

Valine - a deficient amino acid in high lysine diets for the lactating sow. M. D. Tokach*, R. D. Goodband, J. L. Nelssen, and L. J. Kats, Kansas State University, Manhattan.

Mathematical models that determine the optimal amino acid ratio of lactating sows based on milk production and maintenance needs suggest the valine requirement is 70% of lysine (ARC, 1981). However, empirical studies were used to develop the 1:1 ratio for valine:lysine listed by NRC (1988). This becomes a major concern when formulating high lysine (> .90%), corn-soybean meal lactation diets as valine becomes the first-limiting amino acid using the NRC ratio. Including .15% L-lysine HCl in lactation diets will cause valine to be the first-limiting amino acid in diets containing greater than .7% lysine. Therefore, this experiment was designed to determine the influence of two valine to lysine ratios (.83:1 or 1:1) on sow and litter performance. On a commercial swine farm, 152 sows were randomly assigned at farrowing to one of two experimental diets. A control diet was formulated to contain .9% lysine and .75% valine. In the second diet, L-valine replaced corn to provide .9% valine. All other amino acids were fortified at 110% of the ratio suggested by NRC (1988). Diets were corn-soybean meal based and contained equal amounts of all synthetic amino acids except valine. Litters were standardized within 48 h after farrowing. Sow feed intake was recorded and litters were weighed at birth and weaning (21 ± 2 d postfarrowing). Lactation diet (.75 vs .90% valine) had no influence (P > .45) on litter birth weight (15.9 vs 15.8 kg), pig survivability (91.8 vs 92.7%), pigs weaned per litter (10.12 vs 10.25), and daily sow feed intake (4.2 vs 4.2 kg). However, sows fed the .90% valine diet had increased pig (P < .09) and litter (P < .04) weaning weights (Table). These differences were magnified as the number of pigs weaned and sow productivity increased (≤ 10 vs > 10 pigs). These results suggest that further research is needed to determine the valine requirement of the high producing sow. However, it appears that valine deficiencies limit the use of L-lysine HCl in sow lactation diets and that diets formulated on predictions of amino acid requirements based on milk production and maintenance will underestimate the valine requirement of the lactating sow.

Item	All sows		≤ 10 pigs		> 10 pigs		CV
	.75	.90	.75	.90	.75	.90	
No. of sows	75	77	39	39	36	38	--
No. of pigs weaned	10.12	10.25	9.21	9.28	11.18	11.17	10.5
Pig weaning wt, kg	5.74	5.96	6.03	6.18	5.42	5.75	13.6
Litter weaning wt, kg	57.59	60.79	55.36	57.07	60.51	64.13	15.3

Key Words: Sows, Valine, Lysine.

137 Alfalfa grazing by gestating gilts. M. S. Honeyman* and W. Roush, Iowa State University, Ames.

At the Western Research Farm, Castana, Iowa, sixty-two crossbred gilts were randomly allotted to one of four daily dietary treatments: 1) a control diet of 1.8 kg of corn-soy based diet in dry lot, 2) 1.3 kg of corn (A70), 3) .7 kg of corn (A40), and 4) 2 kg of corn (A10). Gilts consuming A70, A40, and A10 diets also received .05 kg of monosodium phosphate and .01 kg of salt daily plus free access to fresh alfalfa for grazing. All gilts received their daily feed allotment in individual feeding stalls. The grazing gilts were provided shade, water and feed in a central drylot. Rings were placed in the noses of all gilts. Stocking rate was 25 pigs per acre of alfalfa per week. The gilts were rotated to a new paddock after 7 d of grazing. The gilts were exposed to boars for 28 d, about 3 weeks prior to the beginning of the 42 d trial.

	Gilts allotted	Gilts farrow	Gain, lb	S.D.	Back fat		Pigs born	
					cm	S.D.	ave	S.D.
Control	22	19	47.1	10.9	-2.0	2.1	10.0	2.9
A70	14	13	63.5	7.2	+1.7	1.6	10.1	3.2
A40	13	9	48.4	11.3	-1.4	3.2	10.1	2.5
A10	13	7	36.0	13.2	-2.4	2.9	10.4	3.3

Overall conception rate was variable and it is not clear whether it was affected by treatment. Litter size was similar for all treatments. For the pregnant gilts there was a treatment effect for weight gain (P < .0001) and backfat change (P < .001). The A10 gilts gained less weight than the gilts on the other treatments (LSD 95% confidence interval). The 25 grazing gilts consumed 2 tons per acre per week of 30% dry matter (dm) alfalfa, or about 10 kg per day of 30% dm alfalfa. Alfalfa stand was reduced an average of .5 plant per square foot and dm content increased 9% as result of 7 d of grazing. The data show that mid-gestation gilts grazing alfalfa need .7-1.0 kg of corn daily to match drylot gains of gilts fed 1.8 kg of a corn-soy based diet. The grazing gilts met most of their vitamin and amino acid needs and about one-half of their energy needs from alfalfa. Portable low-cost electric fence netting was used. A cost analysis showed that the grazing system is cost competitive with the control system and may have applications on diversified farm operations that want to utilize alfalfa in their crop rotation.

