Effects of Wet or Dry Distillers Grains with Solubles Inclusion in Diets Fed to Newly-received Beef Calves on Intake, Average Daily Gain and Feed Efficiency

B.W. Neville[1], M.L. Bauer[1], K. Karges[2], M. Gibson[2], and G.P. Lardy[1]
[1] NDSU Department of Animal Sciences
[2] Poet Nutrition, Sioux Falls, S.D.

Abstract
The effect of moisture (WDGS or DDGS) and level (0 percent, 20 percent or 40 percent DM basis) of corn distillers grains with solubles on DMI, ADG, and G:F of newly-received calves fed medium-concentrate diets was determined using 50 male (47 steer and three bull) calves and 50 heifer calves, which were blocked by initial weight and sex, and assigned randomly to one of five treatments (four pens per treatment). Dietary treatments were fed for 28 days. The control diet (CON) contained 47 percent hay, 43 percent ground corn, 5 percent concentrated separator by-product and 5 percent supplement (DM basis) while WDGS and DDGS replaced corn and soybean meal to form the remaining treatments: 20 percent DDGS, 40 percent DDGS, 20 percent WDGS and 40 percent WDGS. Diets were formulated to contain a minimum of 13 percent crude protein (CP), 0.6 percent calcium (Ca) and 0.3 percent phosphorus (P); or a Ca-to-P ratio of 1.5-to-1 when P was in excess. Calves were weighed for three consecutive days at the beginning and end of the study. A moisture-by-level interaction was detected for DMI (P = 0.05). Dry-matter intake decreased linearly (P = 0.01) and quadratically (P = 0.06) with increasing level of DDGS and WDGS, respectively. Dry-matter intake for CON, 20 percent DDGS, 40 percent DDGS, 20 percent WDGS and 40 percent WDGS-fed calves was 17.3, 16.3, 16.0, 17.13 and 15.3 ± 1.17 pounds per day (lb/d), respectively. Increased inclusion of distillers grains, regardless of moisture, increased ADG quadratically (P = 0.05). Increasing level of WDGS improved (P = 0.03) G:F over CON. The moisture level of distillers grains does not appear to affect DMI, ADG or G:F. However, increased inclusion of either dry or wet distillers grains with solubles may affect DMI, ADG or G:F.

Introduction

Feeding distillers byproducts to livestock is not a new subject; however, data comparing moisture and inclusion level of distillers grains with solubles in diets fed to newly-received calves is limited. Previous research evaluated the level of wet distillers grains with solubles' inclusion in beef finishing diets (Vander Pol et al., 2007), who found that feeding WDGS had a quadratic effect on DMI, ADG and G:F, with inclusion at 30 percent DM appearing to be optimal. Cattle fed DDGS or WDGS were more efficient than those fed corn-based control diets (Ham et al., 1994). Ham also reported that cattle fed WDGS were more efficient than those fed DDGS. Recently, Klopfenstein et al. (2008) reviewed the effects of feeding distillers grain (DG) in the beef feeding industry. They stated that the optimal inclusion level of DDGS is lower than that of WDGS with respect to cattle performance. Further, Ham et al. (1994) stated that wet distillers byproducts contained 39 percent more and DDGS 21 percent more net energy gain (NEg) than dry-rolled corn. Nearly all of this data involves feeding cattle in either the growing or finishing phase. Limited data is available that describes the effects inclusion level and form of distiller grains have on newly-weaned beef calf performance. Therefore, our objective was to evaluate the effects of form (wet, WDGS; dry, DDGS) and level (0 percent, 20 percent or 40 percent DM basis) of corn distillers grains with solubles' inclusion on DMI, ADG and G:F of newly-received calves fed medium-concentrate diets.

