Economy of Adding Fibrous Feedstuffs to Sow Gestation Diets

Producers may be able to improve the profitability of their operation by using fibrous feed ingredients in sow gestation diets.

Duane E. Reese
Allen Prosch[1]

Summary

A previous summary of research results indicated that sows fed high-fiber diets during gestation weaned 0.3 more pigs/litter on the average than sows fed lower-fiber, grain-based diets. Gestation diets containing 18% soybean hulls, 46% distillers dried grains with solubles (DDGS), 34% wheat midds, 25% wheat bran, 23% alfalfa meal, 25% sugar beet pulp, or 45% oats provide sows about 350 g/day of neutral detergent fiber (NDF), which may be sufficient to increase litter size weaned by 0.3 pigs per litter. An economic analysis suggests that feeding a diet containing these sources of NDF would increase sow feed ingredient costs from 0 to $22.35 per sow per gestation period compared to feeding a corn-soybean meal diet. No improvement in litter size at weaning was required to justify feeding DDGS at the ingredient prices assumed in this analysis. Small improvements in litter size (0.16 to 0.24 pigs per litter) would be necessary to justify feeding soybean hulls or wheat midds during gestation. Producers may be able to improve the profitability of their operation by using fibrous feed ingredients in sow gestation diets.

Introduction

In the pork industry, high-fiber, low energy-dense diets are best suited for gestating sows. Gestating sows utilize fiber better than growing pigs, and they have a high feed intake capacity relative to their energy requirement during gestation. Results from a review of 24 research studies on the effects of providing high-fiber diets to sows during gestation was published in the *2008 Nebraska Swine Report*. That review suggested sows fed high-fiber diets during gestation weaned 0.3 more pigs per litter than those fed low-fiber diets.

Table 1. Diets for gestation sows (as-fed basis).

	Diet							
Ingredient, lb	Corn-soy	18% soybean hulls	46% DDGS[a]	34% Wheat midds	25% Wheat bran	23% Alfalfa meal	25% Beet Pulp	45% Oats
Corn	1662	1367	858	1093	1263	1313	1214	855
Soybean meal, 46.5% CP	254	197	150	152	169	166	212	178
Soybean hulls		360						
DDGS			917					
Wheat midds				679				
Wheat bran					490			
Alfalfa meal						462		
Beet pulp							502	
Oats								890
Dicalcium phosphate, 18.5% P	47	43	24	33	35	36	45	41
Limestone	14	10	28	20	20		4	13
Salt	10	10	10	10	10	10	10	10
Vitamin/trace mineral mix	13	13	13	13	13	13	13	13
Daily Intake								
Feed, lb	4.1	4.3	4.1	4.3	4.5	4.6	4.4	4.5
Metabolizable energy, Mcal[b]	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lysine (total), g	11.0	11.8	12.8	10.8	11.6	12.3	12.0	11.3
Lysine (SID), g	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Calcium, g	15.8	15.8	15.9	15.9	17.2	16.7	15.9	15.8
Phosphorus (total), g	14.0	13.4	13.1	15.9	17.2	13.2	13.5	14.3
Phosphorus (available), g	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Neutral detergent fiber, g	173	350	350	350	350	350	350	350
Calculated Analysis, %								
Lysine, total	0.59	0.60	0.69	0.55	0.57	0.59	0.60	0.55
Lysine, SID	0.50	0.47	0.50	0.48	0.46	0.44	0.47	0.45
Calcium, %	0.85	0.80	0.86	0.82	0.85	0.80	0.80	0.77
Phosphorus, total	0.75	0.68	0.71	0.82	0.85	0.63	0.68	0.69
Phosphorus, available	0.48	0.46	0.49	0.47	0.44	0.43	0.45	0.44

[a]Distillers dried grains with solubles
[b]Metabolizable energy (Mcal/lb) and NDF (%) values for corn, soybean meal, soybean hulls, DDGS, wheat midds, wheat bran, alfalfa meal, beet pulp, and oats were 1.56, 1.52, 1.06, 1.55, 1.38, 1.03, 0.75, 1.13, 1.23, and 9.6, 10.2, 56.4, 30.5, 35.6, 42.1, 41.2, 42.4, 27, respectively

High corn and soybean meal prices have pork producers searching for alternative feed ingredients. Fibrous feed ingredients in sow gestation diets should be part of that search. When making a decision to add fibrous feed ingredients to gestation diets, it is important to conduct an economic analysis. The economic analysis presented in this paper included consideration for feed ingredient costs and weaned pig value; costs associated with ingredient storage, feed handling, and manure disposal were not included.

Procedures

Eight corn/soybean meal-based gestation diets were formulated (Table 1). One diet (corn-soy) contained no additional fiber; the remaining seven diets contained additional fiber through the addition of either 18% soybean hulls, 46% DDGS, 34% wheat midds, 25% wheat bran, 23% alfalfa meal, 25% sugar beet pulp, or 45% oats. All diets were formulated to provide sows with similar daily amounts of metabolizable energy, standardized ileal digestible (SID) lysine, calcium, and available phosphorus by altering ingredient composition and daily feed intake. Each of the high-fiber diets was formulated to provide 350 g/day of neutral detergent fiber (NDF), an amount previously suggested that may be necessary to elicit a positive litter size response *(1997*

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Nebraska Swine Report). Total sow feed ingredient cost for a 110-day feeding period was estimated for each diet.

