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PROTEIN NEEDS OF BARROWS AND GILTS
75 TO 225 POUNDS

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Although a considerable amount of research has been conducted on the protein requirement of growing-finishing barrows and gilts, there is still a discrepancy in the recommendations given. Most research has been conducted by feeding barrows and gilts together. Data have suggested gilts require more dietary protein than barrows.

This experiment was part of a regional project of the North Central Swine Nutrition Committee. The objective of the study was to determine the difference in the protein requirement between barrows and gilts.

Experimental Procedures

Forty-eight barrows and 48 gilts averaging approximately 75 pounds were allotted into four replications of three treatments by sex. Thus, there were 12 pens containing four gilts and 12 pens with four barrows. Pigs had access to self-feeders in pens providing approximately 8 square feet per pig in a totally slotted floor confinement building. Pigs were removed from the experiment by pen at average pen weights of 225 pounds. At this time, pigs were slaughtered in the South Dakota State University Abattoir and the following carcass data were obtained: backfat thickness, carcass length, carcass weight and loin eye area. Percent lean was calculated using the National Pork Producers Council's formula.

The three dietary protein levels used were 16, 14 and 12% protein. Dietary composition is shown in table 1.

Table 1. Composition of Diets (%)

Ingredients	Percent protein		
	16	14	12
Ground yellow corn	77.4	83.0	88.7
Soybean meal, 44%	20.3	14.7	9.0
Dicalcium phosphate	1.1	1.1	1.1
Ground limestone	.75	.75	.75
Trace mineralized salt	.25.25	.25	.25
Premix ^a	.2	.2	.2

^a Supplied per pound: vitamin A, 1500 IU; vitamin D, 150 IU; vitamin E, 2.5 IU; vitamin K, 1 mg; riboflavin, 1.25 mg; pantothenic acid, 5 mg; niacin, 8 mg; choline, 25 mg; vitamin B₁₂, 5 mcg; selenium, .04 mg and aureomycin, 25 milligrams.

Results

The results of the experiment by treatment are presented in table 2 and the main effects of protein and sex are summarized in table 3. The different responses of barrows and gilts to the dietary treatments imposed are shown in table 2 as protein x sex interactions. The feed efficiency of barrows was poorer at each protein level from 16 to 14 to 12%. However, gilts fed the 14% protein diet were more efficient than those fed 16% protein. For the overall growing-finishing period, gilts fed 16% protein were less efficient than those fed 12% dietary protein, even though those fed 16% protein gained considerably faster. The poor feed conversion of the gilts fed 16% protein diets is difficult to explain and was unexpected and may have been due to chance.

A protein x sex interaction was also present in percent lean and loin eye area. Carcasses of barrows fed the various protein levels were not different in lean percent or loin eye area. However, carcasses of gilts were affected by dietary protein. This would indicate that gilts have a higher requirement for protein than barrows. Gilts fed 12% protein diets had less lean and smaller loin eye areas than carcasses from gilts fed 14 or 16% dietary protein.

When the data for barrows and gilts were combined (table 3), there was a significant difference in rate of gain and feed/gain due to protein level during the first 4 weeks. These differences diminished as the experiment progressed with a significant difference in rate of gain only for the first 8 weeks. There were no significant differences due to protein at 225 pounds, although differences in rate of gain approached significance at the 5% level. Differences existed in percent lean and loin eye area ($P < .05$) among dietary treatments. Carcasses from pigs fed diets of 16 or 14% protein were superior to those fed 12% protein.

Barrows gained significantly faster than gilts at all periods and were more efficient to 4 weeks ($P < .01$) and 8 weeks ($P < .05$). Gilt carcasses had a greater percentage of carcass lean ($P < .05$), less average backfat ($P < .05$), less 10th rib backfat ($P < .01$) and larger loin eye area ($P < .01$) than did carcasses of barrows.

Summary

Ninety-six crossbred pigs averaging about 73 pounds initial weight were allotted by sex (barrows or gilts) to dietary protein treatments of 16, 14 or 12% and fed to a final weight of approximately 225 pounds.

The 12% protein diet was not adequate for pigs from 73 to 225 pounds when compared to the 16 and 14% protein diets. Differences between the 16 and 14% protein diets were small, although barrows fed the 16% protein diet had numerically better gains and feed efficiency than those fed 14% dietary protein. These data will be combined with similar experiments from several other North Central Region Experiment Stations to further evaluate the dietary protein needs of growing-finishing barrows and gilts.

Table 2. Effect of Protein Level on Performance of Barrows and Gilts^a

Protein level, %	Barrows			Gilts		
	16	14	12	16	14	12
	<u>Avg daily gain, lb</u>					
First 4 wk	1.97	1.83	1.56	1.64	1.56	1.36
First 8 wk	1.90	1.77	1.60	1.51	1.51	1.29
To 225 lb	1.84	1.71	1.64	1.56	1.51	1.34
	<u>Feed/gain</u>					
First 4 wk	2.83	3.11	3.52	3.36	3.18	3.81
First 8 wk ^b	3.20	3.52	3.76	4.02	3.59	4.16
To 225 lb ^b	3.59	3.76	3.97	4.24	3.68	3.95
	<u>Carcass data</u>					
Weight, lb	154.7	153.9	151.0	150.1	150.7	153.3
Lean, % ^b	53.3	53.9	53.2	59.2	58.8	53.7
Length, in.	31.3	31.1	31.2	31.7	31.4	31.8
Avg backfat, in.	1.19	1.14	1.28	1.02	1.07	1.21
Tenth rib fat, in.	1.18	1.17	1.26	.86	.85	1.13
Loin eye area, sq. in. ^b	4.71	5.06	4.85	6.07	5.77	4.79

^a Four lots of four pigs each per treatment, initial wt approximately 73 pounds.

^b Protein x sex interaction, P<.05.

Table 3. Main Effects of Protein and Sex on Performance of Growing-Finishing Swine

	Percent protein			Sex	
	16	14	12	Barrows	Gilts
No. of pigs	32	32	32	48	48
<u>Avg daily gain, lb</u>					
First 4 wk ^{ab}	1.80	1.69	1.45	1.79	1.52
First 8 wk ^{ab}	1.71	1.64	1.45	1.76	1.44
To 225 lb ^b	1.70	1.61	1.49	1.73	1.47
<u>Feed/gain</u>					
First 4 wk ^{ab}	3.09	3.14	3.66	3.15	3.45
First 8 wk ^d	3.61	3.55	3.96	3.49	3.92
To 225 lb	3.87	3.72	3.96	3.77	3.92
<u>Carcass data</u>					
Weight, lb	152.4	152.3	152.1	153.2	151.3
Lean, % ^{cd}	56.3	56.3	53.4	53.5	57.2
Length, in.	31.5	31.3	31.5	31.2	31.6
Avg backfat, in. ^d	1.11	1.10	1.24	1.20	1.10
Tenth rib fat, in. ^b	1.02	1.01	1.20	1.21	.95
Loin eye area, sq. in. ^{bc}	5.39	5.42	4.82	4.87	5.55

^a Protein effect, P<.01.

^b Sex effect, P<.01.

^c Protein effect, P<.05.

^d Sex effect, P<.05.