

**Appendix 3**

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**Report on**

**β-glucan Analysis of Barley and Oat Foods**

**for the National Barley Foods Council**

## **$\beta$ -glucan Analysis of Barley and Oat Foods for the National Barley Foods Council**

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The National Barley Foods Council requested analysis of pearl barley foods from different regions of the U.S., from different growing years, and comparisons with barley and oat foods available in grocery stores. Three foods were suggested, pearl barley, steam-rolled flakes made from the pearl barley, and a sieved flour made from the pearl barley. These foods were also utilized in human clinical trials (Behall et al. 2003, Behall et al. 2004) conducted in 2001 and 2002 at the Beltsville Human Nutrition Research Center.

Total  $\beta$ -glucan was determined using AOAC Method No. 992.28 (AOAC 2000b) and enzymes purchased from Megazyme International Ireland Ltd. Moisture was determined using AOAC Method 925.10 (AOAC 2000a). Analyses were performed in duplicate at the Dept. of Food and Nutrition, North Dakota State University, Fargo, North Dakota as part of a grant, "Development of functional foods and ingredients from waxy hulless barley" funded by Castle Dome Foods, Yuma, AZ.

Samples of pearl barley were obtained in December, 2000, from Idaho and Minnesota, two of the top barley producing regions in the US. The sample from Idaho was identified as the two-row variety Crystal. The Minnesota sample was not identified by variety, but the predominate variety grown in the region is Robust, a six-row malting

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variety. Since the  $\beta$ -glucan content of the two varieties (Table 1) was so similar, 4.77% vs. 5.04%, the decision was made to procure the pearl barley from Minnesota since processing of the pearl barley into flakes and flour would take place in Minnesota. Subsequently, a portion of the selected Minnesota pearl barley was steam-rolled into flakes and a second portion was ground into flour at Minnesota Grain (East Grand Forks, MN). The  $\beta$ -glucan content of these products is similar to the pearl barley. The ground pearl barley was shipped to Midwest Custom Processing (Baldwin, WI) and sieved. The material that went through a US 30 screen (594 microns) but remained over a US 80 screen (178 microns) was called sieved flour and had a  $\beta$ -glucan content of 7.35%.

Several commercial barley and oat foods were purchased from grocery stores to compare  $\beta$ -glucan content of the manufactured foods with commercially available foods. The two pearl barley foods are manufactured by Quaker but distributed under different brand names. The Quaker brand was purchased in Fargo, ND and the Mothers Brand was purchased in Pensacola, FL. Both products had a  $\beta$ -glucan content of 5.65%. It is not known if this is coincidental or if Quaker has a specification for this level of  $\beta$ -glucan.

Both of the oat products were purchased in Fargo, ND. The Quaker brand had 4.12%  $\beta$ -glucan and the Flavorite brand had only 2.92%  $\beta$ -glucan. Both brands carried the health claim allowed for oats soluble fiber even though the Flavorite brand did not meet FDA specifications for rolled oats which stipulates a minimum  $\beta$ -glucan content of 4%.

A second batch of barley food products were manufactured in January, 2002. The  $\beta$ -glucan content of the pearl barley and flakes was slightly higher than those used in 2001 but the sieved flour had a lower  $\beta$ -glucan content than that made in 2001.

**Table 1.  $\beta$ -glucan content of barley food products for USDA clinical trials and commercial barley and oat checks.**

Product	Source	$\beta$ -glucan		Moisture %
		% (dwb)	g/40g serving	
<b>January, 2001</b>				
Pearl Barley	Wallace Pea & Grain Potlatch, Idaho	4.77	1.76	7.61
Pearl Barley	Minnesota Grain <sup>a</sup>	5.04	1.79	11.26
Pearl Barley Flakes	Minnesota Grain	4.92	1.74	11.57
Pearl Barley Flour	Minnesota Grain	5.01	1.79	10.65
Sieved Pearl Barley Flour	MCP <sup>b</sup> , Baldwin, WI	7.35	2.66	9.41
Mothers Quick Barley	Grocery store – Pensacola, FL	5.65	2.09	7.48
Quaker Medium Pearled Barley	Grocery store – Fargo, ND	5.65	2.07	8.41
Quaker Quick Oats	Grocery store – Fargo, ND	4.19	1.58	5.66
Flavorite Quick Oats	Grocery store – Fargo, ND	2.92	1.07	8.43
<b>January, 2002</b>				
Pearl barley - medium	Minnesota Grain	5.67	2.09	7.93
Barley Flake – cut	Minnesota Grain	5.40	1.94	9.96
Pearl barley – regular	Minnesota Grain	5.80	2.08	10.43
Pearl barley flour	Minnesota Grain	5.45	2.00	8.25
Sieved pearl barley flour	MCP, Baldwin, WI	7.73	2.79	9.86

<sup>a</sup>East Grand Forks, MN.

<sup>b</sup>MCP=Midwest Custom Processing

### Appendix 3 – References

AOAC (2000a). Method 925.10: Solids (Total) and Moisture in Flour. In *Official Methods of Analysis of AOAC International Vol. II*, 17<sup>th</sup> Edition, ed W. Horwitz. AOAC International, Gaithersburg, MD, p. 32.1.03.

AOAC (2000b). Method 992.28: (1→3)(1→4)-Beta-D-Glucans in oat and barley fractions and ready-to-eat cereals. In *Official Methods of Analysis of AOAC International Vol. II*, 17<sup>th</sup> Edition, ed W. Horwitz. AOAC International, Gaithersburg, MD, Chapter 32.2.06.

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