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Wheat-based Distiller's Dried Grains with Solubles for Growing and Finishing Cattle

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Introduction

Beef producers are hearing a lot about distillers' dried gains with solubles (DDGS) and other by-products of the bio-fuel industries as potential feed sources for their cattle. Since feed typically accounts for 55 to 65 % of operating costs, it is not surprising that many are starting to ask questions regarding cost, nutritional value and supply. Much of the interest in feeding distiller's dried grains with solubles stems from the rapid increase in ethanol production capacity across North America. The United States has increased annual production capacity from 1.5 to slightly greater than 6 billion gallons from 2001 to 2006 with a further 6 billion gallon capacity currently under construction. Canada will have a capacity close to 1.5 billion litres by the end of 2008. With an increased ethanol industry, there is an increased supply of corn and wheat-based distiller's by-products that can serve as excellent cattle feed. While considerable research has been conducted on corn-based DDGS, little information is available to cattle producers regarding the nutritional value and management of wheat-based DDGS.

Research Objectives:

The objectives of this study were to evaluate the feedlot performance of growing and finishing cattle fed incremental levels of wheat-based DDGS. Performance measures evaluated included daily gain, feed efficiency, ultrasound backfat and ribeye area accretion, carcass traits including yield and marbling score.

Feeding Program:

Two hundred recently weaned calves (640 lbs) were housed in 20 pens at the University of Saskatchewan Beef Cattle Research Station. The cattle were placed on an 85 day backgrounding program and then fed to finish at a target preshrunk weight of 1375 lbs.

During backgrounding the control diet consisted of 50% barley silage, 10% grass hay, 10% barley straw, 25% barley grain and 5% protein / mineral supplement (as fed basis). In treatments 2 through 5, DDGS replaced barley gain at 5, 10, 15 and 20% (as fed), respectively. On a dry matter basis, DDGS comprised 8.1, 16.2, 24.2 and 32.1% of the ration for treatments 2 through 5, respectively. All diets were formulated to a net energy of maintenance (NEm) and gain (NEg) content of 1.52 and 0.93 Mcal / kg of diet DM, respectively, based on the assumption that the energy value of DDGS is equal to that of dry rolled barley. The control diet was formulated to contain a minimum of 12% CP (28% rumen undegradable protein (RUP)) for the backgrounding phase (NRC 1996). Cattle were implanted upon arrival with an estrogen-based implant. The backgrounding phase was designed to target a daily gain of 2.2 to 2.6 lb per day.

During the finishing period, the cattle were maintained on their original treatments. The control diet consisted of 15% barley silage, 80% barley grain and 5% mineral vitamin supplement. It was formulated to 13% crude protein and 1.91 and 1.27 Mcal of NEm and NEg, respectively. As in the backgrounding period, treatments 2 through 5 were formulated to the same energy level as the control with DDGS

replacing barley grain at 5, 10, 15 and 20% of the diet (as fed basis). On a dry matter basis, DDGS comprised 5.8, 11.7, 17.5 and 23.3% of the ration for treatments 2 through 5, respectively.

What Did We Find?

Cattle fed the control diet gained 2.7 lbs per day during the backgrounding phase. This rate of gain falls within expectations based on formulated energy levels (NRC 1996). Feed dry matter intake was 16.8 lbs per day and feed efficiency (kg feed/kg gain) was 6.35:1 during this period. Cattle fed 5% DDGS had the poorest grains (2.4 lb/day) as well as the lowest intakes (16.0 lbs/day) of all cattle. Cattle fed 10, 15 and 20% DDGS had similar or numerically higher gains than the control cattle (2.6, 2.8 and 2.8 lbs/day respectively). Respective dry matter intakes (kg/day) and feed efficiency (kg feed DM per kg gain) values were 17.0 & 6.64; 17.6 & 6.33; and 17.5 & 6.20 for treatments 3, 4 and 5.

Performance of all cattle was excellent during the finishing phase, particularly during the first 56 days. The superior performance during the early phase of finishing can in part be attributed to the fact that the cattle had been re-implanted with a TBA implant at the start of the finishing phase. During the first 56 days of finishing, cattle fed increasing levels of DDGS showed a linear increase in daily gain as inclusion level increased. During this period, dry matter intakes were highest for cattle fed DDGS at the 15 and 20% levels. During the first 56 days of finishing, cattle fed the 5% DDGS level exhibited the most efficient gains. It appears that these cattle were compensating for their reduced performance during backgrounding. The cattle were on finishing rations for approximately 115 days with cattle fed the 20% DDGS having the lowest days on the finishing program (111vs. 115 or 120 days). This difference however, was not significant. Over the entire finishing period, daily gains of all cattle averaged 4.1 lbs. per day with an average feed conversion efficiency of 6.0:1.

Hot carcass weights averaged 800 lbs with no differences across treatments, which was to be expected as the cattle were targeted for slaughter at a consistent live weight. All measures related to yield grade including fat thickness and ribeye area were similar across treatments, as a result carcass lean yield was not affected by treatment (averaged 61%). Similarly there was no influence of treatment on marbling score or the incidence of dark cutters. While no influence of treatment was found, it is important to note that contrary to some reports with corn distillers' grain, no negative effects of replacing barley grain with wheat-based DDGS were noted on carcass quality.

Conclusions and Significance to Industry:

The results of this work show that wheat-based DDGS can replace up to 32 % of the diet dry matter in backgrounding diets and up to 23% in finishing diets, replacing equal amounts of barley grain, without any adverse affects on performance. These results indicate that for finishing cattle wheat-based DDGS has a net energy of gain value equal to or slightly superior to that of barley grain. Economics of feeding DDGS at these levels would depend on availability and price relative to barley and other cereal grains.

When feeding DDGS to growing and finishing cattle, producers should evaluate the impact on the nutrient content of the total mixed diet particularly crude protein and mineral levels such as phosphorus and sulfur. Overfeeding DDGS can elevate protein and phosphorus levels in the diet and ultimately in the manure of cattle. In order to avoid potential environmental problems when this manure is spread, producers should consult a nutritionist to assist them in optimizing DDGS inclusion rates in the diets of their cattle.

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