

Comparing dry, wet, or modified distillers grains plus solubles on feedlot cattle performance and metabolism characteristics

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Introduction

- Feeding Value relative to DRC
- WDGS (32 % DM) → 131 - 148 %
 - MDGS (46 % DM) → 117 - 128 %
 - DDGS (90 % DM) → 107 - 112 %

The UNL pen mean meta analyses utilized over 4500 steers in a combined 25 trials. However, these three DGS products have not been directly compared to one another in the same trial. Also the corn control diet was not consistent across experiments.

Bremer, et. al. 2010.

Objective

Evaluate the effect of drying distillers grains on the energy value in feedlot diets and metabolism characteristics.

Exp. 1 Materials and Methods

RBCD (3 blocks)

- 3 x 3 + 1 Factorial
- 3 types of distillers grains
 - WDGS
 - MDGS
 - DDGS
 - MDGS and DDGS from same plant
 - WDGS from different plant
- 20, 30, or 40 % diet DM inclusion
- DGS replaced corn
- Negative corn control
- Repeated within rep - 10 reps
- Basal Ingredients:
 - 60:40 HMC:DRC
 - 15.0% Corn Silage
 - 5.0% Supplement

440 short yearling steers (778 ± 42 lb)

- 55 pens (8 str/pen)
 - 11 Treatments, 5 reps
 - 154 DOF
- WDGS - 0.8% S, 11.9% fat, 34% NDF
- MDGS - 0.7% S, 12.4% fat, 34% NDF
- DDGS - 0.7% S, 11.9% fat, 32% NDF



Exp. 2 Materials and Methods

RBCD (3 blocks)

- Unbalanced Latin square
 - 4 diets x 6 steers (21 d periods)
 - 14 d adaptation / 7 d collection
- 3 types of distillers grains (40% of diet DM)
 - WDGS
 - MDGS
 - DDGS
- Negative corn control
 - DGS replaced corn
- Basal Ingredients:
 - 60:40 HMC:DRC
 - 15.0% Corn Silage
 - 5.0% Supplement
 - Same source as Exp. #1

Ruminally fistulated

- BW = 990 lb
- Measurements
 - DMI
 - Continuous pH (every min; 7 d)
 - Total tract digestibility (Cr₂O₃)



Results Exp. 1

Table 1. Main effects of 20, 30, or 40% distillers grains on cattle performance and carcass characteristics.

	Treatment ¹			SEM	P-value
	WDGS	MDGS	DDGS		
Performance¹					
Initial BW, lb	767	767	768	1	0.83
Final BW, lb	1400	1409	1392	10	0.51
DMI, lb/d	24.8 ^a	26.4 ^b	27.1 ^b	0.07	< 0.01
ADG, lb	4.11	4.17	4.05	0.3	0.30
G:F	0.165 ^a	0.158 ^b	0.150 ^c	0.002	< 0.01
Carcass Characteristics²					
HCW, lb	882	887	877	6	0.52
12 th rib fat, in	0.63	0.64	0.60	0.1	0.15
Marbling Score	610	599	602	9	0.69
LM area, in ²	13.3	13.2	13.4	0.15	0.50

^{a,b,c} Means with different superscripts differ (P < 0.05).

¹DMI - Dry matter intake; ADG - Average daily gain; G:F - gain per lb of feed.

²HCW - Hot carcass wt.; Marbling Score: 400 - slight, 500 - small, 600 - Modest, 700 - Moderate, 800 - Slightly Abundant.

Table 2. Main effect of level on cattle performance and carcass characteristics.

	Level ¹				SEM	Lin	Quad
	0	20	30	40			
Performance²							
Initial BW, lb	800	767	799	738	1	0.34	0.18
Final BW, lb	1319 ^a	1396 ^b	1390 ^b	1413 ^b	15	< 0.01	0.05
DMI, lb/d	24.6 ^a	26.3 ^b	25.9 ^b	26.2 ^b	0.4	0.01	0.09
ADG, lb	3.58 ^a	4.08 ^b	4.05 ^b	4.19 ^b	0.07	< 0.01	0.04
G:F	0.146 ^a	0.156 ^b	0.157 ^b	0.161 ^b	0.003	< 0.01	0.49
Carcass Characteristics³							
HCW, lb	831 ^a	879 ^b	876 ^b	890 ^b	7	< 0.01	0.05
12 th rib fat, in	0.50 ^a	0.62 ^b	0.62 ^b	0.65 ^b	0.02	< 0.01	0.08
Marbling Score	607	609	599	603	11	0.63	0.99
LM area, in ²	13.3	13.2	13.3	13.4	0.1	0.74	0.17

^{a,b,c} Means with different superscripts differ (P < 0.05).

