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Sorghum grain stillage for pregnant gilts

Abstract

Gilts during pregnancy consumed approximately 29 pounds of milo stillage per day, when fed only stillage. Availability of water did not affect stillage consumption. Gilts fed stillage consumed only 2.2 pounds of DM per day which was not enough to maintain body weight. Gilts fed all the stillage they would consume and one pound of the control diet made similar weight gains and had similar reproductive performance as gilts fed three pounds of the control diet. This suggests that the energy value of the milo stillage is similar to that of the control diet (1620 kcal DE/lb DM) for gilts during gestation.; Swine Day, Manhattan, KS, November 11, 1982

Keywords

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Sorghum Grain Stillage for Pregnant Gilts

G.L. Allee, B.A. Koch, and K.Jackson

Summary

Gilts during pregnancy consumed approximately 29 pounds of milo stillage per day, when fed only stillage. Availability of water did not affect stillage consumption. Gilts fed stillage consumed only 2.2 pounds of DM per day which was not enough to maintain body weight. Gilts fed all the stillage they would consume and one pound of the control diet made similar weight gains and had similar reproductive performance as gilts fed three pounds of the control diet. This suggests that the energy value of the milo stillage is similar to that of the control diet (1620 kcal DE/lb DM) for gilts during gestation.

Introduction

When grains are fermented to alcohol approximately one-third of the original dry matter can be recovered. The nutritional value of the fermentation residue will have a marked impact on the economics of converting grains to alcohol.

The residue from fermentation, commonly called stillage, normally contains only 5 to 10% dry matter. Therefore, large quantities must be consumed before it will make a significant contribution to the nutrient intake of the animal. Another problem is that stillage will spoil rapidly in hot weather.

The objective of this study was to evaluate the feeding value of sorghum grain stillage for swine.

Procedure

Stillage was obtained from a farm still and transported in a polyethylene tank to the research center. The chemical analyses of the stillage are shown in Table 1. Dry matter (DM) content ranged from 5.4 to 8.3% and averaged 7.5%.

Forty crossbred gilts (30 days post breeding) were housed in individual stalls in the gestation building. Twenty gilts served as positive controls and were fed the normal milo-soybean gestation diet (Table 2) at three pounds per head per day. Twenty gilts (five per treatment) were randomly assigned to the following stillage treatments:

- A. Stillage as the only source of energy, protein and water.
- B. Stillage as the only source of energy and protein with water available.
- C. Stillage plus one pound of the control gestation diet -no water available.
- D. As C with water available.

The stillage diets were supplemented with a vitamin and mineral premix to assure these nutrient would not be deficient. Stillage was fed twice a day during the trial. The trial was conducted from June 24 to August 10, 1981.

Gilts were individually weighed at the start of the experiment and on the 105-110th day of gestation, when they were moved into the farrowing house.

All gilts were fed a milo-soybean lactation diet from the time they entered the farrowing house and during the 21-day lactation period. Gilts were weighed immediately after farrowing and after 21 days of lactation. Pigs were individually weighed at birth and at 21-days of age.

Results and Discussion

Consumption of the stillage is shown in Table 3. All gilts had similar stillage consumption. Availability of water did not affect stillage consumption. When the stillage started to spoil, consumption was markedly reduced and a fresh supply of stillage was obtained.

Since there were no differences in stillage consumption due to the availability of water, treatments A and B (stillage only) were combined to evaluate reproductive performance. Similarly, treatments C and D (stillage + 1 lb control diet) were also combined.

Reproductive performance is shown in Table 4. Gilts fed stillage only did not consume enough dry matter to maintain body weight. These gilts were receiving only (29.0 x 7.5% DM) 2.2 pounds of dry matter per day. Gilts fed stillage and one pound of the control diet were able to make similar weight gains as gilts fed three pounds of the control diet.

Number of pigs born live were not influenced by diet, but birth weights were reduced in the gilts fed stillage only. This reduction in birth weight would be expected since energy consumption was reduced. Number of pigs weaned/litter was less for the gilts fed stillage only. Pig weights at 21 days were similar for all treatment, however, litter weights at 21 days were reduced from gilts fed stillage only.

Feed consumption during lactation was similar for all treatments. Gilts fed stillage only during gestation lost less weight during lactation. This would be expected since gilts that gain more weight during gestation also lose more weight during lactation.

Reproductive performance was similar for the gilts fed stillage plus one pound of the control diet and those fed three pounds of the control diet. This suggests that the energy value of the stillage dry matter is very similar to that of the control milo-soybean diet since the stillage consumed (28.1 x .075) = 2.1 pounds of DM per day.

Table 1. Composition of Whole Sorghum Grain Stillage^a

| Item | Dry analysis ^b | | | |
|-----------------------|---------------------------|---|---------|------|
| | Range | | Average | |
| Dry matter | 5.40 | - | 8.30 | 7.5 |
| Crude protein | 26.0 | - | 35.0 | 33.2 |
| Ash | 4.3 | - | 5.2 | 5.0 |
| Ether extract | 11.7 | - | 12.7 | 12.2 |
| Crude fiber | 5.9 | - | 6.8 | 6.2 |
| Nitrogen-free extract | 41.4 | - | 45.4 | 43.4 |
| Hemicellulose* | 23.6 | - | 30.2 | 26.3 |
| Cellulose* | 17.2 | - | 26.3 | 20.2 |
| Lignin* | 6.5 | - | 9.5 | 8.1 |
| Calcium | .11 | - | .12 | .115 |
| Phosphorus | .61 | - | .72 | .67 |
| Sodium | .028 | - | .032 | .030 |
| Magnesium | .31 | - | .35 | .322 |

^aValues presented are from five distillations (three samples/distillation).

^bExpressed as a % of stillage dry matter.

*Van Soest analysis.

Table 2. Composition of Control Gestation Diet

| Ingredient | % |
|---------------------|--------|
| Gr. sorghum grain | 72.60 |
| Soybean meal (44%) | 22.50 |
| Dicalcium phosphate | 2.50 |
| Limestone | 1.30 |
| Salt | .50 |
| Trace-mineral | .10 |
| Vitamin premix | .50 |
| | 100.00 |

Table 3. Stillage Consumption (lbs/day) by Pregnant Gilts^a

| | Treatments | | | |
|------------------------|------------|------|------|------|
| | A | B | C | D |
| Consumption lbs/day | 29.0 | 29.3 | 28.1 | 28.2 |

^aEach value is the mean of five gilts after a seven-day adjustment period.

Table 4. Reproductive Performance

| | Treatments | | |
|--|------------------|-------------------------------------|---------------------------|
| | Stillage only | Stillage + 1# of control diet | Control diet 3#/day |
| No. of gilts started | 10 | 10 | 20 |
| No. farrowing | 8 | 10 | 17 |
| Weight gain, (lb/day) | -.07 | .72 | .78 |
| No. born, live/litter | 9.71 | 10.6 | 10.06 |
| No. weaned/litter | 7.28 | 8.7 | 9.06 |
| Pig birth wt., lb | 2.61 | 2.82 | 2.92 |
| Pig wt. at 21-days, lb | 9.82 | 9.89 | 8.62 |
| Litter wt. at 21-days, lb | 70.38 | 86.08 | 77.81 |
| Sow weight change (post-farrowing to 21-days lactation) | -19.67 | -46.78 | -35.41 |
| Sow feed intake during lactation (lb/day) | 8.40 | 8.32 | 7.89 |