Interaction of Urea with Frequency and Amount of Distillers Grains Supplementation for Growing Steers

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Summary with Implications

A study was conducted to determine the interaction of urea with the frequency and amount of distillers grain supplementation for growing steers consuming forage. Steers were individually fed for 84 d and received ad libitum grass hay and 1 of 8 treatments. Treatment design was a 2 × 2 × 2 factorial. Supplement was fed either every day or 3x/week, amount of supplement fed was 13.99 lb/week or 28.00 lb/week, and contained either no urea or 1.3% urea. Supplementation frequency and the inclusion of urea did not impact steer average daily gain. The amount of supplement did impacted steer average daily gain and hay intake as those receiving more supplement had greater gains but consumed less hay. Urea had no significant effect on hay intake. These results suggest that a dried distillers grain supplement can be fed infrequently to growing steers on a high forage diet without reducing animal performance.

Introduction

Reducing frequency of supplementation can reduce labor costs in backgrounding cattle operations. Dried distillers grains (DDG) is a popular supplement choice for growing cattle on forage-based diets due to its cost, availability, and nutrient content. However, previous work done at the University of Nebraska observed that infrequent supplementation of DDG reduced steer ADG by 10% (*2003 Nebraska Beef Cattle Report*, pp 8–10). The protein content of DDG is high in rumen undegradable protein but low in rumen degradable protein (RDP). In the case of low-quality forage-based diets, RDP is often limiting. However, because of the ability of the ruminant to recycle nitrogen from excess metabolizable protein to the rumen, the addition of an RDP source to a DDG supplement does not improve performance in daily supplemented cattle (*2004 Nebraska Beef Cattle Report*, pp 20–21). In the case of infrequent supplementation, the N recycling mechanism could lag between the supply of N and the demand for N in the rumen required to optimize rumen fermentation. This would reduce fiber utilization and subsequent animal performance. Therefore, it was hypothesized that the addition of urea to a DDGS supplement would immediately contribute to rumen available nitrogen if the animals' nitrogen recycling system could not match microbial demands due to an infrequent supplementation pattern. By supplying urea at the time of supplementation, this could overcome the potential RDP deficiency limiting forage digestibility and subsequent animal performance. The objective of the study was to determine the interaction of the inclusion of urea with a dried distillers grains supplement fed at either a low or high amount, and either daily or 3 times per week.

Procedure

One hundred and twenty crossbred steers (543 lb; SD = 44) were fed one of eight treatments for 84 days. There were two turns, or replications, of 60 steers through the same barn, turn one was conducted November through February, and turn two was March through June. There was a total of 15 animals per treatment. To try and balance the treatments across the whole experiment, if there were 7 animals assigned to treatment in turn one, then 8 animals were assigned to that treatment in turn two, and vice versa. Animals were blocked by turn then stratified by body weight within turn and assigned randomly to treatment. Treatment design was a 2 × 2 × 2 factorial. Factors included frequency of supplementation, amount of supplementation, and inclusion of urea. Supplement was fed either every day (D) or 3x/week (ALT), amount of supplement fed was 13.99 lb/week (LO) or 28.00 lb/week (HI) and contained either no urea (-U) or 1.3% urea (+U). Steers on the D LO and D HI treatments received 2.00 lb/d and 4.00 lb/d, respectively. Steers on the ALT LO and ALT HI received 4.66 lb and 9.33 lb, respectively, on each Monday, Wednesday, and Friday. Steers were fed individually in a Calan gate system and received ad libitum grass hay (6.8% CP). Body weights were measured for three consecutive days following a five-day limit feeding period at the start and end of the trial. Cattle were implanted prior to the start of trial with zeranol. Amount of hay offered was recorded daily and refusals were collected weekly. To ensure total consumption of supplement and ad libitum hay intake, hay was not fed until 5 hours post-supplement feeding. Weekly orts were dried with forced air at 60°C for 48 h to measure dry matter. Data were analyzed using the MIXED Procedure of SAS (SAS Inst. Inc., Cary, NC). Four animals were removed from the analysis, 2 due to death, 1 due to chronic illness, and the other was a bull. Animal served as the experimental unit. The model was first analyzed with an interaction of turn and treatment. However, this interaction was not significant and was removed from the model. The model included amount of supplementation, frequency of supplementation, inclusion of urea, and all factorial interactions. There were no significant ($P > 0.05$) factorial interactions so only the main effects are reported.

Results

Ending body weight did not differ between D and ALT treatments, nor +U and -U ($P \geq 0.56$; Table 1). However, ending BW was greater for HI compared to LO steers, 702 lb and 645 lb, respectively ($P < 0.01$) Average daily gain was 0.66 lb/d greater for steers receiving a HI amount of supplement than LO, ($P < 0.01$). Frequency and urea

Table 1. Performance of steers fed steers fed distillers grains supplement either daily (D) or alternate days (ALT), at a high (HI) or low (LO) amount, and with (+U) or without (-U) the inclusion of urea

	Treatment									
	Freq[1]		Amt[2]		Urea[3]			*P*-value		
	D	ALT	LO	HI	-U	+U	SEM	Freq	Amt	Urea
Initial BW, lb	543	543	543	543	543	543	1.80	0.86	0.72	0.87
Final BW, lb	675	671	645	702	673	673	2.30	0.56	<0.01	0.99
ADG, lb/d	1.58	1.52	1.21	1.87	1.54	1.54	0.01	0.20	<0.01	0.82
Hay DMI, lb/d	13.33	12.14	13.18	12.32	12.96	12.54	0.12	<0.01	<0.01	0.25

[1] D = daily, ALT = every other day

[2] LO = 0.4% of body weight, HI = 0.8% of body weight

[3] +U = inclusion of urea at 1.3% of supplement DM, -U = no inclusion of urea

inclusion did not affect steer ADG ($P \geq 0.20$). Hay dry matter intake was reduced by 0.86 lb/d for steers on the HI treatment compared to the LO ($P < 0.01$). Additionally, frequency of supplementation reduced hay dry matter intake. Steers receiving ALT supplementation consumed 12.14 lb/d of hay while D steers consumed 13.33 lb/d ($P < 0.01$). Urea inclusion had no effect on hay DMI ($P = 0.25$)

Conclusion

Animal performance was not impacted by the addition of urea, suggesting that N recycling was adequate for rumen function. However, in contrast to previous work, reducing supplementation frequency of DDG did not reduce steer gains. The results of these studies suggest that a DDGS supplement with a lower fat content can be fed infrequently to growing steers on a high forage diet with no reduction in performance and urea is not required when supplementing DDGS at 0.4% of body weight.

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