Take Home Message

- In a summary of nine feeding trials, the average increase in performance of cattle fed tempered barley compared to dry rolled barley was 6.6% for average daily gain, 3.7% for feed efficiency and a 2.6% improvement in feed intake.
- Cost for electrical power was reduced by 11.3% when tempered barley was rolled as compared to rolling dry barley.
- Consider tempering barley for your feedlot if the expected increase in animal performance more than offsets the additional cost of labour and facilities necessary to temper barley.

Introduction

Grain costs represent a significant proportion of a feedlot’s (finishing & backgrounding) day to day cost. Therefore, it is essential for cattle feeders to optimize the use of grain to remain competitive in the 1990’s. Barley is the key grain grown and fed in western Canada. Over the years cattle feeders have fed whole barley, ground barley, dry rolled barley, high moisture barley, steam rolled barley and tempered barley. The digestibility of whole barley is reduced by 10-25% as compared to rolled barley, (see Processing Feed Grains). In addition, ground barley leads to digestive upset such as acidosis and bloat due to the small particle size and the resulting rapid rate of digestion.

There is general agreement among nutritionists that barley should be processed but there is not a consensus of opinion relative to the optimum procedure for barley processing. Proper barley processing is more critical in finishing rations than in backgrounding rations due to the high percentage of grain in these rations and the speed in which barley starch degrades in the rumen. Therefore, it is logical to assume that finishers will most likely have a greater benefit from tempered barley than backgrounders. Feedlots that process and feed very dry barley (moisture content 10% or less) have a very difficult time obtaining a coarse roll on these very hard, brittle kernels. Grain with low moisture content that is dry rolled...
either tends to shatter or not get rolled at all. In addition, depending upon the variety of barley grown and weather conditions during the growing season, feedlots often deal with barley of varying kernel size. It is difficult to obtain a proper roll on barley that varies from small thin kernels to thick plump kernels, especially if the grain is extremely dry and brittle. Adding moisture to this grain softens the kernel and therefore makes it easier to roll.

In the past 5 to 10 years there has been a significant amount of research focusing on tempered barley. Tempering of barley requires the addition of water to the grain to increase the moisture to 18-20%. The grain then soaks or ‘tempers’ for 12-24 hours prior to rolling. Tempered barley rolls consistently and evenly and presents few fines in the feedbunk because the rolled kernel ‘hangs together’. However, there are economic and labour costs associated with tempering, therefore feedlots should temper barley if the improvement in animal performance or a reduction in digestive problems such as bloat more than offset the increased costs. The focus of this fact sheet is to review the literature relative to changes in animal performance associated with tempered barley and to predict which feedlot situations should respond most favourably to tempering.

### Tempering Procedure

The tempering procedure can be as simple as hooking up a garden hose to a grain auger to sophisticated setups for large feedlot with legs and horizontal cross augers. If you set up a large commercial tempering system it is best to visit several operations prior to investing in bins, augers and other hardware for the tempering process. Table 1 adapted from (8) indicates the amount of water to add to dry grain to increase the moisture content to the desired level. Feedlots generally increase the moisture content of barley to 18-20% with the tempering process. The grain ‘tempers’ for 12-24 hours prior to rolling. There does not appear to be an advantage to boosting moisture in the grain to greater than 20% total moisture content. Work at the University of Idaho indicated that the power necessary to roll tempered grain versus dry grain is reduced by approximately 11.3% (2). This cost saving should be considered when deciding upon a tempering system.

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<tr>
<th>Moisture in Dry Grain</th>
<th>Tempered Grain Moisture Target</th>
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<tbody>
<tr>
<td>Lbs of water required per lb of dry grain</td>
<td>15%</td>
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<tr>
<td>9%</td>
<td>.07</td>
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<td>10%</td>
<td>.06</td>
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<td>.02</td>
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<td>14%</td>
<td>.01</td>
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Responses of Feedlot Cattle to Tempering

The results of nine trials that compared performance of animals fed tempered or dry rolled barley are shown in Figure 1. The average improvement in performance of cattle fed tempered compared to dry rolled barley was: 6.6% for average daily gain (ADG) 3.7% for feed/gain (F/G) and 2.6% for dry matter intake (DMI). In an attempt to remove outliers from the data set, the trials with the highest and lowest numerical change in feed efficiency were not included. It is interesting to note that in all nine trials feed efficiency was never depressed by the tempering process. Most trials did not indicate the initial moisture content of the barley. This critical number would most likely have a great impact on the dry roll versus tempered comparisons. The drier the barley, the greater the chance that tempering will improve animal performance.

To Temper or Not To Temper, That Is The Question

There will be added costs in terms of investment and labour if your feedlot chooses to temper barley. The added costs must be balanced against the potential for increased profit through an increase in animal performance or a reduction in digestive upset such as grain overload or bloat due to the improvements in grain processing. Compare the added costs of tempering to the expected improvement in animal performance to make an objective decision for your feedlot.

Feedlots that have a good chance of profiting from tempering barley are those that have:
- Aggressive finishing rations;
- Cattle on finishing rations for extended periods of time;
- Very dry barley;
- Barley of varying kernel size;
- Roll of dry grain is questionable;
- Poor bunk management.
Feedlots that have a reduced chance of profiting from tempering barley are:
- Backgrounders;
- Feeders of tough or damp barley;
- Long, cold winters;
- Roll of grain is coarse and consistent;
- Excellent bunk management.

Additional Research

Barley grain is a precious commodity and its efficient use has a tremendous impact on the profitability of western Canadian feedyards. There needs to be additional research to fine tune the use of tempering, especially with extremely dry barley fed in finisher diets. In addition, further research should be pursued in an effort to determine the optimum holding time for tempered barley. Do we simply want to soften the kernel or is there an advantage to tempering for longer periods of time in an effort to start biochemical reactions within the kernel itself?

References