

PULSE FLOURS



Nutritional Advantages

- Fiber
- Protein
- Folate and B vitamins
- Iron, zinc and other minerals
- Polyphenolic antioxidants
- Gluten-free
- Low fat
- No trans fat

Food Applications

- Cakes, muffins and cookies
- Bread
- Pasta and noodles
- Bagels and tortillas
- Crackers
- Extruded snacks
- Low-fat meat products

Recent Food Innovations with Pulse Flours

- Extruded snacks and pasta that demonstrate excellent expansion properties of pulse flours
- Pasta made with pulse/wheat flour blends for a more balanced protein
- High protein, high fiber snacks using pulse/wheat blends
- Breadings for meats made with pulse flours that resulted in increased crispness, more golden color and increased total dietary fiber
- Low-fat meat applications using pulse flours as extenders to improve texture
- Gluten-free crackers made with chickpea flour with improved nutritional value compared to existing cracker products

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Summary of Food Applications Using Pulse Flours

Food Product	Pulse Flour	References
Baked products including cake, cookies, muffins	Bean	Canadian International Grains Institute (unpublished data, 2008)
	Pea	Piteira, Maia, Raymundo & Sousa (2006); Canadian International Grains Institute (unpublished data, 2008)
	Chickpea	Gómez, Oliete, Rosell, Pando & Fernández (2008)
Bread	Chickpea	Dalgetty & Baik (2006); Utrilla-Coello, Osorio-Díaz & Bello-Pérez (2008)
	Lentil	Dalgetty & Baik (2006)
Tortillas	Pea	Wang, Rosell & Benedito de Barber (2002); Gómez, Ronda, Blanco, Caballero & Apesteguía (2003); Dalgetty & Baik (2006); Rosell, Santos & Collar (2006); Collar, Santos & Rosell (2006, 2007); Canadian International Grains Institute (unpublished data, 2008)
	Bean	Anton, Lukow, Fulcher, Arntfield (2009); Anton, Ross, Lukow, Fulcher, Arntfield (2007); Canadian International Grains Institute (unpublished data, 2008)
Pasta	Pea	Tudorica, Kuri & Brennan (2002); Canadian International Grains Institute (unpublished data, 2008); Zhao, Manthey, Chang, Hou & Yuan (2005)
	Bean	Bahnassey, Khan & Harrold (1986); Canadian International Grains Institute (unpublished data, 2008)
	Chickpea	Zhao, Manthey, Chang, Hou & Yuan (2005); Han, Malcolmson, Tyler (unpublished data, 2006)
Crackers	Lentil	Zhao, Manthey, Chang, Hou & Yuan (2005)
	Pea, chickpea, bean	Han et al (2009)
Extruded snacks	Pea	Canadian International Grains Institute (unpublished data, 2008)
	Bean	Anton, Luciano, Maskus (2008); Canadian International Grains Institute (unpublished data, 2008)
	Chickpea	Meng et al (2009)
Low-fat bologna	Chickpea	Sanjeewa, Wanasundara & Shand (2008)
	Pea	Pietrasik et al (2009)
Low-fat beef patties	Pea	Anderson & Berry (2000)
Low-fat sausages	Pea	Kaack & Pedersen (2005)
	Pea, Chickpea	Pietrasik et al (unpublished data, 2008)
Minced fish	Pea	Cardoso, Mendes & Nunes (2008)
Beverages, salad dressings, yogurts, desserts	Pea, Chickpea, Lentil	Boye et al (unpublished data, 2008)

Nutritional Analysis of Select Pulse Flours

	Whole Yellow Pea Flour	Navy Bean Flour	Black Bean Flour	Pinto Bean Flour	Wheat Flour ¹	Rice Flour ¹	Soy Flour ¹
Calories, /100 g	306	356	360	357	362	366	372
Total Fat, %	1.8	1.9	2.4	2.1	1.38	1.42	8.9
Carbohydrates, Total, %	66	61	64	61	72	80	31
Total Dietary Fiber, %	17.6	21.0	18.0	17.5	2.4	2.4	16.0
Insoluble Fiber, %	15.6	18.0	14.0	13.0	n/a	n/a	n/a
Soluble Fiber, %	2.0	3.0	3.9	4.2	n/a	n/a	n/a
Protein (N x 6.25), %	21.6	23.7	20.5	23.1	13.1	5.95	49.8
Moisture, %	7.7	9.7	9.2	9.7	12.8	11.9	4.61
Ash, %	2.5	3.6	3.7	3.7	0.53	0.61	6.04

