

Canadian Pulse Nutrient Profiles: Analysis Methodology

Pooled samples of the top three varieties of peas, lentils and chickpeas produced in Canada between 2010 and 2013 were obtained from the Crop Development Centre in Saskatoon, SK and analyzed for nutritional composition between September and December, 2013. Pooled bean samples were provided by Viterra and analyzed in 2014.

The dehulling and splitting activities for large green and small red lentils and green and yellow peas took place at the Canadian International Grains Institute in Winnipeg, MB. The nutritional analysis was performed by Merieux NutriSciences (formerly known as Silliker Laboratories) in Mississauga, ON. All pulse samples were tested in both their raw and cooked forms. The cooking protocol followed a standardized procedure developed by the Canadian International Grains Institute. Whole peas, chickpeas, and beans were soaked in deionized water at a ratio of 1:4 (seed to water) for 16 hours at room temperature. Split green peas, split yellow peas, whole green lentils and split red lentils were not soaked prior to cooking. Pulses were cooked in deionized water at a ratio of 1:5 (seed to water). Cooking times for the different pulses are listed below:

Pulse Type	Cooking Time (min)
Split green pea	34.0
Split yellow pea	37.0
Whole green lentil	26.0
Split red lentil	12.0
Chickpea	22.7
Navy bean	18.6
Pinto bean	19.2
Red kidney bean	24.5
Black bean	18.5

All pulse samples were analyzed for the following nutrients: Ash, Protein, Total Fat, Saturated Fat, Trans Fat, Carbohydrate, Sugars, Energy, Total Fibre, Soluble Fibre, Insoluble Fibre, Cholesterol, Sodium, Vitamin A, Vitamin C, Iron, Potassium, Calcium, Folate, Phosphorous, Magnesium, Zinc and Selenium.

Pulse Nutrition Information

Pulse Type: Red Lentil

Format: Small, Whole Seed, Raw

Nutrient	Units	Value (per 100g) ¹	Reference
Energy ²	Cal	321	General Atwater factors, USDA Handbook No.74; Health Canada, 2012; CFR101.9(c)(1)(i)(C)
Protein ³	g	25.29	AOAC 992.23
Fat, total	g	1.28	AOAC 996.06
Fat, saturated	g	0.31	AOAC 996.06
Fat, <i>trans</i>	g	<0.01	AOAC 996.06
Fat, monounsaturated	g	0.28	AOAC 996.06
Fat, polyunsaturated	g	0.62	AOAC 996.06
<i>Omega 6</i>	g	0.49	AOAC 996.06
<i>Omega 3</i>	g	0.13	AOAC 996.06
Carbohydrate, total	g	62.6	Calculated by difference
Sugars, total	g	1.2	AOAC 982.14
Fibre, total dietary	g	21.0	AOAC 2011.25
<i>Soluble</i>	g	4.5	AOAC 2011.25
<i>Insoluble</i>	g	16.5	AOAC 2011.25
Ash	g	1.8	AOAC 925.51A
Moisture	g	9.05	AOAC 926.08
Sodium	mg	10.2	AOAC 984.27
Potassium	mg	988	AOAC 984.27
Calcium	mg	68.1	AOAC 984.27
Iron	mg	7.0	AOAC 984.27
Phosphorus	mg	373	AOAC 984.27
Magnesium	mg	111.0	AOAC 984.27
Zinc	mg	3.27	AOAC 984.27
Selenium	ppm	0.9	EPA 3050/6020 USP730
Folate	mcg	97.0	AOAC 944.12
Vitamin A	RE	<20	AOAC 2001.13
Vitamin C	mg	5.7	AOAC 984.26

Code: L11

Notes:

¹ Source of Data: Analyses conducted by Mérieux NutriSciences, 2014

² Energy calculated: [(4 Cal/g x g protein) + (4 Cal/g x (g carbohydrates - g total fibre))] + (9 Cal/g x g fat) + (2 Cal/g x g total fibre)

³ Nitrogen to Protein Conversion Factor: 6.25

Pulse Nutrition Information

Pulse Type: Red Lentil

Format: Small, Whole Seed, Boiled

Nutrient	Units	Value (per 100g) ¹	Reference
Energy ²	Cal	134	General Atwater factors, USDA Handbook No.74; Health Canada, 2012; CFR101.9(c)(1)(i)(C)
Protein ³	g	11.42	AOAC 992.23
Fat, total	g	0.45	AOAC 996.06
Fat, saturated	g	0.13	AOAC 996.06
Fat, <i>trans</i>	g	<0.01	AOAC 996.06
Fat, monounsaturated	g	0.10	AOAC 996.06
Fat, polyunsaturated	g	0.20	AOAC 996.06
<i>Omega 6</i>	g	0.16	AOAC 996.06
<i>Omega 3</i>	g	0.04	AOAC 996.06
Carbohydrate, total	g	24.9	Calculated by difference
Sugars, total	g	0.3	AOAC 982.14
Fibre, total dietary	g	7.7	AOAC 2011.25
<i>Soluble</i>	g	2.3	AOAC 2011.25
<i>Insoluble</i>	g	5.4	AOAC 2011.25
Ash	g	0.3	AOAC 925.51A
Moisture	g	62.88	AOAC 926.08
Sodium	mg	3.2	AOAC 984.27
Potassium	mg	307	AOAC 984.27
Calcium	mg	27.5	AOAC 984.27
Iron	mg	2.7	AOAC 984.27
Phosphorus	mg	149	AOAC 984.27
Magnesium	mg	39.4	AOAC 984.27
Zinc	mg	1.35	AOAC 984.27
Selenium	ppm	0.4	EPA 3050/6020 USP730
Folate	mcg	40.7	AOAC 944.12
Vitamin A	RE	<20	AOAC 2001.13
Vitamin C	mg	<1	AOAC 984.26

