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# Effects of ratio of condensed distiller's solubles to wet distillers' grains on performance of wean to finish pigs

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**September 2014**

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**Partners:**

Minnesota Corn  
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## OBJECTIVES

The objective of this study was to compare the performance of pigs fed diets containing 20% distillers' dried grains with solubles (DDGS) to that of pigs fed diets containing combinations of wet distillers' grains (WDG) and condensed distiller's solubles (CDS).

## MATERIALS AND METHODS

The experimental protocol was reviewed and approved by the University of Minnesota Institutional Animal Care and Use Committee. The trial was conducted in the wean-to-finish facility at the University of Minnesota's Southern Research and Outreach Center.

A total of 280 pigs (initial body weight 21.7 lb., standard deviation 3.9 lb.) were blocked by body weight and assigned to 1 of 4 dietary treatments: 1) 20% DDGS, 2) 20% WDG, 3) 17% WDG + 3% CDS, and 4) 14% WDG + 6% CDS. All the percentages indicated in the dietary treatments are on an as-is basis. Diets were formulated to contain similar levels of nutrients (standardized ileal digestible lysine, methionine, threonine, and tryptophan, digestible phosphorus, and calcium) on an as-is basis and similar metabolizable energy on a dry matter basis.

Each treatment had 7 replicate pens. Pens provide 8 square feet per pig at a stocking density of 10 pigs (5 barrows and 5 gilts) per pen. All pens have concrete slats, a single liquid feeding trough with sensor (Big Dutchman) on the side of the pen, and a water nipple. The Big Dutchman automated liquid feeding system recorded daily pen feed intake, which was automatically adjusted, based on a reference feed intake curve. Pigs were weighed individually on day 14, 35, 56, 98, and 126. Daily minimum and maximum temperatures were recorded each morning. Animals were observed daily for signs of morbidity and mortality, and feed and water outages.

At the end of the growth trial, blood samples were collected from 1 pig per pen (closest to pen average body weight) for analysis of urea nitrogen. The pigs were slaughtered at Tyson Foods, Inc. (Waterloo, IA) where data on carcass characteristics (dressing percentage, backfat depth, loin depth, and lean percentage) were collected.

Pen was the experimental unit. Data were subjected to analysis of covariance by SAS 9.2 with initial body weight as a covariant for growth performance data. Least squares means were separated by the DIFF option. Statistical significance was measured at the 0.05 level.

## RESULTS

Growth performance is shown in Table 1. Pigs from treatments 3 (17% WDG + 3% CDS) and 4 (14% WDG + 6% CDS) were significantly heavier ( $P < 0.05$ ) than animals fed the control diet (20% DDGS) on days 14 and 35. Pigs fed diet 3 (17% WDG + 3% CDS) were heavier ( $P < 0.05$ ) than pigs fed diet 2 (20% WDG) on day 35 and diet 1 (20% DDGS) on day 126. No differences ( $P > 0.05$ ) were observed for body weight across the 4 treatments on days 56 and 98.

During the day 1-14 period, average daily gain (ADG) of pigs fed diet 3 (17% WDG + 3% CDS) and diet 4 (14% WDG + 6% CDS) was higher ( $P < 0.05$ ) than pigs fed the 20% DDGS diet. For day 14-35, pigs from the 17% WDG + 3% CDS group gained more ( $P < 0.05$ ) than those from treatments 1 (20% DDGS) and 2 (20% WDG). During the day 98-126 period, pigs fed 20% DDGS had lower ( $P < 0.05$ ) ADG than those from the other 3 treatments. As for the overall period, pigs from the 17% WDG + 3% CDS group had greater ( $P < 0.05$ ) ADG than those from the 20% DDGS group.

No difference ( $P > 0.05$ ) in average daily intake (ADFI) on a dry matter basis was noticed across the treatments during the first two periods, day 1-14 and 14-35. After that, pigs from the 20% DDGS group ate more ( $P < 0.05$ ) than those from the other 3 groups. Overall, pigs fed 20% DDGS had higher ( $P < 0.05$ ) ADFI than pigs fed the other 3 diets.

