



Adding Value with Barley Flour

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The Beginning...









Traditional Food Barley Products

- Malted barley
- Barley flakes, grits, and flours
- Pot and pearled Barley
- Barley tea
- Shochu
- Tsampaa
- etc





... Hulless barley...





... The Food





Categories of barley from western Canada



What is Whole Grain?

Whole grains, or foods made from them, contain all the essential parts and naturally-occurring nutrients of the entire grain seed. If the grain has been processed (e.g., cracked, crushed, rolled, extruded, and/or cooked), the food product should deliver approximately the same rich balance of nutrients that are found in the original grain seed.

Whole Grains Council, May 2004, www.wholegrainscouncil.org/



Carbohydrates: Starch (58-64%) NSP (9-16%) • β-glucan (3-9%) • Arabinoxylan (3-9%)

Micronutrients: Vitamins, Minerals, Antioxidants (phenolic acids, lignans)

Whole Grain Barley

Lipids (2-3%)

Protein (8-15%)



Comparison of Nutritional Attributes of Whole Grain Flours

Nutrients	WG Wheat ¹	WG Barley ²
Calories, kcal	339	345 ¹
Carbohydrates, %	72.6	73.5
Soluble dietary fiber, %	0.5	4.6
Total dietary fiber, %	12.2	12.7
Protein, %	13.7	12.2

Source: ¹Canadian Nutrient File; ²CIGI Analytical Services



The Opportunity- Health Claim

- In May 2006 the US Dept of Agriculture (USDA) approved a barley health claim
- Manufacturers can make a health claim provided the food contains at least 0.75 grams of soluble fibre (β-glucan) per serving
- This recognition of barley nutritive value is resulting in increased interest in barley as an ingredient

Health Claim: "Soluble fibre from food, such as (Whole Grain Barley Bagel), as part of a diet low in saturated fat and cholesterol, may reduce the risk of heart disease. A serving of (one 95 g bagel) supplies (0.79) grams of the soluble fiber necessary per day to have this effect."



Health Benefits Associated with Whole Grains and Barley Soluble Fibre

- Type 2 diabetes risk reduced 21 30%
- Stroke risk reduced 30 36%
- Heart disease risk reduced 25 28%
- Reduces risk of cancer
- Healthier carotid arteries
- Reduction of inflammatory disease risk
- Can play a role in weight management
- Low glycemic index (GI)

Source: www.wholegrainscouncil.org/



Barley has it all

- Source of both soluble and insoluble dietary fiber
- High in β -glucan soluble fiber
- High in antioxidants
- Adapts to many growing environments





Comparison of Biochemistry of Whole Grain Barley Flour varieties

Variety	Starch Type (amylose- amylopectin ratio)	β -glucan (%)	Total Fibre (%)	Protein (%)
McGwire	Normal	4.3	12.7	10.6
Falcon	Normal	3.7	11.9	12.2
Millhouse	Normal	4.1	9.8	12.6
CDC Rattan	95% Waxy	5.5	12.0	12.0
CDC Fibar	100% Waxy	7.5	16.3	13.9



Functionality of barley in foods:

POSITIVES

- Increased water absorption
- Increased water retention in baked goods (improves density, texture, and volume)
- Increased product yield
- Nutty, wholesome flavour
- Standard processing equipment
- Increasing levels of research in food barley applications



Functionality of barley in foods:

NEGATIVES

- Barley lacks functional gluten proteins
- Supply of food barley is limited at this time
- Extent of knowledge of barley as a food is low
- Message is slow to be accepted



Absorption and moisture content comparison for bagels of varying levels of barley flour





Absorption and moisture content of baked goods with different whole grain barley flours





Nutritional Information 25% Whole Grain Barley Pasta

- 85 g
- 19 g whole grains
- 5 g TDF
- 1 g soluble fibre





Nutritional Information 30% Whole Grain Barley Bagel

- One bagel, 95 g
- 17 g whole grains
- 3 g TDF
- 1 g soluble fibre





Nutritional Information 30% Whole Grain Barley Bread

- 2 slices, 75 g
- 12 g whole grains
- 2 g TDF
- 0.5 g soluble fibre





40% WG Barley Sourdough Artisan Bread





Nutritional Information 50% Whole Grain Barley Tortilla

- One tortilla, 60 g
- 20 g whole grains
- 3 g TDF
- 1 g soluble fibre





Nutritional Information 50% Whole Grain Barley Pita

- One pita, 60 g
- 19 g whole grains
- 3 g TDF
- 1 g soluble fibre





Nutritional Information 100% Whole Grain Barley Cereal

- 1 cup, 30 g
- 28 g whole grains
- 3.5 g TDF
- 1.2 g β-glucan soluble fibre
- 3 g protein





Commercial Products





So.....

- Whole Grain Barley flour is a nutritionally advanced product that is a good answer to increasing healthy food in the diet
- Barley is still at an early stage of acceptance as a food ingredient
- Barley flour can be added into many products and is a sensible addition based on nutrition
- Barley flour is easy to produce and provides functional benefits when added to food products



Barley as a healthy ingredient – milling technology

- Barley can be easily milled and incorporated into foods such as breads, pasta, noodles and breakfast cereals at relatively high inclusion rates
- Barley can be successfully milled on conventional wheat milling equipment







Cleaning

- Disc separators or indented cylinders require attention to ensure proper separation or loss
- Hulls are completely removed and aspirated away through the scourer
- Utilize a color sorter in the flow to remove any discolored kernels



Kernel hardness and tempering

Varieties	Туре	Amylose %	β -glucan %	Kernel hardness
Millhouse, CDC McGwire	Regular (normal starch)	20.0 – 30.0	4.0-5.0	Hard
CDC Candle, CDC Rattan	Low amylose (waxy)	<5.0	6.0-7.0	Soft
CDC Fibar	Zero amylose (waxy)	0	9.0-10.0	Very soft



Hulless Barley Hulless Waxy Hulled barley Barley





Comparative steps in milling wheat & barley

System	Wheat flour milling	Barley flour milling
Break passages	4	4
Reduction passages	8	4
Purification passages	2	1
		(used only as a carrier)
Bran duster	1	1
Shorts duster	1	1



Additional process changes & results expected from milling wheat & barley

System	Wheat flour milling	Hulless barley flour milling	
		Regular starch	Waxy starch
Throughput, %	100	75	60
Flour screens, nylons (N) or wire (W)	9 N – 13 N	100 W	60 W – 100 W
Expected flour yield, %	74 - 76	71 - 75	63 – 67
Expected flour granulations	99%<132um	60%<132um	55%<132um