¹Level of distillers grains (% DM).

²DMI - Dry matter intake; ADG - Average daily gain; G:F - gain per lb of feed.

³HCW - Hot carcass wt.; Marbling Score: 400 - slight, 500 - small, 600 - Modest, 700 - Moderate, 800 - Slightly Abundant.

Figure 1. ADG response to WDGS, MDGS, or DDGS.

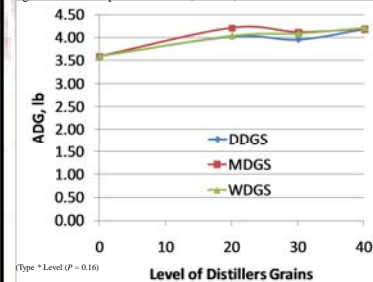
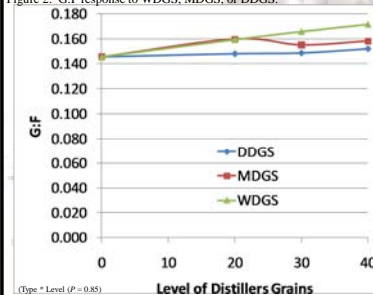


Figure 2. G:F response to WDGS, MDGS, or DDGS.



(Type * Level (P = 0.85))

Results Exp. 2

Table 3. Effects of diet on nutrient intake and digestibility.

	CON	Treatment ¹			SEM	P-value
		WDGS	MDGS	DDGS		
DM						
Intake, lb/d	21.5	20.6	22.1	21.6	1.2	0.83
Digestibility, %	78.0	77.2	76.5	75.2	0.8	0.84
OM						
Intake, lb/d	20.1 ^a	18.7	20.3	19.7	1.1	0.74
Digestibility, %	79.7	79.2	78.4	76.7	0.1	0.81
NDF						
Intake, lb/d	3.4 ^a	4.9 ^b	5.0 ^b	5.4 ^b	0.3	< 0.01
Digestibility, %	35.8 ^a	55.5 ^{ab}	48.0 ^b	51.6 ^b	0.1	0.10
Fat						
Intake, lb/d	0.8 ^a	1.5 ^b	1.4 ^b	1.4 ^b	0.1	< 0.01
Digestibility, %	85.9	89.3	88.2	87.4	0.1	0.73

¹CON = Corn control; WDGS = Wet distillers grains plus solubles; MDGS = Modified distillers grains plus solubles; DDGS = Dried distillers grains plus solubles.

^{a,b} Means with different superscripts differ (P < 0.10).

Table 4. Effects of diet on ruminal pH.

	CON	Treatment ¹			SEM	P-value
		WDGS	MDGS	DDGS		
Average pH	5.73	5.70	4.69	5.92	0.08	0.14
Maximum pH	6.53	6.42	6.36	6.87	0.07	0.29
Minimum pH	5.05 ^a	5.16 ^b	5.13 ^{ab}	5.36 ^b	0.08	< 0.01
pH Magnitude	1.46	1.29	1.20	1.16	0.13	0.27
pH Variance	0.14	0.09	0.10	0.10	0.02	0.11
Time < 5.6, min/d	496	695	560	309	127	0.23
Area < 5.6	106 ^a	224 ^b	128 ^a	106 ^a	38	0.02

¹CON = Corn control; WDGS = Wet distillers grains plus solubles;

MDGS = Modified distillers grains plus solubles;

DDGS = Dried distillers grains plus solubles.

^{a,b} Means with different superscripts differ (P < 0.10).

Conclusions Exp. 1

- ADG was not different for WDGS, MDGS, or DDGS
- G:F was greater for steers consuming WDGS compared to MDGS or DDGS
- WDGS was 35.4 and 17.8% greater than DDGS and MDGS, respectively

Conclusions Exp. 2

- CON diets had lower NDF digestibility than WDGS and DDGS
- Ruminal pH tended to be impacted by dietary treatment with DDGS having the greatest pH

Summary

Drying WDGS has a negative impact on the feeding value of DGS. However, including distillers grains up to 40% of the diet improves animal performance compared to a corn based diet.