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# Replacement of Grazed Forage and Animal Performance When Distillers Grains are Fed in a Bunk or on the Ground

Kari L. Gillespie
*University of Nebraska–Lincoln*

L. Aaron Stalker
*University of Nebraska-Lincoln*, astalker3@unl.edu

Terry Klopfenstein
*Universitiy of Nebraska--Lincoln*, tklopfenstein1@unl.edu

Jerry D. Volesky
*University of Nebraska-Lincoln*, jvolesky1@unl.edu

Jacqueline Musgrave
*University of Nebraska-Lincoln*, jmusgrave1@unl.edu

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**Kari L. Gillespie**
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**Jacki A. Musgrave**[1]

**Summary**

*A 120-day grazing experiment estimated forage savings, performance, and ground feeding efficiency when supplementing spayed yearling heifers with modified distillers grains with solubles (MDGS) at 0.6% of BW on native Sandhills range. Supplemented heifers had 1.28 lb greater ADG and consumed 15.9% less forage. Each 1 lb of MDGS supplement fed replaced approximately 0.7 lb of forage. Loss of MDGS when ground-fed was 4.3%. Supplementing spayed yearling heifers with MDGS at 0.6% BW decreased forage consumption 15.9% and increased gain.*

**Introduction**

Distillers grains fits well into forage situations as it has a highly fermentable fiber source which does not hinder forage digestion, and also supplies undegradable intake protein (UIP) to meet metabolizable protein deficiencies common in grazing situations (*2004 Nebraska Beef Cattle Report,* p. 25).

Distillers grains supplementation increases ADG of growing cattle while reducing forage intake in a forage-based system *(2005 Nebraska E Beef Cattle Report,* p. 18). Forage intake was reduced 0.5 lb for each 1.0 lb of distillers grains fed, as summarized from six distillers grains supplementation studies (2007 *Nebraska Beef Cattle Report*, p. 10). Distillers grains loss when ground-fed appears to be affected by distillers grain form, animal type, and grazing situation. Wet distillers grains with solubles (WDGS) fed to yearling steers on Sandhills winter range resulted in a 13-20% loss (*2010 Nebraska Beef Cattle Report,* p. 17), while dried distillers grains with solubles (DDGS) fed to calves on a subirrigated meadow resulted in a 36-41% loss (*2012 Nebraska Beef Cattle Report*, p. 51). Thus, this study's objectives were to determine forage replacement rate and performance of spayed yearling heifers when supplemented with MDGS at 0.6% BW in a native Sandhills range situation, and calculate MDGS loss that resulted from ground feeding.

**Procedure**

Twenty-four spayed yearling heifers were stratified by initial BW (571 ± 32 lb) and randomly assigned to treatment. Treatments were no supplementation (control), MDGS supplementation fed at 0.6% of BW daily in a bunk, and MDGS supplementation fed at 0.6% of BW daily on the ground. Ground-fed heifers were fed at a different location within their paddock each day. There were two replications per treatment, with four heifers per replication. Treatments were randomly assigned to an east and west grazing block to minimize differences in plant species and topography. Heifers grazed upland Sandhills summer range 120 days at the Gudmundsen Sandhills Laboratory near Whitman, Neb., beginning May 18, 2011. At the conclusion of summer grazing, heifers were transported to the ARDC, limit fed five days at 1.8% BW (DM), and weighed. Final BW was the mean of consecutive two-day BW measurements.

Each replication rotated through six, 2.47 acre paddocks twice throughout the grazing season. Paddocks were stocked at 0.8 AUM/acre. Grazing days per paddock were increased during the second grazing cycle to account for additional forage growth. Based on previous research that distillers supplementation results in a 17% forage replacement rate when fed at 0.6% BW daily, paddocks were stocked for equal grazing pressure between treatments by allowing control cattle to graze each of their paddocks for 17% less time than supplemented cattle. This was achieved by moving control cattle one or two and one-half days earlier than supplemented cattle during a six- and 14-day grazing cycle, respectively, from their grazing paddock to a pasture of similar forage species composition. There, control cattle were managed separately until rotating into their next paddock on the same day that supplemented cattle rotated.

Forage diet samples were collected using esophageally-fistulated cows at the midpoint of each grazing rotation during the first, third, and fifth rotations of both grazing cycles, for 12 total collections. Extrusa samples were analyzed for CP, NDF, and IVDMD. *In vitro* dry matter digestibility was determined through two separate *in vitro* runs. Five forage standards of varying qualities with known *in vivo* DM digestibilities were included in both IVDMD runs. Regression equations were generated for each run by regressing the IVDMD values of the standards on their known digestibilities to then correct all the IVDMD to *in vivo* values.

