EFFECTS OF INCREASED DIETARY LYSINE ON SOW AND LITTER PERFORMANCE[1]

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Summary

Three hundred and fifty three lactating sows were used to determine the effects of increased dietary lysine on sow and litter performance. At farrowing, sows were assigned to corn-soybean meal lactation diets consisting of either 1.0 or 1.3% total lysine. A treatment by parity interaction was observed, with first parity sows fed 1.3% lysine having heavier litter weaning weights than sows fed 1.0% lysine. Surprisingly, third and fourth parity sows fed 1.3% lysine had lower litter weaning weights than those fed 1.0% lysine. No other treatment by parity interactions existed. No differences were observed in the number of pigs weaned or pig survivability. Sows fed 1.3 % lysine tended to consume less feed in the first week of lactation than sow fed 1.0% lysine (9.6 vs 10.0 lb/d), with no differences observed during week 2 or overall. No differences were observed in subsequent performance of the sows on days to estrus; farrowing rate; or number of pigs born, born alive, stillborn, or born mummified. This experiment showed that increasing dietary lysine from 1.0% to 1.3% increased litter weaning weights for parity 1 sows but not for older sows.

(Key Words: Lysine, Lactation, Weaning Weight, Sows.)

Introduction

In recent years, a substantial amount of genetic improvement has occurred in lactating sow performance. With the genetic improvement, concern about the lysine requirement for the lactating sow has risen. A recent review from Biokyowa, Brain Kerr of past lactation experiments has established that the major component driving the sow's lysine requirement is litter weight gain (0.0214 × litter weight gain g/d + .864)= lysine requirement). Although this equation helps to establish the requirement for lactating sow performance, the effects on subsequent farrowing performance are not considered. This experiment investigated the effects of increasing dietary lysine on sow and litter performance as well as for subsequent farrowing rate and total pigs born.

Procedures

A total of 353 sows (PIC C15 × 326) was used from July to September of 1996 on a 1,400 sow commercial farm in North Central Kansas. Sows were allotted to one of two dietary treatments at d 110 of gestation when placed in the farrowing facility. At farrowing, the number of pigs born alive, stillborn, and mummified were recorded. All litters were equalized within 48 h after farrowing to approximately 10.5 pigs. Litter weight was

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recorded at weaning to determine the effect of increased lysine concentration on litter growth rate. Sows were provided ad libitum access to feed and water, and feed intake was recorded daily. At weaning, sows were moved to the breeding facility and monitored for estrus with daily boar exposure. Sows that were rebreed were monitored to determine the effect on the subsequent farrowing rate, number of pigs born, born alive, stillborn, and born mummified. In the statistical analysis, sows were combined into four parity groups; parity 1, parity 2, and parity 3 and 4 sows, and all sows greater than parity 4.

Results

Increasing the dietary lysine from 1.0% to 1.3% resulted in a treatment by parity interaction. Parity 1 sows fed 1.3% lysine weaned heavier litters than sows fed 1.0% lysine (Table 2). However, parity 3 and 4 sows fed the 1.3% lysine diet produced litters that were lighter at weaning than those of sows fed 1.0% lysine, which was unexpected. Lysine by parity interactions were not observed for any other litter criteria (P>.05). No differences were observed in the number of pigs born, born alive, stillborn, or born mummified (P>.05; Table 3). No differences were observed in number of pigs equalized within 48 h of farrowing, number of pigs weaned, or pig survivability (P>.05).

Sow daily feed intake (Table 3) was decreased by increasing dietary lysine from 1.0 to 1.3% during the first week of lactation (P = .02), with no difference observed in week 2 or overall feed intake.

In the analysis of the subsequent reproductive performance, we observed no differences in days to return to estrus; farrowing rate; or the number of pigs born, born alive, stillborn, or born mummified per litter (P>.05; Table 4).

Discussion

Using the equation from Biokyowa that was discussed in the introduction, we determined that all sows in this experiment had lysine intakes above the estimated requirement with the weaning weights that were observed (Figure 1). However, increasing dietary lysine from 1.0% to 1.3% in the lactation for parity 1 sows increased litter weaning weights. We speculate that this may be because the parity 1 sow is still growing and may require more lysine to establish milk production and also meet the need to increase body reserves. Therefore, this experiment suggests that using a 1.0% lysine level in the lactation diet will have no negative effect on subsequent litter performance, but a higher level of dietary lysine may improve litter weaning weights. In the analysis of the subsequent farrowing data ,we observed no differences with increased dietary lysine, showing that 1.0% (approximately 45 grams/d) is a sufficient level for maximizing subsequent farrowing performance for sows used in this experiment. However, the total grams of lysine intake instead of percent lysine should be considered when calculating the requirement for your herd.

