

High fiber during late gestation reduces rate of stillborn piglets

STILLBIRTH is a multifactorial problem in commercial pig production, and there is a need for identifying important risk factors and possible interactions to help pig producers improve management and productivity.

Several previous studies have found that litter size, sow parity, sow body condition score, environmental temperature and the farrowing process are the key factors influencing piglet stillbirth rate.

For example, a study by Vanderhaeghe et al. (2010a) found that under-conditioned sows with back-fat levels of less than 16 mm at the end of gestation had an increased risk of stillbirths compared with sows with back-fat levels between 16 mm and 23 mm.

The same authors also showed that the risk of stillbirths in pigs increased when ambient temperatures were above 22°C at farrowing (Vanderhaeghe et al., 2010b).

More recently, Danish research (Feyera et al., 2017) found that supplementing dietary fiber (DF) to sows in the last two weeks of gestation reduced the proportion of stillborn piglets as well as preweaning mortality from poor viability and piglet diarrhea in lactation.

This study utilized a total of 644 sows (parities 1-8) at a commercial farm in Denmark. Sows in the control group (n = 310) were fed according to the normal farm gestation feeding strategy until one week before expected farrowing, when a transition diet was fed until day 5 of lactation, and then a lactation diet was fed until weaning.

Sows in the high-DF group (n = 334) were fed the same as the control group except that 280 g per day of the gestation diet (days 102-108 of gestation) and 570 g per day of the transition diet (day 109 of gestation until farrowing) were replaced with 350 g and 700 g, respectively, of a DF-rich diet due to its lower energy density.

Sows from each group consumed equal daily amounts of net energy. Sugar beet pulp was used as the DF source to provide a dietary crude fiber concentration at 173 g/kg versus 41 g/kg in the control diet.

Sows were kept in group gestation pens until they were moved to the individual farrowing crate. All litters were standardized to 13-15 piglets within 24

Bottom Line

with **RAN SONG***



hours postpartum, and cross-fostering was allowed only within treatments.

Results

Results from this study showed a reduction in the rate of stillbirths per litter from 8.8% in the control group to 6.6% in

the high-DF group (P < 0.001), leading to a reduction in total piglet mortality from 22.3% to 19.9% (P = 0.004) of total born (Table).

The authors speculated that the underlying modes of action of DF on the stillbirth rate may be related to multiple effects of DF on the nutrient digestibility pattern and/or the passage rate of the digesta.

First, sows that were fed high DF in late gestation were less likely to develop constipation before farrowing due to increased intestinal activities and the high water-holding capacity of the DF,

Effect of DF on stillbirth, live-born and total born piglet mortality and preweaning mortality causes in sows fed a control or high-DF diet in last 2 weeks of gestation

Item	Control	DF	Std. error	P-value
Number of sows	310	334	—	—
Number of nurse sows	52	56	—	—
Total piglets born	18.4	18.1	0.29	0.38
Live-born piglets	16.8	16.9	0.25	0.78
Weaned piglets	14.2	14.4	0.23	0.66
Stillborn piglets, % of total born	8.8	6.6	0.47	<0.001
Preweaning mortality, % of total born	14.6	13.7	0.68	0.21
Overall mortality, % of total born	22.3	19.9	0.71	0.004
Causes of preweaning mortality, % of total born				
Crushing	4.7	5.0	—	0.41
Low birth weight	3.2	3.6	—	0.24
Poor viability at birth	2.8	1.5	—	<0.001
Unidentified	2.3	1.9	—	0.20
Starvation	0.8	1.0	—	0.36
Joint infection	0.5	0.5	—	0.91
Diarrhea	0.7	0.3	—	0.004

Source: Adapted from Feyera et al., 2017.

Frequency distribution of stillborn piglets per litter in sows fed a control or high-DF diet during last 2 weeks of gestation



Source: Adapted from Feyera et al., 2017.

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and water in the colon digesta, in turn, increases the softness of the feces. Soft feces may prevent physical blockage of the birth canal and allow for rapid passage of piglets during farrowing, so feeding a high-DF diet during the transition period is likely favorable to the farrowing process.

The other potential beneficial effect of a high-DF diet may be related to longer postprandial energy uptake from the sow's gastrointestinal tract. Since feed allowance is commonly low before farrowing and glucose is only net absorbed during the first four to six hours after feeding, inclusion of DF may be beneficial in stabilizing the interprandial blood glucose levels.

Therefore, the possible modes of action of a high-DF diet in reducing the stillbirth rate could be through softening the feces and/or due to increased postprandial energy uptake around farrowing, both of which may contribute to a shorter farrowing duration that ultimately reduces stillbirths.

Moreover, the stillbirth frequency distribution was also reported in this study (Figure). Zero stillbirths was the most frequently observed outcome, and its occurrence was greater in the DF-supplemented group than in the control group:

38.9% versus 30.5%, respectively ($P = 0.05$). A stillbirth rate of two or more per litter could be regarded as problematic and could cause reduced production efficiency in the modern swine industry. Fewer sows in the DF group gave birth to two or more stillborn pigs per litter compared with sows in control group: 43.1% versus 30.1% ($P < 0.01$).

Although supplemented DF had no impact on preweaning mortality ($P = 0.21$), the proportion of death due to poor viability at birth ($P < 0.001$) and piglet diarrhea ($P = 0.004$) were reduced (Table).

The authors speculated that sows fed high amounts of DF may have a shorter farrowing duration (as mentioned before), thereby causing less-distressed piglets during farrowing. Additionally, plasma concentrations of short-chain fatty acids of newborn piglets may be increased in sows fed high-DF diets, which can lead to an improved energy status of piglets at birth. However, this was not quantified in this study.

The Bottom Line

The beneficial effects of fiber in gestating sows have been largely studied from a behavioral and welfare perspective, but little is known regarding the effects

of DF on reproductive performance. This study is the first to document that supplementing high amounts of DF to late gestating sows in the last two weeks before expected farrowing reduced the proportion of stillborn piglets and consequently reduced total piglet mortality.

Results from this study indicate a new nutritional strategy to help reduce stillbirths by manipulating the sow feeding program in late gestation. Further investigations are needed to reveal the mode of action of DF in reducing the stillbirth rate using various fiber sources and in different production systems.

References

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