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The Effect of Including Field Peas in Diets for Growing-finishing Pigs

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Materials and methods

Animals and experimental design

A total of 96 growing pigs of approximately 25 kg BW were obtained from the SDSU Swine Research Farm and allotted to one of four different experimental groups based on weight, ancestry, and sex. There were four pigs per pen and six replicate pens per treatment group. During the initial 40 days of the experiment, pigs were fed grower diets while finisher diets were fed for the remaining period. Pigs were killed at a commercial abattoir at a weight of approximately 120 kg. To ensure that slaughter weights were approximately identical for all pigs, the three replicates with the heaviest pigs were killed after 96 days, while the three replicates containing the smallest pigs were killed 109 days after the experiment was initiated.

Eight different diets were formulated (Table 1). Four of the diets were used during the growing period (e.g. day 1 - 40), and the other four diets were used during the finishing period (e.g. day 41 – 96/109). The four grower diets contained 0, 6, 12, or 18% field peas while 0, 12, 24, or 36% field peas were included in the finishing diets. Amino acids were balanced according to current NRC recommendations for grower diets (NRC, 1998). Because of the low content of methionine in field peas, the inclusion of synthetic methionine was increased as the inclusion of field peas was increased in the diets. Likewise, syntetic threonine and synthetic tryptophan was included in the diets containing peas to insure that no amino acid would limit performance. All other nutrients were included to meet or exceed NRC recommendations (NRC, 1998). The nutrient composition of the diets is shown in Table 2.

Housing and feeding

Pigs were housed in an environmentally controlled building with a concrete floor that is partly solid and partly covered with slats. The temperature was maintained at approximately 20° C. Feed was provided on an ad .libitum basis from a two-hole feeder attached to the front of the pen. Likewise, pigs had free access to water, which was provided from a nipple drinker suspended to one of the pen walls.

Data collection, calculations, and statistical analysis

Individual pig weights were recorded at the beginning of the experiment and every two weeks thereafter. The amount of feed dumped in each feeder was recorded on a daily basis and feed in the feeders was recorded each time the pigs were weighed. At slaughter, individual live weights, the dressed weights, fat depth, loin depth, and the lean meat percentage were measured for each pig.

At the end of the experiment, feed disappearance for each pen was calculated for each period. Likewise, average daily weight gain and average gain to feed ratios were calculated for each pen.

Data on pig performance and carcass evaluation were statistically evaluated using the Proc. GLM procedure of SAS. (SAS Stat Inc. Cary, NC). An analysis of variance was performed and treatment means were separated using a least significance test in Proc. GLM.

Results

Data on the growth performance of the pigs are shown in Table 3. During the growing period from day 1 to day 40, no differences ($P>0.05$) in average daily gain, average daily feed intake, or average gain to feed ratios were observed between treatment groups. During the finishing phase, pigs receiving diet 3 with 24 % field peas had a lower ($P<0.05$) gain to feed ratio than had the pigs receiving no peas. However, for average daily gain and average daily feed

intake, no differences ($P > 0.05$) were detected between treatment groups. Likewise, for the entire growing-finishing period, no differences ($P > 0.05$) in gain, feed intake, or gain to feed ratios were obtained between the four experimental groups.

Data on carcass evaluations are shown in Table 4. Pigs in treatment groups 3 had more ($P < 0.05$) backfat than had the pigs receiving the control diet. Pigs in experimental group 2 had larger ($P < 0.05$) loins than had pigs in the control group and pigs in experimental group 4. However, the lean meat percentage of the carcass was not different ($P > 0.05$) between the four treatment groups.

Discussion

The present experiment showed no negative effects on growth performance of feeding field peas to growing-finishing pigs. Pigs fed diets containing 18% field peas during the growing phase and 36% field peas during the finishing phase, performed as well as pigs fed diets containing no field peas. These results are in agreement with previous results showing no negative effects of including up to 40% field peas in diets for growing-finishing pigs (Bell and Wilson, 1970; Gatel et al., 1991; Landblom and Poland, 1996).

However, as was the case in the current experiment, diets containing field peas need to be fortified with synthetic amino acids to balance the amino acid composition of the diet.

The fact that the lean meat percentage was not different between treatment groups means that pigs fed diets containing peas have the same capacity for lean deposition as have pigs fed corn-soybean meal diets. Therefore, the inclusion of peas in diets for growing finishing pigs does not compromise carcass quality of pigs. The dressing percentage was not measured in the current experiment. However, the carcass weights of the pigs from the experimental groups that received peas in their diets were numerically higher than for pigs in the control group. Because there were no differences in the final live-weight between the treatment groups, this finding indicate, that the dressing percentages of the pigs receiving pea-containing diets may have been improved compared to the control pigs. The reason for this observation is unknown; however, Gatel et al. (1991) also reported improved dressing percentage in pigs receiving peas in the diets.

In conclusion, results of the current experiment demonstrates that field peas can be included in diets for growing pigs and for finishing pigs at inclusion rates of 18 and 36%, respectively, without compromising pig performance or carcass quality provided that the diets are balanced for their content of amino acids. Therefore, if field peas are priced favorably compared to corn and soybean meal, producers should not hesitate including field peas in their diet formulations.

References

Bell, J. M., and A. G. Wilson. 1970. An evaluation of field peas as a protein and energy source for swine rations. Can. J. Anim. Sci. 50:15-23.

