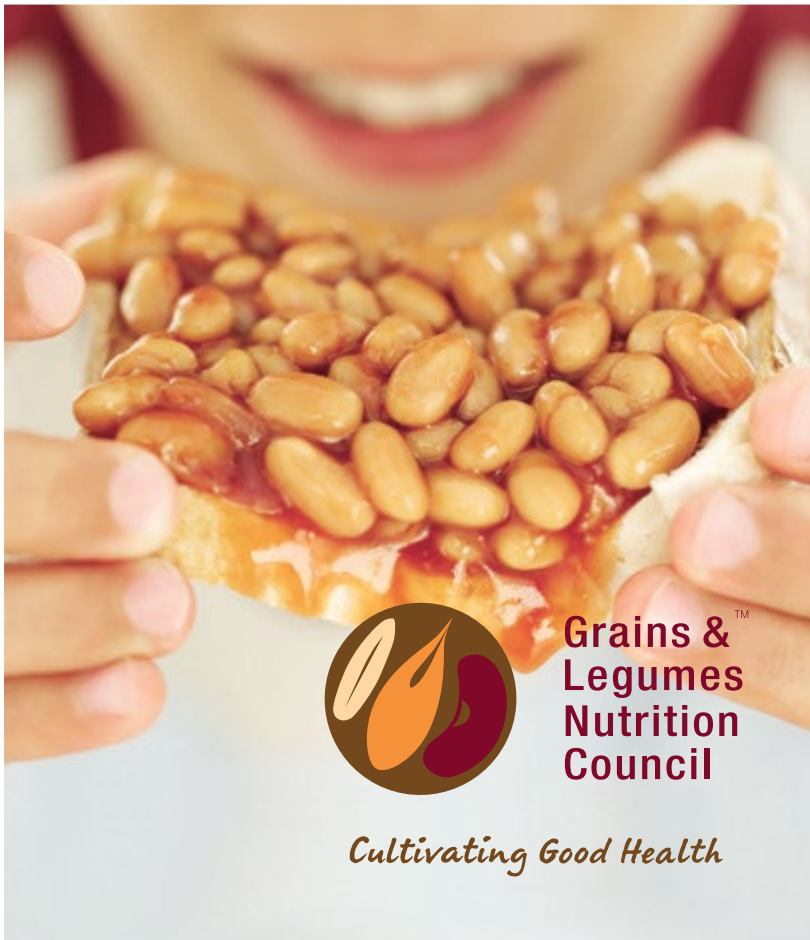
Lifting the Lid on Legumes

The benefits of choosing legumes



Grains & Legumes Nutrition Council™

Cultivating Good Health




A place for legumes on the plate

Legumes such as beans, lentils, peas and soy foods are an important part of a healthy diet for all Australians.

The Australian Dietary Guidelines recommend enhancing dietary variety by increasing the intake of alternatives to meat.[1] Legumes are well-placed to fill this role as they are nutritious, sustainable and inexpensive alternatives. However, most Australians don't include these healthy, convenient foods in meals regularly. In line with the Dietary Guidelines, the Grains & Legumes Nutrition Council™ encourages Australians to enjoy legumes at least 2-3 times each week.

Legumes have been shown to help manage both cholesterol and blood glucose.[2,3,4] Increased intakes are linked to reduced risk of heart disease, diabetes and some cancers.[5-13] In addition, emerging evidence indicates legumes may help in weight management.[14] Legumes contain a range of nutrients and bioactive components that may explain their protective effect. They contain both soluble and insoluble fibre, resistant starch as well as phytochemicals and most have a low glycemic index (GI).[15, 16]

Despite the fact legumes are recommended for all Australians, few of us eat legumes regularly. In 2011, the Grains & Legumes Nutrition Council™ commissioned a survey to track consumption of legumes in Australia which found only 22% of Australians eat legumes once a week.[17] In this survey, the top three reasons reported for not eating legumes were lack of knowledge of how to prepare them, a poor understanding of the health benefits and concern over side effects such as bloating and flatulance.[17]

To assist health care professionals in encouraging more people to benefit from legumes, this report addresses each of these issues. The evidence of the health benefits of eating legumes regularly in the prevention and management of chronic disease and weight is outlined, together with some handy tips to incorporate legumes into the diet and some ideas on reducing the side effects experienced by some people.

Legumes, also called 'pulses', include all forms of beans and peas from the Fabaceae (or Leguminosae) botanical family.

