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Meta-Analysis of Feeding Calf-Feds or Yearlings Wet Distillers Grains with Different Corn Processing Types

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Summary

Meta-analyses of University of Nebraska–Lincoln feedlot research feeding wet corn distillers grains plus solubles (WDGS) with dry-rolled corn (DRC) and high moisture corn (HMC) to either calf-feds or yearlings was conducted to calculate the feeding values of WDGS relative to corn. The feeding value of wet distillers grains plus solubles (WDGS) was superior to dry-rolled corn (DRC) and high moisture corn (HMC). The feeding value of WDGS was greater for yearlings than for calf-feds. The combination of WDGS and HMC provided cattle performance superior to DRC with or without WDGS.

Introduction

Previous research evaluated feeding corn wet distillers grains with solubles (WDGS; 32% DM) to winter calf-feds and summer yearlings in a confinement barn (*1993 Nebraska Beef Cattle Report*, pp. 43-46). The researchers reported a greater feeding value of WDGS replacing 40% of diet DM as dry-rolled corn (DRC) for yearlings than calf-feds, 151% and 134% of the feeding value of DRC, respectively.Previous research also evaluated feeding WDGS with DRC, high moisture corn (HMC), or a blend of both corn types (*2006 Nebraska Beef Cattle Report*, pp. 48-50; *2007 Nebraska Beef Cattle Report*, pp. 33-35). In the 2006 feeding trial, 30% WDGS (DM basis) was fed and F:G was numerically superior for steers fed HMC compared to DRC or a DRC and HMC blend. However, in this trial 0% WDGS diets were not fed to evaluate the response to WDGS from different corn processing types. The 2007 trial evaluated the response to feeding 0%, 15%, 27.5%, and 40% WDGS (DM basis) with either DRC or HMC. A greater response to WDGS was observed with less intensely processed DRC compared to HMC. However, F:G for HMC fed steers was superior to F:G of DRC fed steers with up to 40% WDGS.

The corn processing and cattle type interactions with WDGS were initially evaluated with treatment means from 16 finishing trials (*2010 Nebraska Beef Cattle Report*, pp. 61-62). Since the 2010 report, additional UNL WDGS finishing trials have been identified for inclusion in the meta-analysis. In addition, pen mean observations were compiled for the studies to better account for variation between trials as compared to treatment means previously utilized.

Therefore, a pen level meta-analysis of University of Nebraska feedlot research was conducted to evaluate the interactions of cattle type and corn processing method on cattle performance with WDGS inclusion level.

Procedure

Pen mean cattle performance data from 20 UNL feedlot trials where WDGS replaced DRC or a DRC and HMC blend were compiled for statistical analysis. The criteria for trial inclusion in the dataset were the same as for the 2010 meta-analysis. In all trials, WDGS replaced DRC, HMC, or a blend of the two corn types in diets (0% to 50% of diet DM). Four additional UNL feedlot trials have been completed since the 2010 analysis (*2011 Nebraska Beef Cattle Report*, pp. 90-91; *2011 Nebraska Beef Cattle Report*, pp. 50-52; *2011 Nebraska Beef Cattle Report*, pp. 68-69; *2011 Nebraska Beef Cattle Report,* pp. 55-56). The data are for 350 pen observations representing 3,365 steers. Winter calf-feds were fed in seven trials, summer yearlings were fed in 10 trials, and fall long yearlings were fed in three trials. Steers were fed DRC in 11 trials and a blend of DRC and HMC in nine trials (1:1 ratio of DRC:HMC for six trials and 2:3 ratio of DRC:HMC for three trials), and HMC as the only corn source in one trial. The meta-analysis methodology to analyze the data has been previously reported (*2010 Nebraska Beef Cattle Report*, pp. 61-62). In short, an iterative PROC MIXED procedure of SAS was used to summarize quantitative findings from multiple studies.

Two analyses of the data were conducted. The initial analysis was for the overall effect of WDGS inclusion, regardless of cattle type and corn processing method, to update previously reported WDGS feeding values. The calf-fed trials and yearling trials were then separated, and the effect of corn processing method on F:G was analyzed within cattle type.

Results

Replacement of corn up to 40% of diet DM as WDGS resulted in superior performance compared to cattle fed no WDGS (Table 1). These data agree with the previous meta-analyses. Dry matter intake, ADG, F:G, 12th rib fat, and marbling score improved quadratically as WDGS inclusion level increased. The feeding value of WDGS was consistently greater than corn when WDGS was included up to 40% of diet DM. The feeding value was greater at lower WDGS inclusion levels and decreased as inclusion level increased. All steers fed in the data sets were part of the following system. The UNL research feedlot utilizes spring born, predominately black, crossbred steers weaned

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Table 1. Finishing steer performance when fed different dietary inclusions of wet distillers grains plus solubles (WDGS).

