



Feeding trial: Succotash swine

Staff Contact:

Margaret Dunn – (515) 232-5661
margaret@practicalfarmers.org

Web Link:

http://bit.ly/pfi_nichepork

Cooperators:

- Ron Rosmann, Harlan
- Daniel Rosmann, Harlan

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In a Nutshell

- Hogs were fed one of two rations to determine if an alternative ration could reduce input costs while maintaining acceptable growth rates and carcass quality.
- Thirty hogs from each group were selected for evaluation of carcass traits at slaughter.
- Hogs on the alternative diet consumed less feed, gained less weight per day, and therefore required more days to reach market weight.
- Despite lower intake, the feed-to-gain ratio was greater in alternative hogs.
- Costs per pound of feed and cost per pound of gain were lower for the alternative group.
- Results suggest that replacing corn in swine finishing diets with less-expensive small grains and alternative feeds results in a slight reduction in pig gain and feed efficiency, but reduces the overall costs.

Project Timeline:
May 2012 to August 2012

About the Cooperator

Rosmann Family Farms is owned and operated by Ron and Maria Rosmann and their family. Located in Shelby County, the farm produces organic crops, beef, pork, and chickens. They recently added a store, Farm Sweet Farm.



Background

Feed is the largest single cost in swine production (Thaler and Holden 2010), and corn is a significant portion of that cost. Many producers are seeking alternative feedstuffs, such as small grains, to reduce costs and to obtain health benefits like improved gut microflora and reduced gastric ulcers (Johnston et al. 2003). Due to higher protein and lysine content, small grains can also be used to reduce the amount of soybean meal and amino acid supplements in growing and finishing diets (Reese et al. 2010). Previous research by PFI cooperators has demonstrated that barley can be partially substituted for corn in growing and finishing swine diets without sacrificing quality and reducing

costs (Wilson 1994-95), and that alfalfa supplementation does not affect cost and can improve lean yield (Rosmann 1996). The current trial was initiated to see whether a combination of small grains, alfalfa, and field peas could be used to reduce the cost of growing and finishing swine, while maintaining similar performance and carcass characteristics to hogs fed a more traditional diet.

Methods

Two groups of finishing hogs (mixed barrows and gilts) were fed a standard diet of corn, soybean meal, and premix; or an alternative mix of corn, soybean meal, premix, triticale, field pea, alfalfa, and succotash (oats, barley, and wheat).

Two versions of each diet were developed, corresponding to different phases of growth. From 125 lb through 200 lb (phase 1), the hogs were fed a 15.6% crude protein (CP) diet; from 200 lb through finish, ~250 lb (phase 2), the hogs were fed a 14.0% CP diet. Feed ingredients were analyzed for crude protein content by Dairyland Labs.

Hogs were weighed at the initiation of the study on May 4, 2012. On July 19, 15 standard-fed and nine alternative-fed hogs were sold; the remaining hogs were sold on August 2. Hogs were classified into weight ranges at harvest, and carcass data were obtained. Other data collection included feed consumption and feed costs.

Because data was not available for individual pigs, and only one group of pigs was raised on each diet, no statistical significance could be established. Values reported are means for the entire group of 30 pigs on each diet.

Results

The standard and alternative diets were formulated as shown in **Table 1**. Phase 1 and phase 2 diets were formulated to be 15.6 and 14.0% crude protein, respectively. However, analysis of feed components from Dairyland Labs reveals that the crude protein contents of the standard diets were lower than the target in both stages, and that of the alternative diet was greater than the target in phase 1. Insufficient protein in the standard diets may have reduced pig growth. Yet, because standard protein sources (i.e. soybean meal) are fairly expensive, increasing the soybean meal content of the standard diet to increase the crude protein would make that diet even more expensive relative to the alternative diet. Conventional energy and protein sources (corn and soybean meal) are expensive: \$0.25/lb for organic corn and \$0.55/lb for organic soybean meal at the time of publication. By substituting succotash (\$0.16/lb) for corn and a combination of triticale and field peas (\$0.18/lb) and hay (\$0.10) for soybean meal, the cost of the diets are greatly reduced.

Feed consumption for the two groups was a bit different, as shown in **Table 2**. Alternative hogs consumed slightly less feed, both per day and over the course of the trial. Diet cost was less per pound in the alternative diet, so feed costs per pig were lower.