Code: L14

Notes:

¹ Source of Data: Analyses conducted by Mérieux NutriSciences, 2014

² Energy calculated: [(4 Cal/g x g protein) + (4 Cal/g x (g carbohydrates - g total fibre))] + (9 Cal/g x g fat) + (2 Cal/g x g total fibre)

³ Nitrogen to Protein Conversion Factor: 6.25

Pulse Nutrition Information

Pulse Type: Red Lentil

Format: Small, Dehulled Seed, Split, Raw

Nutrient	Units	Value (per 100g) ¹	Reference
Energy ²	Cal	320	General Atwater factors, USDA Handbook No.74; Health Canada, 2012; CFR101.9(c)(1)(i)(C)
Protein ³	g	27.36	AOAC 992.23
Fat, total	g	1.14	AOAC 996.06
Fat, saturated	g	0.31	AOAC 996.06
Fat, <i>trans</i>	g	<0.01	AOAC 996.06
Fat, monounsaturated	g	0.24	AOAC 996.06
Fat, polyunsaturated	g	0.54	AOAC 996.06
<i>Omega 6</i>	g	0.43	AOAC 996.06
<i>Omega 3</i>	g	0.11	AOAC 996.06
Carbohydrate, total	g	60.2	Calculated by difference
Sugars, total	g	1.2	AOAC 982.14
Fibre, total dietary	g	20.5	AOAC 2011.25
<i>Soluble</i>	g	6.5	AOAC 2011.25
<i>Insoluble</i>	g	14.0	AOAC 2011.25
Ash	g	2.4	AOAC 925.51A
Moisture	g	8.93	AOAC 926.08
Sodium	mg	5.7	AOAC 984.27
Potassium	mg	1010	AOAC 984.27
Calcium	mg	25.8	AOAC 984.27
Iron	mg	6.2	AOAC 984.27
Phosphorus	mg	375	AOAC 984.27
Magnesium	mg	84.4	AOAC 984.27
Zinc	mg	3.15	AOAC 984.27
Selenium	ppm	0.9	EPA 3050/6020 USP730
Folate	mcg	108	AOAC 944.12
Vitamin A	RE	<20	AOAC 2001.13
Vitamin C	mg	5.8	AOAC 984.26

Code: L13

Notes:

¹ Source of Data: Analyses conducted by Mérieux NutriSciences, 2014

² Energy calculated: [(4 Cal/g x g protein) + (4 Cal/g x (g carbohydrates - g total fibre))] + (9 Cal/g x g fat) + (2 Cal/g x g total fibre)

³ Nitrogen to Protein Conversion Factor: 6.25

Pulse Nutrition Information

Pulse Type: Red Lentil

Format: Small, Dehulled, Split Seed, Boiled

Nutrient	Units	Value (per 100g) ¹	Reference
Energy ²	Cal	113	General Atwater factors, USDA Handbook No.74; Health Canada, 2012; CFR101.9(c)(1)(i)(C)
Protein ³	g	9.47	AOAC 992.23
Fat, total	g	0.46	AOAC 996.06
Fat, saturated	g	0.11	AOAC 996.06
Fat, <i>trans</i>	g	<0.01	AOAC 996.06
Fat, monounsaturated	g	0.10	AOAC 996.06
Fat, polyunsaturated	g	0.23	AOAC 996.06
<i>Omega 6</i>	g	0.18	AOAC 996.06
<i>Omega 3</i>	g	0.05	AOAC 996.06
Carbohydrate, total	g	19.5	Calculated by difference
Sugars, total	g	0.2	AOAC 982.14
Fibre, total dietary	g	3.4	AOAC 2011.25
<i>Soluble</i>	g	1.7	AOAC 2011.25
<i>Insoluble</i>	g	1.7	AOAC 2011.25
Ash	g	0.2	AOAC 925.51A
Moisture	g	70.31	AOAC 926.08
Sodium	mg	4.0	AOAC 984.27
Potassium	mg	216	AOAC 984.27
Calcium	mg	9.8	AOAC 984.27
Iron	mg	2.1	AOAC 984.27
Phosphorus	mg	112	AOAC 984.27
Magnesium	mg	23.0	AOAC 984.27
Zinc	mg	1.08	AOAC 984.27
Selenium	ppm	0.3	EPA 3050/6020 USP730
Folate	mcg	43.2	AOAC 944.12
Vitamin A	RE	<20	AOAC 2001.13
Vitamin C	mg	<1	AOAC 984.26

