

# Effects of Self-limiting Dried Distillers Grains With Solubles Supplementation on Growth Performance of Grazing Heifers

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*The objective of this study was to evaluate the impact of the feeding method of dried distillers grains with solubles (DDGS) on the growth performance of yearling heifers grazing Northern Plains rangelands. Results indicate similar gain among control, self-limited DDGS and hand-fed DDGS treatments, while self-limited DDGS had similar intake in heifers receiving hand-fed DDGS. Further investigation into the usage of self-limited supplements is needed, and factors such as forage quality and quantity, length of grazing season, anticipated animal performance and cost of supplement must be assessed.*

## Summary

We evaluated the impact of the feeding method of dried distillers grains with solubles (DDGS) on the growth performance of yearling heifers grazing native pastures at the Central Grasslands Research Extension Center (CGREC) in south-central North Dakota. Eighty-four yearling spayed heifers (initial body weight [BW]: 801.8 ± 8.8 pounds) were stratified by BW and randomly assigned to one of six

pastures, with each pasture randomly assigned to one of three treatments: 1) control (CONT; no supplement), 2) hand-fed (HF) DDGS supplemented at 0.6 percent BW per day and 3) self-limited (SL) DDGS with 16 percent sodium chloride (NaCl) inclusion. Hand-fed DDGS (HF) were delivered daily and placed in feeders. Self-limited DDGS (SL) were mixed with NaCl in a grinder mixer and placed in creep feeders *ad libitum* throughout grazing. The stocking rate was held constant in all pastures at one animal unit (AU)/four acres.

At the start of the grazing study, initial BW was not different among treatments ( $P = 0.21$ ). Final BW and average daily gain (ADG) were not different among CONT, HF and SL treatments ( $P \geq 0.18$ ). In addition, supplemental intake was not different between heifers in the HF and SL treatments ( $P = 0.27$ ).

## Introduction

Dried distillers grains with solubles have been researched extensively as a supplemental form of energy and protein for

grazing livestock. Supplementation during grazing can be a valuable management strategy during summer months when forage quality and quantity are typically at their lowest (Caton and Dhuyvetter, 1997). Dried distillers grains with solubles supplementation can offset nutritional deficiencies and increase animal performance (Morris et al., 2006; MacDonald et al., 2007). When forage quality meets the animal's requirements, energy and protein supplementation will have limited effect on livestock performance. However, Schauer et al. (2004) proposed that when forage quality is limited, protein supplementation may not benefit livestock performance, but energy supplementation may improve performance.

Supplementation is often critical to maintain production demands for certain classes of cattle (Caton and Dhuyvetter, 1997). Hand-fed supplementa-



tion allows for control over the amount of supplement given to grazing livestock but may increase the proportion of non-feeders due to competition for trough space (Bowman and Sowell, 1997). Research by Cardon et al. (1951) demonstrated that salt may be used in rangeland supplementation situations as a self-limiter and limit the animal's consumption of feed. Self-limited supplementation attempts to allow every animal the opportunity to consume supplement, which potentially would decrease competition for supplement and proportion of nonfeeders (Bowman and Sowell, 1997). Livestock can develop a decreased sensitivity to the palatability of salt, which may lead to increased supplement intake through time (Schauer et al., 2004).

The objective of this study was to evaluate the impact of the feeding method of DDGS on the growth performance of yearling heifers grazing Northern Plains rangelands. Our research hypothesis is that heifers fed self-limited DDGS will perform similarly to those hand-fed DDGS at 0.6 percent of BW daily, and heifers receiving supplement would have increased animal performance when compared with control heifers receiving no supplement.

### Procedures

Procedures were approved by the North Dakota State Univer-

sity Animal Care and Use Committee prior to the initiation of the study.

The primary grass and forb species found in the pastures included Kentucky bluegrass, blue grama, needle and thread, long-stolon sedge and western snowberry (Hirschfeld et al., 1996). Stocking rates were one AU/four acres.

Eighty-four yearling spayed heifers (nonimplanted;  $801.8 \pm 8.8$  pounds) were stratified by BW and randomly assigned to one of six pastures for a 56-day grazing study starting on June 28, 2012. Pastures were assigned randomly to one of three treatments: 1) control (CONT; no supplement), 2) hand-fed (HF) DDGS supplemented at 0.6 percent BW per day and 3) self-limited (SL) DDGS with 16 percent NaCl inclusion.

