

The Chemical Composition and Nutritive Value of Canadian Pulses

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Field Pea (*Pisum sativum*)

Table 1. Proximate and mineral composition of Canadian field peas

	Canadian field peas			Australian field peas	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	23.7	20.2 – 27.4	48	23.2	19.3 – 27.3
Starch	45.5	41.6 – 49.0	48	NA ^b	NA
Amylose (% of total starch)	25.6	20.7 – 33.7	48	NA	NA
ADF ^a	7.0	5.8 – 8.7	48	9.3	7.6 – 17.6
NDF ^a	9.6	8.4 – 11.2	48	13.3	7.1 – 24.5
Fat	1.3	1.0 – 1.7	48	1.1	0.7 – 2.4
Ash	2.8	2.3 – 3.4	48	2.5	2.1 – 3.3
Minerals (mg/100 g dry matter)					
Calcium (Ca)	82.3	59.6 – 106.9	48	70.0	50.0 – 110.0
Copper (Cu)	0.7	0.5 – 0.9	48	0.6	0.4 – 0.8
Iron (Fe)	5.6	4.1 – 7.9	48	5.3	3.5 – 9.0
Potassium (K)	1047.2	687.4 – 1473.2	48	820.0	200.0 – 1100.0
Magnesium (Mg)	142.4	115.4 – 172.3	48	120.0	100.0 – 150.0
Manganese (Mn)	1.2	0.2 – 2.4	48	1.6	0.8 – 5.6
Phosphorus (P)	436.7	226.5 – 950.5	48	400.0	260.0 – 850.0
Zinc (Zn)	3.9	2.5 – 6.4	48	3.0	1.7 – 4.6

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 2. Amino acid composition of Canadian field peas

Amino acid (g/16 g N)	Canadian field peas			Australian field peas	
	Mean	Range	Number	Mean	Range
Alanine	4.1	3.8 – 4.6	48	4.0	2.8 – 4.6
Arginine	8.5	6.8 – 12.6	48	10.1	6.5 – 12.3
Aspartic Acid	12.5	10.4 – 14.8	48	10.3	7.3 – 12.3
Cystine	1.2	1.0 – 1.9	48	1.5	1.1 – 1.9
Glutamic Acid	15.6	14.1 – 17.6	48	16.1	11.0 – 20.0
Glycine	4.3	3.6 – 5.2	48	4.1	3.2 – 4.8
Histidine	2.3	1.9 – 2.9	48	2.4	1.4 – 2.9
Isoleucine	3.3	2.4 – 4.4	48	3.9	2.9 – 4.8
Leucine	6.5	5.3 – 7.4	48	6.6	5.1 – 7.8
Lysine	6.3	3.9 – 7.6	48	6.9	4.3 – 8.3
Methionine	1.1	0.9 – 1.4	48	0.9	0.4 – 1.2
Phenylalanine	4.4	3.1 – 5.0	48	4.2	2.9 – 5.2
Proline	4.8	4.0 – 6.9	48	4.1	3.5 – 4.7
Serine	5.6	5.0 – 6.2	48	4.3	2.1 – 5.3
Threonine	4.4	3.8 – 5.1	48	3.4	1.9 – 4.1
Tryptophan	0.8	0.7 – 0.9	48	0.8	0.6 – 0.9
Tyrosine	2.9	1.7 – 4.1	48	2.9	2.0 – 4.1
Valine	4.0	3.2 – 5.0	48	4.3	2.9 – 5.4
Cys + Met	2.3	1.9 – 5.0	48	2.5	1.9 – 3.1
Tyr + Phe	7.2	6.1 – 8.7	48	7.1	4.9 – 9.2

Table 3. Vitamins in Canadian field peas

Vitamin (mg/100 g)	Canadian field peas			Australian field peas	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	32	NA ^b	NA
C	0.55	0.28 – 0.96	32	NA	NA
D	ND	ND	32	NA	NA
Thiamin (B1)	0.51	0.34 – 0.98	32	NA	NA
Riboflavin (B2)	0.18	0.12 – 0.40	32	NA	NA
Niacin (B3)	1.55	0.85 – 2.29	32	NA	NA
Panthenic acid (B5)	1.18	0.72 – 2.98	32	NA	NA
Pyridoxine (B6)	0.05	0.01 – 0.10	32	NA	NA
Cyanocobalamin (B12)	ND	ND	32	NA	NA
Biotin	ND	ND	32	NA	NA
γ-tocopherol	6.89	5.28 – 8.51	32	NA	NA
α-tocopherol	0.01	0.00 – 0.16	32	NA	NA
Folic acid (μg/100 g)	ND	ND	32	NA	NA

^aND=not detectable.

^bNA=not available.

Table 4. Fatty acid composition of Canadian field peas

Fatty acid (% in oil)	Canadian field peas			Australian field peas	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	48	NA	NA
Myristic (C14:0)	0.42	0.30 – 0.67	48	0.33	0.30 – 0.40
Palmitic (C16:0)	10.30	8.57 – 12.73	48	12.48	10.20 – 15.00
Palmitoleic (C16:1)	0.18	0.00 – 0.45	48	NA ^b	NA
Stearic (C18:0)	3.29	2.39 – 5.27	48	1.17	0.70 – 4.00
Oleic (C18:1)	23.22	17.83 – 30.43	48	25.12	20.20 – 29.70
Linoleic (C18:2)	45.63	40.55 – 52.44	48	42.27	25.00 – 52.20
Linolenic (C18:3)	13.69	10.25 – 17.15	48	9.68	7.90 – 11.80
Arachidic (C20:0)	0.79	0.50 – 1.19	48	0.66	0.60 – 0.70
Gadoleic (C20:1)	0.62	0.48 – 0.84	48	0.48	0.40 – 0.60
Eicosadienoic (C20:2)	0.17	0.00 – 0.64	48	NA	NA
Behenic (C22:0)	0.25	0.00 – 0.38	48	0.30	0.30 – 0.30
Erucic (C22:1)	0.24	0.13 – 0.45	48	0.24	0.20 – 0.30
Lignoceric (C24:0)	0.33	0.21 – 0.51	48	0.23	0.20 – 0.30
Nervonic (C24:1)	0.01	0.00 – 0.14	48	NA	NA

^aND=not detectable.

^bNA=not available.

Table 5. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian field peas

	Canadian field peas			Australian field peas	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	2.8	2.1 – 4.3	48	NA ^d	NA
Raffinose	0.7	0.5 – 0.9	48	NA	NA
Stachyose	2.7	1.9 – 3.9	48	NA	NA
Verbascope	1.0	0.5 – 1.5	48	NA	NA
Oligosaccharides ^a	4.4	3.5 – 5.5	48	3.5	2.4 – 5.8
Phytic acid (g/100 g dry matter)	0.79	0.30 – 1.30	48	0.59	0.22 – 0.99
Tannins (g/100 g dry matter)	ND ^c	ND	48	0.02	0.01 – 1.10
TIA (mg/g dry matter) ^b	2.2	1.52 – 2.79	48	1.3	0.40 – 2.10

^aSum of raffinose, stachyose and verbascope.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Lentil (*Lens culinaris*)

Table 6. Proximate and mineral composition of Canadian green lentils

	Canadian green lentils			Australian green lentils	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	26.3	21.3 – 30.2	36	24.0	19.8 – 28.0
Starch	45.0	41.9 – 48.5	36	NA ^b	NA
Amylose (% of total starch)	25.4	22.5 – 27.4	36	NA	NA
ADF ^a	5.5	4.5 – 7.4	36	6.0	4.0 – 7.0
NDF ^a	8.1	7.0 – 9.5	36	18.0	13.5 – 22.6
Fat	1.1	1.0 – 1.3	36	0.9	0.3 – 1.3
Ash	2.8	2.3 – 3.5	36	2.2	1.0 – 3.4
Minerals (mg/100 g dry matter)					
Calcium (Ca)	77.2	48.4 – 97.0	36	60.0	10.0 – 80.0
Copper (Cu)	1.0	0.7 – 1.3	36	0.7	0.4 – 0.8
Iron (Fe)	7.6	5.4 – 11.4	36	65.4	4.3 – 341.5
Potassium (K)	964.7	550.8 – 1286.5	36	830.0	720.0 – 920.0
Magnesium (Mg)	126.8	104.1 – 167.1	36	90.0	70.0 – 90.0
Manganese (Mn)	1.6	0.6 – 2.9	36	1.6	1.2 – 1.9
Phosphorus (P)	455.8	260.3 – 725.8	36	320.0	240.0 – 380.0
Zinc (Zn)	3.9	2.9 – 5.9	36	3.3	2.6 – 4.2

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 7. Amino acid composition of Canadian green lentils

Amino acid (g/16 g N)	Canadian green lentils			Australian lentils	
	Mean	Range	Number	Mean	Range
Alanine	3.9	3.6 – 4.3	36	3.4	2.6 – 4.1
Arginine	7.4	6.2 – 11.1	36	6.7	4.4 – 9.0
Aspartic Acid	12.2	10.1 – 15.9	36	9.2	6.3 – 11.1
Cystine	0.9	0.7 – 1.4	36	1.4	1.4 – 1.5
Glutamic Acid	14.5	12.8 – 17.3	36	13.8	9.5 – 16.0
Glycine	3.7	3.3 – 4.4	36	3.3	3.1 – 3.8
Histidine	2.4	1.8 – 3.0	36	1.8	1.3 – 2.4
Isoleucine	3.3	2.6 – 4.2	36	3.5	3.1 – 4.0
Leucine	6.4	5.7 – 7.1	36	5.6	4.7 – 6.8
Lysine	5.7	4.4 – 7.0	36	5.4	4.1 – 6.5
Methionine	0.9	0.8 – 1.2	36	0.4	0.1 – 0.8
Phenylalanine	4.4	3.7 – 5.0	36	3.6	3.2 – 4.6
Proline	4.4	3.5 – 6.1	36	4.1	3.9 – 4.5
Serine	5.6	5.0 – 6.3	36	2.9	1.7 – 4.7
Threonine	4.1	3.6 – 4.9	36	3.2	2.0 – 4.8
Tryptophan	0.7	2.6 – 0.9	36	NA ^a	NA
Tyrosine	2.5	1.18 – 3.4	36	2.3	1.9 – 2.6
Valine	4.0	3.3 – 4.9	36	4.0	2.9 – 4.6
Cys + Met	1.8	1.6 – 2.6	36	2.1	2.0 – 2.3
Tyr + Phe	6.9	5.4 – 8.2	36	5.9	5.1 – 6.9

Table 8. Vitamins in Canadian green lentils

Vitamin (mg/100 g)	Canadian green lentils			Australian lentils	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	24	NA ^b	NA
C	0.71	0.26 – 2.18	24	NA	NA
D	ND	ND	24	NA	NA
Thiamin (B1)	0.29	0.13 – 0.51	24	NA	NA
Riboflavin (B2)	0.33	0.23 – 0.45	24	NA	NA
Niacin (B3)	2.57	0.57 – 3.56	24	NA	NA
Panthenic acid (B5)	1.32	0.71 – 2.06	24	NA	NA
Pyridoxine (B6)	0.23	0.16 – 0.33	24	NA	NA
Cyanocobalamin (B12)	ND	ND	24	NA	NA
Biotin	ND	ND	24	NA	NA
γ -tocopherol	5.08	3.10 – 6.36	24	NA	NA
α -tocopherol	0.60	0.36 – 0.88	24	NA	NA
Folic acid (μ g/100 g)	138.11	100.0 – 217.00	24	NA	NA

^aND=not detectable.

^bNA=not available.

