2010

Supplementing Wet Distillers Grains Mixed with Low Quality Forage to Grazing Cow/Calf Pairs

Brandon L. Nuttelman
University of Nebraska - Lincoln, blnuttelman@huskers.unl.edu

William A. Griffin
University of Nebraska-Lincoln, wgriffin2@unl.edu

Terry J. Klopfenstein
University of Nebraska-Lincoln, tklopfenstein1@unl.edu

Walter H. Schacht
University of Nebraska-Lincoln, wschacht1@unl.edu

Leslie Aaron Stalker
University of Nebraska-Lincoln, stalkera@byui.edu

See next page for additional authors

Supplementing Wet Distillers Grains Mixed with Low Quality Forage to Grazing Cow/Calf Pairs

Brandon L. Nuttelman
William A. Griffin
Terry J. Klopfenstein
Walter H. Schacht
L. Aaron Stalker
Jacqueline A. Musgrave
Jerry D. Volesky[1]

Summary

Two studies were conducted over two years during the summer grazing season to determine the effect of grass intake when grazing cow/calf pairs were supplemented wet distillers grains (WDGS) with low quality forage. In 2007, a mixture of 45% WDGS and 55% grass hay was fed. In 2008, three blends of 50:50, 60:40, and 70:30 WDGS and wheat straw were fed. Supplemented cows and calves outgained non-supplemented groups in 2007. There were no differences in animal performance during 2008. Grazed forage intake was reduced by supplementing WDGS mixed with wheat straw without negatively affecting animal performance.

Introduction

Storing wet distillers grains with solubles (WDGS) for extended lengths of time can be beneficial to cow/calf producers. Mixing WDGS with low-quality forage increases the palatability of the forage, and the additional bulk from the forage can potentially reduce grazed forage intake by supplying fill. Two consecutive summer grazing studies were conducted to determine the effect of supplementing cows with wet distillers grains (WDGS) that had previously been mixed and stored with low quality forage on 1) grazed forage intake and 2) cow and calf performance.

Procedure

Experiment 1

In 2007, 3-year old, non-gestating, lactating beef cows with spring born calves at side (n=24) grazed their assigned paddocks for 56 days during the summer. Paddocks were 2.47 acres and were assigned randomly to one of three treatments that consisted of: 1) the recommended stocking rate of 0.6 AUM/acre with no supplementation (CON1); 2) double the recommended stocking rate (1.2 AUM/acre) and supplemented 14.6 lb/head daily (50% of estimated DMI) of 55% grass hay and 45% WDGS (DM) (SUP); and 3) double the recommended stocking rate (1.2 AUM/acre) with no supplementation (2X). Stocking rate was increased by dividing the assigned paddock into halves and allowing the cattle access to only one of the halves during a grazing period of the rotation. Cattle were rotated through seven paddocks, and the days of grazing for each paddock were adjusted prior to initiation of the trial to account for stage of plant growth.

Experiment 2

In 2008, a second study of similar design was conducted in the same paddocks to compare different mixtures of WDGS and wheat straw. Wheat straw was selected to serve as a source of lower quality forage containing more NDF than the grass hay used in the previous year. Wheat straw was mixed with WDGS at three different levels consisting of 50:50, 40:60, and 30:70 WDGS:wheat straw on a DM basis. The mixtures of WDGS and wheat straw were stored in silo bags thirty days prior to initiation of the trial. Water was added to the two lower levels of WDGS during mixing until the moisture content was equal to that of the high level of WDGS (about 50%).

Twenty paddocks were arranged by the previous year's usage and grazing order, and then assigned to one of four treatments: 1) the recommended stocking rate (0.6 AUM/acre) with no supplementation (CON2); 2) 50:50 WDGS:wheat straw supplement (HIGH); 3) 40:60 WDGS:wheat straw supplement (MED); or 4) 30:70 WDGS:wheat straw supplement (LOW). The paddocks assigned to treatments 2, 3, and 4 were grazed at double the recommended stocking rate (1.2 AUM/acre). Cattle received 12.6 lbs (DM) of WDGS and wheat straw mixture daily (50% of estimated daily intake). These paddocks were divided in half to increase stocking rate, and cattle were allowed to graze one of the halves during the grazing period. Two-year old lactating cows with spring born calves at side (n = 40) were utilized and assigned to a specific paddock rotation. Cattle within a block grazed each assigned paddock for seven days. When cattle were not grazing the experimental pasture, they were moved to a pasture of similar forage species composition and managed separately. They continued to be supplemented with the mix to measure differences in animal performance.