WDGS Inclusion[1]:	0WDGS	10WDGS	20WDGS	30WDGS	40WDGS	Lin[2]	Quad[2]
DMI, lb/day	23.0	23.3	23.3	23.0	22.4	0.01	< 0.01
ADG, lb	3.53	3.77	3.90	3.93	3.87	< 0.01	< 0.01
F:G	6.47	6.16	5.96	5.83	5.78	< 0.01	< 0.01
12th rib fat, in	0.48	0.52	0.54	0.55	0.55	< 0.01	0.01
Marbling score[3]	528	535	537	534	525	0.19	< 0.01
Feeding value, %[4]		150	143	136	130		

[1]Dietary treatment levels (DM basis) of wet distillers grains plus solubles (WDGS), 0WDGS = 0% WDGS, 10WDGS = 10% WDGS, 20WDGS = 20% WDGS, 30WDGS = 30% WDGS, 40WDGS = 40% WDGS.
[2]Estimation equation linear and quadratic term t-statistic for variable of interest response to WDGS level.
[3]500 = Small[0].
[4]Percentage of corn feeding value, calculated from predicted F:G relative to 0WDGS F:G, divided by WDGS inclusion.

Table 2. Finishing steer performance when calf-feds or yearlings were fed different dietary inclusions of wet distillers grains plus solubles (WDGS) replacing dry-rolled corn (DRC) or a blend of DRC and high-moisture corn (HMC).

WDGS Inclusion[1]:	0WDGS	10WDGS	20WDGS	30WDGS	40WDGS
Winter Calf-feds					
DRC diet, F:G	6.17	5.95	5.75	5.56	5.38
Feeding Value,% of DRC[2]		136	136	136	136
DRC and HMC Blend, F:G	6.17	6.02	5.89	5.76	5.63
Feeding Value,% of Corn Blend[2]		124	124	124	124
Summer Yearlings					
DRC diet, F:G	6.76	6.34	6.05	5.86	5.76
Feeding Value, % of DRC[2]		167	159	151	143
DRC and HMC Blend, F:G	6.76	6.41	6.19	6.06	6.02
Feeding Value,% of Corn Blend[2]		154	146	138	131

[1]Dietary treatment levels (DM basis) of wet distillers grains plus solubles (WDGS), 0WDGS = 0% WDGS, 10WDGS = 10% WDGS, 20WDGS = 20% WDGS, 30WDGS = 30% WDGS, 40WDGS = 40% WDGS.
[2]Percentage of respective corn processing type feeding value, calculated from predicted F:G relative to 0WDGS F:G, divided by WDGS inclusion.

in the fall for most research trials. After an initial receiving period, the largest steers are fed as calf-feds in the winter; the medium steers are fed as short yearlings in the summer after wintering on cornstalks; and the small steers are wintered on cornstalks, grazed on grass the following summer, and finished in the fall to market by 24 months of age. We realize that season of feeding and steer age are confounded in this system. However, the confinement barn study mentioned in the introduction provided a moderate environment for both winter and summer steer feeding and fed cattle as either calf-feds or yearlings in two consecutive years. The study indicated greater feeding value of WDGS for yearlings than calf-feds.As expected, calf-feds were more efficient than yearlings (Table 2). The feeding value of WDGS, regardless of corn processing type, was greater for yearlings than for calf-feds. The feeding value of WDGS was a constant 136% of DRC and a constant 124% of a DRC and HMC blend for calf-feds due to linear improvement in F:G as WDGS replaced corn. Yearling performance improved quadratically as WDGS level increased, regardless of corn processing type. The feeding value of WDGS for yearlings decreased linearly in both DRC and blended corn diets. Feeding value of WDGS replacing 20-40% of diet DM for yearlings decreased from 159 to 143% of DRC, and from 146 to 131% for a blend of DRC and HMC.

The feeding values of DRC and a blend of DRC and HMC were similar for 0% WDGS fed steers within cattle type. The feeding value of WDGS was greater when WDGS replaced DRC as compared to a corn blend at any inclusion level of WDGS.

Only one trial has evaluated feeding WDGS, replacing HMC with WDGS in diets and feeding WDGS replacing DRC (*2007 Nebraska Beef Cattle Report*, pp. 33-35). The trial evaluated replacing each corn type with up to 40% of diet DM as WDGS. The DRC 0% WDGS cattle performed similarly to the winter DRC-only fed cattle of the meta-analysis. The HMC had 115% of the feeding value of DRC in the trial. The data for the HMC fed cattle have been plotted on the graph with the meta-analysis equations. The improvement in F:G of increasing WDGS from 0% to 40% WDGS in HMC diets is less than the improvement in F:G of DRC and corn blend due to HMC having a greater feeding value than DRC. As HMC is replaced by WDGS, the feeding value replacement is less than the feeding value differential of WDGS and DRC, because HMC is greater than DRC. These data suggest the combination of 47.5% of diet DM as HMC and 40% of diet DM as WDGS has a feeding value equal to 122% of DRC. The results of this trial reiterate the conclusion that the feeding value of WDGS was superior to DRC and HMC. The feeding value of WDGS was greater for yearlings than for calf-feds. The feeding value of WDGS was greater in DRC diets than in corn blend diets. The combination of WDGS and HMC provided cattle performance superior to DRC with or without WDGS.

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