Table 9. Fatty acid composition of Canadian green lentils

Fatty acid (% in oil)	Canadian green lentils			Australian lentils	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	36	NA	NA
Myristic (C14:0)	0.67	0.00 – 0.93	36	0.60	0.60 – 0.60
Palmitic (C16:0)	12.66	10.79 – 15.36	36	13.20	12.70 – 13.70
Palmitoleic (C16:1)	0.20	0.00 – 0.61	36	NA ^b	NA
Stearic (C18:0)	1.50	1.27 – 1.82	36	1.95	1.80 – 2.10
Oleic (C18:1)	20.86	17.04 – 25.63	36	25.37	22.70 – 28.00
Linoleic (C18:2)	44.38	40.97 – 46.14	36	47.52	41.90 – 57.14
Linolenic (C18:3)	14.15	11.93 – 16.23	36	12.30	11.60 – 12.70
Arachidic (C20:0)	0.94	0.77 – 1.11	36	NA	NA
Gadoleic (C20:1)	1.36	1.21 – 1.58	36	1.25	1.20 – 1.30
Eicosadienoic (C20:2)	0.15	0.00 – 0.22	36	NA	NA
Behenic (C22:0)	0.97	0.81 – 1.13	36	NA	NA
Erucic (C22:1)	0.52	0.36 – 0.74	36	NA	NA
Lignoceric (C24:0)	1.10	0.47 – 1.99	36	0.90	NA
Nervonic (C24:1)	ND	ND	36	NA	NA

^aND=not detectable.

^bNA=not available.

Table 10. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian green lentils

	Canadian green lentils			Australian lentils	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	2.01	1.68 – 2.48	36	NA ^c	NA
Raffinose	0.43	0.33 – 0.49	36	NA	NA
Stachyose	2.09	1.66 – 2.63	36	NA	NA
Verbascope	0.56	0.36 – 0.76	36	NA	NA
Oligosaccharides ^a	3.07	2.52 – 3.77	36	2.5	2.0 – 3.1
Phytic acid (g/100 g dry matter)	0.79	0.30 – 1.20	36	0.52	0.30 – 0.69
Tannins (g/100 g dry matter)	0.54	0.30 – 1.02	36	0.33	0.06 – 0.63
TIA (mg/g dry matter) ^b	2.57	1.94 – 3.38	36	0.59	0.18 – 1.18

^aSum of raffinose, stachyose and verbascope.

^bTIA=trypsin inhibitor activity.

^cNA=not available.

Table 11. Proximate and mineral composition of Canadian red lentils

	Canadian red lentils			Australian lentils	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	25.7	21.6 – 29.0	12	24.0	19.8 – 28.0
Starch	44.0	41.5 – 46.9	12	NA ^b	NA
Amylose (% of total starch)	26.5	24.3 – 28.3	12	NA	NA
ADF ^a	5.8	5.1 – 6.5	12	6.0	4.0 – 7.0
NDF ^a	8.9	8.1 – 9.4	12	18.0	13.5 – 22.6
Fat	1.1	1.0 – 1.3	12	0.9	0.3 – 1.3
Ash	3.0	2.6 – 3.4	12	2.2	1.0 – 3.4
Minerals (mg/100 g dry matter)					
Calcium (Ca)	89.9	48.4 – 107.7	12	60.0	10.0 – 80.0
Copper (Cu)	1.1	0.7 – 1.6	12	0.7	0.4 – 0.8
Iron (Fe)	8.1	5.4 – 13.1	12	65.4	4.3 – 341.5
Potassium (K)	1104.0	550.8 – 1233.1	12	830.0	720.0 – 920.0
Magnesium (Mg)	127.5	104.1 – 150.0	12	90.0	70.0 – 90.0
Manganese (Mn)	1.8	0.6 – 2.9	12	1.6	1.2 – 1.9
Phosphorus (P)	503.7	260.3 – 611.2	12	320.0	240.0 – 380.0
Zinc (Zn)	4.3	2.9 – 5.1	12	3.3	2.6 – 4.2

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 12. Amino acid composition of Canadian red lentils

Amino acid (g/16 g N)	Canadian red lentils			Australian lentils	
	Mean	Range	Number	Mean	Range
Alanine	4.1	3.8 – 4.4	12	3.4	2.6 – 4.1
Arginine	7.7	6.5 – 9.5	12	6.7	4.4 – 9.0
Aspartic Acid	12.4	11.3 – 14.1	12	9.2	6.3 – 11.1
Cystine	1.0	0.8 – 1.4	12	1.4	1.4 – 1.5
Glutamic Acid	14.7	13.2 – 16.4	12	13.8	9.5 – 16.0
Glycine	3.8	3.6 – 4.3	12	3.3	3.1 – 3.8
Histidine	2.3	2.0 – 2.8	12	1.8	1.3 – 2.4
Isoleucine	3.1	2.6 – 4.0	12	3.5	3.1 – 4.0
Leucine	6.3	5.8 – 7.1	12	5.6	4.7 – 6.8
Lysine	5.8	4.0 – 6.7	12	5.4	4.1 – 6.5
Methionine	1.0	0.8 – 1.1	12	0.4	0.1– 0.8
Phenylalanine	4.3	3.7 – 4.8	12	3.6	3.2 – 4.6
Proline	4.4	3.7 – 5.9	12	4.1	3.9 – 4.5
Serine	6.0	5.5 – 6.4	12	2.9	1.7 – 4.7
Threonine	4.2	3.8 – 4.7	12	3.2	2.0 – 4.8
Tryptophan	0.7	0.6 – 0.9	12	NA ^a	NA
Tyrosine	2.9	1.6 – 3.3	12	2.3	1.9 – 2.6
Valine	3.8	3.4 – 4.7	12	4.0	2.9 – 4.6
Cys + Met	1.9	1.6 – 2.5	12	2.1	2.0 – 2.3
Tyr + Phe	7.2	6.4 – 7.8	12	5.9	5.1 – 6.9

Table 13. Vitamins in Canadian red lentils

Vitamin (mg/100 g)	Canadian red lentils			Australian lentils	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	8	NA ^b	NA
C	0.73	0.45 – 0.89	8	NA	NA
D	ND	ND	8	NA	NA
Thiamin (B1)	0.34	0.28 – 0.41	8	NA	NA
Riboflavin (B2)	0.31	0.29 – 0.36	8	NA	NA
Niacin (B3)	1.73	1.28 – 2.47	8	NA	NA
Panthenic acid (B5)	1.10	0.87 – 1.96	8	NA	NA
Pyridoxine (B6)	0.28	0.17 – 0.34	8	NA	NA
Cyanocobalamin (B12)	ND	ND	8	NA	NA
Biotin	ND	ND	8	NA	NA
γ-tocopherol	5.84	4.95 – 6.37	8	NA	NA
α-tocopherol	0.49	0.42 – 0.70	8	NA	NA
Folic acid (μg/100 g)	139.6	101.1 – 177.0	8	NA	NA

^aND=not detectable.

^bNA=not available.

Table 14. Fatty acid composition of Canadian red lentils

Fatty acid (% in oil)	Canadian red lentils			Australian lentils	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	12	NA	NA
Myristic (C14:0)	0.57	0.42 – 0.73	12	0.60	0.60 – 0.60
Palmitic (C16:0)	14.74	13.25 – 15.77	12	13.20	12.70 – 13.70
Palmitoleic (C16:1)	0.22	0.00 – 0.33	12	NA ^b	NA
Stearic (C18:0)	1.48	1.34 – 1.65	12	1.95	1.80 – 2.10
Oleic (C18:1)	19.82	17.05 – 22.17	12	25.37	22.70 – 28.00
Linoleic (C18:2)	44.29	42.91 – 45.23	12	47.52	41.90 – 57.14
Linolenic (C18:3)	13.51	12.68 – 14.66	12	12.30	11.60 – 12.70
Arachidic (C20:0)	0.85	0.80 – 0.92	12	NA	NA
Gadoleic (C20:1)	1.17	1.12 – 1.24	12	1.25	1.20 – 1.30
Eicosadienoic (C20:2)	0.30	0.00 – 1.86	12	NA	NA
Behenic (C22:0)	0.86	0.81 – 0.91	12	NA	NA
Erucic (C22:1)	0.85	0.80 – 0.92	12	NA	NA
Lignoceric (C24:0)	0.64	0.56 – 0.70	12	0.90	NA
Nervonic (C24:1)	ND	ND	12	NA	NA

^aND=not detectable.

^bNA=not available.

Table 15. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian red lentils

	Canadian red lentils			Australian lentils	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	1.80	1.64 – 1.97	12	NA ^c	NA
Raffinose	0.42	0.34 – 0.51	12	NA	NA
Stachyose	1.94	1.67 – 2.29	12	NA	NA
Verbascope	0.52	0.39 – 0.69	12	NA	NA
Oligosaccharides ^a	2.87	2.60 – 3.40	12	2.5	2.0 – 3.1
Phytic acid (g/100 g dry matter)	1.02	0.77 – 1.20	12	0.52	0.30 – 0.69
Tannins (g/100 g dry matter)	0.61	0.44 – 0.79	12	0.33	0.06 – 0.63
TIA (mg/g dry matter) ^b	2.74	2.46 – 3.31	12	0.59	0.18 – 1.18

^aSum of raffinose, stachyose and verbascope.

^bTIA=trypsin inhibitor activity.

^cNA=not available.

Chickpea (*Cicer arietinum*)

Table 16. Proximate and mineral composition of Canadian chickpeas (kabuli)

	Canadian chickpeas (kabuli)			Australian chickpeas (kabuli)	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	24.4	17.9 – 30.8	12	21.5	18.1 – 25.7
Starch	41.1	38.2 – 43.9	12	NA ^b	NA
Amylose (% of total starch)	26.2	24.4 – 29.2	12	NA	NA
ADF ^a	3.7	3.0 – 5.7	12	5.5	3.3 – 7.5
NDF ^a	5.0	4.2 – 7.7	12	11.9	5.2 – 16.0
Fat	5.9	5.5 – 6.9	12	5.0	4.0 – 5.8
Ash	3.2	2.9 – 3.8	12	2.7	2.3 – 3.0
Minerals (mg/100 g dry matter)					
Calcium (Ca)	106.6	80.5 – 144.3	12	110.0	40.0 – 160.0
Copper (Cu)	1.0	0.7 – 1.4	12	0.6	0.3 – 1.4
Iron (Fe)	5.5	4.3 – 7.6	12	5.7	3.2 – 12.5
Potassium (K)	1127.2	816.1 – 1580.1	12	890.0	220.0 – 1110.0
Magnesium (Mg)	177.8	152.9 – 212.8	12	120.0	10.0 – 170.0
Manganese (Mn)	3.9	2.3 – 4.8	12	2.3	0.1 – 3.7
Phosphorus (P)	505.1	294.1 – 828.8	12	380.0	240.0 – 930.0
Zinc (Zn)	4.4	3.6 – 5.6	12	3.2	2.1 – 3.9

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 17. Amino acid composition of Canadian chickpeas (kabuli)

Amino acid (g/16 g N)	Canadian chickpeas (kabuli)			Australian chickpeas (kabuli)	
	Mean	Range	Number	Mean	Range
Alanine	3.9	3.5 – 4.7	12	3.9	3.2 – 4.3
Arginine	10.5	8.3 – 13.7	12	10.4	8.1 – 12.1
Aspartic Acid	12.1	11.2 – 12.9	12	10.8	8.9 – 11.8
Cystine	1.3	0.8 – 2.0	12	1.4	0.7 – 1.8
Glutamic Acid	15.2	13.1 – 17.5	12	16.2	13.1 – 17.6
Glycine	3.8	3.2 – 4.5	12	3.6	2.9 – 4.0
Histidine	2.1	1.7 – 2.4	12	2.8	2.4 – 3.3
Isoleucine	3.1	2.6 – 3.9	12	4.0	3.6 – 4.5
Leucine	6.4	5.6 – 7.2	12	7.2	6.1 – 7.7
Lysine	5.8	4.9 – 6.7	12	6.3	4.9 – 6.9
Methionine	1.5	1.1 – 2.1	12	1.3	0.7 – 1.6
Phenylalanine	5.2	4.5 – 6.2	12	5.7	4.7 – 6.2
Proline	4.9	3.8 – 6.5	12	3.9	2.9 – 4.4
Serine	5.9	5.2 – 6.7	12	5.1	4.0 – 5.8
Threonine	4.2	3.3 – 5.1	12	3.5	3.0 – 3.8
Tryptophan	1.0	0.7 – 1.6	12	0.6	0.3 – 0.8
Tyrosine	2.8	2.2 – 3.3	12	2.7	2.0 – 3.0
Valine	3.7	2.9 – 4.6	12	4.2	3.8 – 4.4
Cys + Met	2.8	1.9 – 4.1	12	2.7	1.2 – 3.3
Tyr + Phe	8.0	6.7 – 9.2	12	8.4	6.8 – 9.1