Hand-fed supplemental DDGS (HF) were offered in feeders in each pasture according to treatment and pail fed five days per week. Refused feed was removed and weighed before each feeding. Self-limited DDGS (SL) were mixed with 16 percent NaCl in a grinder mixer and placed into creep feeders *ad libitum* throughout grazing. Refused feed was removed and weighed at the termination of the project. Initial and final BW were the average of consecutive days' BW, with intermediate BW taken every 28 days to adjust hand-fed sup-

plement deliveries with increasing body weights.

Sample forage clippings were taken from pastures at three time intervals, starting at the beginning of the experiment and continuing every 28 days until the end of grazing. Samples were analyzed for dry matter, ash, crude protein (CP), phosphorus and calcium (methods 934.01, 942.05, 2001.11, 965.17 and 968.08, respectively; AOAC, 2010).

Heifer performance data was analyzed as a completely random design using general linear model (GLM) procedure of SAS (SAS Ins. Inc., Cary, N.C.). The experimental unit was pasture, and treatment was CONT, HF or SL supplementation. Treatment differences were considered significant at an alpha of  $P < 0.05$ .

### Results and Discussion

Initial BW (Table 1) did not differ among treatments ( $P = 0.21$ ). Final BW and average daily gain (ADG) were not different among CONT, HF and SL treatments ( $P \geq 0.18$ ). Overconsumption of supplements may have a potential negative impact on forage intake and digestibility, leading to decreased animal performance (Bowman and Sowell, 1997). In the current study, 16 percent NaCl may not restrict enough to reduce overconsumption, which would explain having similar final BW and

**Table 1. Effects of self-limiting dried distillers grains with solubles supplementation on animal performance of heifers grazing northern Great Plains rangeland.** <sup>1</sup>

Item	Treatment <sup>2</sup>			SEM <sup>3</sup>	P-value
	CON	HF	SL		
Initial BW, lb	800	795	811	8.8	0.21
Final BW, lb	891	882	886	8.2	0.62
ADG, lb/d	1.62	1.55	1.29	0.19	0.18
DDGS intake, lb	0	4.33	5.25	2.6	0.27

<sup>1</sup>Means presented are least square means.

<sup>2</sup>CON = no supplement provided, HF = dried distillers grains with solubles supplemented at 0.6 percent BW, SL = dried distillers grains with solubles self-limited with 16 percent NaCl inclusion.

<sup>3</sup>n = 2.

ADG in the CONT and HF treatments. However, Schauer et al. (2004) supplemented wheat middlings, barley malt spouts and soybean hulls (treatments included hand-fed supplement, self-limited supplement with 16 percent NaCl and no supplement) to steers grazing Northern Plains rangeland and found that supplemented steers had higher ADG and increased final BW when coming off pasture than non-supplemented steers. This may be due to the added nutrients that the supplementation steers were consuming during the latter part of the grazing season, compared with unsupplemented steers when the forage quality declined (McCollum et al., 1985).

In the current research, overall supplemental intake for heifers in the HF and SL treatments did not differ ( $P = 0.27$ ). Similarly, Schauer et al. (2004) found that self-limited steers grazing Northern Plains rangeland had similar supplemental

intake to hand-fed steers. In addition, Schauer et al. (2004) noted that steers self-limited with 16 percent NaCl did consume more supplement than hand-fed steers in the later summer months of grazing (August through October). This may be due to the increase of self-limited intake through time, whereas the supplement intake for hand-fed steers was held at a constant percentage of body weight (Schauer et al., 2004).

In the current research, the grazing season ended in the middle of August; thus, we are unable to determine if similar increases in SL intake and improved animal performance may have occurred.

Forage samples collected during June, July and August of the current study had CP percentages of 8.49, 7.93 and 7.19 (respectively). However, CP in the current study was lower than those reported by Schauer et al. (2004) on the same study

site. The differences in forage quality from the two studies are likely the result of seasonal precipitation and, thus, late-season growth of cool-season forages (Schauer et al., 2004).

Results indicate similar gain among control, self-limited DDGS and hand-fed DDGS treatments, while heifers receiving self-limited DDGS had similar intake to heifers receiving hand-fed DDGS. Further investigation into the usage of self-limited supplements is needed, and factors such as forage quality and quantity, length of grazing season, anticipated animal performance and cost of supplement must be assessed.

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