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Summary

A finishing experiment evaluated substitution of corn with corn silage in diets with modified distillers grains with solubles (MDGS). Steers were fed 15, 30, 45, or 55% corn silage in diets with 40% MDGS. Two additional treatments were tested with 30% corn silage and 65% MDGS and 45% corn silage and 0% MDGS. As corn silage inclusion increased, there was a slight linear increase in F:G with a linear decrease in DMI and ADG. However, ADG and F:G were improved when corn silage was fed with MDGS.

Introduction

The use of corn silage in beef finishing diets has been economical in times of high-priced corn. Feeding corn silage allows cattle feeders to take advantage of the entire corn plant at a time of maximum quality and tonnage as well as secure substantial quantities of roughage/grain inventory. In past research (*2000 Nebraska Beef Cattle Report*, pp. 68-71), when corn silage partially replaced corn in finishing diets, ADG and feed efficiency were reduced as corn silage inclusion increased. However this research was completed prior to the expansion of the ethanol industry and the use of distillers grains in finishing diets. To our knowledge, there has been no research evaluating elevated levels of corn silage in finishing diets containing distillers grains. Therefore the objectives of this experiment was to determine the performance effects and carcass characteristics (along with economic outcomes as reported in *2013 Nebraska Beef Cattle Report*, pp. 76-77) of feeding elevated levels of corn silage and MDGS as a partial replacement of corn in finishing diets.

Procedure

Crossbred steer calves (n = 324; BW = 715 ± 38 lb) were sorted into two weight blocks and assigned randomly to one of 36 pens (9 head/pen). Treatments (Table 1) consisted of 15, 30, 45, and 55% corn silage with 40% MDGS (15:40, 30:40, 45:40, and 55:40, respectively) as well as one treatment with 30% corn silage and 65% MDGS (30:65) and another with 45% corn silage and 0% MDGS (45:0). Elevated levels of corn silage and MDGS replaced a 1:1 blend of dry rolled corn: high moisture corn. All steers were fed a supplement formulated for 30 g/ton of DM Rumensin® and a targeted intake of 90 mg/steer daily of Tylan®. Steers consuming 45:0 treatment diets were supplemented with Soypass for the first 84 days to meet metabolizable protein requirements. Pens were fed once daily at approximately 0930 hours. Steers were implanted with Revalor®-IS on day 1 and re-implanted with Revalor®-S on day 83. All steers were on feed for 173 days. Prior to being transported to a commercial abattoir (Greater Omaha Packing Co., Inc., Omaha, Neb.), pens of steers were weighed on a platform scale. A 4% pencil shrink was applied to this weight for final live BW and calculation of dressing percentage. Hot carcass weight was obtained the day of harvest. Carcass adjusted final BW, used in calculation of ADG and G:F, was calculated from HCW and a common dressing percentage (63%). Marbling score, 12th rib fat thickness, and LM area were recorded after a 48 hour carcass chill.

Performance and carcass data were analyzed using the mixed procedure of SAS (SAS Inst. Inc., Cary, N.C.). Pen was the experimental unit, and BW block was included as a fixed effect. Orthogonal contrasts were used to test the effects of corn silage inclusion levels within diets containing 40% MDGS. Pairwise preplanned contrasts were used to test 45% corn silage with and without MDGS and 30% corn silage with 40 or 60% MDGS.

Results

Performance

As corn silage inclusion increased, final BW, ADG, and DMI linearly

Table 1. Diet composition (DM basis).

	Treatment[1]					
	15:40	30:40	45:40	55:40	30:65	45:0
DRC[2]	20.0	12.5	5.0	0.0	0.0	25.0
HMC[3]	20.0	12.5	5.0	0.0	0.0	25.0
Corn Silage	15.0	30.0	45.0	55.0	30.0	45.0
MDGS[4]	40.0	40.0	40.0	40.0	65.0	0.0
Supplement[5]	5.0	5.0	5.0	5.0	5.0	5.0

[1]15:40= 15% Corn Silage, 40% MDGS; 30:40= 30% Corn Silage, 40% MDGS; 45:40= 45% Corn Silage, 40% MDGS; 55:40= 55% Corn Silage, 40% MDGS; 30:65= 30% Corn Silage, 65% MDGS; 45:0= 45% Corn Silage, 0% MDGS.[2]DRC= Dry rolled corn.
[3]HMC= High moisture corn.
[4]MDGS= Modified distillers grains with solubles.
[5]Formulated to provide 338 mg/head/day Rumensin and 90 mg/head/day Tylan. The 45:0 treatment supplement contained urea formulated for 1.49% dietary inclusion (DM basis). Soypass was also fed to the 45:0 treatment for 84 days to meet metabolizable protein requirements.