Table 18. Vitamins in Canadian chickpeas (kabuli)

Vitamin (mg/100 g)	Canadian chickpeas (kabuli)			Australian chickpeas (kabuli)	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	8	NA ^b	NA
C	1.34	0.28 – 2.40	8	NA	NA
D	ND	ND	8	NA	NA
Thiamin (B1)	0.49	0.39 – 0.78	8	NA	NA
Riboflavin (B2)	0.26	0.10 – 0.34	8	NA	NA
Niacin (B3)	1.22	0.48 – 1.49	8	NA	NA
Panthenic acid (B5)	1.02	0.72 – 1.19	8	NA	NA
Pyridoxine (B6)	0.38	0.19 – 0.51	8	NA	NA
Cyanocobalamin (B12)	ND	ND	8	NA	NA
Biotin	ND	ND	8	NA	NA
γ-tocopherol	10.68	9.16 – 13.62	8	NA	NA
α-tocopherol	2.24	1.43 – 2.80	8	NA	NA
Folic acid (μg/100 g)	299.21	153.8 – 486.5	8	NA	NA

^aND=not detectable.

^bNA=not available.

Table 19. Fatty acid composition of Canadian chickpeas (kabuli)

Fatty acid (% in oil)	Canadian chickpeas (kabuli)			Australian chickpeas (kabuli)	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	12	NA ^b	NA
Myristic (C14:0)	0.21	0.19 – 0.26	12	0.13	0.10 – 0.20
Palmitic (C16:0)	9.41	10.30 – 8.52	12	9.01	7.90 – 10.10
Palmitoleic (C16:1)	0.30	0.27 – 0.34	12	0.20	0.20 – 0.20
Stearic (C18:0)	1.42	1.21 – 1.68	12	1.59	0.10 – 5.30
Oleic (C18:1)	32.56	27.70 – 42.46	12	27.26	18.60 – 32.00
Linoleic (C18:2)	51.20	42.25 – 56.59	12	52.88	48.15 – 56.25
Linolenic (C18:3)	2.69	2.23 – 3.91	12	2.79	2.40 – 3.30
Arachidic (C20:0)	0.66	0.59 – 0.76	12	0.80	0.70 – 0.90
Gadoleic (C20:1)	0.57	0.48 – 0.70	12	0.55	0.50 – 0.70
Eicosadienoic (C20:2)	0.06	0.00 – 0.09	12	NA	NA
Behenic (C22:0)	0.42	0.29 – 0.48	12	0.53	0.50 – 0.60
Erucic (C22:1)	0.07	0.00 – 0.16	12	NA	NA
Lignoceric (C24:0)	0.17	0.00 – 0.29	12	0.38	0.30 – 0.50
Nervonic (C24:1)	ND	ND	12	NA	NA

^aND=not detectable.

^bNA=not available.

Table 20. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian chickpeas (kabuli)

	Canadian chickpeas (kabuli)			Australian chickpeas (kabuli)	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	3.84	3.10 – 4.41	12	NA ^c	NA
Raffinose	0.61	0.48 – 0.73	12	NA	NA
Stachyose	2.20	1.76 – 2.72	12	NA	NA
Verbascose	ND ^d	ND	12	NA	NA
Oligosaccharides ^a	2.81	2.32 – 3.44	12	2.1	1.7 – 2.8
Phytic acid (g/100 g dry matter)	0.98	0.78 – 1.25	12	0.70	0.39 – 0.99
Tannins (g/100 g dry matter)	ND	ND	12	0.01	0.01 – 0.04
TIA (mg/g dry matter) ^b	6.37	4.31 – 7.90	12	2.96	1.39 – 4.90

^aSum of raffinose, stachyose and verbascose.

^bTIA=trypsin inhibitor activity.

^cNA=not available.

^dND=not detectable.

Table 21. Proximate and mineral composition of Canadian chickpeas (desi)

	Canadian chickpeas (desi)			Australian chickpeas (desi)	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	23.0	20.3 – 27.5	12	20.1	17.0 – 24.3
Starch	36.4	33.1 – 40.4	12	NA ^b	NA
Amylose (% of total starch)	23.8	20.5 – 25.9	12	NA	NA
ADF ^a	13.1	12.7 – 13.5	12	14.7	10.9 – 16.7
NDF ^a	12.8	10.1 – 13.6	12	25.19	5.2 – 30.2
Fat	5.4	4.4 – 5.9	12	3.9	2.9 – 4.8
Ash	3.2	2.7 – 3.5	12	2.6	2.3 – 3.2
Minerals (mg/100 g dry matter)					
Calcium (Ca)	161.7	115.0 – 226.5	12	180.0	120.0 – 230.0
Copper (Cu)	1.0	0.5 – 1.4	12	0.7	0.3 – 1.2
Iron (Fe)	5.9	4.6 – 7.0	12	5.0	3.5 – 12.0
Potassium (K)	1215.7	1027.6 – 1479.1	12	820.0	230.0 – 1020.0
Magnesium (Mg)	169.1	143.7 – 188.6	12	140.0	120.0 – 160.0
Manganese (Mn)	3.4	2.8 – 4.1	12	3.4	1.8 – 4.9
Phosphorus (P)	377.3	276.2 – 518.6	12	360.0	230.0 – 860.0
Zinc (Zn)	3.6	2.8 – 5.1	12	3.1	2.2 – 4.2

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 22. Amino acid composition of Canadian chickpeas (desi)

Amino acid (g/16 g N)	Canadian chickpeas (desi)			Australian chickpeas (desi)	
	Mean	Range	Number	Mean	Range
Alanine	4.1	3.6 – 4.526	12	4.0	3.0 – 4.6
Arginine	9.8	8.3 – 13.6	12	9.9	8.4 – 12.3
Aspartic Acid	12.8	11.1 – 15.9	12	11.1	9.3 – 11.9
Cystine	1.4	1.1 – 1.6	12	1.6	1.2 – 1.9
Glutamic Acid	16.0	13.4 – 18.7	12	16.4	12.9 – 17.8
Glycine	3.9	3.3 – 4.2	12	3.7	3.0 – 4.2
Histidine	2.2	1.7 – 2.7	12	2.7	2.2 – 3.3
Isoleucine	3.6	2.5 – 4.4	12	4.0	3.6 – 4.7
Leucine	7.0	5.6 – 7.7	12	7.3	6.1 – 7.9
Lysine	5.9	5.2 – 6.9	12	6.6	5.2 – 7.3
Methionine	1.5	1.1 – 1.7	12	1.3	0.9 – 1.6
Phenylalanine	5.3	4.5 – 5.9	12	5.5	4.7 – 6.0
Proline	4.8	4.0 – 6.3	12	4.0	2.8 – 4.7
Serine	6.0	5.5 – 6.9	12	5.3	3.9 – 5.9
Threonine	4.3	3.7 – 4.7	12	3.7	3.1 – 4.5
Tryptophan	0.9	0.8 – 1.1	12	0.9	0.4 – 1.2
Tyrosine	2.3	1.4 – 3.1	12	2.7	1.9 – 3.1
Valine	4.0	2.8 – 4.7	12	4.2	3.8 – 5.1
Cys + Met	2.9	2.2 – 3.1	12	2.9	2.3 – 3.7
Tyr + Phe	7.6	6.6 – 8.7	12	8.2	6.7 – 9.0

Table 23. Vitamins in Canadian chickpeas (desi)

Vitamin (mg/100 g)	Canadian chickpeas (desi)			Australian chickpeas (desi)	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	8	NA ^b	NA
C	1.65	0.67 – 3.01	8	NA	NA
D	ND	ND	8	NA	NA
Thiamin (B1)	0.29	0.22 – 0.34	8	NA	NA
Riboflavin (B2)	0.21	0.16 – 0.24	8	NA	NA
Niacin (B3)	1.72	1.43 – 2.28	8	NA	NA
Panthenic acid (B5)	1.09	0.85 – 1.65	8	NA	NA
Pyridoxine (B6)	0.30	0.27 – 0.36	8	NA	NA
Cyanocobalamin (B12)	ND	ND	8	NA	NA
Biotin	ND	ND	8	NA	NA
γ-tocopherol	9.33	7.85 – 11.55	8	NA	NA
α-tocopherol	1.91	1.65 – 2.17	8	NA	NA
Folic acid (μg/100 g)	206.48	109.0 – 294.4	8	NA	NA

^aND=not detectable.

^bNA=not available.

Table 24. Fatty acid composition of Canadian chickpeas (desi)

Fatty acid (% in oil)	Canadian chickpeas (desi)			Australian chickpeas (desi)	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	0.02	0.00 – 0.10	12	NA ^b	NA
Myristic (C14:0)	0.22	0.17 – 0.32	12	0.20	NA
Palmitic (C16:0)	9.09	8.56 – 11.05	12	10.44	9.10 – 11.50
Palmitoleic (C16:1)	0.26	0.23 – 0.30	12	NA	NA
Stearic (C18:0)	1.16	1.04 – 1.60	12	0.92	0.30 – 1.40
Oleic (C18:1)	22.31	18.44 – 28.51	12	20.46	17.60 – 23.30
Linoleic (C18:2)	61.62	53.13 – 65.25	12	57.61	45.95 – 61.50
Linolenic (C18:3)	3.15	2.54 – 3.65	12	3.84	3.50 – 4.80
Arachidic (C20:0)	0.51	0.45 – 0.74	12	0.70	0.60 – 0.80
Gadoleic (C20:1)	0.50	0.41 – 0.59	12	0.52	0.50 – 0.60
Eicosadienoic (C20:2)	0.12	0.08 – 0.15	12	NA	NA
Behenic (C22:0)	0.37	0.30 – 0.42	12	0.54	0.40 – 0.80
Erucic (C22:1)	0.13	0.00 – 0.21	12	NA	NA
Lignoceric (C24:0)	ND ^a	ND	12	0.10	NA
Nervonic (C24:1)	ND	ND	12	NA	NA

^aND=not detectable.

^bNA=not available.

Table 25. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian chickpeas (desi)

	Canadian chickpeas (desi)			Australian chickpeas (desi)	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	2.03	1.56 – 2.85	12	NA ^c	NA
Raffinose	0.54	0.46 – 0.77	12	NA	NA
Stachyose	1.64	1.25 – 1.98	12	NA	NA
Verbascose	ND ^d	ND	12	NA	NA
Oligosaccharides ^a	2.18	1.72 – 2.75	12	1.65	1.20 – 2.50
Phytic acid (g/100 g dry matter)	0.92	0.63 – 1.24	12	0.66	0.37 – 1.13
Tannins (g/100 g dry matter)	ND	ND	12	0.04	0.01 – 0.09
TIA (mg/g dry matter) ^b	9.71	6.82 – 11.38	12	3.95	1.16 – 6.73

^aSum of raffinose, stachyose and verbascose.

^bTIA=trypsin inhibitor activity.

^cNA=not available.

^dND=not detectable.

Bean (*Phaseolus vulgaris* L.)