Table 1. Experimental Lactation Diets[a]

	Dietary Lysine, %	
Ingredient, %	1.0	1.3
Corn	68.10	57.01
Soybean meal 46.5%	27.57	38.84
Monocalcium phosphate	2.05	1.84
Limestone	1.13	1.16
Salt	.50	.50
Sow vitamin premix	.25	.25
Vitamin premix	.25	.25
Trace mineral premix	.15	.15

[a]Diets formulated to contain .90 Ca, .80 P., and approximately 1500 Mcal ME.

Table 2. Effects of Dietary Lysine by Parity Interactions on Litter Weaning Weights (lb)[a]

	Dietary Lysine, %			
Item	1.0	1.3	SEM	Parity effect (P <)
Parity 1	98.8	106.7	3.16	.03
Parity 2	107.8	111.4	3.16	.38
Parity 3 and 4	115.3	107.2	3.16	.06
Parity 5 and above	117.0	116.4	3.16	.90

[a]Lactation length was used as a covariate.

Table 3. Effects of Dietary Lysine on Sow Performance

	Dietary Lysine, %			
Item	1.0	1.3	SEM	P <
No. of sows	181	172		
Parity	2.97	2.72	.14	.22
Lactation length, d	16.7	17.0	.09	.01
Total number of pigs born	11.2	11.7	.21	.10
Number pigs born alive	10.4	10.8	.21	.15
Number stillborn	.55	.73	.07	.08
Number mummified	.26	.19	.04	.28
Number pigs day 2	10.5	10.4	.06	.75
Pigs weaned[a]	9.7	9.8	.07	.61
Pig survival,%[a]	93.2	93.5	.63	.77
Average daily feed intake, lb/d				
Week 1	9.6	10.0	.14	.02
Week 2	11.8	11.8	.17	.99
Overall	10.7	10.9	.13	.31

[a]Utilized both parity and lactation length as covariates.

Table 4. Effects of Dietary Lysine on Subsequent Farrowing Performance[a]

Item,	Dietary Lysine, % 1.0	1.3	SEM	P <
Number of sows weaned	181	172		
Days to return to estrus	6.03	5.85	.49	.79
Number of sows rebreed[b]	131	119		
Number of sows which farrowed	91	95		
Farrowing rate, %	71.5	76.7	4.0	.35
Number of pigs born per litter	11.6	11.1	.33	.29
Number of pigs born alive per litter	10.5	10.5	.29	.84
Number of pigs born stillborn per litter	.89	.57	.12	.06
Number of pigs born mummified per litter	.08	.11	.04	.62

[a]Utilized parity as a covariate.
[b]Sows were not included if culled for reproductive problems, structure, and age.

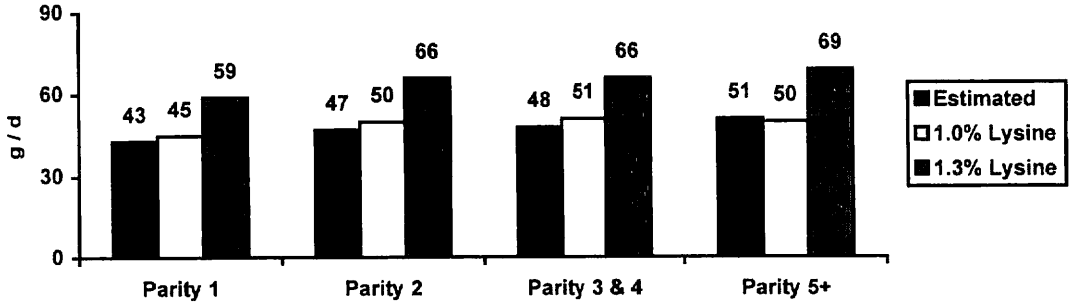

Figure 1. Comparison of Estimated Lysine Requirement (using equation from Biokyowa) and Actual Lysine Intake of Sows.