14 ppm Cu by analysis. Farrowing rate ı similar for the two groups (94 vs 89% in Parity 1, 100 vs 94% in Parity ·r control vs high Cu). Gestation and lactation (ad libitum) feed intakes ·e the same for both treatments (1.90, 4.75 kg/d). Sow lactation weight ı was 10.8 vs 8.0 kg, respectively. Averaged over both parities, litter size birth (9.37 vs. 9.97 total pigs; 8.90 vs 9.48 live pigs) or at day weaning (8.17 vs 8.31 pigs) was not affected (P=.20) by feeding h Cu to sows. Average pig weights at birth (1.37 vs 1.35 kg for total pigs; 0 vs 1.37 kg for live pigs) were not influenced by treatment, but tended <.10) to be slightly reduced at weaning (6.18 vs 5.82 kg) in sows fed high . Livers were obtained from all sows at the end of the study. Liver Cu was .rkedly increased in those fed high Cu (103 vs 2,314 ppm of DM; P<.001). e number of sows completing the two-parity study was the same (83%) the two treatment groups. In Exp. 2, 12 Hampshire-Yorkshire sows were l lactation diets with 0 or 250 ppm added Cu (from $CuSO_4$). Milk mples were collected on day 15, and one pig/litter was killed on day 18 d the liver analyzed for Cu. Milk Cu was increased in sows fed the high ı diet (.98 vs 1.97 ppm of DM for control vs high Cu; P<.001), as was liver ı in pigs that nursed sows fed high Cu (202 vs 666 ppm of DM; P<.001). ıese studies confirm our earlier work indicating that sows can be fed high ı diets for multiple parities without detrimental effects, even though their ·er accumulates excessive Cu. The results also indicate that Cu levels in w milk and in the liver of nursing pigs are increased by feeding high Cu ets to sows.

ey Words: Sow, Copper, Liver

128 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 CO_2 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 ^{14}C L-isoleucine, L-leucine, and L-valine were included in the media at 5 uL (100 mCi/mL) for a 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 ^{14}C labeled amino acid metabolized by the mammary tissue was; 2.57, 1.86, and 4.07%, for isoleucine, leucine, and valine, respectively ($P < .03$). The CO_2 production rates were greatest for valine, and least for leucine ($P < .02$), leading to the differences observed in CO_2 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 CO_2 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 CO_2. 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

129 The response of 10-kg pigs to increasing dietary threonine levels. D. Ragland*, and O. 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 Mcal DE and 3.6 g threonine per kilogram; to which 0, .8, 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