Table 26. Proximate and mineral composition of Canadian navy beans

	Canadian navy beans			Australian navy beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	25.1	22.0 – 28.1	12	24.3	21.9 – 27.2
Starch	38.0	35.7 – 40.5	12	NA ^b	NA
Amylose (% of total starch)	24.6	20.8 – 26.2	12	NA	NA
ADF ^a	7.1	5.5 – 8.8	12	5.2	5.0 – 5.4
NDF ^a	8.2	7.8 – 9.2	12	16.1	13.4 – 18.9
Fat	1.5	1.3 – 1.7	12	1.5	1.1 – 1.9
Ash	4.3	4.0 – 4.7	12	3.8	3.2 – 4.6
Minerals (mg/100 g dry matter)					
Calcium (Ca)	155.1	106.9 – 196.8	12	170.0	140.0 – 220.0
Copper (Cu)	1.1	0.7 – 1.6	12	0.8	0.7 – 0.9
Iron (Fe)	7.6	4.7 – 10.5	12	6.8	5.6 – 9.3
Potassium (K)	1704.9	1532.6 – 1844.1	12	1350.0	1280.0 – 1500.0
Magnesium (Mg)	202.7	166.9 – 217.8	12	150.0	140.0 – 160.0
Manganese (Mn)	1.7	1.3 – 2.2	12	1.48	1.1 – 1.9
Phosphorus (P)	618.4	484.2 – 780.9	12	450.0	340.0 – 540.0
Zinc (Zn)	3.4	2.6 – 4.6	12	3.0	2.4 – 3.4

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 27. Amino acid composition of Canadian navy beans

Amino acid (g/16 g N)	Canadian navy beans			Australian navy beans	
	Mean	Range	Number	Mean	Range
Alanine	4.0	3.7 – 4.2	12	4.2	3.9 – 4.5
Arginine	6.4	5.5 – 7.5	12	6.6	5.6 – 7.1
Aspartic Acid	12.9	11.4 – 14.7	12	12.3	11.53 – 13.5
Cystine	0.9	0.8 – 1.7	12	0.8	0.7 – 0.9
Glutamic Acid	14.6	13.3 – 15.9	12	16.3	15.1 – 17.0
Glycine	3.9	3.4 – 4.5	12	3.9	3.7 – 4.1
Histidine	2.6	2.0 – 3.1	12	2.8	2.5 – 3.0
Isoleucine	3.6	2.7 – 4.6	12	4.5	4.2 – 4.8
Leucine	7.1	6.1 – 8.1	12	8.3	7.9 – 8.7
Lysine	5.8	3.9 – 6.8	12	6.9	6.1 – 7.6
Methionine	1.2	1.0 – 1.5	12	0.8	0.6 – 1.0
Phenylalanine	5.0	3.9 – 5.7	12	5.7	5.4 – 6.3
Proline	4.4	3.4 – 6.1	12	3.7	3.45 – 4.4
Serine	7.0	6.1 – 7.8	12	6.1	5.7 – 6.4
Threonine	5.0	4.4 – 6.0	12	4.4	4.1 – 4.7
Tryptophan	1.0	0.9 – 1.1	12	NA	NA
Tyrosine	3.5	2.5 – 4.4	12	3.5	3.1 – 3.8
Valine	4.4	3.6 – 5.5	12	5.2	4.7 – 5.7
Cys + Met	2.2	2.0 – 3.2	12	1.6	1.4 – 1.9
Tyr + Phe	8.5	7.4 – 9.9	12	9.2	8.5 – 10.1

Table 28. Vitamins in Canadian navy beans

Vitamin (mg/100 g)	Canadian navy beans			Australian navy beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	8	NA ^b	NA
C	3.85	3.12 – 5.10	8	NA	NA
D	ND	ND	8	NA	NA
Thiamin (B1)	0.58	0.42 – 0.91	8	NA	NA
Riboflavin (B2)	0.16	0.11 – 0.20	8	NA	NA
Niacin (B3)	1.31	0.60 – 1.66	8	NA	NA
Panthenic acid (B5)	0.31	0.27 – 0.36	8	NA	NA
Pyridoxine (B6)	0.21	0.04 – 0.25	8	NA	NA
Cyanocobalamin (B12)	ND	ND	8	NA	NA
Biotin	ND	ND	8	NA	NA
γ-tocopherol	3.85	3.12 – 5.10	8	NA	NA
α-tocopherol	ND	ND	8	NA	NA
Folic acid (μg/100 g)	107.99	72.70 – 149.30	8	NA	NA

^aND=not detectable.

^bNA=not available.

Table 29. Fatty acid composition of Canadian navy beans

Fatty acid (% in oil)	Canadian navy beans			Australian navy beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	12	NA ^b	NA
Myristic (C14:0)	0.13	0.00 – 0.17	12	NA	NA
Palmitic (C16:0)	9.30	8.08 – 10.78	12	9.50	9.20 – 9.80
Palmitoleic (C16:1)	0.26	0.17 – 0.33	12	NA	NA
Stearic (C18:0)	2.00	1.59 – 2.29	12	0.50	0.40 – 0.60
Oleic (C18:1)	10.52	8.32 – 15.12	12	13.80	7.40 – 20.20
Linoleic (C18:2)	28.12	24.25 – 32.66	12	41.00	26.00 – 56.00
Linolenic (C18:3)	46.74	42.17 – 54.52	12	28.85	9.50 – 48.20
Arachidic (C20:0)	0.53	0.42 – 0.61	12	0.60	0.60 – 0.60
Gadoleic (C20:1)	0.20	0.18 – 0.25	12	0.35	0.20 – 0.50
Eicosadienoic (C20:2)	ND	ND	12	NA	NA
Behenic (C22:0)	0.78	0.57 – 0.94	12	0.90	0.50 – 1.30
Erucic (C22:1)	0.03	0.00 – 0.13	12	NA	NA
Lignoceric (C24:0)	1.06	0.67 – 1.76	12	0.30	0.30 – 0.30
Nervonic (C24:1)	ND	ND	12	NA	NA

^aND=not detectable.

^bNA=not available.

Table 30. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian navy beans

	Canadian navy beans			Australian navy beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	3.2	2.8 – 4.1	12	NA ^d	NA
Raffinose	0.5	0.4 – 0.6	12	NA	NA
Stachyose	4.0	3.7 – 4.5	12	NA	NA
Verbascose	ND ^c	ND	12	NA	NA
Oligosaccharides ^a	4.6	4.25 – 5.03	12	3.2	2.60 – 3.90
Phytic acid (g/100 g dry matter)	1.42	0.94 – 1.75	12	1.20	1.12 – 1.27
Tannins (g/100 g dry matter)	ND	ND	12	0.49	0.03 – 0.94
TIA (mg/g dry matter) ^b	9.96	7.75 – 13.56	12	5.15	5.00 – 5.30

^aSum of raffinose, stachyose and verbascose.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 31. Proximate and mineral composition of Canadian black turtle beans

	Canadian black turtle beans			Australian black turtle beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	26.2	21.0 – 31.1	4	NA ^b	NA
Starch	36.1	31.8 – 41.4	4	NA	NA
Amylose (% of total starch)	24.9	20.5 – 24.4	4	NA	NA
ADF ^a	7.0	6.0 – 8.2	4	NA	NA
NDF ^a	10.1	9.2 – 11.0	4	NA	NA
Fat	1.6	1.1 – 2.3	4	NA	NA
Ash	4.4	4.3 – 4.5	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	189.3	137.5 – 243.4	4	NA	NA
Copper (Cu)	1.5	1.2 – 1.9	4	NA	NA
Iron (Fe)	9.7	8.9 – 10.6	4	NA	NA
Potassium (K)	1795.5	1736.2 – 1846.0	4	NA	NA
Magnesium (Mg)	207.7	163.5 – 262.4	4	NA	NA
Manganese (Mn)	1.6	1.6 – 1.7	4	NA	NA
Phosphorus (P)	566.6	530.5 – 583.3	4	NA	NA
Zinc (Zn)	4.7	3.7 – 6.0	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 32. Amino acid composition of Canadian black turtle beans

Amino acid (g/16 g N)	Canadian black turtle beans			Australian black turtle beans	
	Mean	Range	Number	Mean	Range
Alanine	4.5	4.4 – 4.8	5	NA ^a	NA
Arginine	6.7	5.8 – 7.6	5	NA	NA
Aspartic Acid	13.4	12.9 – 13.9	5	NA	NA
Cystine	1.0	0.8 – 1.3	5	NA	NA
Glutamic Acid	15.8	14.4 – 16.5	5	NA	NA
Glycine	4.1	3.9 – 4.3	5	NA	NA
Histidine	2.2	1.9 – 2.5	5	NA	NA
Isoleucine	4.4	4.3 – 4.5	5	NA	NA
Leucine	8.4	8.1 – 8.7	5	NA	NA
Lysine	6.7	6.6 – 6.9	5	NA	NA
Methionine	1.2	0.9 – 1.4	5	NA	NA
Phenylalanine	5.5	5.1 – 5.8	5	NA	NA
Proline	4.0	3.9 – 4.1	5	NA	NA
Serine	6.9	6.7 – 7.1	5	NA	NA
Threonine	4.3	4.0 – 4.5	5	NA	NA
Tryptophan	0.9	0.9 – 1.0	5	NA	NA
Tyrosine	4.3	3.7 – 4.8	5	NA	NA
Valine	5.4	5.2 – 5.7	5	NA	NA
Cys + Met	2.2	1.8 – 2.5	5	NA	NA
Tyr + Phe	9.8	9.0 – 10.6	5	NA	NA

^aNA=not available.

Table 33. Vitamins in Canadian black turtle beans

Vitamin (mg/100 g)	Canadian black turtle beans			Australian black turtle beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.10	0.10 – 0.10	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.45	0.41 – 0.48	2	NA	NA
Riboflavin (B2)	0.11	0.10 – 0.11	2	NA	NA
Niacin (B3)	1.26	1.22 – 1.29	2	NA	NA
Panthenic acid (B5)	0.45	0.45 – 0.46	2	NA	NA
Pyridoxine (B6)	0.31	0.18 – 0.45	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	3.58	2.98 – 4.18	2	NA	NA
α-tocopherol	0.10	0.09 – 0.10	2	NA	NA
Folic acid (μg/100 g)	60.25	44.00 – 76.50	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 34. Fatty acid composition of Canadian black turtle beans

Fatty acid (% in oil)	Canadian black turtle beans			Australian black turtle beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	9.68	8.66 – 10.95	4	NA	NA
Palmitoleic (C16:1)	0.10	0.00 – 0.30	4	NA	NA
Stearic (C18:0)	2.13	1.77 – 2.38	4	NA	NA
Oleic (C18:1)	13.89	11.43 – 17.32	4	NA	NA
Linoleic (C18:2)	26.42	20.30 – 33.55	4	NA	NA
Linolenic (C18:3)	44.71	36.63 – 50.25	4	NA	NA
Arachidic (C20:0)	0.63	0.48 – 0.81	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	0.85	0.74 – 1.09	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	1.13	0.93 – 1.38	4	NA	NA
Nervonic (C24:1)	0.46	0.00 – 0.85	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 35. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian black turtle beans

	Canadian black turtle beans			Australian black turtle beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	3.93	3.35 – 4.76	4	NA ^d	NA
Raffinose	0.57	0.46 – 0.70	4	NA	NA
Stachyose	3.50	3.28 – 3.70	4	NA	NA
Verbascope	0.07	0.04 – 0.08	4	NA	NA
Oligosaccharides ^a	4.14	3.82 – 4.28	4	NA	NA
Phytic acid (g/100 g dry matter)	1.38	1.28 – 1.56	4	NA	NA
Tannins (g/100 g dry matter)	0.49	0.32 – 0.63	4	NA	NA
TIA (mg/g dry matter) ^b	11.23	7.83 – 12.87	4	NA	NA