'Legumes are rich in nutrients including protein, soluble and insoluble fibre, oligosaccharides, a range of vitamins and minerals, as well as potentially bioactive nutrients. There is growing evidence that their regular consumption can reduce the risk of developing a range of chronic diseases including obesity, diabetes, heart disease and certain cancers.'

Associate Professor Jon Buckley. Director, Nutritional Physiology Research Centre, University of South Australia

"The Heart Foundation recommends including legumes in at least two meals per week"

Barbara Eden, APD - The Heart Foundation

Legumes & Heart Health

Population studies indicate people who eat legumes are less likely to develop heart disease and intervention trials have demonstrated legumes can reduce cholesterol.[18,19] Eating ½ to 2 cups of legumes a day may also lower heart disease risk through favourable effects on blood pressure, blood glucose and helping weight management.[2,4,20]

Both soy and non-soy legumes have been shown to reduce cholesterol. A meta-analysis of 43 trials concluded that regular consumption of 15 to 30g of soy protein daily for between three and eight weeks has a significant favourable impact on serum lipoprotein risk factors for coronary heart disease. One cup of soy drink plus a soy burger provides 19g of soy protein. The review reported a reduction of 5.5% in LDL and 10.7% in fasting triacylglycerol as well as 3.2% increase in HDL cholesterol compared to controls.[21]

A second meta-analysis of clinical trials investigating legumes other than soy reported significant decreases in total cholesterol, LDL-cholesterol and triglycerides in a sample of predominantly male hypercholesterolemic participants. The 10 trials studied the effects of 80-440g/day (½ to 2 cups) of chickpeas, pinto beans, baked beans, navy beans as well as flour from ground beans. All studies reported net decreases in total cholesterol with a mean reduction of 5.5% in total cholesterol and 6.6% in LDL cholesterol.[2]

Observational studies also provide evidence for the cardio-protective effect of legumes. Results from the US-based study NHANES indicates that legume consumption four or more times a week is associated with a 22% lower risk of coronary heart disease and an 11% reduced risk of CVD compared to only eating legumes once per week.[5]

The fatty acid profile, dietary fibre, isoflavones and antioxidants in legumes may contribute to reducing the risk of cardiovascular disease through their hypocholesterolaemic effect. Legumes are also a source of saponins and phytosterols which may assist with decreasing absorption of cholesterol from the gut.[15,16] In addition, legumes are low sodium and contain no cholesterol.

Nutrition Tip

Canned legumes are a handy alternative to dried versions. Sodium is added during the canning process to preserve the integrity and appearance of the legumes. The sodium can be lowered by almost half by simply rinsing them thoroughly.[22]

Legumes & Blood Sugar Control

As a high fibre, low GI source of protein legumes make an excellent choice to include for the dietary management of blood glucose control. Legumes have been shown to improve short-term blood glucose control, and as part of a low GI diet are linked to long-term improvements in HbA1c and reduced risk of type 2 diabetes.[3,6,13]

A meta-analysis of 11 trials reported consumption of up to half a cup per day of legumes for more than four weeks significantly reduces fasting blood glucose and insulin levels.[3] In addition, low GI diets including legumes have been shown to help long-term blood glucose control and reduce risk of type 2 diabetes.[3,6] A meta-analysis of 19 randomised controlled trials found when legumes were included in a lower GI diet they lowered HbA1c significantly for up to 52 weeks in both diabetic and non-diabetic individuals.[3]

Professor Jennie Brand-Miller explains, 'the main mechanism is due to the nature of the starch in legumes which is encapsulated and is higher in amylose than cereal grains. This means it is less likely to be fully gelatinised during cooking which reduces the rate of starch digestion and therefore the glycemic response.' It has also been proposed the protein in legumes stimulates insulin secretion, facilitating a more rapid extraction of glucose from the bloodstream into cells compared to other carbohydrate foods.[3]

"Legumes are the star performers for blood glucose control"

Professor Jennie Brand-Miller, University of Sydney

Legumes may also reduce the risk of diabetes through the second-meal effect.[23] The second meal effect is the ability of legumes to lower both postprandial glycemia after the meal at which they are consumed and also at a subsequent meal later in the day or even on the following day.[24]

More evidence from long-term trials and cohort studies is needed to confirm the emerging evidence for the role of legumes in long-term blood glucose control and type 2 diabetes prevention. The Grains & Legumes Nutrition Council™ is working in collaboration with Australian and International groups to help facilitate such research.

