

UTILIZING BARLEY IN BEEF CATTLE DIETS

Dr. Jeff Lehmkuhler
Extension Beef Cattle Specialist

Introduction

Feeding barely in beef cattle diets is a common practice in the northern and western areas of the United States as well as Canada. Corn dominates as the main ingredient in livestock diets in areas of the corn belt which includes Wisconsin. Yet cereal grains are grown as alternative crops with the intent to utilize them as feed and questions arise as to their feeding value. The following is intended to introduce general principles of feeding barley to beef cattle and specific questions should be addressed to your local county extension agricultural agent or nutritionist.

Barley Composition

Barley is higher in crude protein and fiber than corn while having a slightly lower net energy value than corn. The composition of barley can vary widely as any other feedstuff and one should consider a feed analysis to accurately formulate diets. Hull-less varieties will contain less fiber, more starch, protein and energy than hulled varieties. The reduced fiber from hull-less varieties may also result in lower rumen pH as the dietary fiber levels will be reduced unless increased fiber is added to the diet from other feedstuffs. Small differences also exist between 2-row and 6-row varieties as well as those varieties raised for malting.

The average composition of barley is shown in Table 1. It can be seen that the small grains presented in Table 1 have higher levels of protein. This should be considered when formulating diets to avoid overfeeding of protein and reducing dietary costs. The energy values for these small grains are also slightly less than that of corn with barley having 1.40 mcal/kg of net energy for gain (NEg). The higher fiber levels in the small grains reduce their energy concentrations but they still are a valuable feedstuff. Oats are shown to contain the highest level of neutral detergent fiber (NDF) of those presented making them an excellent grain for calf starters, creep feeds, and growing rations while their use in finishing diets may result in reduced gains, increased feed conversions and feed costs. One noticeable difference for barley is the higher potassium (K) concentration compared to the other grains. Again, one should evaluate supplemental potassium levels and reduce levels from other sources when barley is used at moderate to high inclusion levels.

Table 1. Nutrient composition of various common small grains and corn utilized in beef cattle diets.

Nutrient ¹	Corn	Barley	Wheat	Oats
CP, %	9.8	13.2	14.2	13.6
NEm, mcal/kg	2.18	2.06	2.06	1.73
NEg, mcal/kg	1.50	1.40	1.40	1.11
Ca, %	0.03	0.05	0.05	0.07
P, %	0.31	0.35	0.42	0.30
K, %	0.33	0.57	0.41	0.45
NDF, %	9.0	18.1	11.7	42.0

¹ Adapted from 1996 Beef NRC.

Feeding Barley

When feeding barley to beef cattle, there are a few things to consider. The difference in nutrient composition was already discussed. Another factor to consider is particle size of the grain. The smaller particle size can allow for increased escape from the rumen reducing the extent of rumen digestion. This is of concern for the fiber fraction of the grain as the animal relies on the microorganisms in the rumen to convert the fiber to a useful form of energy and protein. However, the fiber fraction of the hull was reported to be low in digestibility in feedlot rations. The starch and protein components of the grain can be digested by the animal in the lower gastrointestinal tract and if these components escape the rumen it will be digested and absorbed in the lower GI tract. Processing the grain has been shown to produce variable responses. It increases the surface area for the microorganisms to attach and begin digesting the feeds in the rumen. However, it may also increase passage rate and reduce extent of digestion in the rumen. Due to the small particle size and the fibrous hull of barley, it is recommended that one considers rolling or grinding it to increase the digestibility. Though increased processing results in greater digestibility, one should avoid grinding practices that results in finely ground materials as it can result in digestive disturbances reducing intakes and animal performance.

The starch matrix of barley results in a more rapid rate of fermentation than corn. Processed barley has a rate of fermentation that is greater than that of high moisture corn and dry rolled corn while being slower than processed wheat. This rapid fermentation rate can lead to an increased risk of rumen upset and acidosis. One can utilize increased fiber (hay, silage, etc...) to mitigate this higher rate of fermentation. Mixing grains and/or types of processing can also be employed to allow for a more constant rate of fermentation. Adaptation to high grain diets slowly is also important when feeding feedstuffs that have rapid rates of fermentation.

It has been reported that barley can increase the incidence of feedlot bloat. This is likely a function of the rapidly digestible starch that leads to gaseous bloat. Some indications of alfalfa and barley combinations that can result in increased incidence of bloat have also been reported. Recommendations are to ensure adequate roughage levels, use of ionophores, ensure adequate forage length and implementation of good bunk management for reducing the risk and incidence of barley induced bloat.

Conclusion

In summary, feeding barley in diets offered to beef cattle is similar to feeding of other cereal grains. Use of processing can increase digestibility and the increased rates of fermentation needs to be managed appropriately to ensure animal performance. Barley can be used as the sole grain in the ration or replace corn. This decision to utilize barley in cattle diets should be based on economics associated with nutrient content which requires a feed analysis. Adjustments in supplements may be needed to account for differences in protein and mineral levels in barley when replacing corn. Producers should consider feeding barley as an alternative to corn, especially if it is economically viable. For additional information, contact your local extension agent.