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Comparison of Commercial Lick Tubs to Distillers Grains Supplementation for Calves Grazing Corn Residue

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Summary

Steer calves grazing irrigated corn residue were supplemented dried distillers grains plus solubles (DGS) or allowed continuous access to a commercial lick tub. Dried DGS was fed at 2.94 lb/steer/day and the lick tubs were consumed at 2.04 lb/steer/day (DM basis). Gain was greater for cattle supplemented with dried DGS (1.36 lb/day) compared to those with access to lick tubs (0.83 lb/day). Supplement efficiency varied between calves receiving dried DGS (46%) and those with continuous access to the lick tub (43%) when expressed on a DM basis. Values for dried DGS supplementation (48%) were not different for supplement efficiency on an OM basis when compared to cattle on the lick tub treatment (50%). Economic analysis shows that as the price of DGS increases, the difference in profit between supplementation strategies is reduced.

Introduction

Corn residue is an abundant forage source that is low in energy and crude protein to meet the needs of calves. Providing protein supplementation to calves grazing corn residue optimizes gain of the calves and improves intake of low-quality forages. Various methods of supplementation exist although dried distillers grains plus solubles (DGS) are among the most common. Dried DGS have a high protein (30% CP) and energy content (95% TDN; *2011 Nebraska Beef Cattle Report*, pp. 20-21). Other forms of supplementation are available as lick tubs and may result in similar performance while improving convenience for producers. The commercial lick tubs (Sweet Pro, Walhalla, N.D.) utilized for this trial are made during the proprietary fermentation process. A pressing technique is used to give the product its characteristic hardness which assists in controlling intake. However, performance relative to a common supplementation strategy is unknown. The objective of this trial was to compare the use of commercial lick tubs to daily byproduct supplementation of dried DGS for calves grazing corn residue.

Procedure

One hundred twenty five crossbred steers (529 ± 5.82) were backgrounded on irrigated corn residue for a 70 day grazing period at the University of Nebraska–Lincoln Agricultural Research and Development Center near Mead, Neb. The trial was replicated over two consecutive years. Each year, an irrigated corn residue field was divided into eight paddocks, with four replications receiving dried distillers grains plus solubles (DGS) and four having continuous access to lick tubs. The dried DGS treatment received supplementation in a bunk at 2.94 lb/steer daily on a DM basis. Lick tubs were replaced in each paddock when less than 10% remained and the plastic tray was removed once the supplement was consumed. Each lick tub was weighed prior to placement in the field and upon removal was corrected for DM to determine the amount of supplement consumed.

Cattle were limit-fed at 2% of BW for five days prior to the initiation of the trial. The diet consisted of 50% Sweet Bran, 25% alfalfa, and 25% grass hay. Three day weights were taken on day -1, 0, and 1 in order to reduce variation due to gut fill. Cattle were assigned to each paddock based on day -1 and day 0 weights. Paddock was then assigned randomly to treatment. At the conclusion of the trial, steers were limit-fed the same diet at 2% of BW and three-day weights were collected. Steers were implanted with Ralgro® on day 1 of the trial, prior to being turned out to graze.

Stocking rate was calculated based on yield of the field at harvest and previous research quantifying the amount of residue consumed per acre. The yield (bu/ac), estimated forage availability (8 lb/bu available due to trampling, weathering and leaving adequate ground cover), grazing efficiency factor (85% for irrigated), and number of acres were multiplied together to estimate the total available forage for each field. Total available forage was then divided by estimated DMI (10 lb/steer daily) of all steers allotted to graze each respective paddock in order to calculate days of available grazing. Using this calculation, the 60 acre irrigated field would allow 125 steers to graze for 70 days based on a yield of 250 bu of grain/acre. The field was then divided into eight paddocks to allow four replications of each treatment.

Samples of supplementation types were collected and dried in a forced air oven at 60°C for 48 hours and were then dried in an ash oven for 4 hours at 600°C to determine the mineral content.

