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RESEARCH FACTS

RESEARCH & TECHNOLOGY DEVELOPMENT FOR THE CANADIAN BEEF INDUSTRY



Effects of feeding corn distillers' grains on animal health , performance and carcass value

Project Title:

Influence of feeding increasing levels of wet or dry corn distillers' grains plus solubles in whole corn based finishing diets: Effects on performance, meat quality, and nutrient balance and excretion.

Researchers:

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Background

Canada's renewable fuel standards require gasoline to be blended with ethanol. In North America, most ethanol is produced from wheat or corn. Only the starch of these grains is converted into ethanol. The byproduct contains protein, fiber, fat and minerals at levels that are three times more concentrated than in the original grain. The byproducts (distillers' grains and solubles) are used as livestock feed. They can be fed wet, but are often mixed together, dried, and fed as dried distillers' grains with solubles (DDGS).

There are several questions about feeding distillers' grains to beef cattle. On one hand, the lower starch and higher fiber content of distillers' grains may lower the diet's energy content. This would slow the rate of digestion in the rumen, reduce animal performance, and impact carcass quality, but it may also lower the risk of grain overload and liver abscesses. On the other hand, the small particle size of distillers' grains may cause the opposite effects. The increased sulfur content may increase the risk of feedlot polio, and higher mineral concentrations would likely increase nutrient levels in manure.

Objectives

To determine whether feeding various levels of wet or dry corn distillers' grains plus solubles in finishing diets affects feedlot performance, carcass traits, animal health, nutrient intake, digestibility and excretion.

What they did

Researchers carried out two trials. In the first trial, seven groups of crossbred steer calves were fed different finishing diets. All

diets contained 10% forage and 90% concentrate, but the amount of distillers' grains in the concentrate varied between the groups. Six groups were fed a concentrate with 17%, 33% or 50% of either DDGS or modified wet distillers' grains plus solubles, the remainder being whole corn. The other group received a concentrate of 100% whole corn. Individual feed intake, growth performance, blood glucose and urea nitrogen levels, rumen pH, carcass traits and organ weights were measured.

In the second trial, detailed metabolic and digestibility measurements were collected on steers fed 0, 17, 33 or 50% DDGS. Feed intake, digestion, retention and excretion measurements were collected for a number of nutrients and minerals.

What they learned

Feedlot performance and carcass traits: end weight, average daily gain, feed to gain ratio and days on feed did not statistically differ among the seven diets. Dressing percentage, marbling score and yield grade were also similar. Blood urea nitrogen levels mirrored dietary nitrogen levels; both rose as the level of distillers' grains in the diet increased. Kidneys were heavier in cattle fed distillers' grains, but the weights of the other organs were similar for all diets. Cattle fed distillers' grains had slightly lower liver abscess scores than cattle fed only whole corn. No evidence of polio was observed.

Metabolism trial:

Cattle ate the same amount of feed, regardless of the level of distillers' grains. Digestibility decreased as the level of distillers' grains increased. As a result, cattle fed DDGS produced 14 to 27% more manure and 5 to 57% more urine than cattle fed whole corn. Cattle fed DDGS had higher levels of nitrogen, phosphorus, and sulfur in the blood as the proportion of DDGS in the diet increased. Because dietary requirements for nitrogen, phosphorus and sulfur were met, excess minerals were excreted in the manure and urine. Compared to the whole corn diet, feeding 17% DDGS increased the daily excretion of nitrogen by 3%, phosphorus by 16% and sulfur by 52%. At 33% DDGS, nitrogen excretion increased by 22%, phosphorus by 35%, and sulfur by 100% compared to the whole corn diet, and at 50% DDGS, nitrogen excretion increased by 34%, phosphorus by 67% and sulfur by 183%.

What it means

This research indicates that up to 50% corn-based distillers' grains plus solubles can be fed in a 90% concentrate finishing diet without adversely affecting animal performance, carcass weight, quality or yield grade.

The impacts on animal health are less clear. Lower liver abscess scores might suggest that the rumen was healthier when cattle were fed distillers' grains, even though the rumen pH at slaughter was the same in all diets. In contrast, increases in circulating mineral levels, urine production, and kidney weights indicate that the kidneys may work harder to excrete excess minerals when more distillers' grains are fed. Increased nutrient excretion in the urine and manure of cattle fed high levels of distillers' grains may increase the nutrient content of manure and the land base required to spread it.

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