Research Facts

Research & Technology Development for the Canadian Beef Industry

Replacing barley grain with wheat and grain screenings in feedlot diets (Fact sheet B)

by Alberta Crop Industry Development Fund

Project Title:		Project Code:	2010C008F
Research support to the establishment of a NIR network and feeding practices that will lower feed costs and improve net feed efficiency in feedlot cattle – Fecal starch and grain processing index.		**Completed:**	*2014*

Researchers:

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Background:

Feed accounts for as much as 70% of production costs and is second only to fixed costs in terms of importance to the profitability of feedlot cattle production. Consequently, a 5% improvement in feed efficiency has four times the economic value of a 5% improvement in daily gain. This project proposed to focus on those feedlot practices that we believe show the most promise for lowering feed costs and establishing a NIR network that will enable producers to assess feed value. This included utilizing alternative feeds including wheat, specifically formulated feed pellets and high fat by-products or cereal grain sources. The project was linked with proposed programs on NIR adoption in commercial feedlots.

Objectives:

The overall objective of the research pipeline was to achieve a 4 to 6% reduction in the cost of gain through improved feed efficiency or the use of alternative feeds.

What They Did:

Study: Effect of wheat *vs* barley and processing index on growth performance, eating behavior and carcass quality of finishing feedlot steers - Cross breed steers (n=160, BW=538±36 kg) were allocated to 16 feedlot pens (10 per pen and 4 pens per treatment) and fed wheat or barley grain at 89% of diet DM with a processing index (PI) of either 75 or 85 for 12 wk prior to slaughter.

Study: Effect of replacing barley with wheat in diets for beef steers on nutrient digestibility, rumen fermentation and bacteria community, and plasma constituent - This study investigated the effect of substituting barley grain with feed wheat in a finishing diet fed to beef steers on rumen fermentation, bacterial communities, nutrient digestibility and plasma metabolites. The experiment was designed as a replicated 4 × 4 Latin square using 8 rumen cannulated steers (742 ± 44 kg) fed diets in which wheat replaced 0, 30, 60 or 89% of the barley grain on a dry matter (DM) basis and with a constant processing index of 80.

Study: Effects of feeding pelleted grain screenings differing in fat content on performance and nutrient utilization in feedlot cattle - The objective of this study was to evaluate low and high fat grain screening pellets (GSP) as a replacement for barley grain in feedlot diets. Yearling heifers (n = 150, average BW of 445 ± 35.5 kg) were assigned to 1 of 15 pens (10 heifers/pen) and pens were randomly assigned to 1 of 3 treatments. Treatments consisted of (DM basis) a control (CON; 76% barley grain, 10% wheat dried distiller's grains, 9% barley silage, 5% mineral and vitamin supplement); low-fat GSP (LF) and high-fat GSP (HF). The LF and HF diets were similar to the CON except GSP replaced 20% of the barley grain in both diets.

See Fact Sheet A for results of other studies related to this topic.

What They Learned:

The goals as outlined in the original proposal were accomplished as demonstrated by the following achievements:

- Project demonstrated that either hard or soft wheat could be fully substituted for barley grain in finishing feedlot diets without adverse impacts on growth performance or profitability. This information will enable producers to take full advantage of feed wheat in feedlot diets as it comes available, a situation that is becoming increasingly frequent as there has been a noticeable increase in the use of feed wheat in feedlot diets.
- Project demonstrated a 7% improvement in feed efficiency with improved processing with barley based feedlots and a 4% improvement with wheat based diets. This range was within or even slightly surpassed the objective of a 4-6% reduction in the cost of gain through improved feed efficiency.
- NIR is a useful tool for the prediction of feed value in byproduct feeds. This enabled a sliding scale of value to be developed relative to barley and for feedlot producers to utilize this tool to pay for byproduct feeds based on their feed value.

NIR had the ability to predict energy density through estimation of oil content in byproduct feeds.

What It Means:

Suppose four trucks pull up to a feedlot. One contains barley, the second contains feed wheat, the third contains corn DDGS from ethanol production and the fourth has screenings from a seed cleaning plant.   For many feedlot operators, there's no choice to be made. They're buying the barley, and will likely pass on the wheat. As for the by-products, it may not be worth the risk or supply could be an issue.

"When we look at digestibility and energy, wheat is actually higher than barley," says McAllister. "Wheat, chemically and structurally, is different than barley. There's also a big range between durum, soft wheat and hard wheat, but if they're properly processed, they are equal in terms of feed value."

Corn DDGS and grain screenings were also found to have worthwhile value given their modest cost. Here, given the wide variability of by-products like these, NIR technology makes all the difference. A truckload of grain by-products could be a cost-effective addition to a ration, or it could be a nutritional strikeout. You can't judge this by the naked eye, but NIR can tell you.

Whether the feedstuff is barley, wheat or some type of by-product, McAllister's research found that proper processing was key to maximizing its feed value. Overall, the project found that sound processing could improve feed efficiency by 7% for barley and 4% for wheat.

"In all cases, you must pay attention to processing," says McAllister. "Using NIR to predict feed value, you should be able to pay for feed based on its feed value, not its weight, because weight can't tell you much. It doesn't take long, or very many cattle, for this to add up to a significant amount of money."

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