Table 1

Diet composition of standard and alternative diets fed to hogs at different stages of growth and finishing

Phase 1: 15.6% CP	Standard			Alternative		
	% of Diet	% CP in Ingredient	% of Total Diet CP	% of Diet	% CP in Ingredient	% of Total Diet CP
Corn	79.5	8.14	6.47	55	8.14	4.48
Soy	17.5	44.00	7.70	20	44.00	8.80
Premix	3	0	0	2.5	0	0
Succotash				10	11.20	1.12
Triticale/Field Peas				10	14.70	1.47
Hay				2.5	13.22	0.33
Total	100		14.17	100		16.20
Phase 2: 14.0% CP	Standard			Alternative		
	% of Diet	% CP in Ingredient	% of Total Diet CP	% of Diet	% CP in Ingredient	% of Total Diet CP
Corn	83.5	8.14	6.80	57	8.14	4.64
Soy	14	44.00	6.16	13.25	44.00	5.83
Premix	2.5	0	0	2.5	0	0
Succotash				12.5	11.20	1.40
Triticale/Field Peas				12.5	14.70	1.84
Hay				2.25	13.22	0.30
Total	100		12.96	100		14.00

Table 2

Feed costs for standard and alternative diets fed to finishing hogs

	Standard	Alternative
Total Feed (lb)	17970 lb	18062 lb
Total Feed Cost (\$)	\$5433.40	\$5104.89
Feed Cost (\$/lb)	\$0.30	\$0.28
Total Feed Consumed (lb)	17770 lb	17362 lb
Cost of Feed Consumed (\$)	\$5372.93	\$4907.05
Daily Feed Consumption (lb per pig per day)	6.97 lb	6.61 lb
Daily Feed Cost (lb per pig per day)	\$2.11	\$1.87

Hogs in both groups started at approximately the same weight: 125.33 lb for the standard, and 126.66 lb for the alternative. As shown in **Table 3**, standard hogs had higher average daily gain (ADG) and final weights, and took less time to get to market weight. Combining the feed consumption and growth data, it turns out that the alternative hogs were slightly less efficient in terms of feed-to-gain ratio, but cost less per pound of gain. Standard hogs were also slightly fatter, as seen in a lower % lean and greater backfat thickness compared to alternative hogs.

However, none of the differences were statistically significant.

Economic analysis of the two systems finds greater income from the conventional hogs, due to higher sale prices and higher weights. However, the reduced feed cost of the alternative hogs was significant enough to improve the bottom line, demonstrated in **Table 4**. While both systems lost money, the alternative hogs lost about \$5 less per pig than the conventional hogs – a total savings of approximately \$150. It should be noted that labor and housing expenses were not included. Because the alternative hogs took 2.4 days more to reach finishing weight, their daily expenses would be greater than those of the standard hogs.



Table 3

Growth and carcass characteristics of hogs finished on either a standard or alternative diet

	Standard	Alternative
Initial Weight (lb)	125.33	126.66
Final Weight (lb)	256.84	253.89
Weight Gain (lb)	131.51	127.23
Carcass Weight (lb)	184.90	183.57
Average % Lean	0.5385	0.5415
Backfat (in)	0.895	0.801
Time to Finish (days)	85	87.4
Average Daily Gain (lb/day)	1.55	1.46
Feed:Gain (lb feed/lb gain)	4.50	4.55
Cost of Gain (\$/lb gain)	1.35	1.27



Ron Rosmann in front of the family's on-farm store

Conclusions and Next Steps

The project's results seem to indicate that small grains can be substituted for corn and soybean meal in finishing hog rations. While statistical significance could not be determined, it seems that alternative diets don't result in as rapid or as great of weight gain as do standard diets. The hot, dry summer also likely hampered pig growth performance; owner Ron Rosmann mentioned that the hogs have a lot of Berkshire genetics, which do not fare the best in the heat. Regardless, the feed savings are enough to improve the producer's bottom line.

Analysis for the purpose of this trial describes a monetary loss for the Rosmanns. While labor input costs and housing costs were not included, neither was the value of manure. The Rosmanns compost their livestock manure and apply it to their cropland, and estimate the value at \$80,000-\$100,000 per year.

The next step for this project would be to reformulate the standard diets to meet the crude protein targets, and to try and further reduce the corn and soybean meal content of the alternative diets. While the carcass information from the packing plant indicated no issues with either type of hog, it would be beneficial to have taste tests and sensory evaluation of meat from both types of hogs against a "store-bought" animal. Ron also would like to try finishing in cooler months, when the Berkshire hogs are performing their best.

References

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Table 4

Expenses, receipts, and net profit/loss of hogs finished on either a standard or alternative diet

		Standard				Alternative			
		\$/lb	Avg wt	Quantity	Total	\$/lb	Avg wt	Quantity	Total
Expenses	Cost of Feeder Pigs	1.15	125.33	30	4323.89	1.15	126.66	30	4369.77
	Feed Cost	0.30		17770	5372.93	0.28		17362	4907.05
	Total Expenses				9696.81				9276.82
Receipts	Sale of Pigs	1.12	256.84	30	8559.06	1.10	253.89	30	8308.63
	Total Profit				8559.06				8308.63
Net Profit or Loss	Total				-1137.75				-968.19
	Per Pig				-37.93				-32.27

PFI Cooperators' Program

PFI's Cooperators' Program gives farmers practical answers to questions they have about on-farm challenges through research, record-keeping, and demonstration projects. The Cooperators' Program began in 1987 with farmers looking to save money through more judicious use of inputs.