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Dietary Fiber Use in Sow Diets: Debate and Discussion

The objective of feeding a gestating sow is to provide adequate nutrient intake for maintenance, growth of maternal tissues, and fetal growth and development. A gestating sow in good body condition needs 260 g protein, 13 to 14 g lysine, 18 to 22 g Ca, and 16 to 18 g P daily. This is typically accomplished by feeding gestating sows 4 to 5 lb/d of a nutritionally fortified corn-SBM based diet.

Alternative energy sources, which are generally higher in fiber, are often used in gestating sow feeds. Fiber sources are lower in energy and more bulky than corn. Since gestating sows are limit fed, they are excellent candidates for higher fiber, lower energy type diets. Some feed companies have suggested that adding fiber to gestating sow feeds will improve sow productivity, but research results with added dietary fiber are inconsistent and do not always support this recommendation.

Researchers at the University of Nebraska summarized multiple trials evaluating high fiber diets for gestating sows (Table 1). Alfalfa meal and distillers grains fed during gestating had a negative impact on number of pigs born alive (PBA). The decrease in litter size was observed in one of three studies with alfalfa meal and both studies with distillers grains. In contrast, alfalfa hay or haylage, corn gluten feed, oat hulls or oats, and wheat straw increased PBA. Based on these studies, the Nebraska group concluded there was a positive response in number of PBA when sows consumed 350 to 520 g/d of neutral detergent fiber (NDF). Unfortunately, the data are compromised due to variability in diet formulation among treatments. For example, some fiber sources (e.g., alfalfa hay and haylage) contain high levels of B-vitamins (e.g., folic acid), which have been shown to improve litter size. Since diets were not balanced on a B-vitamin basis, effects of B-vitamin and NDF levels were confounded, making it impossible to determine which nutrient gave the beneficial response in litter size.

Table 1. Change in Litter Size Due to Fiber Source Fed During Gestation

	NDF, g/d*		Pigs Born	Litters,
Fiber Source	Control	Fiber	Alive, no.	no.
Alfalfa Meal	264	381	-0.4	269
Alfalfa Hay/Haylage	246	721	+0.5	647
Corn Gluten Feed	166	794	+0.7	229
Distillers Grains	139	418	-0.3	118
Oat Hulls/Oats	260	1221	+1.8	96
Wheat Straw	150	368	+0.5	699

*Ave. neutral detergent fiber intake by sows fed the control or fibrous diets during gestation.
**Total number of litters produced by sows fed control or fibrous diets.
Taken from the Carolina Swine Nutrition Conference, 1996.

Limit-fed sows obtain more energy from fibrous feedstuffs than grow-finish pigs fed ad libitum, as sows have higher fermentation capacity in the hindgut due to lower feed intake and slower rate of passage. Thus, adding fiber to the gestation diet may be justified from a nutritional standpoint. High fiber diets may also provide more energy for the sow than calculated, which could affect PBA.

Fiber additions impact sow behavior, which may contribute to increased PBA. European researchers evaluated stereotypic behavior (repeated behavior having no apparent purpose such as bar-biting, sham-chewing, and excessive water wastage) in sows. They suggest that sows perform stereotypic behaviors when something is wrong with the environment. There may be certain biological consequences to stereotypic behavior, including increased metabolic rate and poorer feed conversion. Such sows are more liable to be thin and in poorer body condition than sows not engaging in stereotypic behavior during gestation. Consequently, sow reproductive performance may be impaired in sows that exhibit stereotypic behavior during gestation.

Gestating sows are fed much lower quantities of feed than they are capable of consuming, thereby preventing sows from feeling full or satisfied. The natural instinct is to search for food, which increases stereotypic behavior. European researchers linked feed restriction to the development of stereotypic behavior in gestating sows. Feeding sows more volume resulted in less stereotypic behavior. In a U.K. study (Table 2), sows were fed as follows: control (4.4 lb/d); sugar beet pulp-supplemented diet (5.5 lb/d); or sugar beet pulp diet (ad libitum). Each of the stereotypic behaviors monitored were reduced with higher feeding rates. Unfortunately, subsequent number of PBA was not reported.

Table 2. Effect of Dietary Fiber on Stereotypic Behavior of Gestating Sows

	Time Spent On A Behavior (min/sow*)		
Treatment	Licking	Sham-Chewing	Bar-Biting
Control (4.4 lb/d)	28.1	12.1	8.8
Sugar Beet Pulp (5.5 lb/d)	6.1	0.9	0.1
Sugar Beet Pulp (ad libitum)	2.6	0.0	0.3
Probability value	<.03	<.08	<.05

*During first 1.5 hr after feeding.

Changing fiber levels in gestation diets will result in different diet densities, depending on ingredients used and physical form of feed (meal vs. pellets). This requires adjustments to feeding rates to achieve desired body condition. Excessive levels of fiber in gestation diets can lead to diet separation and sorting when fed in meal form. Also, sows fed high fiber diets excrete more manure, which can be a big problem in some production systems. Fiber addition to gestation diets should be based on economics. A cost comparison of gestation feeds with and without added fiber are shown in Table 3. In some cases with lower energy diets, feed cost per ton may be lower, but if sows have to be fed more to maintain body condition, feed cost per sow per year will increase. If adding fiber increases feed cost, an increase in pigs weaned must be achieved to justify higher diet costs. Higher fiber diets in gestation can be used to increase feeding rates and provide bulk when ulcers are a problem. Otherwise, adding fiber to gestation diets is not necessarily beneficial.

Table 3. Cost Comparison of Fiber Sources in Gestating Sow Diets

Diet	Corn-SBM	Wheat Midds	Soybean Hulls	Alfalfa Meal	Oats
Feed Cost, $/ton	122	116	118	124	112
Feed/gestation, lb/sow	450	485	484	505	495
Cost/gestation, $/sow	27.61	27.94	28.27	30.91	27.61

Gestation period assumed to be 110 days.
Taken from Pork 98 (May), Source: Univ. of Nebraska