Table 2. Effect of corn silage and MDGS inclusion on cattle performance and carcass characteristics.

	Treatment[1]							*P*-value[2]			
	15:40	30:40	45:40	55:40	30:65	45:0	SEM	Lin.	Quad.	30	45
Initial BW, lb	727	725	724	725	726	726	1.0	0.09	0.29	0.69	0.06
Final BW[3], lb	1426	1403	1375	1335	1353	1340	10.3	<0.01	0.21	<0.01	0.02
DMI, lb/day	23.2	22.8	22.7	21.9	21.7	22.2	0.3	0.01	0.45	0.01	0.30
ADG, lb[3]	4.04	3.92	3.76	3.53	3.62	3.55	0.06	<0.01	0.19	<0.01	0.02
Feed:Gain	5.73	5.81	6.03	6.21	5.98	6.28		<0.01	0.33	0.12	0.04
HCW, lb	899	884	866	841	852	844	6.5	<0.01	0.21	<0.01	0.02
Dressing %, %	63.3	62.6	61.9	61.1	62.1	61.1	0.3	<0.01	0.54	0.19	0.07
LM area, in^2	14.53	14.55	14.32	14.05	14.23	14.08	0.237	0.13	0.46	0.34	0.49
12^{th}-rib fat, in	0.55	0.53	0.52	0.43	0.50	0.49	0.022	<0.01	0.09	0.29	0.29
Calculated YG	3.14	3.04	3.04	2.79	2.93	2.92	0.110	0.05	0.47	0.50	0.45
Marbling Score[4]	556	557	543	532	547	539	12.0	0.13	0.52	0.55	0.85

[1]15:40= 15% Corn Silage, 40% MDGS; 30:40= 30% Corn Silage, 40% MDGS; 45:40= 45% Corn Silage, 40% MDGS; 55:40= 55% Corn Silage, 40% MDGS; 30:65= 30% Corn Silage, 65% MDGS; 45:0= 45% Corn Silage, 0% MDGS.
[2]Lin. = *P*-value for the linear response to corn silage inclusion, Quad.= *P*-value for the quadratic response to corn silage inclusion, 30 = t-test comparison of treatments 30:40 and 30:65, 45 = t-test comparison of treatments 45:40 and 45:0.
[3]Calculated from hot carcass weight, adjusted to a common 63% dressing percentage.
[4]Marbling Score: 400=Slight[00], 500=Small[00].

decreased ($P < 0.05$; Table 2). Feed:gain increased linearly ($P < 0.01$) with increasing corn silage in the diet, with the steers on the 15:40 treatment being 1.5%, 5.0%, and 7.7% more efficient than steers on treatments 30:40, 45:40, and 55:40, respectively. Although there were improvements in F:G for decreasing levels of corn silage in this experiment, the magnitude of these improvements are less than those seen in previous experiments utilizing elevated levels of corn silage in diets containing no distillers grains (*2000 Nebraska Beef Cattle Report*, pp. 68-71). Cattle fed 45% corn silage with 40% MDGS instead of 0% MDGS had increased final BW and ADG ($P < 0.05$), no difference in DMI ($P = 0.30$), and improved F:G ($P = 0.04$). For steers fed 30% dietary corn silage, the addition of 65% MDGS (compared to 40% MDGS) resulted in decreases in final BW, DMI, and ADG ($P < 0.01$), as well as 3% less favorable F:G ($P < 0.01$).

Carcass characteristics

Dressing percentage, HCW, 12^{th} rib fat, and calculated YG decreased linearly ($P < 0.01$; Table 2) with increasing corn silage inclusion. There were no differences in marbling score or LM area ($P > 0.05$) due to corn silage inclusion with 40% MDGS. Comparing steers fed 30% corn silage with 40% MDGS instead of 65% MDGS, HCW was 32 lb greater ($P < 0.01$), with no differences ($P > 0.05$) in other carcass characteristics. There also was an improvement in HCW (22 lb; $P = 0.02$) for steers fed 40% MDGS instead of 0% MDGS in diets containing 45% corn silage. There were no other differences ($P > 0.07$) in carcass characteristics for steers consuming diets containing 45% corn silage.

In general, corn silage in combination with MDGS can be utilized to partially replace corn in finishing diets. Cattle performance is reduced with increased level of corn silage in finishing diets containing MDGS. However, feeding corn silage with MDGS is better than without MDGS for ADG and F:G.

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