^aSum of raffinose, stachyose and verbascope.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 36. Proximate and mineral composition of Canadian cranberry beans

	Canadian cranberry beans			Australian cranberry beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	24.3	20.5 – 27.9	4	NA ^b	NA
Starch	42.1	39.0 – 45.3	4	NA	NA
Amylose (% of total starch)	23.8	21.8 – 25.9	4	NA	NA
ADF ^a	7.2	6.3 – 7.6	4	NA	NA
NDF ^a	9.4	8.9 – 10.2	4	NA	NA
Fat	1.4	1.3 – 1.5	4	NA	NA
Ash	3.6	3.3 – 3.9	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	119.9	100.1 – 148.0	4	NA	NA
Copper (Cu)	1.2	1.0 – 1.4	4	NA	NA
Iron (Fe)	8.3	7.4 – 8.9	4	NA	NA
Potassium (K)	1641.2	1380.8 – 1917.9	4	NA	NA
Magnesium (Mg)	190.8	156.7 – 223.8	4	NA	NA
Manganese (Mn)	1.2	1.1 – 1.3	4	NA	NA
Phosphorus (P)	525.4	481.8 – 545.2	4	NA	NA
Zinc (Zn)	3.6	3.1 – 3.9	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 37. Amino acid composition of Canadian cranberry beans

Amino acid (g/16 g N)	Canadian cranberry beans			Australian cranberry beans	
	Mean	Range	Number	Mean	Range
Alanine	4.6	4.5 – 4.8	5	NA ^a	NA
Arginine	6.5	5.9 – 7.2	5	NA	NA
Aspartic Acid	13.5	13.3 – 14.0	5	NA	NA
Cystine	1.0	0.8 – 1.3	5	NA	NA
Glutamic Acid	16.0	15.4 – 16.5	5	NA	NA
Glycine	4.2	4.0 – 4.5	5	NA	NA
Histidine	2.4	2.2 – 2.6	5	NA	NA
Isoleucine	4.4	4.34 – 4.6	5	NA	NA
Leucine	8.4	8.1 – 8.9	5	NA	NA
Lysine	6.9	6.58 – 7.1	5	NA	NA
Methionine	1.2	1.1 – 1.3	5	NA	NA
Phenylalanine	5.6	5.45 – 5.9	5	NA	NA
Proline	4.1	3.9 – 4.8	5	NA	NA
Serine	7.1	6.9 – 7.3	5	NA	NA
Threonine	4.5	4.0 – 4.9	5	NA	NA
Tryptophan	0.9	0.9 – 1.0	5	NA	NA
Tyrosine	4.1	3.48 – 4.6	5	NA	NA
Valine	5.4	5.2 – 5.7	5	NA	NA
Cys + Met	2.2	1.9 – 2.5	5	NA	NA
Tyr + Phe	9.7	9.0 – 10.5	5	NA	NA

^aNA=not available.

Table 38. Vitamins in Canadian cranberry beans

Vitamin (mg/100 g)	Canadian cranberry beans			Australian cranberry beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.09	0.09 – 0.09	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.49	0.46 – 0.52	2	NA	NA
Riboflavin (B2)	0.16	0.14 – 0.17	2	NA	NA
Niacin (B3)	1.14	1.10 – 1.18	2	NA	NA
Panthenic acid (B5)	0.37	0.36 – 0.37	2	NA	NA
Pyridoxine (B6)	0.18	0.17 – 0.18	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	3.45	3.00 – 3.89	2	NA	NA
α-tocopherol	0.12	0.10 – 0.14	2	NA	NA
Folic acid (μg/100 g)	41.0	37.00 – 45.00	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 39. Fatty acid composition of Canadian cranberry beans

Fatty acid (% in oil)	Canadian cranberry beans			Australian cranberry beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	7.85	7.04 – 8.40	4	NA	NA
Palmitoleic (C16:1)	ND	ND	4	NA	NA
Stearic (C18:0)	1.24	1.10 – 1.36	4	NA	NA
Oleic (C18:1)	10.04	9.64 – 10.77	4	NA	NA
Linoleic (C18:2)	26.27	22.45 – 29.91	4	NA	NA
Linolenic (C18:3)	52.4	47.04 – 57.29	4	NA	NA
Arachidic (C20:0)	0.43	0.36 – 0.47	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	0.79	0.63 – 0.92	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	0.98	0.73 -1.15	4	NA	NA
Nervonic (C24:1)	ND	ND	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 40. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian cranberry beans

	Canadian cranberry beans			Australian cranberry beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	4.14	3.46 – 4.83	4	NA ^d	NA
Raffinose	0.23	0.15 – 0.44	4	NA	NA
Stachyose	3.13	2.60 – 3.41	4	NA	NA
Verbascose	0.21	0.09 – 0.43	4	NA	NA
Oligosaccharides ^a	3.58	3.47 – 3.79	4	NA	NA
Phytic acid (g/100 g dry matter)	1.22	1.10 – 1.43	4	NA	NA
Tannins (g/100 g dry matter)	0.84	0.74 – 0.99	4	NA	NA
TIA (mg/g dry matter) ^b	9.31	7.99 – 10.37	4	NA	NA

^aSum of raffinose, stachyose and verbascose.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 41. Proximate and mineral composition of Canadian Dutch brown beans

	Canadian Dutch brown beans			Australian Dutch brown beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	22.5	21.4 – 23.8	4	NA ^b	NA
Starch	43.0	41.4 – 45.3	4	NA	NA
Amylose (% of total starch)	22.1	20.7 – 24.0	4	NA	NA
ADF ^a	6.2	5.6 – 6.6	4	NA	NA
NDF ^a	7.9	7.4 – 8.8	4	NA	NA
Fat	1.4	1.3 – 1.4	4	NA	NA
Ash	3.7	3.4 – 4.1	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	96.8	80.3 – 109.4	4	NA	NA
Copper (Cu)	1.2	1.1 – 1.2	4	NA	NA
Iron (Fe)	8.9	8.1 – 9.5	4	NA	NA
Potassium (K)	1624.4	1479.5 – 1763.2	4	NA	NA
Magnesium (Mg)	173.3	159.1 – 190.4	4	NA	NA
Manganese (Mn)	1.4	1.3 – 1.6	4	NA	NA
Phosphorus (P)	502.5	428.8 – 604.8	4	NA	NA
Zinc (Zn)	3.4	3.0 – 4.1	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 42. Amino acid composition of Canadian Dutch brown beans

Amino acid (g/16 g N)	Canadian Dutch brown beans			Australian Dutch brown beans	
	Mean	Range	Number	Mean	Range
Alanine	4.7	4.3 – 4.8	5	NA ^a	NA
Arginine	6.1	5.7 – 6.7	5	NA	NA
Aspartic Acid	13.5	13.2 – 14.3	5	NA	NA
Cystine	1.0	1.0 – 1.1	5	NA	NA
Glutamic Acid	15.65	15.3 – 16.2	5	NA	NA
Glycine	4.2	3.7 – 4.2	5	NA	NA
Histidine	2.3	1.7 – 2.5	5	NA	NA
Isoleucine	4.4	4.3 – 4.5	5	NA	NA
Leucine	8.3	8.1 – 8.5	5	NA	NA
Lysine	6.6	6.2 – 6.8	5	NA	NA
Methionine	1.21	1.1 – 1.3	5	NA	NA
Phenylalanine	5.6	5.3 – 5.8	5	NA	NA
Proline	4.0	3.5 – 4.2	5	NA	NA
Serine	7.1	6.68 – 7.4	5	NA	NA
Threonine	4.6	3.8 – 5.1	5	NA	NA
Tryptophan	1.0	0.9 – 1.0	5	NA	NA
Tyrosine	4.3	3.7 – 4.8	5	NA	NA
Valine	5.6	5.3 – 6.0	5	NA	NA
Cys + Met	2.3	2.1 – 2.3	5	NA	NA
Tyr + Phe	9.9	9.1 – 10.3	5	NA	NA

^aNA=not available.

Table 43. Vitamins in Canadian Dutch brown beans

Vitamin (mg/100 g)	Canadian Dutch brown beans			Australian Dutch brown beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.10	0.09 – 0.10	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.50	0.47 – 0.52	2	NA	NA
Riboflavin (B2)	0.14	0.14 – 0.14	2	NA	NA
Niacin (B3)	1.42	1.23 – 1.61	2	NA	NA
Panthenic acid (B5)	0.43	0.41 – 0.44	2	NA	NA
Pyridoxine (B6)	0.18	0.17 – 0.18	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	3.27	3.14 – 3.39	2	NA	NA
α-tocopherol	ND	ND	2	NA	NA
Folic acid (μg/100 g)	27.50	18.00 – 37.00	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 44. Fatty acid composition of Canadian Dutch brown beans

Fatty acid (% in oil)	Canadian Dutch brown beans			Australian Dutch brown beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	11.27	10.95 – 11.74	4	NA	NA
Palmitoleic (C16:1)	ND	ND	4	NA	NA
Stearic (C18:0)	1.55	1.47 – 1.60	4	NA	NA
Oleic (C18:1)	9.03	8.55 – 9.33	4	NA	NA
Linoleic (C18:2)	26.76	25.37 – 28.369	4	NA	NA
Linolenic (C18:3)	48.1	46.84 – 49.41	4	NA	NA
Arachidic (C20:0)	0.49	0.46 – 0.52	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	1.19	1.10 – 1.27	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	1.40	1.28 – 1.61	4	NA	NA
Nervonic (C24:1)	0.22	0.00 – 0.89	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 45. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian Dutch brown beans

	Canadian Dutch brown beans			Australian Dutch brown beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	2.85	2.71 – 2.98	4	NA ^d	NA
Raffinose	0.34	0.25 – 0.42	4	NA	NA
Stachyose	2.97	2.66 – 3.17	4	NA	NA
Verbascose	0.17	0.10 – 0.25	4	NA	NA
Oligosaccharides ^a	3.47	3.33 – 3.55	4	NA	NA
Phytic acid (g/100 g dry matter)	1.26	1.04 – 1.52	4	NA	NA
Tannins (g/100 g dry matter)	0.90	0.77 – 1.03	4	NA	NA
TIA (mg/g dry matter) ^b	8.16	7.97 – 8.67	4	NA	NA

^aSum of raffinose, stachyose and verbascose.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 46. Proximate and mineral composition of Canadian dark red kidney beans

	Canadian dark red kidney beans			Australian dark red kidney beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	28.5	23.6 – 34.3	4	NA ^b	NA
Starch	37.0	32.7 – 40.7	4	NA	NA
Amylose (% of total starch)	21.2	20.3 – 23.3	4	NA	NA
ADF ^a	8.4	7.5 – 9.2	4	NA	NA
NDF ^a	9.6	8.4 – 10.7	4	NA	NA
Fat	1.1	0.7 – 1.4	4	NA	NA
Ash	3.9	3.9 – 4.1	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	96.3	64.3 – 122.1	4	NA	NA
Copper (Cu)	1.0	0.8 – 1.1	4	NA	NA
Iron (Fe)	8.8	8.5 – 9.0	4	NA	NA
Potassium (K)	1778.0	1695.4 – 1844.9	4	NA	NA
Magnesium (Mg)	176.3	162.26 – 208.6	4	NA	NA
Manganese (Mn)	1.4	1.23 – 1.6	4	NA	NA
Phosphorus (P)	523.8	447.8 – 615.1	4	NA	NA
Zinc (Zn)	3.7	3.1 – 4.4	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 47. Amino acid composition of Canadian dark red kidney beans

Amino acid (g/16 g N)	Canadian dark red kidney beans			Australian dark red kidney beans	
	Mean	Range	Number	Mean	Range
Alanine	4.4	3.8 – 4.8	5	NA ^a	NA
Arginine	6.8	6.3 – 7.7	5	NA	NA
Aspartic Acid	13.5	13.2 – 13.7	5	NA	NA
Cystine	0.95	0.8 – 1.1	5	NA	NA
Glutamic Acid	15.4	14.6 – 16.0	5	NA	NA
Glycine	4.0	3.5 – 4.3	5	NA	NA
Histidine	2.3	1.9 – 2.5	5	NA	NA
Isoleucine	4.3	3.9 – 4.5	5	NA	NA
Leucine	8.1	7.5 – 8.4	5	NA	NA
Lysine	6.6	6.1 – 6.8	5	NA	NA
Methionine	1.3	1.2 – 1.4	5	NA	NA
Phenylalanine	5.4	5.2 – 5.5	5	NA	NA
Proline	3.8	3.4 – 4.2	5	NA	NA
Serine	6.8	6.4 – 7.0	5	NA	NA
Threonine	4.2	3.8 – 4.6	5	NA	NA
Tryptophan	1.0	0.9 – 1.4	5	NA	NA
Tyrosine	4.1	3.7 – 4.5	5	NA	NA
Valine	5.3	4.9 – 5.5	5	NA	NA
Cys + Met	2.2	2.0 – 2.3	5	NA	NA
Tyr + Phe	9.5	9.1 – 10.0	5	NA	NA

^aNA=not available.

