

Evaluation of whole-crop barley cultivars in western Canada for in vitro fiber digestibility

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Why is this important?

Growing high quality forage is a key factor to maintain productivity of high producing dairy cows at low feeding costs. Whole-crop barley silage is the primary forage used in western Canada, and selecting barley varieties that are consistently high in digestibility is an important management decision as it affects the profitability of dairy operations. Although barley has been grown as a forage for livestock in western Canada, little data currently exists to assess quality of barley varieties as whole-crop forage.

Fibre digestibility has been identified as an important quality parameter of forages. This is determined by in vitro analysis, which uses incubated rumen fluid from a cow to measure the digestibility of feeds in a simulated rumen environment.

In vitro fibre digestibility is highly variable, depending on genetics and growing environment, but has consistent effects on productivity of dairy cows. In a study by Oba and Allen (1999) they found that a one-unit increase in in-vitro digestibility of NDF was associated with 0.17 and 0.25 kg/d increase in dry matter intake and 4% fat-corrected milk yield, respectively. Neutral detergent fibre (NDF) is the most common measure of fibre and includes most of the structural components of the plant cells.

The objective of the current project was to determine in vitro fibre digestibility of selected whole-crop barley varieties. This information will help animal producers to make an informed decision in selecting barley variety for forage production.

Table 1. Description of barley cultivars evaluated in the current study

	Row	Note
AC Ranger	6-row	Silage variety
CDC Austenson	2-row	Feed variety
Gadsby	2-row	General purpose variety
Vivar	6-row	Feed variety
FB445	6-row	Recommended for registration
FB446	6-row	
FB447	6-row	
FB450	2-row	Malting variety; to be registered as TR13609

What did we do?

Dr. Vern Baron (AAFC Lacombe Research Centre) and Dr. Patricia Juskiw (FCDC, Alberta Agriculture and Forestry) collected samples of 4 registered barley varieties (Gadsby, CDC Austenson, Vivar, and AC Ranger) as well as an additional 4 lines (FB445, FB446, FB447, and FB450) over the last 2 years (Table 1). Samples of each variety were collected at the soft-dough stage at 5 locations in western Canada (Alberta, Saskatchewan, and Manitoba) with 3 replications at each location. Each sample of whole crop barley was measured for total biomass yield, starch content, NDF content, and in-vitro NDF digestibility.

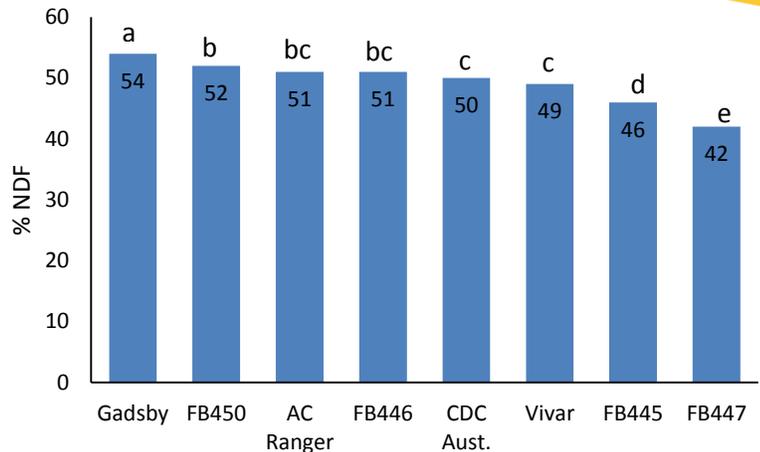


Figure 1. Effects of barley cultivars on fibre digestibility of whole crop barley.

Cultivar digestibility differed significantly if superscripts (a-e) differ.

What did we find?

Biomass yield averaged at 14,090 and 11,680 DM kg/ha for 2013 and 2014, respectively, and there was no difference between the barley cultivars evaluated in the current study. The growing environment (year and location) had an effect on the biomass yield, starch content, NDF content and NDF digestibility of the whole crop barley. In terms of the individual cultivars there was a difference between NDF content and NDF digestibility of the whole crop but no difference in the starch content. For NDF content, significant difference was found among cultivars; 'CDC Austenson' and 'Gadsby' (52.8 and 53.8%, respectively) had lower NDF content than 'FB447' and 'FB450' (56.8 and 56.2%, respectively). Among the eight cultivars, in vitro NDF digestibility ranged from 41.5% to 53.5% (average over two years), and 'Gadsby' (53.5%) had the highest in vitro NDF digestibility (Figure 1).

What does this mean?

Findings from this study suggest that a significant variation exists in in vitro NDF digestibility among barley cultivars grown under different environment, and 'Gadsby' had a low NDF and the highest NDF digestibility among barley cultivars evaluated in the current study. These are important quality parameters of forages as they affect production and profitability.

Summary Points

- NDF content and NDF digestibility was different among the barley cultivars, while starch content was not
- Among the barley cultivars evaluated in the current study, Gadsby had low NDF content and the highest NDF digestibility
- Malting variety (ie. FB450) can have higher NDF digestibility than some feed or silage varieties

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