Results and Discussion

Variation in the cost of the complete diets and in the total sow feed ingredient expense among the eight feeding programs was observed (Table 2). The total feed expense per sow per 110-day period for the diets with various sources of additional fiber increased with a range of $0.00 to $22.07/sow compared to the corn-soybean meal diet. The cost of feeding the 46% DDGS diet was similar to that for the corn-soybean meal diet. Expense incurred from feeding the 34% wheat midds or 18% soybean hulls diet was $3.29 and $4.76 per sow more than that for the corn-soybean meal diet. The 25% wheat bran, 23% alfalfa meal, and 25% beet pulp and 45% oats feeding programs were considerably more expensive than the corn-soybean meal diet program.

When lower energy, fibrous feedstuffs are added to the diet, sows often must be provided more feed to meet their daily metabolizable energy requirement. Feeding a gestation diet containing 34% wheat midds or 18% soybean hulls resulted in 4.6% greater feed usage compared to feeding the corn-soybean meal diet (Table 2). Feeding a diet containing 25% wheat bran, 23% alfalfa meal, 25% beet pulp, or 45% oats increased feed usage by 9, 12, 7, and 10%, respectively compared to feeding the corn-soybean diet. The amount of feed for sows fed the 46% DDGS diet was similar to that for those fed the corn-soybean meal diet. Therefore, it is important to compare total feed ingredient cost per sow per period of time rather than ingredient cost per ton of feed when evaluating the economics of feeding many high-fiber diets to gestating sows.

In the event a producer faces additional sow feed expense, such as revealed in the feeding of all fibrous ingredients except DDGS in this analysis, additional value must be generated in order to justify the extra feed expense. Litter size improvement can represent increased value. The change in litter size at weaning needed to offset additional sow feed ingredient expense is presented in Table 3. The calculations are based on pig values at weaning of $20, 25, 30, 35, 40, and 45 per pig. With DDGS being the exception, the use of all fibrous feedstuffs required an increase in litter size ranging from 0.11 to 1.12 pigs per litter to pay for the extra sow feed expense incurred. Soybean hulls and wheat midds required the least litter size improvement (0.16 to 0.24 depending on pig value); wheat bran required the greatest litter size improvement to offset the additional feed expense associated with feeding the various fiber sources.

Based on the results of the original review presented in the *2008 Nebraska Swine Report*, it is somewhat reasonable to expect a litter size improvement at weaning. A total of 34 comparisons evaluating litter size at weaning were made between sows fed control and high-fiber diets; in 19 (56%) of those comparisons an increase in litter size was observed while in 12 (35%) a decrease was observed. On average, 0.3 more pigs were weaned per litter. A larger improvement in litter size at weaning (0.6 pigs per litter) was observed in studies where sows were fed high-fiber diets over multiple reproductive cycles. This implies that, to ensure an improvement in litter size from feeding fiber, fiber-feeding must be initiated before mating.

The results in Table 3 are valid for the ingredient prices used in this analysis only. Given the price volatility the feed ingredient market has experienced recently, producers are advised to frequently evaluate prices for high-fiber feed ingredients for possible inclusion in sow gestation diets. The diets in Table 2 could serve as the basis for evaluating the economic feasibility of feeding fibrous ingredients to gestation sows.

The amount of manure solids produced from feeding these high-fiber diets would probably increase in proportion to the extra amount of feed provided, which could be a problem in some manure disposal systems. Some producers report that the undigested portion of the hull from oats is particularly a nuisance to remove from manure storage devices.

Table 2. Feed ingredient costs and feed usage estimates for various gestation feeding programs.

Item	Diet							
	Corn-soy	Soybean hulls	DDGS[a]	Wheat midds	Wheat bran	Alfalfa meal	Beet pulp	Oats
Feed cost/ton, $[b]	190	200	189	197	265	213	226	238
Feed cost/sow/period, $[b,c]	42.94	47.70	42.39	46.23	65.29	54.05	54.62	59.14
Difference in sow feed expense (vs. corn-soy), $/sow/period		4.76	0	3.29	22.07	11.10	11.71	16.20
Gestation feed usage, lb/sow/period[c]	452	478	449	468	492	508	483	498

[a]Distillers dried grains with solubles.
[b]Ingredient prices used were corn $3.80/bu; soybean meal $290/ton; soybean hulls $225/ton; DDGS $170/ton; wheat midds $197/ton; wheat bran $490/ton; alfalfa meal $290/ton; beet pulp $300/ton; oats $262/ton; dicalcium phosphate $1,050/ton.
[c]Period = 110 days; Daily metabolizable energy intake = 6.1 Mcal.

Table 3. Change in number of pigs weaned/litter needed to offset extra sow feed ingredient expense per 110-day gestation period.

Diet	Value of a pig at weaning, $/pig					
	20	25	30	35	40	45
Corn-soy						
Soybean hulls	0.24	0.19	0.16	0.14	0.12	0.11
DDGS[a]	-0.03	-0.02	-0.02	-0.02	-0.01	-0.01
Wheat midds	0.16	0.13	0.11	0.09	0.08	0.07
Wheat bran	1.12	0.89	0.74	0.64	0.56	0.50
Alfalfa meal	0.56	0.44	0.37	0.32	0.28	0.25
Beet pulp	0.58	0.47	0.39	0.33	0.29	0.26
Oats	0.81	0.65	0.54	0.46	0.40	0.36

[a]Distillers dried grains with solubles.

[1]Duane E. Reese is Extension swine specialist in the Animal Science Department and Allen Prosch was Pork Central coordinator at the University of Nebraska–Lincoln.