Table 48. Vitamins in Canadian dark red kidney beans

Vitamin (mg/100 g)	Canadian dark red kidney beans			Australian dark red kidney beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.09	0.09 – 0.09	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.56	0.39 – 0.73	2	NA	NA
Riboflavin (B2)	0.16	0.15 – 0.17	2	NA	NA
Niacin (B3)	1.10	0.91 – 1.29	2	NA	NA
Panthenic acid (B5)	0.44	0.41 – 0.48	2	NA	NA
Pyridoxine (B6)	0.21	0.17 – 0.25	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	3.79	3.02 – 4.55	2	NA	NA
α-tocopherol	0.13	0.12 – 0.14	2	NA	NA
Folic acid (μg/100 g)	52.50	49.00 – 56.00	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 49. Fatty acid composition of Canadian dark red kidney beans

Fatty acid (% in oil)	Canadian dark red kidney beans			Australian dark red kidney beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	9.35	8.79 – 9.81	4	NA	NA
Palmitoleic (C16:1)	ND	ND	4	NA	NA
Stearic (C18:0)	1.97	1.41 – 2.43	4	NA	NA
Oleic (C18:1)	12.05	9.83 – 14.71	4	NA	NA
Linoleic (C18:2)	23.69	18.09 – 29.45	4	NA	NA
Linolenic (C18:3)	50.26	47.22 – 53.46	4	NA	NA
Arachidic (C20:0)	0.64	0.48 – 0.79	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	0.81	0.72 – 0.91	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	1.22	1.07 – 1.34	4	NA	NA
Nervonic (C24:1)	ND	ND	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 50. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian dark red kidney beans

	Canadian dark red kidney beans			Australian beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	3.45	3.06 – 4.04	4	NA ^d	NA
Raffinose	0.26	0.21 – 0.30	4	NA	NA
Stachyose	3.80	3.65 – 4.00	4	NA	NA
Verbascose	0.14	0.11 – 0.18	4	NA	NA
Oligosaccharides ^a	4.20	4.02 – 4.48	4	NA	NA
Phytic acid (g/100 g dry matter)	1.22	1.04 – 1.34	4	NA	NA
Tannins (g/100 g dry matter)	0.75	0.63 – 0.85	4	NA	NA
TIA (mg/g dry matter) ^b	9.67	9.47 – 9.98	4	NA	NA

^aSum of raffinose, stachyose and verbascose.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 51. Proximate and mineral composition of Canadian great northern beans

	Canadian great northern beans			Australian great northern beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	26.6	21.7 – 32.1	4	NA ^b	NA
Starch	37.9	33.6 – 42.9	4	NA	NA
Amylose (% of total starch)	22.3	20.7 – 23.8	4	NA	NA
ADF ^a	7.7	7.5 – 7.9	4	NA	NA
NDF ^a	9.0	8.0 – 10.5	4	NA	NA
Fat	1.3	1.1 – 1.4	4	NA	NA
Ash	4.0	3.8 – 4.2	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	192.6	148.0 – 280.3	4	NA	NA
Copper (Cu)	1.1	0.9 – 1.2	4	NA	NA
Iron (Fe)	8.3	7.6 – 8.9	4	NA	NA
Potassium (K)	1733.2	1626.8 – 1840.6	4	NA	NA
Magnesium (Mg)	205.3	164.0 – 251.2	4	NA	NA
Manganese (Mn)	1.6	1.3 – 1.7	4	NA	NA
Phosphorus (P)	482.6	392.9 – 556.6	4	NA	NA
Zinc (Zn)	3.9	2.9 – 5.5	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 52. Amino acid composition of Canadian great northern beans

Amino acid (g/16 g N)	Canadian great northern beans			Australian great northern beans	
	Mean	Range	Number	Mean	Range
Alanine	4.4	4.3 – 4.5	5	NA ^a	NA
Arginine	7.0	6.5 – 7.3	5	NA	NA
Aspartic Acid	13.2	12.6 – 13.6	5	NA	NA
Cystine	0.9	0.8 – 1.0	5	NA	NA
Glutamic Acid	15.9	15.3 – 16.7	5	NA	NA
Glycine	4.1	3.9 – 4.1	5	NA	NA
Histidine	2.2	1.8 – 2.7	5	NA	NA
Isoleucine	4.4	4.3 – 4.5	5	NA	NA
Leucine	8.3	8.1 – 8.5	5	NA	NA
Lysine	6.8	6.6 – 7.0	5	NA	NA
Methionine	1.2	1.2 – 1.4	5	NA	NA
Phenylalanine	5.5	5.4 – 5.6	5	NA	NA
Proline	3.9	3.8 – 4.0	5	NA	NA
Serine	6.8	6.6 – 6.9	5	NA	NA
Threonine	4.3	4.12 – 4.5	5	NA	NA
Tryptophan	0.9	0.9 – 1.0	5	NA	NA
Tyrosine	4.3	3.9 – 4.7	5	NA	NA
Valine	5.4	5.1 – 5.5	5	NA	NA
Cys + Met	2.2	1.9 – 2.3	5	NA	NA
Tyr + Phe	9.8	9.3 -10.2	5	NA	NA

^aNA=not available.

Table 53. Vitamins in Canadian great northern beans

Vitamin (mg/100 g)	Canadian great northern beans			Australian great northern beans s	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.10	0.09 – 0.10	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.48	0.48 – 0.49	2	NA	NA
Riboflavin (B2)	0.12	0.12 – 0.13	2	NA	NA
Niacin (B3)	0.88	0.71 – 1.04	2	NA	NA
Panthenic acid (B5)	0.53	0.51 – 0.54	2	NA	NA
Pyridoxine (B6)	0.25	0.13 – 0.36	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	4.35	4.24 – 4.45	2	NA	NA
α-tocopherol	ND	ND	2	NA	NA
Folic acid (μg/100 g)	93.00	70.00 – 116.00	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 54. Fatty acid composition of Canadian great northern beans

Fatty acid (% in oil)	Canadian great northern beans			Australian great northern beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	9.05	7.85 – 9.81	4	NA	NA
Palmitoleic (C16:1)	ND	ND	4	NA	NA
Stearic (C18:0)	2.04	1.64 – 2.41	4	NA	NA
Oleic (C18:1)	10.17	7.53 – 13.17	4	NA	NA
Linoleic (C18:2)	28.85	24.85 – 37.03	4	NA	NA
Linolenic (C18:3)	47.52	38.34 – 52.62	4	NA	NA
Arachidic (C20:0)	0.55	0.45 – 0.67	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	0.67	0.61 – 0.72	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	1.15	0.89 – 1.25	4	NA	NA
Nervonic (C24:1)	ND	ND	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 55. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian great northern beans

	Canadian great northern beans			Australian great northern beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	5.14	4.81 – 5.48	4	NA ^d	NA
Raffinose	0.54	0.32 -0.92	4	NA	NA
Stachyose	3.42	3.32 – 3.58	4	NA	NA
Verbascose	0.02	0.00 – 0.05	4	NA	NA
Oligosaccharides ^a	3.98	3.65 – 4.50	4	NA	NA
Phytic acid (g/100 g dry matter)	1.26	1.04 – 1.52	4	NA	NA
Tannins (g/100 g dry matter)	ND ^c	ND	4	NA	NA
TIA (mg/g dry matter) ^b	6.21	5.65 – 6.94	4	NA	NA

^aSum of raffinose, stachyose and verbascose.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 56. Proximate and mineral composition of Canadian light red kidney beans

	Canadian light red kidney beans			Australian light red kidney beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	25.9	22.7 – 29.0	4	NA ^b	NA
Starch	38.7	35.5 – 41.7	4	NA	NA
Amylose (% of total starch)	22.0	19.9 – 25.3	4	NA	NA
ADF ^a	8.7	8.4 – 9.2	4	NA	NA
NDF ^a	8.6	8.1 – 9.0	4	NA	NA
Fat	1.1	0.9 – 1.4	4	NA	NA
Ash	3.7	3.2 – 4.0	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	125.9	83.3 – 172.8	4	NA	NA
Copper (Cu)	1.0	0.8 – 1.1	4	NA	NA
Iron (Fe)	7.0	6.1 – 7.4	4	NA	NA
Potassium (K)	1650.4	1355.6 – 1908.7	4	NA	NA
Magnesium (Mg)	163.1	132.3 – 222.7	4	NA	NA
Manganese (Mn)	1.3	1.2 – 1.4	4	NA	NA
Phosphorus (P)	491.5	464.7 – 525.5	4	NA	NA
Zinc (Zn)	3.4	2.7 – 3.8	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 57. Amino acid composition of Canadian light red kidney beans

Amino acid (g/16 g N)	Canadian light red kidney beans			Australian light red kidney beans	
	Mean	Range	Number	Mean	Range
Alanine	4.5	4.2 – 4.7	5	NA ^a	NA
Arginine	6.2	5.9 – 6.7	5	NA	NA
Aspartic Acid	13.2	12.9 – 13.6	5	NA	NA
Cystine	0.91	0.8 – 1.0	5	NA	NA
Glutamic Acid	16.1	15.8 – 16.5	5	NA	NA
Glycine	4.1	3.7 – 4.3	5	NA	NA
Histidine	2.4	2.2 – 2.6	5	NA	NA
Isoleucine	4.4	4.2 – 4.5	5	NA	NA
Leucine	8.3	8.3 – 8.4	5	NA	NA
Lysine	6.8	6.6 – 6.9	5	NA	NA
Methionine	1.2	1.1 – 1.3	5	NA	NA
Phenylalanine	5.6	5.4 – 5.8	5	NA	NA
Proline	3.8	3.5 – 4.2	5	NA	NA
Serine	6.9	6.8 – 7.0	5	NA	NA
Threonine	4.4	4.1 – 4.6	5	NA	NA
Tryptophan	0.9	0.9 – 1.0	5	NA	NA
Tyrosine	4.2	4.0 – 4.4	5	NA	NA
Valine	5.4	5.3 – 5.7	5	NA	NA
Cys + Met	2.1	1.9 – 2.3	5	NA	NA
Tyr + Phe	9.8	9.5 – 9.9	5	NA	NA

^aNA=not available.