¹ USDA Nutrient Database. Values for Wheat flour, white (industrial), 13% protein, bleached, enriched; Rice flour, white; Soy flour, defatted, crude protein basis (N x 6.25)

Starch Properties of Select Pulse Flours²

	Whole Yellow Pea Flour	Whole Green Pea Flour	Navy Bean Flour		Black Bean Flour		Pinto Bean Flour	
			Raw	Precooked	Raw	Precooked	Raw	Precooked
Total starch, %	43.3	51.5	33.3	36.9	38.3	34.3	37.0	34.6
Amylose, %	10.0	13.0	9.3	10.9	9.2	9.6	10.5	8.6
Rapidly Digestible Starch, %	7.4	8.7	1.0	2.0	0.9	3.7	1.3	4.3
Slowly Digestible Starch, %	35.4	36.4	2.4	2.1	3.9	3.8	1.9	3.7
Resistant Starch, %	0.5	6.4	29.8	32.8	33.5	28.9	33.8	26.4

² Liu, Q. (unpublished data, 2008). Values represent % total flour

RVA Pasting Profile for Pea Flours³

RVA Values	Pea flours			
	Whole Yellow	Split Yellow	Whole Green	Split Green
Peak Viscosity	128	181	70	163
Hot Paste Viscosity	114	169	65	149
Breakdown	14.0	12.5	5.5	14.5
Final Viscosity	158	317	107	288
Setback	44	149	42	139

RVA Pasting Profile for Bean Flours³

RVA Values	Pre-cooked					Raw				
	Navy	Black	Dark Red	Light Red	Great Northern	Navy	Black	Dark Red	Light Red	Great Northern
Peak Viscosity	126	49	101	75	143	125	169	153	140	159
Hot Paste Viscosity	119	41	90	68	140	120	153	146	134	155
Breakdown	7	8	11	7	3	5	16	7	6	4
Final Viscosity	213	122	165	148	235	199	276	266	241	270
Setback	94	81	76	80	95	79	122	120	107	115

³ Canadian International Grains Institute (unpublished data, 2008)

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Functional Properties of Pea Flours³

	Pea flours			
	Whole Yellow	Split Yellow	Whole Green	Split Green
Water abs capacity (g water/g fl)	1.77	1.65	2.57	1.23
Oil abs capacity (g oil/g fl)	1.64	1.53	1.60	1.52
Emulsifying activity (%)	67	78	80	90
Emulsion stability (%)	50	62	53	56
Foam capacity (vol. increase, %)	37	31	50	35
Foam stability (% of init. foam vol)				
10 min	89	85	65	93
20 min	63	83	52	89
30 min	43	78	40	84
60 min	37	66	30	70
120 min	33	61	27	61



Functional properties of Bean Flours³

	Pre-cooked Flours					Raw Flours				
	Navy	Black	Dark Red	Light Red	Great Northern	Navy	Black	Dark Red	Light Red	Great Northern
Water abs capacity ⁴	1.82	1.89	2.14	1.63	1.62	1.68	1.87	2.39	2.24	1.91
Oil abs capacity ⁴	1.07	1.17	1.14	1.16	1.16	1.23	1.16	1.23	1.16	1.21
Emulsifying activity (%)	61	55	57	52	56	54	56	55	57	58
Emulsion stability (%)	8	0	38	23	87	95	52	73	71	78
Foam capacity ⁴	25	25	31	29	21	58	68	64	49	50
Foam stability (% of init. foam vol)										
10 min	71	47	73	71	82	80	65	84	86	76
20 min	53	35	59	52	74	76	64	79	71	70
30 min	47	26	45	43	65	70	55	72	71	66
60 min	29	12	27	33	53	63	45	63	59	47
120 min	15	6	23	24	47	49	35	47	50	37

³ Canadian International Grains Institute (unpublished data, 2008); ⁴ Values for water abs capacity are represented as g water/g fl; values for oil abs capacity are represented as g oil/g fl; values for foam capacity are represented as vol increase, %.

... HIGH QUALITY CANADIAN INGREDIENTS www.pulsecanada.com

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This material was funded under the Growing Forward programs of Agriculture and Agri-Food Canada.