Materials and Methods

The effect of moisture and level of corn distillers grains with solubles' inclusion on DMI, ADG and G:F of newly-received calves fed medium-concentrate diets was evaluated in a 2x2+1 factorial design. Fifty male (47 steer and three bull) calves and 50 heifer calves were blocked by initial weight and sex, and assigned randomly to one of five treatments (four pens per treatment). Calves were weighed for three consecutive days at the beginning and end of the study. Dietary treatments were fed for 28 days and the control diet (CON) contained 47 percent hay, 43 percent ground corn, 5 percent concentrated separator by-product and 5 percent supplement (DM basis) while WDGS and DDGS replaced corn and soybean meal to form the remaining treatments: 20 percent DDGS, 40 percent DDGS, 20 percent WDGS and 40 percent WDGS (Table 1). Diets were formulated to contain a minimum of 13 percent CP, 0.6 percent Ca and 0.3 percent P; or a Ca-to-P ratio of 1.5-to-1 when P was in excess (Table 1). Statistical analysis of data was completed utilizing the mixed model of SAS (SAS Institute Inc., Cary, N.C.). The model included fixed effects of treatment, sex and an interaction of treatment and sex; the random effect was weight block. Contrasts were analyzed for moisture and level of distiller grains, as well as moisture by level interaction.

Table 1. Receiving diets fed to newly weaned beef calves.

		DDGS		WDGS	
	Control	20%	40%	20%	40%
Grass hay	47.00	47.00	47.00	47.00	47.00
Corn	43.00	23.00	3.00	23.00	3.00
DDGS	-	20.00	40.00	-	-
WDGS	-	-	-	20.00	40.00
CSB[1]	5.00	5.00	5.00	5.00	5.00
SBM	0.72	-	-	-	-
Ground corn	2.85	3.60	3.24	3.60	3.24
Limestone	1.33	1.30	1.66	1.30	1.66
Vitamin E, [2] premix	0.02	0.02	0.02	0.02	0.02
Vitamin A:D, [3] premix	0.02	0.02	0.02	0.02	0.02
Mineral [4] premix	0.05	0.05	0.05	0.05	0.05
Deccox[5] premix	0.03	0.03	0.03	0.03	0.03

[1] Concentrated separator byproduct

[2] 20,000 IU/LB

[3] 22,000,000 IU/LB of vitamin A, 2,100,000 IU/LB of vitamin D_3

[4] Ca (3.295-3.950%), Cu (2.560%), Zn (16.0%), Fe (6.5%), I (1,050ppm), Co (250 ppm)

[5] Dequinate 6% (27.2 g/lb)

Results

No moisture by level interactions for ADG ($P = 0.56$) or G:F ($P = 0.70$) were detected. Further, moisture (DDGS or WDGS) did not affect ($P \geq 0.40$; Table 2) DMI, ADG or G:F. Dry-matter intake was affected by a moisture by level interaction ($P = 0.03$). Calves fed DDGS decreased intake linearly ($P = 0.01$), while calves fed WDGS diets had both linear ($P = 0.01$) and quadratic ($P = 0.05$) decreases in DMI. Increased inclusion of WDGS increased ADG quadratically ($P = 0.05$). There was no effect ($P \geq 0.27$) of DDGS inclusion on ADG. However, increased inclusion of distillers grains, regardless of moisture level, increased ADG quadratically ($P = 0.05$), with the

greatest daily gains occurring at the 20 percent inclusion level, compared with the 0 percent or 40 percent levels. Increasing the level of WDGS improved (P = 0.03) G:F, while increased inclusion of DDGS had no effect ($P \geq 0.12$) on G:F. There was a linear (P = 0.03) increase in G:F with increasing inclusion of distillers grains with solubles.

Table 2. Animal performance of newly weaned beef calves fed medium-concentrate diets containing varying levels and form of distillers grains with solubles.

	Treatment								
	Con	D20	D40	W20	W40	SE	Moisture	Level	Moisture x Level
DMI, lb.	17.33	16.34	15.99	17.13	15.32	1.16	0.84	0.01	0.05
ADG, lb.	3.49	3.80	3.61	4.05	3.66	0.18	0.40	0.12	0.56
G:F[1]	0.20	0.23	0.23	0.24	0.24	0.01	0.46	0.88	0.70

[1] G:F, gain to feed represents the amount of gain per 1 pound of dry-matter intake.

Implications

Beef cattle producers could benefit by including distillers grains in receiving or weaning diets. This data indicates that including either wet or dry distillers grains with solubles will increase ADG and G:F. Data from this study suggest feeding 20 percent wet distillers grains with solubles may be more beneficial than the other treatment diets tested. Further research with feeding distillers grains in medium-concentrate diets undoubtedly will aide in establishment of better guidelines for producers.

Literature Cited

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