Quality of Western Canadian Feed Barley and Hulless Barley

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Introduction

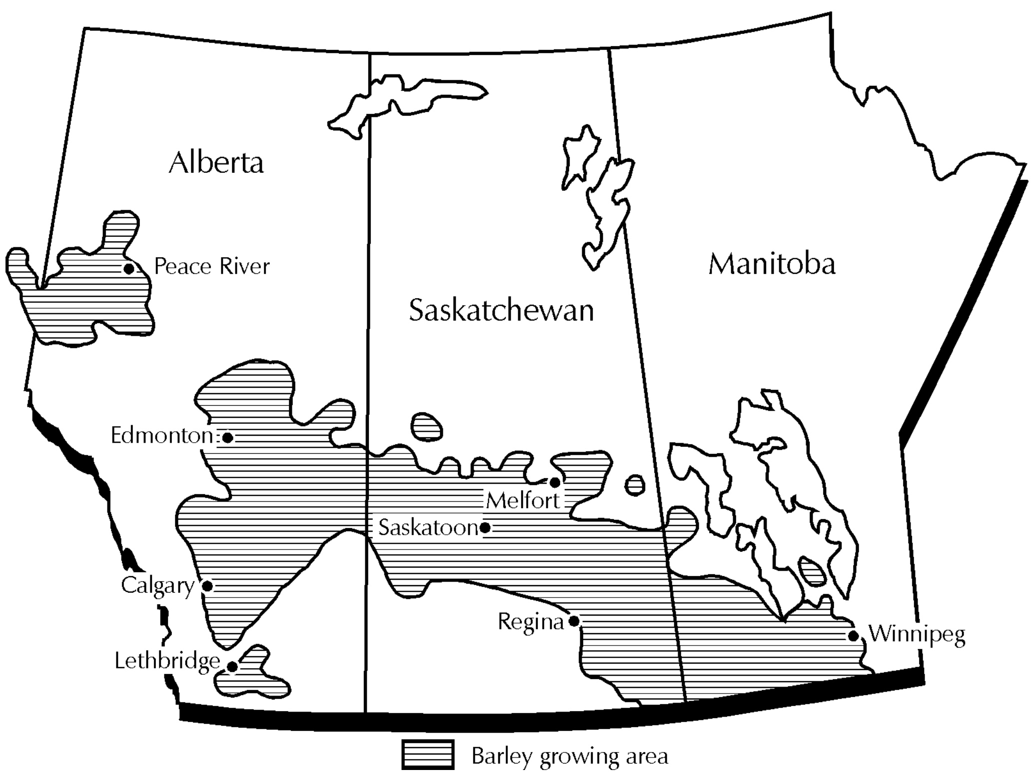
This bulletin

- Reviews the conditions under which the 1997 barley crop was grown and harvested in western Canada
- Presents preliminary quality data for the No. 1 Canada Western (CW) grade
- Presents feed quality data for the 1997 hulless barley crop

The No. 1 CW grade annually represents a high proportion of the barley grown. Thus, the data give a good indication of the quality of the 1997 crop available for feed.

Figure 1 shows the major barley growing areas in western Canada.

Figure 1 • Major barley growing areas in western Canada



Growing and harvesting conditions

Seeding

Barley seeding in 1997 for western Canada was delayed by cool spring conditions, a situation similar to that seen in 1996. Temperatures were significantly below normal during the last half of April and early May. Seeding started in the southwestern areas in the first half of May but was delayed into the last half of May in eastern and northern areas. Specifically, seeding in northern Alberta and northeastern Saskatchewan was delayed by wet soil conditions and the fact that farmers still had to complete a portion of the 1996 harvest.

Flooding in the Red River Valley of Manitoba also caused significant delays. There, seeding did not get underway until early to mid June. Despite the late start to the season, barley planting was nearly 60 percent complete by the end of May and 95 percent finished by the middle of June.

Growing conditions

June temperatures were near normal in western areas but warmer than normal in the east. Rainfall in June was variable across the prairies, with western areas close to normal and eastern regions receiving below normal amounts. The dry conditions were particularly acute in southwestern Manitoba and southeastern Saskatchewan resulting in poor germination and reduced yield potential. Above normal temperatures in these areas also contributed to stress. The normal to above normal rainfall was welcomed in the southwest, but in the northwestern areas, especially in Alberta, not only did the rains delay seeding, but the excess soil moisture caused weakened stands and in some cases drowned out the crop.