Forage intake was not estimated during this trial. In order to compare the change in gain to the amount of supplement intake, supplement efficiency was estimated. This allows for the difference between supplement types to be accounted for. Supplement efficiency was calculated by dividing gain by supplement intake.

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Economic Analysis

Economic analysis was applied to performance values and days of grazing from year 1 and year 2.

Initial purchase price was calculated as a five-year average from the first week of November in 2009, 2010, 2011, 2012, and 2013 for 500-540 lb large-framed, number 1 steers. Feeder cattle weighted average sale data were collected from the archives at USDA Agricultural Marketing Service (AMS) at the Huss-Platte Valley location. The price of distillers grains was calculated at three different corn prices ($4/bu, $5.50/bu, and $7/bu) and priced at 120% the value of corn. The lick tub was priced at $80 per tub and was not adjusted with the price of corn. Selling price was calculated as a five-year average of the last week of January in 2010, 2011, 2012, 2013, and 2014 for large-framed, number 1 steers from the archives at USDA AMS. Ending weights varied by treatment and year.

Irrigated corn residue was charged at $15 per acre and approximately half an acre was allotted per steer for the grazing period. Yardage was set at $0.30/steer when feed was delivered daily and $0.15/steer on days when feed was not delivered. Dried DGS was supplemented daily while the lick tub was replaced every four days.

Net return was calculated as total revenue (selling price of the calf) minus total costs (initial price of the calf, total price of supplement, price of grazing residue, and transportation costs). Cost of gain was calculated as total costs divided by the gain of the calf. Total feed costs were calculated as the price of supplement plus the price of grazing residue.

Data were analyzed using PROC GLIMMIX with year as a random effect and treatment included in the model statement.

Table 1. Comparison of dried distillers grains and lick tub supplementation for calves grazing corn residue on a dry matter basis.

	Dried DGS	Lick Tub	S.E.	F-test
Initial BW, lb	529	529	5.8	0.62
Final BW, lb	608	578	9.2	<0.01
ADG, lb/day	1.36	0.83	0.06	<0.01
Supp. Intake, %BW	0.52	0.36	0.03	<0.01
Supp. Intake, lb/head/day	2.94	2.02	0.21	<0.01
Supp. Efficiency, %	46	43	0.15	<0.01

Table 2. Comparison of dried distillers grains and lick tub supplementation for calves grazing corn residue on a dry matter and organic matter basis.

	Dried DGS	Lick tub	S.E.	F-test
Initial BW, lb	529	529	5.82	0.6
Final BW, lb	608	578	9.2	<0.01
ADG, lb/day	1.36	0.83	0.06	<0.01
DM				
Supplemental Intake, %BW	0.52	0.36	0.03	<0.01
Supplemental Intake, lb/head/day	2.94	2.02	0.21	<0.01
Supplemental Efficiency, %	46	43	0.15	<0.01
OM				
Supplemental Intake, %BW	0.5	0.3	0.01	<0.01
Supplemental Intake, lb/head/day	2.82	1.68	0.08	<0.01
Supplemental Efficiency, %	48	50	0.03	0.64

Results

Average daily gain of steers supplemented with dried DGS was greater (1.36 lb) than those with access to lick tubs (0.83 lb; $P < 0.01$, Table 1). On a DM basis, steers receiving dried DGS consumed 2.94 lb DM per day compared to 2.02 lb DM for steers offered lick tubs ($P < 0.01$). As a percentage of BW on a DM basis, steers on the lick tub treatment consumed less supplement (0.36%) than those receiving DGS (0.52%; $P < 0.01$). Supplement efficiency on a DM basis for the DGS treatment was 46% compared to 43% for the cattle on the lick tub treatment ($P < 0.01$).

The OM content of the lick tubs was 76%. Analysis on an OM basis shows similar results for gain (Table 2). Calves consumed 2.82 lb/steer daily on the DGS treatment compared with 1.68 lb/steer daily for the lick tub ($P < 0.01$). As a percentage of BW, calves consumed 0.50% for the DGS and 0.30% for the lick tub ($P < 0.01$). Supplement efficiency was not different on an OM basis for the dried DGS (48%) and lick tub treatments (50%; $P = 0.64$). The lick tubs were designed to provide mineral supplementation. Differences seen when values are expressed on a DM or OM basis are expected due to the high mineral content of the tub. The high mineral content of the tub appears to dilute the energy available from OM.