Gains were estimated throughout the summer at 1.5 lb/head and MDGS feeding amounts were adjusted monthly to account for projected cattle gain. Samples of MDGS were collected twice monthly to calculate DM and used to adjust feeding amount to 0.6% BW on a DM basis. A MDGS

(Continued on next page)

**Table 1. Forage quality over time[1].**

| Sample dates | 5/20-21 | 6/1-2 | 6/13-14 | 6/23-24 | 7/21-22 | 8/18-19 |
|---|---|---|---|---|---|---|
| CP% | 10.6 | 10.3 | 11.1 | 8.8 | 8.4 | 8.7 |
| NDF% | 64.9 | 64.6 | 55.8 | 69.1 | 70.6 | 70.8 |
| IVDMD% | 65.5 | 64.8 | 64.5 | 66.9 | 56.0 | 50.5 |

[1]Sequence of grazing paddocks over summer, from May 20 through Aug. 19, 2011.

**Table 2. Performance response of heifers to distillers grains.**

| | Treatment[1] | | | | |
|---|---|---|---|---|---|
| | Control | Bunk-fed | Ground-fed | SEM | *P*-value |
| Initial BW, lb | 575[a] | 563[a] | 577[a] | 12 | 0.65 |
| ADG, lb | 1.17[a] | 2.51[b] | 2.39[b] | .08 | <0.01 |
| Ending BW, lb | 726[a] | 881[b] | 878[b] | 16 | <0.01 |

[ab]Means with different superscripts differ (*P*-value < 0.01).
[1]Cattle received no supplementation or daily MDGS supplementation at 0.6% BW fed in a bunk or on the ground daily MDGS supplementation at 0.6% BW fed in a bunk or fed on the ground.

**Table 3. Residual forage post-grazing (lb/ac)[1].**

| | Treatment[1] | | | | |
|---|---|---|---|---|---|
| | Control | Bunk-fed | Ground-fed | SEM | *P*-value |
| Total live[3] | 1202 | 1338 | 1210 | 127 | 0.38 |
| Standing dead | 448 | 559 | 420 | 56 | 0.22 |
| Litter | 918 | 950 | 687 | 114 | 0.24 |

Means with different superscripts differ (*P*-value < 0.01).
[1]Average post-grazing values from six paddocks per treatment over three clipping dates (early July, late July, late August).
[2]Paddocks grazed by control cattle, bunk-fed cattle, or ground-fed cattle.
[3]Total live represents live grass, forbs, and shrubs.

composite sample was analyzed to determine nutrient composition (31% CP, 12% fat, 25% NDF).

At the conclusion of grazing each paddock during the first, third, and fifth grazing periods of the second grazing cycle, 10 quadrats (2.69 $ft^2$) were hand clipped at ground level in each paddock. Forage was sorted by live material, standing dead, litter, forbs, shrubs, and cactus. Samples were dried in a forced-air oven for 48 hours at 60°C, weighed, and residual forage per acre was calculated to verify forage replacement and evaluate the equal grazing pressure hypothesis between treatments.

The 1996 NRC model was used to estimate range forage intake based on cattle performance and supplement intake. The model also was used to retrospectively calculate the MDGS intake difference between bunk and ground-fed treatments.

All data were analyzed using the MIXED procedure of SAS.

## Results

During the grazing season, paddocks averaged 10% CP, 66% NDF, and 61% IVDMD. Table 1 shows range forage quality throughout the grazing season, illustrating a general decline in CP and IVDMD, and a general increase in NDF as forages matured. Supplemented cattle gained more (2.43 vs. 1.17 lb/day; $P < 0.05$) and had greater ending BW (880 vs. 726 lb; $P < 0.05$) than control cattle (Table 2). Heifers supplemented on the ground gained 0.12 lb/day less than those fed in bunks, a difference that was not statistically significant ($P = 0.28$). However, using the 0.12 lb/day difference, retrospective analysis estimated 4.3% of offered MDGS was lost when ground-fed. Each 1 lb of MDGS supplement fed replaced approximately 0.68 lb of forage intake, which equates to a 15.9% forage replacement rate.

There was no difference ($P = 0.38$) in residual forage among paddocks grazed by different treatment groups (Table 3). This lack of difference illustrates equal grazing pressure by supplemented and unsupplemented heifers, as grazing days had been adjusted assuming a 17% forage savings when supplementing MDGS at 0.6% BW to yearlings in a range situation.

Supplementing MDGS to spayed yearling heifers at 0.6% BW daily effectively increased summer grazing gains and reduced forage needs 15.9%. There was no performance advantage to bunk feeding over ground feeding.

[1]Kari Gillespie, graduate student; Brandon Nuttelman, research technician; Cody Schneider, research technician; Terry Klopfenstein, professor, University of Nebraska–Lincoln (UNL) Department of Animal Science, Lincoln, Neb.; Aaron Stalker, assistant professor, Jacki Musgrave, research technician, UNL West Central Research and Extension Center (WCREC), North Platte, Neb.; Jerry Volesky, professor, UNL Department of Agronomy and Horticulture, WC REC.