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BARLEY DIETS FOR GROWING-FINISHING PIGS

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Barley is an important feed ingredient that may be used as an alternative for corn in swine diets. It is higher in protein and the amino acid lysine than is corn. But, it also contains less energy than corn and thus diets based on barley as the grain source are less efficient than corn based diets. It has also been suggested that hogs fed barley diets do not yield as well as those fed corn diets. The objectives of this experiment were to determine the effect of lysine and fat supplementation to barley based diets and to compare these diets with corn based diets. A further objective was to determine the effect of barley diets on carcass characteristics and dressing percentage.

Experimental Procedure

Ninety-six Landrace x Large White crossbred pigs were randomly allotted to four replications of six dietary treatments on the basis of litter, weight and sex. The pigs averaged about 59 lb initially and were grouped four per pen in a slotted floor, enclosed confinement building. The basal diets were formulated to contain .75% lysine during the grower period (59-125 lb) and .62% lysine during the finishing period (125-220 lb). Compositions of the diets fed to the six treatment groups are shown in Tables 1 and 2. Experimental treatments were as follows:

1. Corn-soy diet (.75% lysine to 125 lb and .62% lysine 125 to 220 lb)
2. Barley-soy diet (equal lysine to treatment 1)
3. Barley-soy diet plus .05% L-lysine
4. Barley-soy diet plus 2.5% fat
5. Barley-soy diet plus .05% lysine and 2.5% fat
6. Corn-soy diet plus 2.5% fat

The experiment was terminated when pig weights within a replicate averaged approximately 220 lb. The three heaviest pigs in each pen were slaughtered at the Swift Packing Plant in Huron, South Dakota. Dressing percentage, carcass backfat and percent lean in the carcass were determined.

Table 1. Composition of Experimental Diets to 125 lb (%)

Grain	Corn	Barley	Barley	Barley	Barley	Corn
Lysine (.05%)	-	-	+	-	+	-
Fat (2.5%)	-	-	-	+	+	+
Corn	78.77	--	--	--	--	75.97
Barley	--	83.02	82.96	80.12	80.06	--
Soybean meal, 44%	18.8	14.7	14.7	15.1	15.1	19.1
Animal fat	--	--	--	2.5	2.5	2.5
Dicalcium phos- phate	1.4	1.1	1.1	1.15	1.15	1.4
Limestone	.6	.75	.75	.7	.7	.6
Salt, white	.3	.3	.3	.3	.3	.3
Premix ^a	.13	.13	.13	.13	.13	.13
L-lysine HCl	--	--	.06	--	.06	--

a

Supplied the following per lb of diet: vitamin A, 1500 IU; vitamin D, 150 IU; vitamin E, 5 IU; vitamin K, 1 mg; riboflavin, 1.5 mg; pantothenic acid, 6 mg; niacin, 8 mg; vitamin B₁₂, 6 mcg; chlortetracycline, 25 mg; zinc, 100 ppm; iron, 75 ppm; copper, 7.5 ppm; manganese, 25 ppm; iodine, .175 ppm and selenium .1 ppm.

Table 2. Composition of Experimental Diets, 125-220 lb (%)

Grain	Corn	Barley	Barley	Barley	Barley	Corn
Lysine (.05%)	-	-	+	-	+	-
Fat (2.5%)	-	-	-	+	+	+
Corn	83.97	--	--	--	--	81.27
Barley	--	88.52	88.46	85.62	85.56	--
Soybean meal, 44%	13.9	9.5	9.5	9.9	9.9	14.1
Animal fat	--	--	--	2.5	2.5	2.5
Dicalcium phos- phate	1.05	.75	.75	.8	.8	1.05
Limestone	.65	.8	.8	.75	.75	.65
Salt, white	.3	.3	.3	.3	.3	.3
Premix ^a	.13	.13	.13	.13	.13	.13
L-lysine HCl	--	--	.06	--	.06	--

a

Supplied the following per lb of diet: vitamin A, 1500 IU; vitamin D, 150 IU; vitamin E, 5 IU; vitamin K, 1 mg; riboflavin, 1.5 mg; pantothenic acid, 6 mg; niacin, 8 mg; vitamin B₁₂, 6 mcg; chlortetracycline, 25 mg; zinc 100 ppm; iron, 75 ppm; copper, 7.5 ppm; manganese, 25 ppm; iodine, .175 ppm and selenium .1 ppm.

Results

The pig performance dates are summarized in Table 3. Pigs fed corn as the cereal grain portion of their diets gained faster than those pigs fed the various barley diets during the grower and overall periods. Average daily gains during the finisher period (125 to 220 lb) were not significantly different among treatments except for pigs fed the barley based diet without lysine or fat supplementation. These pigs gained less (P<.05) than pigs fed the barley diet supplemented with both lysine and fat or pigs fed the corn or corn plus fat diets.