Table 58. Vitamins in Canadian light red kidney beans

Vitamin (mg/100 g)	Canadian light red kidney beans			Australian light red kidney beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.09	0.09 – 0.09	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.99	0.89 – 1.09	2	NA	NA
Riboflavin (B2)	0.23	0.22 – 0.24	2	NA	NA
Niacin (B3)	0.33	0.32 – 0.33	2	NA	NA
Panthenic acid (B5)	0.31	0.27 – 0.36	2	NA	NA
Pyridoxine (B6)	0.21	0.04 – 0.25	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	3.08	2.70 – 3.45	2	NA	NA
α-tocopherol	0.07	0.07 – 0.07	2	NA	NA
Folic acid (μg/100 g)	34.50	33.00 – 36.00	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 59. Fatty acid composition of Canadian light red kidney beans

Fatty acid (% in oil)	Canadian light red kidney beans			Australian light red kidney beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	9.64	8.68 – 10.68	4	NA	NA
Palmitoleic (C16:1)	ND	ND	4	NA	NA
Stearic (C18:0)	1.46	1.36 – 1.54	4	NA	NA
Oleic (C18:1)	12.51	10.39 – 14.97	4	NA	NA
Linoleic (C18:2)	22.36	16.61 – 28.50	4	NA	NA
Linolenic (C18:3)	51.64	48.40 – 55.04	4	NA	NA
Arachidic (C20:0)	0.52	0.48 – 0.54	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	0.77	0.70 – 0.81	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	1.10	0.97 – 1.19	4	NA	NA
Nervonic (C24:1)	ND	ND	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 60. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian light red kidney beans

	Canadian light red kidney beans			Australian light red kidney beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	4.69	4.09 – 5.21	4	NA ^d	NA
Raffinose	0.26	0.16 – 0.36	4	NA	NA
Stachyose	3.44	3.03 – 3.69	4	NA	NA
Verbascose	0.16	0.11 – 0.22	4	NA	NA
Oligosaccharides ^a	3.85	3.51 – 4.05	4	NA	NA
Phytic acid (g/100 g dry matter)	1.12	0.92 – 1.29	4	NA	NA
Tannins (g/100 g dry matter)	0.74	0.49 – 0.86	4	NA	NA
TIA (mg/g dry matter) ^b	6.21	5.25 – 7.60	4	NA	NA

^aSum of raffinose, stachyose and verbascose.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 61. Proximate and mineral composition of Canadian pink beans

	Canadian pink beans			Australian pink beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	23.5	21.3 – 25.8	4	NA ^b	NA
Starch	39.4	35.4 – 42.0	4	NA	NA
Amylose (% of total starch)	25.3	21.4 – 29.6	4	NA	NA
ADF ^a	6.8	5.9 – 7.4	4	NA	NA
NDF ^a	10.4	8.0 – 12.4	4	NA	NA
Fat	0.9	0.8 – 1.0	4	NA	NA
Ash	4.1	3.8 – 4.3	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	118.3	80.0 – 147.1	4	NA	NA
Copper (Cu)	1.0	0.9 – 1.3	4	NA	NA
Iron (Fe)	8.4	7.7 – 9.9	4	NA	NA
Potassium (K)	1856.6	1648.3 – 1982.2	4	NA	NA
Magnesium (Mg)	191.6	167.0 – 220.7	4	NA	NA
Manganese (Mn)	1.6	1.4 – 1.8	4	NA	NA
Phosphorus (P)	491.8	437.5 – 543.4	4	NA	NA
Zinc (Zn)	3.4	3.0 – 3.9	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 62. Amino acid composition of Canadian pink beans

Amino acid (g/16 g N)	Canadian pink beans			Australian pink beans	
	Mean	Range	Number	Mean	Range
Alanine	4.6	4.4 – 4.7	5	NA ^a	NA
Arginine	6.7	6.4 – 7.0	5	NA	NA
Aspartic Acid	13.5	12.7 – 13.8	5	NA	NA
Cystine	1.0	0.9 – 1.1	5	NA	NA
Glutamic Acid	15.3	14.9 – 15.4	5	NA	NA
Glycine	4.2	4.1 – 4.3	5	NA	NA
Histidine	2.4	2.2 – 2.6	5	NA	NA
Isoleucine	4.5	4.3 – 4.7	5	NA	NA
Leucine	8.5	8.4 – 8.6	5	NA	NA
Lysine	6.8	6.7 – 6.9	5	NA	NA
Methionine	1.2	1.0 – 1.3	5	NA	NA
Phenylalanine	5.5	5.3 – 5.7	5	NA	NA
Proline	3.9	3.8 – 4.0	5	NA	NA
Serine	6.9	6.8 – 7.0	5	NA	NA
Threonine	4.5	4.2 – 4.9	5	NA	NA
Tryptophan	1.0	0.9 – 1.0	5	NA	NA
Tyrosine	4.1	3.9 – 4.2	5	NA	NA
Valine	5.3	5.1 – 5.4	5	NA	NA
Cys + Met	2.2	1.9 – 2.4	5	NA	NA
Tyr + Phe	9.6	9.44 – 9.8	5	NA	NA

^aNA=not available.

Table 63. Vitamins in Canadian pink beans

Vitamin (mg/100 g)	Canadian pink beans			Australian pink beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.09	0.09 – 0.09	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.62	0.56 – 0.67	2	NA	NA
Riboflavin (B2)	0.12	0.12 – 0.12	2	NA	NA
Niacin (B3)	0.94	0.90 – 0.99	2	NA	NA
Panthenic acid (B5)	0.44	0.40 – 0.48	2	NA	NA
Pyridoxine (B6)	0.2	0.16 – 0.24	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	3.49	3.29 – 3.68	2	NA	NA
α-tocopherol	ND	ND	2	NA	NA
Folic acid (μg/100 g)	111.50	74.00 – 149.00	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 64. Fatty acid composition of Canadian pink beans

Fatty acid (% in oil)	Canadian pink beans			Australian pink beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	5.58	4.05 – 7.44	4	NA	NA
Palmitoleic (C16:1)	ND	ND	4	NA	NA
Stearic (C18:0)	1.24	1.01 – 1.65	4	NA	NA
Oleic (C18:1)	7.29	6.22 – 9.15	4	NA	NA
Linoleic (C18:2)	26.47	25.03 – 27.46	4	NA	NA
Linolenic (C18:3)	57.29	53.01 – 60.80	4	NA	NA
Arachidic (C20:0)	0.40	0.36 – 0.46	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	0.57	0.48 – 0.62	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	1.16	1.11 – 1.21	4	NA	NA
Nervonic (C24:1)	ND	ND	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 65. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian pink beans

	Canadian pink beans			Australian pink beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	4.54	4.46 – 4.61	4	NA ^d	NA
Raffinose	0.31	0.25 – 0.42	4	NA	NA
Stachyose	3.65	3.63 – 3.69	4	NA	NA
Verbascope	0.06	0.04 – 0.08	4	NA	NA
Oligosaccharides ^a	4.02	3.97 – 4.09	4	NA	NA
Phytic acid (g/100 g dry matter)	1.20	1.13 – 1.27	4	NA	NA
Tannins (g/100 g dry matter)	0.78	0.74 – 0.85	4	NA	NA
TIA (mg/g dry matter) ^b	5.75	5.52 – 6.01	4	NA	NA

^aSum of raffinose, stachyose and verbascope.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 66. Proximate and mineral composition of Canadian pinto beans

	Canadian pinto beans			Australian pinto beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	23.7	19.7 – 27.8	4	NA ^b	NA
Starch	40.9	37.2 – 43.6	4	NA	NA
Amylose (% of total starch)	24.9	23.9 – 27.0	4	NA	NA
ADF ^a	7.1	6.1 – 9.3	4	NA	NA
NDF ^a	9.7	7.3 – 12.8	4	NA	NA
Fat	1.0	0.9 – 1.2	4	NA	NA
Ash	4.1	3.6 – 4.5	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	123.0	98.9 – 146.0	4	NA	NA
Copper (Cu)	0.9	0.6 – 1.2	4	NA	NA
Iron (Fe)	10.7	7.7 – 13.9	4	NA	NA
Potassium (K)	1843.2	1714.5 – 2015.5	4	NA	NA
Magnesium (Mg)	218.3	188.8 – 254.7	4	NA	NA
Manganese (Mn)	1.5	1.4 – 1.7	4	NA	NA
Phosphorus (P)	542.9	417.6 – 669.3	4	NA	NA
Zinc (Zn)	3.9	3.7 – 4.4	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 67. Amino acid composition of Canadian pinto beans

Amino acid (g/16 g N)	Canadian pinto beans			Australian pinto beans	
	Mean	Range	Number	Mean	Range
Alanine	4.5	4.4 – 4.8	5	NA ^a	NA
Arginine	7.0	6.3 – 7.8	5	NA	NA
Aspartic Acid	12.9	12.4 – 13.6	5	NA	NA
Cystine	1.0	0.8 – 1.2	5	NA	NA
Glutamic Acid	15.7	15.4 – 16.4	5	NA	NA
Glycine	4.1	4.0 – 4.3	5	NA	NA
Histidine	2.5	2.3 – 2.7	5	NA	NA
Isoleucine	4.3	4.2 – 4.4	5	NA	NA
Leucine	8.2	8.0 – 8.5	5	NA	NA
Lysine	6.9	6.5 – 7.0	5	NA	NA
Methionine	1.3	1.3 – 1.4	5	NA	NA
Phenylalanine	5.4	5.3 – 5.6	5	NA	NA
Proline	4.0	3.9 – 4.3	5	NA	NA
Serine	6.7	6.3 – 7.1	5	NA	NA
Threonine	4.3	3.9 – 4.6	5	NA	NA
Tryptophan	0.9	0.9 – 0.9	5	NA	NA
Tyrosine	4.4	4.0 – 5.2	5	NA	NA
Valine	5.3	5.1 – 5.4	5	NA	NA
Cys + Met	2.3	2.2 – 2.6	5	NA	NA
Tyr + Phe	9.8	9.3 – 10.6	5	NA	NA

^aNA=not available.

Table 68. Vitamins in Canadian pinto beans

Vitamin (mg/100 g)	Canadian pinto beans			Australian pinto beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.09	0.09 – 0.09	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.69	0.62 – 0.76	2	NA	NA
Riboflavin (B2)	0.12	0.12 – 0.12	2	NA	NA
Niacin (B3)	1.12	0.94 – 1.29	2	NA	NA
Panthenic acid (B5)	0.38	0.31 – 0.44	2	NA	NA
Pyridoxine (B6)	0.18	0.16 – 0.20	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	3.51	3.49 – 3.54	2	NA	NA
α-tocopherol	ND	ND	2	NA	NA
Folic acid (μg/100 g)	91.25	71.00 – 111.50	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 69. Fatty acid composition of Canadian pinto beans

Fatty acid (% in oil)	Canadian pinto beans			Australian pinto beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	5.73	4.27 – 7.47	4	NA	NA
Palmitoleic (C16:1)	ND	ND	4	NA	NA
Stearic (C18:0)	1.24	0.86 – 1.63	4	NA	NA
Oleic (C18:1)	8.62	6.76 – 13.20	4	NA	NA
Linoleic (C18:2)	25.89	23.75 – 29.99	4	NA	NA
Linolenic (C18:3)	56.46	51.42 – 61.03	4	NA	NA
Arachidic (C20:0)	0.41	0.32 – 0.50	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	0.51	0.41 – 0.59	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	1.15	1.10 – 1.19	4	NA	NA
Nervonic (C24:1)	ND	ND	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 70. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian pinto beans

	Canadian pinto beans			Australian pinto beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	4.40	3.98 – 4.90	4	NA ^d	NA
Raffinose	0.37	0.27 – 0.55	4	NA	NA
Stachyose	3.65	3.33 – 3.86	4	NA	NA
Verbascope	0.04	0.00 – 0.07	4	NA	NA
Oligosaccharides ^a	4.07	3.78 – 4.20	4	NA	NA
Phytic acid (g/100 g dry matter)	1.24	0.99 – 1.46	4	NA	NA
Tannins (g/100 g dry matter)	1.10	1.06 – 1.14	4	NA	NA
TIA (mg/g dry matter) ^b	5.96	5.43 – 6.37	4	NA	NA