July temperatures were normal during the first two weeks and above normal in the latter half of the month. July rainfall was below normal in most areas with the exception of Manitoba, where heavy precipitation, especially in the central and eastern portions of the province, resulted in increased disease pressure in cereal crops. The combination of elevated temperatures and little or no precipitation in the rest of the prairies caused crop conditions to decline rapidly in the last half of July.

The hot, dry weather continued for the first two weeks in August, causing further deterioration in crop condition. However, barley matured rapidly and harvesting began in some southern areas by the middle of August. The stress during heading resulted in incomplete filling, which in turn reduced yields. Rains returned to the prairie region in mid-August, which helped improve conditions in some northern areas, but it was too late to help the bulk of the crop.

Harvesting

The weather during the last half of August and September was nearly ideal across the prairie region. As a result, barley harvesting was 50 percent completed by the first week in September and 95 percent finished by the end of September. Northern Alberta experienced less than ideal weather during September, as heavy rains covered the Peace River region, delaying the harvest and reducing the quality of the crop.

Production

Barley acreage was down slightly in 1997 on prediction of more favourable prices for oilseeds and pulse crops. However, good overseas demand and increased feeding of livestock on the prairies kept barley acreage well above the 10-year average. As shown in Table 1, seeded barley area on the prairies was down 5 percent compared with 1996 but was still 12 percent higher than the 10-year average.

Total barley production for 1997 was affected by the lower acreage and by inadequate moisture in late July and early August. As a result, production was down significantly from the record crop in 1996. Table 1 shows

- Barley production dropped almost 14 percent from 1996 to 1997 across the prairies.
- Production across the prairies was still 10 percent higher than the 10-year average.
- Alberta, which is the major barley-producing province, harvested 9 percent less than in 1996 and 6 percent more than the 10-year average.
- Severe drought conditions contributed to reduced production of 17 percent in Saskatchewan and 23 percent in Manitoba compared with 1996.
- Production was 18 percent greater than the 10-year average in Saskatchewan and 7 percent above the 10-year average in Manitoba.

Table 1 • Barley production in western Canada for 1997[1], 1996[1] and the 1988–97 average

	Seeded Area			Production		
	1997	1996	1988–97 average	1997	1996	1988–97 average
	(thousands of hectares)			(thousands of tonnes)		
Manitoba	567	627	555	1 633	2 112	1 525
Saskatchewan	1 821	1 902	1 531	4 463	5 356	3 771
Alberta[2]	2 308	2 391	2 096	6 483	7 155	6 108
Total	**4 696**	**4 920**	**4 183**	**12 579**	**14 623**	**11 404**

[1] Statistics Canada, *Field Crop Reporting Series*, No. 7, October 8, 1997
[2] Alberta figures include small amounts grown in British Columbia

Crop quality

No. 1 CW barley

Protein content of western Canadian barley was higher in all three prairie provinces in 1997 compared to last year and the five-year average, as shown in Table 2. The levels of lysine measured in 1997 barley were also higher than in 1996 for all three provinces. As well, the lysine contents of all western Canadian feed barley were above the 0.45% (dry matter basis) listed by the National Research Council (National Academy Press, Washington, D.C., 1988).

Table 2 also shows that barley test weights were lower in 1997 compared to 1996. However, test weights were still higher than the five-year average for Saskatchewan and Alberta and only slightly lower for Manitoba. Percentage of plump kernels showed a similar trend: all three prairie provinces showed lower percentages than last year but values were still significantly higher than the five-year average.

Fibre levels, both acid-detergent fibre (ADF) and neutral-detergent fibre (NDF), were significantly higher in both Saskatchewan and Alberta than those seen in 1996 barley and on average over the past five years. Manitoba barley from the 1997 harvest showed a decrease in fibre compared to 1996 but values were similar to the five-year average.

In summary, the feeding value of 1997 Canadian barley was lower than in 1996. Drought conditions at the end of July and in early August caused barley to mature early, resulting in inadequate filling of the grain, resulting in reduced test weight and kernel plumpness. Therefore, this year's barley had lower digestible energy but higher protein content. These factors translate into a slight reduction in feeding value, as feed grains are fed mainly as a source of energy.

Hulless barley

Interest in the use of hulless barley as a feed has continued to increase. At least 134 000 hectares of hulless barley were planted in 1997, according to the Canadian Wheat Board. This represents an increase of more than 10 percent over 1996. Demand for hulless barley in Canada has been mainly from feed mills and on-farm feed-mixers on the prairies. Most feed has been going to pigs.