Barley diets appeared to affect palatability during the first part of the experiment as pigs fed each of the barley based diets consumed less (P<.05) feed per day than pigs fed the corn diet. However, during the finisher period the barley diets were consumed as readily as the corn diet. Daily feed consumption did not differ significantly among treatments over the total experiment.

The addition of fat to the corn based diet resulted in an improved feed efficiency. Feed/gain was not significantly different among the other five dietary treatments. Pigs fed the

three diets with added fat were more efficient than those fed these diets without fat during both the finisher and overall periods.

The last-rib backfat of carcasses from pigs fed the unsupplemented barley diet was 1.13 inches. This was significantly less than the 1.31 inches of last-rib fat of pigs fed the fat supplemented corn diet. Corresponding carcass backfat of pigs receiving the other diets ranged from 1.17 inches for pigs fed barley plus lysine to 1.30 for those receiving the corn based diet. Pigs fed the barley plus lysine diet had the highest percent of carcass lean (53.0%) which was more ($P < .05$) than the 51.3% lean in carcasses from pigs fed the barley-fat and corn-fat diets. Carcass yield varied from 74.9% when pigs were fed the barley diet to 72.4% for those fed the barley-fat diet ($P < .05$). There were no significant differences in carcass measurements due to grain source (barley or corn), lysine supplement or fat addition.

Summary

An experiment was conducted with 96 pigs to study the effect of supplemental lysine (.05%) and fat (2.5%) in barley-soybean meal diets and to compare barley and corn as grain sources.

Lower daily feed consumption of pigs fed barley diets during the grower (59 to 125 lb) period resulted in reduced daily gains for these pigs compared to pigs fed corn diets. Pigs appeared to adjust to the barley diets as feed consumption was not affected during the finishing period. However, pigs fed the corn diets also gained faster during the overall period. Feed efficiency was improved by the addition of 2.5% fat to the diets.

The main effects of grain source, lysine or fat supplementation did not affect carcass backfat, carcass lean or carcass yield.

Table 3. Effect of Lysine and Fat Supplementation to Barley Diets on Performance of Growing-Finishing Pigs

Grain	Corn	Barley	Barley	Barley	Barley	Corn
Lysine (.05%)	-	-	+	-	+	-
Fat (2.5%)	-	-	-	+	+	+
<hr/>						
<u>Pig weight, lb</u>						
Start	59.2	59.3	59.2	59.1	59.2	59.1
Mid	124.4 ^a	127.1 ^b	125.5 ^b	126.0 ^b	124.6 ^b	127.0 ^a
End	231.6 ^a	215.0 ^b	222.0 ^b	222.6 ^b	219.6 ^b	232.2 ^a
<u>Avg daily gain, lb</u>						
Grower ^d	1.73 ^a	1.53 ^{b,c}	1.55 ^{b,c}	1.57 ^b	1.41 ^c	1.75 ^a
Finisher	1.60 ^a	1.45 ^b	1.55 ^{a,b}	1.55 ^{a,b}	1.62 ^a	1.61 ^a
Overall	1.64 ^a	1.48	1.55 ^b	1.56	1.53 ^b	1.66 ^a
<u>Avg daily feed, lb</u>						
Grower	4.93 ^a	4.45 ^{b,c}	4.43 ^{b,c}	4.35 ^{b,c}	4.16 ^c	4.62 ^{a,b}
Finisher ^d	6.65 ^{a,b}	6.72 ^{a,b}	7.08 ^a	6.95 ^a	6.64 ^{a,b}	5.95 ^b
Overall ^d	6.0	5.75	5.95	5.91	5.55	5.45
<u>Feed/gain^e</u>						
Grower	2.89 ^{a,b}	2.93 ^a	2.91 ^{a,b}	2.77 ^{a,b}	2.94 ^a	2.66 ^b
Finisher	4.17 ^{a,b}	4.66 ^a	4.57 ^a	4.56 ^a	4.10 ^{a,b}	3.68 ^b
Overall	3.68 ^a	3.90 ^a	3.88 ^a	3.83 ^a	3.63 ^{a,b}	3.28 ^b
<u>Carcass data</u>						
Backfat, in	1.30 ^{a,b}	1.13 ^b	1.17 ^{a,b}	1.27 ^{a,b}	1.24 ^{a,b}	1.31 ^c
Lean, %	52.1 ^{a,b,c}	52.6 ^b	53.0 ^a	51.3 ^c	51.9 ^{b,c}	51.3 ^c
Yield, %	74.6 ^{a,b}	74.9 ^a	73.8 ^{a,b}	72.4 ^b	74.8 ^{a,b}	73.8 ^{a,b}

a,b,c

Means with unlike superscripts differ (P<.05).

d

Difference due to supplemented fat, treatments 1, 2, 3 vs 4, 5, 6 (P<.05).

e

Each figure is an average of 12 pigs.