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Effects of Different Lysine:ME Ratios in Normal and Reduced Protein Diets on Growth Performance and Carcass Traits of Grow-Finish Pigs

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One hundred forty four pigs (initial weight: 37.13 kg) were used to evaluate the effects of different lysine:ME ratios and protein levels on performance and carcass traits of growing-finishing (G/F) pigs. On June 15, 2000, pigs were blocked by initial weight and gender to one of six treatments. There were 6 pens/treatment with 6 pigs/pen. The trial was a 2 x 3 factorial design with two protein levels and three lysine:ME ratios. The two protein levels were normal protein contents of the corn-soybean meal (SBM) diets and reduced protein contents (three percentage units lower than the control). Diets with reduced protein levels were supplemented with synthetic amino acids to make their amino acid levels equal to those of the normal protein diet. The three lysine:ME ratios were the ratio of the corn-SBM diet and 5% below or above this ratio. Lower lysine:ME ratios were achieved by adding 4% animal fat while increased lysine:ME ratios were achieved by adding both fat and L-lysine. The trial was divided into three phases, with 30, 35, and 32 days, respectively. All experimental diets were fed in the meal form.

Compared with pigs fed normal protein diets, pigs fed reduced protein diets grew faster ($P < .05$) and tended to consume more feed ($P < .10$). Therefore, feed/gain (F/G) ratios were similar for pigs fed normal and reduced protein diets. Improved daily gain from pigs fed reduced protein diets might be due to higher levels of synthetic amino acids (lysine, threonine, methionine and tryptophan) in the diets, which reduced excess dietary amino acids and thus helped to decrease heat stress in summer. Dietary protein levels did not affect lean percentage, loin depth, and yield. But reducing dietary protein level by 3% increased fat depth ($P < .05$) in this study, similar to the findings from other research. This backfat effect may be eliminated if net energy system is used to formulate the diets.

Lysine:ME ratios did not affect daily gain, but a quadratic effect ($P < .05$) on feed intake and F/G ratio was observed suggesting either 5% below or above the medium ratio decreased feed intake and improved feed efficiency. Diets with low or high lysine:ME ratios contained 4% added fat and thus had higher ME concentrations than diets with medium lysine:ME ratio, which may have resulted in the lower feed intake and improved feed efficiency. Similar carcass traits (backfat thickness, loin depth, lean %, and yield) were observed among the three lysine:ME treatments ($P > .10$).

No interactions ($P > .10$) between lysine:ME ratios and protein levels were observed, indicating that the response to lysine:ME ratio was not affected by including high level of synthetic amino acids in the diets to reduce protein levels.

In summary, data from this study suggest that using synthetic amino acids to reduce dietary protein increased daily gain; lysine:ME ratio of the corn-SBM diets did not maximize feed efficiency; adding fat to decrease the ratio or adding both fat and lysine to increase the ratio improved feed efficiency; response to lysine:ME ratio appeared to be similar between normal and reduced protein diets.

	Low Lys:ME		Medium Lys:ME		High Lys:ME	
	Normal CP	Reduced CP	Normal CP	Reduced CP	Normal CP	Reduced CP
Lysine:ME Phase I	2.90		3.05		3.20	
Phase II	2.44		2.56		2.68	
Phase III	2.00		2.10		2.20	
Protein (%) Phase I	18.20	15.20	18.20	15.20	18.20	15.20
Phase II	16.20	13.20	16.20	13.20	16.20	13.20
Phase III	14.00	11.00	14.00	11.00	14.00	11.00

Lysine:ME	Low		Medium		High		SE	P (Lys:ME)		P values	
Protein	N	R	N	R	N	R		Lin	Quad	Prot.	Inter.
ADG, kg	.78	.82	.77	.81	.79	.80	.04	.85	.52	.04	.67
ADFI, kg	2.10	2.16	2.25	2.32	2.07	2.13	.10	.55	.00	.09	.90
F/G	2.71	2.64	2.93	2.87	2.62	2.64	.04	.26	.00	.27	.64
Fat depth, in.	.74	.83	.70	.78	.74	.78	.04	.46	.29	.02	.79
Lean, %	54.26	53.89	54.99	54.28	54.44	54.32	.33	.36	.16	.14	.42
Loin depth, in.	2.52	2.56	2.62	2.58	2.55	2.58	.05	.58	.27	.86	.30
Yield, %	75.12	75.23	75.67	75.03	75.56	75.68	.35	.21	.86	.65	.22