Key Words: alfalfa, gestating gilts, grazing

Sows fed gestation diets containing either wheat straw or soybean hulls during two parities perform as well as control-fed sows. D.A. Nelson, M.G. Hogberg, E.R. Miller and M.S. Allen, Michigan State University, E. Lansing.

Thirty Yorkshire X Landrace F1 gilts were randomly assigned to either a corn-soybean meal (C), a C-wheat straw (WS), or a C-soybean hull (SBH) diet approximately one wk before breeding. Gestation diets were formulated so that animals in all treatment groups were offered the same daily amount of ME, CP, lysine, Ca, and P. The WS and SBH diets were balanced for the same daily intake of NDF. When formulating the diets, wheat straw was assigned a value of zero for all nutrients. The nutrient contributions of soybean hulls were taken from the U.S.-Canadian feed tables (1982). During gestation, gilts received 25% more diet than sows. All sows were given *ad libitum* access to the C diet throughout lactation to weaning, and were returned to their respective experimental diet at weaning. Although there were no differences among treatments in the number of pigs born alive/litter, there was a difference (P = .07) in the number of pigs/litter at 21 d. The larger number of pigs nursed by WS sows may have contributed to the difference (P = .09) among treatments in the wean to estrus interval. Constipation scores of sows were different among treatments at each time period with SBH sows having the lowest incidence of constipation.

Item	C	WS	SBH	P
n	17	17	18	
Gestation wt gain, kg	53.9	59.9	54.3	.17
Lactation wt loss to 21 d, kg	-6.3	-10.6	-6.1	.50
Lactation feed intake/d, kg	4.5	4.5	5.1	.13
Number pigs born alive/litter	9.2	10.0	8.4	.29
Number pigs/litter at 21 d	8.3	9.1	7.6	.07
Live born litter wt, kg	13.6	16.4	13.2	.12
21 d litter wt, kg	47.1	50.0	49.0	.76
Mean to estrus interval, d	5.0	6.1	5.1	.09
Constipation score (1-5; 3=normal, 5= very hard)				
d 109 of gestation	4.2	4.3	3.2	.001
d 3 of lactation	4.0	4.5	3.7	.05
d 10 of lactation	3.4	3.4	2.9	.01

Key Words: Sows, Gestation, Fiber

138 Effect of dietary and injectable vitamin E on reproductive performance of primiparous sows. D. Carrion* and R. C. Ewan, Iowa State University, Ames.

Twenty Yorkshire x Landrace gilts were allocated to treatments at random within five replications. Treatments were a 2x2 factorial arrangement of none or 600 IU of d-α-tocopherol injected i.m. at breeding and before farrowing and none or 50 IU of d-α-tocopheryl acetate supplemented per kg of diet. During gestation, gilts were individually fed 1.8 kg/d of a corn-soybean meal diet, and were allowed *ad libitum* access to a corn-soybean meal diet during lactation. The gilts that received injectable tocopherol were smaller at breeding (P < .04) and before farrowing (P < .02), but lost less weight (P < .06) at farrowing than gilts that were not injected. Gilts fed diets supplemented with d-α-tocopheryl acetate gained less weight during gestation (P < .05) than gilts fed unsupplemented diets. Treatments did not affect weight of the gilts at farrowing and 21 d of lactation, weight loss and daily feed intake during lactation or weaning to remating interval. Birth weight of the pigs from gilts treated with injectable tocopherol was less (P < .06) than pigs from untreated gilts. Gilts fed diets supplemented with d-α-tocopheryl acetate farrowed fewer total pigs (P < .03) and alive pigs (P < .01), and had more pigs born dead (P < .06) than gilts fed control diets. Treatments did not affect litter weight at farrowing or mummies per litter. Pigs in litters of gilts fed additional d-α-tocopheryl acetate had greater growth rate during lactation than pigs of gilts fed control diets (P < .07). The number of pigs weaned decreased for gilts fed unsupplemented diets with injectable tocopherol, but increased in gilts fed supplemented diets with injectable tocopherol, resulting in diet x injection interaction (P < .06). Weaning weight of pigs from gilts fed supplemental vitamin E were greater (P < .08) than of pigs from gilts fed the control diet. Treatments also did not affect litter or weight of the pigs at 21 d of lactation. Injectable tocopherol decreased the birth weight of the pigs and dietary d-α-tocopheryl acetate supplementation decreased the number of pigs born, born alive, and born dead, but increased growth rate during lactation.

Key Words: Gilts, reproductive performance, vitamin E