Using legumes to lower GI of a meal

	Meal	Carbohydrate	GI
Breakfast	2 pieces of wholemeal toast with 2 poached eggs	25g	64-85
...with legumes	1 piece of wholemeal toast with 1/2 cup baked beans and 1 poached egg	29g	50
Dinner	Grilled salmon with 150g mashed potato	20g	83
...with legumes	Grilled salmon with lentil and vegetable mix with orange pieces	21g	37

Reference: Sydney University Glycemic Index Database/Foodworks 2009

Nutrient composition of legumes per 100g as commonly consumed

	ENERGY (kJ)	PROTEIN (g)	FAT (g)	SATURATED FAT (g)	CARBOHYDRATE (g)	FIBRE (g)	FOLATE (µg)	CALCIUM (mg)	IRON (mg)	MAGNESIUM (mg)	POTASSIUM (mg)	ZINC (mg)	GLYCEMIC INDEX*
Legumes and legume foods													
Baked beans, canned	375	4.9	0.3	0	11	5.2	50	40	1.0	25	238	0.5	40
Butter (Lima) beans, dried, boiled	338	6.4	0.3	0.1	10.2	5.3	83	16	1.3	35	350	0.7	36
Cannellini beans, canned	387	6.2	0.6	0.2	12.2	6.4	81	46	1.6	30	260	0.6	31
Chickpeas, canned	449	6.3	2.1	0.3	13.3	4.7	63	45	1.8	27	140	1	38
Hummus dip	1014	9.3	17	3.4	9	8.7	n/a	45	2.5	5	0.3	0.3	6
Lentils, dried, boiled	323	6.8	0.4	0.1	9.5	3.7	20	17	2	25	220	0.9	29
Red kidney beans, canned	426	6.6	0.6	0.1	14.1	6.5	40	36	2.1	30	270	0.6	36
Soy beans, dried, boiled	597	13.5	7.7	1.2	1.4	7.2	54	76	2.2	71	420	1.6	14
Soy drink, fortified, reduced fat	270	3.3	1.5	0.2	9	0.7	156	141	0.9	14	230	0.4	17 - 44
Split peas, dried, boiled	273	6.6	0.4	0.3	6.7	3.9	65	13	1	23	140	0.6	32
Tofu	530	12.0	7.3	1.0	0	7	30	320	2.9	78	130	1.7	-
Bean mix, canned	410	6.4	0.4	0.1	13.8	6.2	67	43	2	30	220	0.8	37
Other sources of protein													
Beef steak, grilled	742	31.7	5.5	1.9	0	0	0	6	3.2	27	346	8.1	-
Chicken breast, grilled	598	29.8	2.5	0.9	0	0	54	5	0.4	n/a	375	0.7	-
Hardboiled egg	583	12.4	9.5	3.1	0.7	1.2	83	39	1.6	10	107	1.2	-
Salmon, grilled	987	24.3	15.5	4.8	0	0	0	8	1.3	29	360	0.4	-
Almonds	2503	19.5	54.7	4.0	4.8	8.8	29	250	3.9	260	740	3.7	-

"Legumes provide a valuable and cost efficient source of protein, iron, some essential fatty acids, soluble and insoluble fibre and micronutrients. They are valuable inclusions in the diet."
Australian Dietary Guidelines

A serve of legumes[1]
Vegetable =75g (1/2 cup) cooked legumes
Meat alternative = 150g (1 cup) cooked legumes

The phytate content of legumes is reduced and absorption of zinc improved by boiling or by pre-soaking[46]

Legumes & Cancer

A growing body of evidence from large population studies and comprehensive reviews indicates legumes may have a protective effect against bowel, breast, lung and prostate cancers.[7-12]

Population studies indicate soy consumption has a role in both preventing breast cancer and reducing risk of re-occurrence in breast cancer survivors. Two meta-analyses have concluded there is a 14-25% reduced risk of breast cancer with high soy food intakes.[8,9]

The potential influence of soy isoflavones on breast cancer prognosis as well as their interaction with the hormonal therapy tamoxifen have led to concern about soy food consumption among breast cancer patients.[25] These concerns have stemmed from the results of in-vitro and animal studies, but the relevance of these results in women consuming soy foods is not established.[26] Importantly, recent evidence indicates that there is no increased risk of breast cancer recurrence or increased mortality with increased soy intake in breast cancer patients.[27-35] The largest study to date on the influence of soy food and breast cancer outcomes tracked over 9,500 US and Chinese breast cancer survivors for seven years, including women taking tamoxifen. The authors concluded that eating soy food is safe for breast cancer survivors and contrary to previous concerns, women who consumed the highest intakes of soy foods had a 29% reduced risk of breast cancer specific mortality and a 36% reduced risk of recurrence compared to those with the lowest intake of soy foods.[27]