For both years, the experiment was conducted at the University of Nebraska's Gudmundsen Sandhills Laboratory located near Whitman, Neb. These studies were replicated over two blocks based on botanical composition and topography. Standing crop and forage utilization were determined by clipping 20 1-m^2 quadrats both pre- and post-grazing; quadrats were sorted by live grass, forbs, standing dead, and litter, then dried and weighed to determine forage availability. Cow/calf pairs were limit fed meadow hay at 2% of BW for five days prior to and at the conclusion of the grazing period to eliminate variation due to gut fill. The final three days of each limit feeding period, cows and calves were individually weighed, and the average of the weights was used

(Continued on next page)

as the initial and ending BW. Cattle that were offered supplement received the mixture at 50% of their estimated daily intake. The supplement was fed in feed bunks located in alleys contiguous to the paddocks to eliminate trampling of forage around the feeding site.

Table 1. Exp. 1 animal performance and grazing results.

	Treatment				
	CON1[1]	SUP[2]	2X[3]	SEM	*P*-value
Initial, lb					
Cow	1016	1016	1012	24	0.99
Calf	254	247	247	9	0.89
ADG, lb					
Cow	-0.99[a]	0.55[b]	-0.11[a]	0.07	< 0.01
Calf	1.8[a]	2.36[b]	1.65[a]	0.02	< 0.01
% Utilization	33.1[a]	52.0[b]	57.8[b]	0.1	< 0.01
DMI lb/day					
Grazed intake[4]	27.8	24.5	25.6		
Supplement	—	14.8	—		

[a,b] Means with different superscripts differ (*P*-value < 0.05).
[1]Cattle grazed at recommended stocking rate and received no supplementation.
[2]Cattle grazed at double the recommended stocking rate and received 50% of estimated daily intake of 45:55 WDGS:wheat straw mixture.
[3]Cattle grazed at double the recommended stocking rate and received no supplementation.
[4]Calculated by dividing total amount of grazed forage disappearance by number of cow/calf pairs and number of grazing days.

Table 2. Exp. 2 animal performance and grazing results.

	Treatment					
	CON2[1]	LOW[2,3]	MED[2,4]	HIGH[2,5]	SEM	*P*-value
Initial, lb						
Cow	880	882	893	893	20	0.63
Calf	276	280	267	267	15	0.53
ADG, lb/d						
Cow	-0.07	0.29	0.24	0.93	0.31	0.06
Calf	1.96	1.98	1.96	2.18	0.20	0.46
% Utilization	34.4[a]	38.4[ab]	44.3[b]	46.0[b]	0.3	0.01
DMI, lb/day						
Grazed intake[6]	25.4[a]	13.5[b]	16.5[b]	16.3[b]	1.32	< 0.01
Supplement	—[a]	12.8[b]	12.6[b]	12.4[b]	0.2	< 0.01

[a,b]Means with different superscripts differ (*P*-value < 0.05).
[1]Cattle grazed at the recommended stocking rate.
[2]Cattle grazed at double the recommended stocking rate, and received 50% supplement of estimated daily intake.
[3]Cattle were supplemented with 70:30 wheat straw:WDGS mixture.
[4]Cattle were supplemented with 60:40 wheat straw:WDGS mixture.
[5]Cattle were supplemented with 50:50 wheat straw:WDGS mixture.
[6]Calculated by dividing total amount of grazed forage disappearance by number of cow/calf pairs and number of grazing days.

Results

Experiment 1

Initial BW (Table 1) was not different across treatments for individual cows or individual calves ($P > 0.89$); neither was final BW ($P > 0.13$). However, ADG for cows and calves receiving the WDGS and grass hay supplement (SUP) was numerically higher when compared to cows and calves that received no supplement, regardless of stocking rate. Cows receiving supplementation outgained CON1 and 2X cows by 1.54 lb and 1.70 lb per day ($P < 0.01$), respectively. Calves receiving supplementation outgained CON1 and 2X calves by 0.55 lb and 0.71 lb per day ($P < 0.01$), respectively. The extra gain observed for the calves receiving supplement can be a result of either a) increased milk production from the dam's consumption of a higher quality diet than the non-supplemented cows, b) the observed consumption of the WDGS and wheat straw mixture by the calves, or c) a combination of the two. The calves were at the bunk and appeared to be eating each day; however, it is not possible to determine the actual amount of mixture that the calves consumed.

