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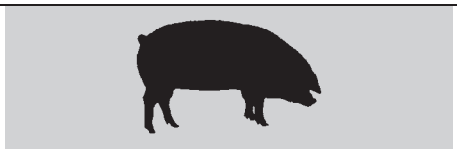

The effects of corn- or sorghum-based diets with or without sorghum dried distillers grains with solubles on lactating-sow and litter performance[1]

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ABSTRACT

A total of 140 sows and their litters were used to determine the effects of corn- or sorghum-based diets without or with 20% sorghum dried distillers grains with solubles (DDGS) on lactating-sow and litter performance. Sows were allotted to 1 of 4 dietary treatments on d 110 of gestation. Weaning age was 21 d. Treatments were arranged in a 2 × 2 factorial with main effects of grain source and sorghum DDGS. Litters were equalized to 13 pigs per treatment. Overall (d 0 to 21), a tendency ($P < 0.08$) for a DDGS × grain source interaction was observed as ADFI increased in corn-based diets when DDGS were added but decreased in sorghum-based diets. Sows fed sorghum-based diets had decreased ($P < 0.04$) lactation BW loss compared with those fed corn-based diets. Litter weaning weights tended to be reduced ($P < 0.06$) for sows fed diets containing DDGS compared with those fed diets without DDGS. Sows fed the sorghum-based diet with 20% sorghum DDGS had the lightest litter weaning weight compared with other treatments. Litter weight gain tended ($P < 0.09$) to decrease when sorghum DDGS were added to corn- or sorghum-based diets. No differences were observed in piglet survivability among all treatments. Overall, feeding sows corn- or sorghum-based diets (without DDGS) in lactation did not affect litter performance; however, the 4% decrease in litter weaning weight of sows fed sorghum with 20% sorghum DDGS needs to be taken into account when selecting ingredients for lactating sows.

Key words: lactation, litter, sorghum, sorghum dried distillers grains with solubles, sow

INTRODUCTION

In the Great Plains region of the United States, sorghum is grown because it is drought tolerant, and therefore, sorghum dried distillers grains with solubles (**DDGS**) are often available to swine producers because of larger acreage of sorghum in the area compared with other grain sources, and its use in ethanol production.

Grain sorghum is a suitable replacement for corn in swine diets and results in similar pig growth performance when formulated in nursery and finishing-pig diets (Shelton et al., 2004; Issa, 2009; Benz et al., 2011). Gestating sow performance is not affected by corn DDGS inclusion rates from 40 to 80% (Thong et al., 1978; Monegue and Cromwell, 1995), and lactating-sow performance is not affected by corn DDGS at an inclusion rate of 30% (Song et al., 2007; Greiner et al., 2008). Louis et al. (1991) observed no differences for lactation weight loss among sows fed corn- or sorghum-based diets; however, a reduction in litter weaning weights was observed for sows fed sorghum-based diets.

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Table 1. Dietary ingredient composition (as-fed basis)

Item, %	Corn	Sorghum	Sorghum DDGS[1]
DM	88.47	88.05	92.53
CP	8.10	8.61	32.05
Crude fat	2.96	2.72	9.23
Crude fiber	1.36	1.31	7.03
Ash	1.40	1.42	4.19

[1]Sorghum DDGS = sorghum dried distillers grains with solubles.

Corn DDGS have greater concentrations of GE than corn; however, energy digestibility is reduced in DDGS because of increased insoluble dietary fiber (Pedersen et al., 2007). Therefore, DDGS and corn have similar DE and ME values when fat content of the DDGS and corn are similar.

Research has been conducted on lactating sows using corn DDGS, but no research has been conducted to determine the feeding value of sorghum DDGS for lactating sows. Therefore, the objective of this study was to determine the effects of corn- or sorghum-based diets without or with 20% sorghum DDGS on lactating-sow and litter performance.

MATERIALS AND METHODS

All practices and procedures used in these experiments were approved by the Kansas State University Institutional Animal Care and Use Committee. This study was conducted at the Kansas State University Swine Teaching and Research Center in Manhattan. The facility is a totally enclosed, environmentally controlled, mechanically ventilated barn. The barn contains 29 farrowing crates (2.13 × 0.46 m for the sow and 2.13 × 0.48 m for the pigs) that are each equipped with a single feeder and nipple waterer.

The sorghum, corn, and sorghum DDGS were analyzed for DM (AOAC 930.15), CP (AOAC 990.03), crude fat (AOAC 920.39), crude fiber (Ankom Method, Ankom Technology, Macedon, NY), and ash (AOAC 942.05) at the Kansas State University Analytical Laboratory (Manhattan, KS). Standard ileal digestibility values for the sorghum DDGS were derived from Urriola et al. (2009). These values were then used in diet formulation (Table 1). The grain sorghum fed in this study was a red-pericarp variety, and the corn grain fed was US #2 yellow dent. The corn DDGS used were golden brown with L*, a*, and b* values of 70.5, 14.9, and 39.2, respectively. The sorghum DDGS were darker brown in color than the corn DDGS with L*, a*, and b* values of 50.7, 16.6, and 24.9, respectively. Bulk densities (g/L) were measured on the treatment diets (Table 2). When 20% sorghum DDGS were included in the corn- or sorghum-based diets, bulk density of the dietary treatment decreased.

Table 2. Bulk densities of experimental diets by farrowing group (as-fed basis)[1]

Bulk density, g/L	Corn and no DDGS	Corn and 20% sorghum DDGS	Sorghum and no DDGS	Sorghum and 20% sorghum DDGS
Group 1	741	666	781	678
Group 2	688	662	735	669
Group 3	672	620	752	649
Groups 4 and 5	759	666	801	688

[1]Bulk densities represent the mass per unit volume. DDGS = dried distillers grains with solubles.

A total of 140 sows (PIC 1050) and their litters were used. Sows were randomly allotted to 1 of 4 experimental diets throughout 5 farrowing groups using farrowing group as the blocking criteria. There were 7 sows per treatment with 4 treatments per farrowing group. The experiment was conducted with consecutive sow groups farrowing from September through January. During gestation, all sows were fed a corn-based diet with 20% corn DDGS. Feed amounts in gestation were assigned based on sow body condition (Young et al., 2004). Two sows were removed from the study for the sorghum-based diet and 1 sow from the sorghum-based diet with 20% sorghum-DDGS treatments because of feed refusals. An additional 1 and 2 sows were removed from the study for the sorghum and sorghum-DDGS treatments because of illness, respectively.

Treatments were arranged in a 2 × 2 factorial with main effects of grain source (corn vs. sorghum) and sorghum DDGS (0 vs. 20%; Table 3). Sows had ad libitum access to water throughout the study. Sows were switched to their experimental diets on d 110 of gestation, corresponding to their move to the farrowing house. Sows had restricted access to feed from d 110 until farrowing (2 kg). Sows were fed 2.7, 3.6, and 5.4 kg on d 0 of farrowing and subsequent 2 d, respectively. Sows had ad libitum access to feed for the remainder of the lactation period.

Average daily feed intake was determined by measuring total feed disappearance on d 0, 7, 14, and 21 and at weaning. The average age of the piglets was 21 d; however, piglet age ranged from 19 to 23 d of age. Therefore, total feed disappearance was measured on d 21 and at wean-