Gatel, F., F. Grosjean, and J. Castaing. 1991. Ytilization of diets with high levels of pea (Pisum sativum hortense, cv. Finale) by the growing finishing pigs. World-Review of Animal Production. Rome:International Publishing Enterprises, 26:55-60.

Landblom, D., and C. Poland. 1996. Seasonal growth performance of barrows and gilts fed either soybean meal or trapper field peas with two levels of lysine. In: Dickerson Research Extension Center, 45th Annual Livestock Research Roundup bulletin

NRC. 1998. Nutrient requirements of swine (10th Ed.). National Academy Press, Washington DC.

TABLE 1. INGREDIENT COMPOSITION OF EXPERIMENTAL DIETS (AS IS)

	Grower Diets				Finisher Diets			
Diet	G-1	G-2	G-3	G-4	F-1	F-2	F-3	F-4
Corn, %	75.49	71.32	67.03	62.9	82.43	73.73	66.86	59.89
Peas, %	0	6.0	12.0	18.0	0	12.0	24.0	36.0
SBM, 44%, %	21.5	19.7	18.0	16.0	15.0	11.75	6.6	1.5
Limestone, %	.83	.83	.83	.83	.86	.86	.87	.85
DCP, %	1.25	1.25	1.25	1.25	.85	.85	.85	.9
Lysine, HCL, %	.13	.1	.08	.06	.06	0	0	0
DL-Methionine, %	0	0	.01	.02	0	0	0	.01
L-Threonine, %	0	0	0	.01	0	0	0	.01
L-Tryptophan, %	0	0	0	.01	0	.01	.02	.04
Salt, %	.3	.3	.3	.3	.3	.3	.3	.3
Min-Vit-mix, %	.5	.5	.5	.5	.5	.5	.5	.5
Total, %	100	100	100	100	100	100	100	100

TABLE 2. NUTRIENT COMPOSITION OF EXPERIMENTAL DIETS (AS IS)

	Grower Diets				Finisher Diets			
Diet	G-1	G-2	G-3	G-4	F-1	F-2	F-3	F-4
ME, Kcal/kg	3,269	3,262	3,253	3,241	3,300	3,283	3,270	3,255
Crude protein, %	15.7	15.8	15.9	16.0	13.4	13.8	13.4	13.1
Lysine, %	0.91	0.90	0.90	0.91	0.69	0.69	0.69	0.68
Methionine, %	0.26	0.25	0.26	0.26	0.23	0.22	0.20	0.19
Methionine + Cysteine, %	0.55	0.54	0.54	0.54	0.49	0.48	0.44	0.42
Threonine, %	0.59	0.59	0.59	0.60	0.50	0.50	0.48	0.46
Tryptophan, %	0.18	0.17	0.17	0.18	0.14	0.15	0.14	0.15
Calcium, %	0.68	0.68	0.68	0.68	0.59	0.59	0.59	0.58
Phosphorus, %	0.58	0.58	0.58	0.58	0.49	0.49	0.48	0.49

TABLE 3. GROWTH PERFORMANCE FROM EXPERIMENT

Treatment group	1	2	3	4	SEM[a]
Field peas, Grower/Finisher%	0/0	6/12	12/24	18/36	-
n	24	24	24	24	-
Grower period (day 1-40)					
Average initial weight, kg	26.71	26.69	26.67	26.75	1.18
Average end weight, kg	56.39	57.67	55.46	56.54	2.18
Average daily gain, g	742	775	720	745	33
Average daily feed intake, kg	1.3 9	1.35	1.34	1.41	0.05
Average gain:feed ratio, kg/kg	0.53	0.57	0.54	0.53	0.04
Finishing period (d41-96/109)					
Average initial weight, kg	56.4	57.67	55.46	56.54	2.18
Average end weight, kg	113.3	114.2	111.7	114.0	1.83
Average daily gain, g	909	907	906	924	25
Average daily feed intake, kg	2.65	2.74	2.91	2.81	0.08
Average gain:feed ratio, kg/kg	0.34[b]	0.33[bc]	0.31[c]	0.33[bc]	0.01
Overall (d1-96/109)					
Average initial weight, kg	26.71	26.69	26.67	26.75	1.18
Average end weight, kg	113.3	114.2	111.7	114.0	1.83
Average daily gain, g	845	855	834	854	21
Average daily feed intake, kg	2.16	2.19	2.29	2.26	0.05
Average gain:feed ratio, kg/kg	0.39	0.39	0.37	0.38	0.013

[a]Pooled standard error of the mean

[bc]Numbers within a row lacking a common superscript are different ($P<0.05$)

TABLE 4. CARCASS CHARACTERISTICS FROM EXPERIMENTAL PIGS

Diet	1	2	3	4	SEM[a]
Field peas, grower/finisher %	0/0	6/12	12/24	18/36	-
n	24	24	24	24	-
Carcass weight, kg	80.9	84.8	83.4	85.2	1.59
10th rib fat, mm	18.5[b]	20.3[bc]	21.3[c]	20.6[bc]	0.8
Loin depth, cm	6.17[b]	6.45	6.33[bc]	6.20[b]	0.07
Lean, %	53.83	53.96	53.42	53.46	0.3

[a]Pooled standard error of the mean

[bc]Numbers within a row lacking a common superscript are different ($P<0.05$)