The amount of forage that disappeared during the grazing period was determined by pre- and post-grazing clipping samples. These measurements were used to determine the percentage utilization of the available forage and the amount of grazed forage intake that was replaced by the WDGS and wheat straw mixture.

Percentage forage utilization was determined by dividing the amount of forage that disappeared during the grazing period by the amount of available forage prior to grazing. Percentage utilization was similar for the double-stocked treatments SUP and 2X (52.0 and 57.8%, respectively; $P < 0.15$).However, CON1 had significantly less percentage utilization of the available forage compared to SUP and 2X (18.9 and 24.7% less, respectively).

The amount of forage that disappeared from each paddock during the grazing period was divided by the number of cow/calf pairs and the number of days each paddock was grazed. There were no differences among CON1, SUP, or 2X (27.8, 24.5, and 25.6 lb, respectively; $P = 0.44$) in the amount of forage that disappeared per cow/calf pair on a daily basis. In addition to this, the cattle receiving supplement also consumed 14.8 lb/day of WDGS and wheat straw. Therefore, 1 lb of WDGS and grass hay mixture replaced 0.22 lb of grazed forage.

Experiment 2

Initial BW (Table 2) was not different among treatments in 2008 ($P > 0.27$). Ending BW was affected by supplementation ($P = 0.04$). Cattle assigned to HIGH treatment were heavier at the conclusion of the study compared to CON2, LOW, and MED (944, 875, 899, and 906 lb, respectively), and cattle on MED treatment tended ($P = 0.09$) to be heavier than CON2 at the end of the study. Cow ADG tended ($P = 0.06$) to be different among treatments and was numerically higher for HIGH. Calf ending BW ($P = 0.63$) and ADG ($P = 0.46$) were not different among treatments.

CON2 cattle had significantly less percentage utilization of available forage than HIGH and MED (34.4, 46.0, and 44.3%, respectively; $P = 0.02$). However, CON2 and LOW did not differ (34.4 and 38.4%, respectively; $P = 0.27$) in percent utilization of available forage. Cattle on CON2 had greater DMI of grazed forage than those on supplemented treatments ($P < 0.01$), but there was no difference for grazed forage disappearance among HIGH, MED, and LOW treatments ($P > 0.11$). The total amount of grazed forage and WDGS/wheat straw supplement consumed daily in the double stock treatments was similar to the daily amount of forage that disappeared for CON2 ($P = 0.12$). This suggests that the supplemented cattle and CON2 had similar total daily DMI. The LOW and CON2 treatments had similar percentage utilization of available forage and total DMI, suggesting that the 12.8 lb of WDGS/wheat straw supplement consumed daily by the LOW treatment replaced 11.9 lb of grazed forage intake. Cattle in the MED and HIGH treatments consumed more WDGS and less wheat straw than those in the LOW treatment; as a result, both grazed forage intake and total intake increased. The combined amount of neutral detergent fiber (NDF) consumed daily from the grazed forage intake and the WDGS and wheat straw supplement for the LOW treatment was similar to the NDF intake of CON2 (15.7 and 15.4 lb NDF/day; $P = 0.89$). This suggests the fibrous nature of the diet limited DMI.

The lower quality wheat straw used in 2008 replaced a larger proportion of grazed forage intake than the grass hay used in 2007. The higher fiber content of the wheat straw and lower digestibility are the most likely reasons for this greater replacement rate. The 70:30 wheat straw:WDGS blend nearly replaced grazed forage intake on a 1:1 basis. The replacement rate of grazed forage was reduced as the quality of the supplement increased; that is, fiber content decreased. Cow and calf performance was greatest when grass hay was mixed with WDGS, but the replacement rate was the lowest. The quality and ratio of the forage used will determine the grazed forage replacement rate and the animal response.

---

[1]Brandon L. Nuttelman, graduate student, William A. Griffin, research technician, Terry J. Klopfenstein and L. Aaron Stalker, professors, Animal Science, University of Nebraska, Lincoln, Neb.; Walter H. Schacht, professor, Agronomy, UNL; Jacqueline A. Musgrave, technician, Gudmundsen Sandhills Laboratory; Jerry D. Volesky, associate professor, Agronomy, University of Nebraska, Lincoln, Neb.