

# LYSINE ADDITIONS TO CORN AND BARLEY RATIONS

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Barley and oats are the principle North Dakota-produced grains used in livestock feeds. Each has been available at prices that are attractive to livestock producers and the swine producer in particular.

In many areas of North Dakota, barley may be under-rated as a feed grain for most species of livestock. This is especially true for swine. Calculations based upon the nutritive content and the value of these nutrients usually indicate that barley has a higher value per ton than corn. The nutritional value of barley and its price combine to make it the most economical basal feed for growing-finish-ing swine in most areas of North Dakota.

Recently, the North Dakota Agricultural Experiment Station was invited by the North Central Committee on Swine Nutrition (NCR-42) to partici-pate in a cooperative study to determine if rations containing soybean meal as the only source of sup-plemental protein provided adequate lysine for rap-id and efficient gains when rations were formulat-ed to contain 15 per cent crude protein. All cooper-ators were to feed corn-soy rations with and without supplemental lysine. Because of the obvious inter-est, barley-soy rations with and without lysine also were fed at the North Dakota Agricultural Experi-ment Station.

## Procedure

Two experiments involving a total of 96 pigs were conducted to compare the relative perform-ance of animals fed corn-soy or barley-soy rations with or without added lysine. Six pigs were assigned to each pen on the basis of sex, breed and initial weight. Pens of pigs were removed from the exper-

iment when the average weight of the animals was approximately 200 pounds. All pigs were weighed at 14-day intervals with feed consumption record-ed. Performance data evaluated included average daily gain, feed consumption and feed per unit of gain. Backfat probes were taken in the first exper-iment.

## Results

No significant differences in average daily gain due to sex, basal grain (barley or corn) or ly-sine supplementation were present in Experiment I. Data for feed consumption and feed efficiency cannot be statistically evaluated as these must be treated as pen averages and there was only one pen per treatment. Although average backfat probes were not statistically analyzed, it was ap-parent that pigs fed barley rations had consider-ably less backfat than pigs fed corn rations. Pigs

Table I: Composition of Rations in Experiment I and II and Average Analysis

Ingredient	RATION			
	Corn Basal	Corn + Lys	Barley Basal	Barley + Lys
Corn	80.40	80.30	—	—
Barley	—	—	86.50	86.40
Soybean meal	17.00	17.00	10.90	10.90
Dicalcium phosphate	0.85	0.85	0.85	0.85
Limestone	0.75	0.75	0.75	0.75
Trace mineral salt	0.50	0.50	0.50	0.50
Vitamin premix	0.50	0.50	0.50	0.50
Zinc oxide	3.5 gm	3.5 gm	3.5 gm	3.5 gm
L-Lysine	—	0.10	—	0.10
<b>Av. Analysis, % of Diet</b>				
Ash	4.48	4.15	5.15	5.19
Fiber	4.99	5.21	7.44	6.69
Crude protein	15.8	15.3	15.8	16.6
Phosphorus	0.51	0.50	0.57	0.57

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**Table II: Experiment I — Summary of Results**

Lot no.	1	2	3	4	5	6	7	8
Treatment <sup>1</sup>	C+Lys	C	B+Lys	B	B+Lys	C	C+Lys	B
Sex <sup>2</sup>	F	F	F	F	M	M	M	M
No. of pigs	6	6	6	6	6	6	6	6
Av. initial wt.	52.3	54.4	52.6	54.8	54.2	54.0	53.9	54.8
Av. final wt.	200.5	199.3	198.5	204.0	196.7	201.5	201.8	197.7
No. days	91	84	98	98	98	91	91	98
Av. daily gain	1.63	1.73	1.49	1.52	1.45	1.62	1.63	1.46
Av. daily feed	5.06	5.60	5.30	5.45	5.54	4.99	5.28	5.60
Feed/gain	311	324	356	358	381	308	325	384
Av. backfat, in.	1.41	1.62	1.15	1.10	1.11	1.35	1.43	1.24

**Selected Comparisons**

	Corn vs. Barley	+0.1% Lysine vs. No. Lysine Added	Barrows vs. Gilts
Av. daily gain	1.65	1.48	1.54
Ave. daily feed	5.23	5.47	5.35
Feed/gain	317	370	350
Av. backfat, in.	1.45	1.15	1.28

<sup>1</sup>C equals Corn basal, C + Lys equals Corn basal +0.1% Lysine, B equals Barley basal, B + Lys equals Barley basal + 0.1% Lysine

<sup>2</sup>F equals gilts M equals barrows

fed barley did require 7 to 14 more days to reach approximately 200 pounds than those fed corn.