Adhering hulls have become a greater concern. Experience has shown they lower feeding value. Standards have increased and the industry now demands grain with less than 5 percent adhering hulls if maximum premiums are to be paid.

The 1997 hulless barley survey showed an increase in the percentage of adhering hulls compared to the previous year. It is generally agreed that the thinner barley produced on the prairies in 1997 made threshing more difficult and thus contributed to the higher percentages of adhering hulls observed.

In 1997, for the first time, all samples of hulless barley were hulled before analysis. This was because of the high levels of adhering hulls observed on the samples received and because end-users of hulless barley are interested only in samples with low percentages of adhering hulls. Comparing the results in Tables 3 and 4 among years, therefore, should be done with caution, taking into account the percentage of adhering hulls listed for each of the years.

Table 3 and 4 show that protein and lysine values for 1997 hulless barley were higher than in 1996, partly as a result of the hulling of the samples and of the dry summer weather. Lysine values were all significantly higher than those reported for wheat, corn or covered barley by the National Research Council (National Academy Press, Washington, D.C., 1988). Test weights were up significantly over previous years, again largely as a result of the reduction in adhering hulls.

Table 2 • Quality of 1997 provincial composites of harvest survey No. 1 CW barley compared to previous years

Province	Year	Protein content[1] (N x 6.25)	Lysine content[1]	Test weight	Plump kernels[2]	ADF content[1,3]	NDF content[1,4]
		(%)	(%)	(kg/hl)	(%)	(%)	(%)
Manitoba	1997	12.7	0.47	63.2	84.0	4.8	13.5
	1996	11.8	0.46	64.6	85.8	5.2	13.9
	1993–97 average	11.9	NA	63.3	82.1	4.8	13.5
Saskatchewan	1997	11.8	0.47	65.3	87.4	4.6	13.6
	1996	11.2	0.45	66.7	88.1	4.4	12.8
	1993–97 average	11.4	NA	64.9	86.8	4.3	12.6
Alberta	1997	11.9	0.46	65.7	85.2	5.2	13.7
	1996	11.8	0.45	66.7	85.7	4.6	12.6
	1993-97 average	11.7	NA	65.3	84.4	4.6	12.9
Western	**1996**	**12.0**	**0.46**	**65.2**	**85.8**	**4.9**	**13.6**
Canada[5]	**1996**	**11.6**	**0.45**	**66.4**	**86.5**	**4.6**	**12.8**
	1993–97 average	**11.6**	**NA**	**64.9**	**84.8**	**4.5**	**12.9**

NA = not available
[1] dry matter basis
[2] over 6/64" sieve
[3] acid-detergent fibre
[4] neutral-detergent fibre
[5] weighted average of data from individual provinces

Table 3 • Quality of hulless barley by province for the three years 1995–97

Province	Year	Number of samples	Protein content[1] (N x 6.25)	Lysine content[1]	Test weight	Adhering hulls
			(%)	(%)	(kg/hl)	(%)
Manitoba	1997[2]	39	14.9	0.54	80.2	2.8
	1996	66	13.8	0.50	75.4	14.2
	1995	58	14.1	NA	73.6	16.0
Saskatchewan	1997	28	13.7	0.53	81.0	2.9
	1996	65	12.3	0.47	77.1	13.3
	1995	67	13.7	NA	75.0	18.2
Alberta	1997	22	14.1	0.52	80.7	6.0
	1996	32	12.9	0.50	78.5	10.6
	1995	80	13.6	NA	76.1	15.8
Western Canada[3]	**1997**	**89**	**14.3**	**0.53**	**80.6**	**3.6**
	1996	**163**	**13.0**	**0.49**	**76.7**	**13.1**
	1995	**205**	**13.8**	**NA**	**75.0**	**16.7**

NA = not available
[1] dry matter basis
[2] 1997 samples hulled before analysis
[3] weighted average of data from individual provinces

Table 4 • Quality of hulless barley by cultivar for the three years 1995–97

Cultivar	Year	Number of samples	Protein content[1] (N x 6.25)	Lysine content[1]	Test weight	Adhering hulls
			(%)	(%)	(kg/hl)	(%)
CDC Buck	1997[2]	4	13.6	0.50	81.4	5.5
	1996	14	11.8	0.43	78.4	11.9
	1995	44	12.8	NA	72.9	21.7
CDC Richard	1997	13	12.4	0.51	82.4	2.1
	1996	18	11.4	0.46	79.0	9.4
	1995	36	13.6	NA	75.6	16.2
Condor	1997	17	14.7	0.52	82.6	1.8
	1996	50	13.1	0.49	77.0	15.4
	1995	76	14.2	NA	75.8	17.5
Falcon	1997	35	14.9	0.56	81.0	1.2
	1996	64	13.6	0.51	76.7	9.8
	1995	47	14.4	NA	75.4	10.9
Phoenix	1997	6	14.2	0.55	80.3	1.0
	1996	8	12.4	0.47	78.1	12.7
CDC Silky	1997	12	14.9	0.56	80.0	5.7
	1996	7	13.5	0.47	65.7	35.3