Economic Analysis

In scenario 1, corn was priced at $4.00 per bushel and a difference exists between treatments for price of supplementation with the price of dried DGS at $28.40/steer compared to $55.89/steer for the lick tub ($P < 0.01$; Table 3). There are differences in net return when comparing dried DGS to the lick tubs at $103.54 and $44.63, respectively ($P < 0.01$). The cost of gain was greater for the

Table 3. Economics of feeding distillers grains at 120% the value of corn when compared to a commercial lick tub.

	$4.00 Corn				$5.50 Corn				$7.00 Corn			
Item	Dried Dgs	Lick Tub	S.E.	F-Test	Dried Dgs	Lick Tub	S.E.	F-Test	Dried Dgs	Lick Tub	S.E.	F-Test
$/Steer												
steer cost	792.74	793.68	3.57	0.4	792.74	793.68	3.57	0.4	792.74	793.68	3.57	0.4
supplement cost	28.40	55.89	5.14	<0.01	29.52	55.89	5.33	<0.01	33.54	55.89	5.12	<0.01
yardage cost	20.25	12.66	7.59	<0.01	20.25	12.66	7.59	<0.01	20.25	12.66	7.59	<0.01
grazing cost	7.11	7.22	0.18	0.7	7.11	7.22	0.18	0.7	7.11	7.22	0.18	0.7
total feed cost	25.95	63.10	7.12	<0.01	36.63	63.10	5.43	<0.01	40.66	63.10	5.22	<0.01
total steer cost	852.37	862.89	9.43	0.2	853.49	862.89	6.48	0.3	857.52	862.89	7.14	0.5
revenue	955.91	907.52	34.91	<0.01	955.91	907.52	34.91	<0.01	955.91	907.52	34.91	<0.01
net return	103.54	44.63	26.73	<0.01	102.42	44.63	29.26	<0.01	98.40	44.63	28.96	<0.01
$/lb												
cost of gain	0.75	1.47	0.14	<0.01	0.77	1.47	0.16	<0.01	0.82	1.47	0.16	<0.01

lick tub treatment at $1.47 compared with $0.75 for dried DGS ($P < 0.01$). Total feed costs were higher for calves on the lick tub treatment at $63.10 in comparison to those supplemented with dried DGS at $25.95 ($P < 0.01$).

In scenario 2, the price of corn was set at $5.50 per bushel (Table 3). A difference exists between treatments for price of supplementation with dried DGS costing $29.52 compared with the lick tub at $55.89 ($P < 0.01$). Differences were found for net return, with the dried DGS treatment at $102.42 and the lick tub at $44.63, respectively ($P < 0.01$). The cost of gain was higher for the lick tub treatment at $1.47 compared with dried DGS at $0.77 ($P < 0.01$). Total feed cost was lower for those supplemented with dried DGS at $36.63 compared with $63.10 for the lick tub treatment.

In the third scenario, corn was priced at $7.00 per bushel (Table 3). Differences were found in price when supplementing dried DGS ($33.54) compared to the lick tubs ($55.89; $P < 0.01$). Differences were found in net return with dried DGS treatment at $98.40 and the lick tub at $44.63, respectively ($P < 0.01$). The cost of gain was higher for the lick tub treatment at $1.47 compared with $0.82 for the dried DGS treatment ($P < 0.01$). Differences were present for total feed costs, with dried DGS at $40.66 and the lick tub at $63.10, respectively ($P < 0.01$).

In all scenarios, it appears to be more profitable to supplement with dried DGS when compared with the lick tubs. Calves receiving DGS had greater gain and lower supplementation costs, resulting in greater net return and lower cost of gain. Economic differences were smaller when the price of corn was higher assuming the price of the lick tub does not change.

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