Code: L16

Notes:

¹ Source of Data: Analyses conducted by Mérieux NutriSciences, 2014

² Energy calculated: [(4 Cal/g x g protein) + (4 Cal/g x (g carbohydrates - g total fibre))] + (9 Cal/g x g fat) + (2 Cal/g x g total fibre)

³ Nitrogen to Protein Conversion Factor: 6.25

Pulse Nutrition Information

Pulse Type: Red Lentil

Format: Extra Small, Whole Seed, Raw

Nutrient	Units	Value (per 100g) ¹	Reference
Energy ²	Cal	308	General Atwater factors, USDA Handbook No.74; Health Canada, 2012; CFR101.9(c)(1)(i)(C)
Protein ³	g	25.09	AOAC 992.23
Fat, total	g	1.25	AOAC 996.06
Fat, saturated	g	0.33	AOAC 996.06
Fat, <i>trans</i>	g	<0.01	AOAC 996.06
Fat, monounsaturated	g	0.28	AOAC 996.06
Fat, polyunsaturated	g	0.58	AOAC 996.06
<i>Omega 6</i>	g	0.46	AOAC 996.06
<i>Omega 3</i>	g	0.12	AOAC 996.06
Carbohydrate, total	g	62.5	Calculated by difference
Sugars, total	g	1.4	AOAC 982.14
Fibre, total dietary	g	26.6	AOAC 2011.25
<i>Soluble</i>	g	6.8	AOAC 2011.25
<i>Insoluble</i>	g	19.8	AOAC 2011.25
Ash	g	2.2	AOAC 925.51A
Moisture	g	8.99	AOAC 926.08
Sodium	mg	10.5	AOAC 984.27
Potassium	mg	867	AOAC 984.27
Calcium	mg	60.1	AOAC 984.27
Iron	mg	5.2	AOAC 984.27
Phosphorus	mg	289	AOAC 984.27
Magnesium	mg	93.9	AOAC 984.27
Zinc	mg	2.10	AOAC 984.27
Selenium	ppm	0.6	EPA 3050/6020 USP730
Folate	mcg	122	AOAC 944.12
Vitamin A	RE	6.0	AOAC 2001.13
Vitamin C	mg	9.9	AOAC 984.26

Code: L12

Notes:

¹ Source of Data: Analyses conducted by Mérieux NutriSciences, 2014

² Energy calculated: [(4 Cal/g x g protein) + (4 Cal/g x (g carbohydrates - g total fibre))] + (9 Cal/g x g fat) + (2 Cal/g x g total fibre)

³ Nitrogen to Protein Conversion Factor: 6.25

Pulse Nutrition Information

Pulse Type: Red Lentil

Format: Extra Small, Whole Seed, Boiled

Nutrient	Units	Value (per 100g) ¹	Reference
Energy ²	Cal	150	General Atwater factors, USDA Handbook No.74; Health Canada, 2012; CFR101.9(c)(1)(i)(C)
Protein ³	g	11.54	AOAC 992.23
Fat, total	g	0.50	AOAC 996.06
Fat, saturated	g	0.16	AOAC 996.06
Fat, <i>trans</i>	g	<0.01	AOAC 996.06
Fat, monounsaturated	g	0.10	AOAC 996.06
Fat, polyunsaturated	g	0.21	AOAC 996.06
<i>Omega 6</i>	g	0.17	AOAC 996.06
<i>Omega 3</i>	g	0.04	AOAC 996.06
Carbohydrate, total	g	29.2	Calculated by difference
Sugars, total	g	0.3	AOAC 982.14
Fibre, total dietary	g	8.9	AOAC 2011.25
<i>Soluble</i>	g	2.3	AOAC 2011.25
<i>Insoluble</i>	g	6.6	AOAC 2011.25
Ash	g	0.4	AOAC 925.51A
Moisture	g	58.35	AOAC 926.08
Sodium	mg	10.1	AOAC 984.27
Potassium	mg	250	AOAC 984.27
Calcium	mg	28.1	AOAC 984.27
Iron	mg	2.4	AOAC 984.27
Phosphorus	mg	127	AOAC 984.27
Magnesium	mg	35.1	AOAC 984.27
Zinc	mg	0.97	AOAC 984.27
Selenium	ppm	0.2	EPA 3050/6020 USP730
Folate	mcg	43.9	AOAC 944.12
Vitamin A	RE	<20	AOAC 2001.13
Vitamin C	mg	<1	AOAC 984.26

Code: L15

Notes:

¹ Source of Data: Analyses conducted by Mérieux NutriSciences, 2014

² Energy calculated: [(4 Cal/g x g protein) + (4 Cal/g x (g carbohydrates - g total fibre))] + (9 Cal/g x g fat) + (2 Cal/g x g total fibre)

³ Nitrogen to Protein Conversion Factor: 6.25