NA = not available
[1] dry matter basis
[2] All 1997 samples hulled before analysis

Methods and definitions

Notes on the methods used at the Grain Research Laboratory for the collection of samples and for the quality tests on barley are given below.

Samples

Covered barley samples are submitted to the Grain Research Laboratory by individual producers from across western Canada. Only those qualifying for the Extra No. 1 and No. 1 CW barley grades are included in this survey. Provincial samples are composited in proportion to Statistics Canada's five-year average estimates of production for each crop district.

Hulless barley samples are composited by province and by cultivar based on samples received. Composited samples are hulled using a commercial de-awner.

Test weight

Test weight is determined using the Schopper Chondrometer equipped with the one-litre container. Results are reported on the sample as received (not dried before analysis) and are determined by dividing the weight of the grain in grams by 10.

Dockage and assortment

Dockage and assortment is assessed by passing samples through a Carter Dockage Tester equipped with a No. 6 riddle to remove foreign material and two slotted sieves to sort the barley. Plump barley is the material retained on the 6/64" x 3/4" (2.38 mm) slotted sieve.

Adhering hulls

Adhering hulls are determined by Industry Services on 25 g of clean barley. Kernels with adhering hulls are handpicked and weighed. Results are reported as a percentage by weight.

Protein content (N x 6.25)

Protein content by Combustion Nitrogen Analysis (CNA) is determined on a LECO Model FP-428 CNA analyser calibrated by EDTA. Samples are ground on a UDY Cyclone Sample Mill fitted with a 1.0-mm screen. A 200-mg sample is analysed as received (it is not dried before analysis). A moisture analysis is also performed and results are reported on a dry matter basis.

Lysine content

Lysine contents is determined by hydrolysing ground barley in hydrochloric acid (6 Normal) as described by Tkachuk and Irvine (1969), *Cereal Chemistry* 46:206–218. Analysis for amino acid content is carried out with a Beckman 7300 High Performance Analyzer, using a modified method of Spackman, Stein and Moore (1958), *Analytical Chemistry* 30:1190–1206.

Fibre analysis

Neutral-detergent fibre (NDF) is measured using a modified method of Mongeau and Brassard (1979), *Cereal Chemistry* 56:437–441. Acid-detergent fibre (ADF) is measured using a modified method of Van Soest (1973), *Journal of the Association of Official Analytical Chemists* 56:781–784. The major modification for both NDF and ADF determinations is the use of nylon bags instead of crucibles and a filtering manifold to separate the fibre from the detergent solutions.

Acknowledgments

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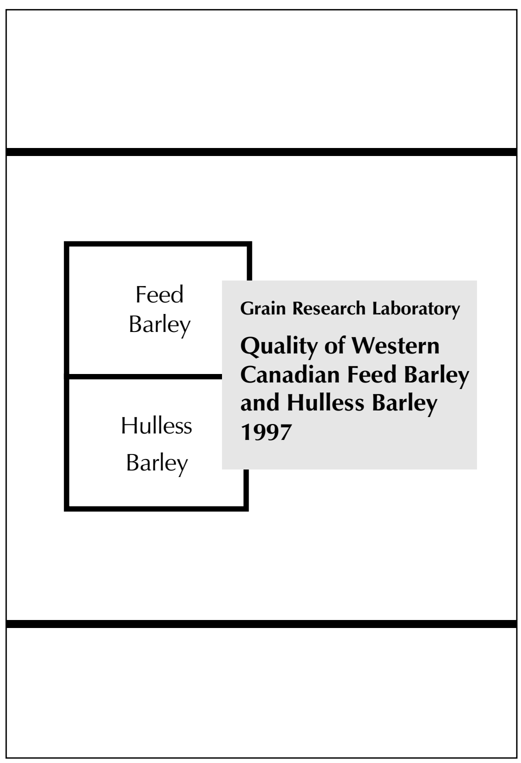
- Shirley Lowe, Christine Varnes and the Sample Processing Unit of the Grain Research Laboratory for technical assistance



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