The only significant ( $P < .05$ ) difference in Experiment II was that the barrows gained more rapidly than the gilts. Differences in rate of gain due to type of grain (barley or corn) or lysine supplementation were not statistically significant.

Results from other states are not available at this time.

**Discussion**

These experiments demonstrate that pigs fed barley rations from 50 to 200 pounds gain at approximately the same rate as pigs fed rations in which corn is the basal feed. All rations in these experiments were formulated to contain 15 per cent crude protein. This protein level is quite satisfactory for the pig from 50 to approximately 100 pounds and should be higher than is necessary for pigs from 100 to 200 pounds.

Pigs fed rations containing corn required less total feed to reach marketable weight than those fed rations containing barley, although the barley rations were most economical. If 150 pounds of gain is assumed with feed efficiencies (pounds of feed per hundred weight of grain) of 320 for corn rations and 365 for barley rations, the average feed consumed per pig was 480 pounds for those fed corn and 548 pounds for those fed barley.

If soybean meal sells for \$96 per ton and the cost of the added vitamins and minerals averages 26 cents per hundred pounds of feed, it can be calculated that if barley sells for 86 cents per bushel, shelled corn would have to sell for less than \$1.12 per bushel to produce comparable feed costs. One of the advantages of barley is that less protein supplement (soybean meal) normally is required to attain the desired protein level than when corn is used as the basal grain in the ration.

Lysine supplementation of corn-soy and barley-soy rations formulated to contain 15 per cent crude

**Table III: Experiment II — Summary of Results**

Lot no.	1	2	3	4	5	6	7	8
Treatment <sup>1</sup>	C	B	C+Lys	B+Lys	B+Lys	B	C	C+Lys
Sex	M	M	M	M	F	F	F	F
No. of pigs	6	6	6	6	6	6	6	6
Av. initial wt.	47.9	48.0	48.0	48.7	48.3	47.3	49.3	45.7
Av. final wt.	208.6	207.3	200.7	215.8	195.7	187.7	195.0	195.2
No. days	98	98	98	98	105	105	105	105
Av. daily gain	1.63	1.63	1.56	1.71	1.40	1.34	1.39	1.42
Av. daily feed	5.21	5.73	5.16	6.14	5.25	4.82	4.43	4.41
Feed/gain	320	352	331	359	370	360	319	311

**Selected Comparisons**

	Corn vs. Barley	+0.1% Lysine vs. No. Lysine Added	Barrows vs. Gilts
Av. daily gain	1.50	1.52	1.63
Av. daily feed	4.80	5.49	5.56
Feed/gain	320	360	341

For explanation of treatment and sex abbreviations see Table II.

protein was not beneficial in these experiments. Therefore, under most circumstances it would not be profitable to add lysine to corn-soy or barley-soy rations formulated to contain 15 per cent crude protein if these rations are to be fed from 50 pounds to market weight.

Previous research utilizing pigs of lighter initial weight and rations containing lower protein levels (Dinusson, *et al.* 1962, Erickson 1960) indicated that responses to lysine supplementation have occurred in approximately half of the trials reported. These responses have occurred because of the normal variation in lysine content of grains and protein supplements. Response to lysine addition is most likely to occur at weights up to approximately 120 pounds and when low protein rations are fed. Lysine addition is less likely to be beneficial for finishing swine above 120 pounds and in rations containing high protein levels.

### Summary

Two experiments involving a total of 96 growing-finishing pigs were conducted to compare corn-soy and barley-soy rations with or without added lysine. Pigs fed corn-soy rations containing 15 per cent crude protein gained slightly more rapidly and more efficiently than those fed comparable barley-soy rations, although the difference in rate of gain was not statistically significant. Pigs receiving the barley rations had less backfat than those fed rations containing corn. Based upon current local prices, rations containing barley were more economical to feed than comparable rations containing corn.

### Literature Cited

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- Dinusson, W. E., D. O. Erickson, C. N. Hauge, and D. W. Bolin. 1962. **Barley Rations for Swine: Protein and Lysine as Supplements.** Research Report No. 5, North Dakota A. E. S., Fargo, North Dakota.

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