^aSum of raffinose, stachyose and verbascope.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 71. Proximate and mineral composition of Canadian small red beans

	Canadian small red beans			Australian small red beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	23.7	21.2 – 27.1	4	NA ^b	NA
Starch	40.7	37.90– 43.0	4	NA	NA
Amylose (% of total starch)	24.4	20.0 – 27.4	4	NA	NA
ADF ^a	7.4	6.8 – 7.7	4	NA	NA
NDF ^a	9.1	7.4 – 9.8	4	NA	NA
Fat	1.1	1.0 – 1.1	4	NA	NA
Ash	4.1	4.0 – 4.2	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	134.8	112.5 – 158.9	4	NA	NA
Copper (Cu)	0.9	0.6 – 1.1	4	NA	NA
Iron (Fe)	7.6	7.2 – 8.2	4	NA	NA
Potassium (K)	1750.0	1687.3 – 1880.4	4	NA	NA
Magnesium (Mg)	210.12	179.3 – 240.7	4	NA	NA
Manganese (Mn)	1.4	1.3 – 1.5	4	NA	NA
Phosphorus (P)	534.2	465.8 – 574.8	4	NA	NA
Zinc (Zn)	4.0	3.6 – 4.2	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 72. Amino acid composition of Canadian small red beans

Amino acid (g/16 g N)	Canadian small red beans			Australian small red beans	
	Mean	Range	Number	Mean	Range
Alanine	4.5	4.4 – 4.6	5	NA ^a	NA
Arginine	6.5	6.2 – 6.7	5	NA	NA
Aspartic Acid	13.4	13.0 – 14.1	5	NA	NA
Cystine	0.9	0.8 – 1.0	5	NA	NA
Glutamic Acid	14.8	12.6 – 15.5	5	NA	NA
Glycine	4.2	4.1 – 4.4	5	NA	NA
Histidine	2.3	1.8 – 2.6	5	NA	NA
Isoleucine	4.5	4.4 – 4.6	5	NA	NA
Leucine	8.4	8.2 – 8.5	5	NA	NA
Lysine	6.7	6.1 – 6.9	5	NA	NA
Methionine	1.2	1.1 – 1.3	5	NA	NA
Phenylalanine	5.5	5.4 – 5.7	5	NA	NA
Proline	4.0	3.7 – 4.1	5	NA	NA
Serine	6.9	6.8 – 7.0	5	NA	NA
Threonine	4.6	4.3 – 4.7	5	NA	NA
Tryptophan	1.0	0.9 – 1.0	5	NA	NA
Tyrosine	4.2	4.0 – 4.5	5	NA	NA
Valine	5.4	5.2 – 5.5	5	NA	NA
Cys + Met	2.2	2.0 – 2.3	5	NA	NA
Tyr + Phe	9.7	9.4 – 10.1	5	NA	NA

^aNA=not available.

Table 73. Vitamins in Canadian small red beans

Vitamin (mg/100 g)	Canadian small red beans			Australian small red beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.09	0.09 – 0.09	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.57	0.50 – 0.64	2	NA	NA
Riboflavin (B2)	0.1	0.10 – 0.11	2	NA	NA
Niacin (B3)	0.78	0.73 – 0.84	2	NA	NA
Panthenic acid (B5)	0.40	0.38 – 0.43	2	NA	NA
Pyridoxine (B6)	0.17	0.15 – 0.19	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	3.84	3.52 – 4.16	2	NA	NA
α-tocopherol	0.06	0.06 – 0.06	2	NA	NA
Folic acid (μg/100 g)	84.50	71.00 – 98.00	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 74. Fatty acid composition of Canadian small red beans

Fatty acid (% in oil)	Canadian small red beans			Australian small red beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	7.38	6.87 – 8.38	4	NA	NA
Palmitoleic (C16:1)	ND	ND	4	NA	NA
Stearic (C18:0)	1.45	1.38 – 1.52	4	NA	NA
Oleic (C18:1)	9.52	8.30 – 12.33	4	NA	NA
Linoleic (C18:2)	24.40	18.10 – 27.19	4	NA	NA
Linolenic (C18:3)	55.12	52.84 – 59.17	4	NA	NA
Arachidic (C20:0)	0.42	0.40 – 0.42	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	0.52	0.46 – 0.63	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	1.19	1.04 – 1.33	4	NA	NA
Nervonic (C24:1)	ND	ND	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 75. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian small red beans

	Canadian small red beans			Australian small red beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	4.74	4.53 – 4.95	4	NA ^d	NA
Raffinose	0.45	0.37 – 0.52	4	NA	NA
Stachyose	3.48	3.33 – 3.57	4	NA	NA
Verbascose	0.09	0.08 – 0.10	4	NA	NA
Oligosaccharides ^a	4.02	3.93 – 4.11	4	NA	NA
Phytic acid (g/100 g dry matter)	1.42	1.39 – 1.46	4	NA	NA
Tannins (g/100 g dry matter)	0.81	0.51 – 1.07	4	NA	NA
TIA (mg/g dry matter) ^b	8.39	7.99 – 8.75	4	NA	NA

^aSum of raffinose, stachyose and verbascose.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.

Table 76. Proximate and mineral composition of Canadian white kidney beans

	Canadian white kidney beans			Australian white kidney beans	
	Mean	Range	Number	Mean	Range
Composition (g/100 g dry matter)					
Protein (N x 6.25)	27.6	24.9 – 30.5	4	NA ^b	NA
Starch	39.5	36.6 – 42.2	4	NA	NA
Amylose (% of total starch)	21.5	20.2 – 24.0	4	NA	NA
ADF ^a	7.8	7.1 – 8.7	4	NA	NA
NDF ^a	8.3	8.0 – 8.7	4	NA	NA
Fat	1.3	1.1 – 1.5	4	NA	NA
Ash	3.9	3.7 – 4.2	4	NA	NA
Minerals (mg/100 g dry matter)					
Calcium (Ca)	171.0	145.3 – 210.0	4	NA	NA
Copper (Cu)	1.1	1.0 – 1.1	4	NA	NA
Iron (Fe)	9.1	8.3 – 9.8	4	NA	NA
Potassium (K)	1757.4	1548.4 – 1921.9	4	NA	NA
Magnesium (Mg)	177.3	166.9 – 186.6	4	NA	NA
Manganese (Mn)	1.3	1.0 – 1.5	4	NA	NA
Phosphorus (P)	552.6	488.5 – 675.4	4	NA	NA
Zinc (Zn)	3.6	3.4 – 3.9	4	NA	NA

^aADF=acid detergent fibre, and NDF=neutral detergent fibre.

^bNA=not available.

Table 77. Amino acid composition of Canadian white kidney beans

Amino acid (g/16 g N)	Canadian white kidney beans			Australian white kidney beans	
	Mean	Range	Number	Mean	Range
Alanine	4.4	4.3 – 4.5	5	NA ^a	NA
Arginine	6.5	6.1 – 6.9	5	NA	NA
Aspartic Acid	13.4	13.0 – 14.0	5	NA	NA
Cystine	0.9	0.8 – 1.1	5	NA	NA
Glutamic Acid	16.6	16.2 – 17.5	5	NA	NA
Glycine	4.1	3.9 – 4.3	5	NA	NA
Histidine	2.3	2.2 – 2.5	5	NA	NA
Isoleucine	4.4	4.3 – 4.6	5	NA	NA
Leucine	8.5	8.4 – 8.6	5	NA	NA
Lysine	6.6	6.1 – 6.9	5	NA	NA
Methionine	1.2	1.1 – 1.3	5	NA	NA
Phenylalanine	5.6	5.5 – 5.7	5	NA	NA
Proline	4.0	3.9 – 4.2	5	NA	NA
Serine	7.1	6.8 – 7.4	5	NA	NA
Threonine	4.2	3.9 – 4.6	5	NA	NA
Tryptophan	0.9	0.8 – 0.9	5	NA	NA
Tyrosine	4.4	3.7 – 5.0	5	NA	NA
Valine	5.4	5.2 – 5.7	5	NA	NA
Cys + Met	2.1	2.0 – 2.2	5	NA	NA
Tyr + Phe	9.9	9.4 – 10.5	5	NA	NA

^aNA=not available.

Table 78. Vitamins in Canadian white kidney beans

Vitamin (mg/100 g)	Canadian white kidney beans			Australian white kidney beans	
	Mean	Range	Number	Mean	Range
Retinol (A)	ND ^a	ND	2	NA ^b	NA
C	0.09	0.09 – 0.09	2	NA	NA
D	ND	ND	2	NA	NA
Thiamin (B1)	0.73	0.65 – 0.80	2	NA	NA
Riboflavin (B2)	0.11	0.10 – 0.13	2	NA	NA
Niacin (B3)	1.12	0.98 – 1.26	2	NA	NA
Panthenic acid (B5)	0.35	0.35 – 0.36	2	NA	NA
Pyridoxine (B6)	0.16	0.14 – 0.17	2	NA	NA
Cyanocobalamin (B12)	ND	ND	2	NA	NA
Biotin	ND	ND	2	NA	NA
γ-tocopherol	2.96	2.85 – 3.07	2	NA	NA
α-tocopherol	ND	ND	2	NA	NA
Folic acid (μg/100 g)	22.00	20.00 – 24.00	2	NA	NA

^aND=not detectable.

^bNA=not available.

Table 79. Fatty acid composition of Canadian white kidney beans

Fatty acid (% in oil)	Canadian white kidney beans			Australian white kidney beans	
	Mean	Range	Number	Mean	Range
Lauric (C12:0)	ND ^a	ND	4	NA ^b	NA
Myristic (C14:0)	ND	ND	4	NA	NA
Palmitic (C16:0)	8.27	6.74 – 9.85	4	NA	NA
Palmitoleic (C16:1)	ND	ND	4	NA	NA
Stearic (C18:0)	1.55	1.44 – 1.61	4	NA	NA
Oleic (C18:1)	10.38	9.88 – 10.77	4	NA	NA
Linoleic (C18:2)	24.9	21.99 – 27.56	4	NA	NA
Linolenic (C18:3)	52.53	48.64 – 56.55	4	NA	NA
Arachidic (C20:0)	0.57	0.54 – 0.61	4	NA	NA
Gadoleic (C20:1)	ND	ND	4	NA	NA
Eicosadienoic (C20:2)	ND	ND	4	NA	NA
Behenic (C22:0)	0.79	0.71 – 0.85	4	NA	NA
Erucic (C22:1)	ND	ND	4	NA	NA
Lignoceric (C24:0)	1.02	0.97 – 1.06	4	NA	NA
Nervonic (C24:1)	ND	ND	4	NA	NA

^aND=not detectable.

^bNA=not available.

Table 80. Sugars, phytic acid, tannins and trypsin inhibitor activity (TIA) in Canadian white kidney beans

	Canadian white kidney beans			Australian white kidney beans	
	Mean	Range	Number	Mean	Range
Sugars (g/100 g dry matter)					
Sucrose	3.67	3.43 – 3.89	4	NA ^d	NA
Raffinose	0.22	0.15 – 0.30	4	NA	NA
Stachyose	3.53	3.29 – 3.77	4	NA	NA
Verbascope	0.18	0.15 – 0.22	4	NA	NA
Oligosaccharides ^a	3.93	3.81 – 4.09	4	NA	NA
Phytic acid (g/100 g dry matter)	1.34	1.15 – 1.56	4	NA	NA
Tannins (g/100 g dry matter)	0.00	0.00 – 0.01	4	NA	NA
TIA (mg/g dry matter) ^b	10.88	10.33 – 11.63	4	NA	NA

^aSum of raffinose, stachyose and verbascope.

^bTIA=trypsin inhibitor activity.

^cND=not detectable.

^dNA=not available.