Pigs fed 20% DDGS had lower ( $P < 0.05$ ) ratio of ADG to ADFI than those fed the other 3 diets in all phases except the day 14-35 period.

The carcass characteristics and blood urea nitrogen are presented in Table 2. No difference ( $P > 0.05$ ) was observed for dressing percentage, back fat depth, lean percentage, and blood urea nitrogen among the 4 treatments.

In conclusion, our results indicate that 17% WDG + 3% CDS is the best combination among the 4 treatments tested under our experimental conditions.

**Table 1 Effects of cake to syrup ratio on pig growth performance**

Dietary treatment						
Growing phase	Control (20 % DDGS)	20 % WDG	17 % WDG + 3 % CDS	14 % WDG + 6 % CDS	SEM	P Value
<b>Body weight (BW), lbs.</b>						
Initial BW	21.9	21.4	21.6	21.9	1.4	0.99
Day 14	34.4 B	35.3 AB	36.2 A	36.0 A	0.4	0.02
Day 35	66.4 C	67.7 BC	70.8 A	69.1 AB	0.8	0.01
Day 56	113.2	114.1	116.9	114.3	1.7	0.48
Day 98	219.3	214.4	220.3	218.6	3.1	0.56
Day 126	274.4 B	281.3 AB	287.1 A	281.0 AB	3.5	0.12
<b>Average daily gain, lbs./day</b>						
Day 1-14	0.905 B	0.970 AB	1.037 A	1.020 A	0.029	0.02
Day 14-35	1.524 B	1.547 B	1.647 A	1.576 AB	0.030	0.05
Day 35-56	2.228	2.209	2.195	2.152	0.058	0.82
Day 56-98	2.527	2.389	2.463	2.483	0.059	0.43
Day 98-126	1.968 B	2.386 A	2.386 A	2.229 A	0.086	0.01
Day 1-126	2.006 B	2.060 AB	2.107 A	2.058 AB	0.0279	0.12
<b>Average daily intake (lbs./day, dry matter basis)</b>						
Day 1-14	1.750	1.650	1.727	1.721	0.064	0.72
Day 14-35	3.368	3.430	3.538	3.367	0.084	0.45
Day 35-56	5.336 A	4.635 B	4.759 B	4.697 B	0.115	0.0008
Day 56-98	7.728 A	6.588 B	6.688 B	6.728 B	0.181	0.0005
Day 98-126	8.495 A	7.791 B	7.956 AB	7.531 B	0.241	0.06
Day 1-126	6.055 A	5.406 B	5.522 B	5.405 B	0.103	0.0004
<b>Feed conversion efficiency (gain: feed intake)</b>						
Day 1-14	0.515 B	0.591 A	0.602 A	0.592 A	0.018	0.01
Day 14-35	0.453	0.452	0.469	0.469	0.011	0.56
Day 35-56	0.418 B	0.478 A	0.461 A	0.457 A	0.011	0.01
Day 56-98	0.329 B	0.369 A	0.371 A	0.371 A	0.013	0.09
Day 98-126	0.232 B	0.311 A	0.300 A	0.299 A	0.011	< 0.0001
Day 1-126	0.332 B	0.385 A	0.383 A	0.382 A	0.008	0.0001

Note: (1) Day refers to days on trial. (2) Means within a row without common letters differ (P < 0.05).

**Table 2. Effects of cake to syrup ratio on pig carcass characteristics and blood urea nitrogen**

Dietary treatment						
Item	Control (20% DDGS)	20% WDG	17% WDG + 3% CDS	14% WDG + 6% CDS	<u>SEM</u>	<u>P</u> <u>Value</u>
Dress, %	74.1	73.6	73.0	73.2	0.5	0.41
Fat depth, inches	0.85	0.79	0.84	0.86	0.03	0.34
Muscle depth, inches	2.79	2.78	2.83	2.83	0.03	0.43
Lean,%	54.8	55.1	55.0	54.9	0.2	0.59
Blood urea nitrogen (mg/dL)	12.42	11.95	14.08	13.64	1.34	0.62