In 2011, the World Cancer Research Fund concluded the evidence for a protective effect of high fibre foods such as legumes against colorectal cancer is convincing.[36] An analysis of the Nurses' Health Study, found those who consumed four or more servings of legumes a week had a lower incidence of colorectal adenomas than women who reported consuming one serving or less.[37] This is supported by results from the Shanghai Women's Health Study, which found women consuming the most soy food a 33% lower colorectal cancer risk.[7]

The mechanisms of the role of legumes in cancer protection are not clearly understood. Legumes contain several phenolic compounds which are antioxidants and may provide some cancer protective effects.[38] Legumes are also significant sources of resistant starch, which is fermented by colonic bacteria to short chain fatty acids (SCFA). The SCFA butyrate is thought to be of particular benefit for lowering bowel cancer risk as it promotes the death of colorectal cancer cells.[39]

"Consumption of legumes is associated with reduced risk of colorectal cancer"
Australian Dietary Guidelines, 2013[1]

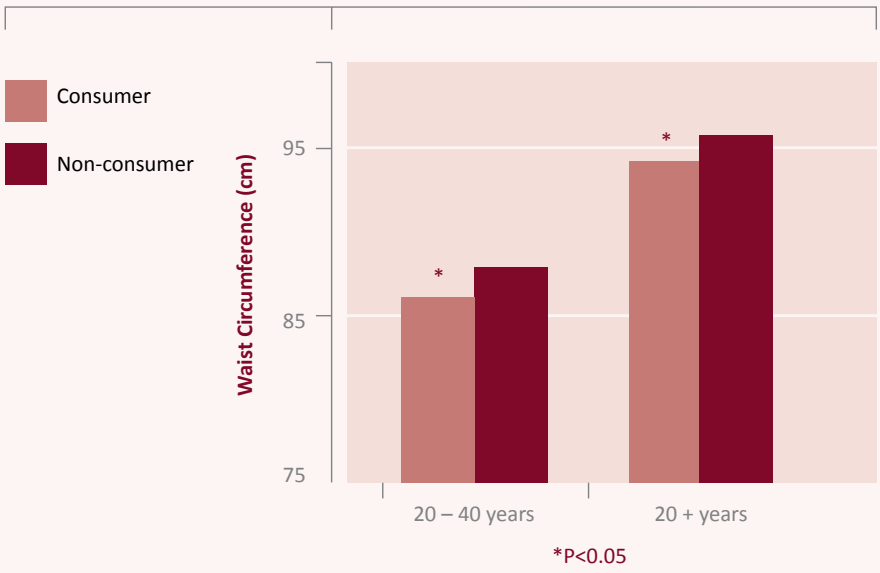
Legumes & Weight Management

It can be challenging to help people adjust their diet to meet their nutrient needs and promote weight loss, while at the same time still keeping them satiated. Nutrient rich legumes can be a valuable part of such a diet. They contain soluble fibre and protein and are mostly low GI, all of which may help promote satiety.

Emerging evidence suggests including three to five cups of legumes a week in an energy-restricted diet may help improve weight loss. A recent review of the evidence found that of the five trials to investigate the effect of legumes in a calorie–controlled diet, four reported significant reductions in weight between 3.6kg and 8.1kg over six to eight weeks compared to diets without legumes.[40]

For long-term weight management, observational studies suggest a link between dietary patterns incorporating legumes and lower BMI as well as reduced risk of obesity.[40] In a US–based population study of 1,475 adults, regular consumption of beans was associated with lower BMI, 23% reduced risk of increased waist size and 22% reduced risk of obesity compared to those who did not eat beans.[41]

Bean Consumption Associated with Reduced Waist Circumference



Source: Papanikolaou Y, Fulgoni V. J Am Coll Nutr. October 2008 27:569-576

Legumes may assist in short-term weight loss through their effect on satiety for up to four hours.[40] A recent study of 25 young men found those who ate lentils with pasta were not as hungry and did not eat as much at the next meal 4.5 hours later as those men who had eaten pasta with the same amount of calories.[23] It is suggested this 'second meal effect' is the result of higher levels of fibre and resistant starch in legumes which remain undigested until they reach the large bowel where they are fermented. The fermentation products are used for energy in preference to glucose, thus suppressing appetite for longer periods.[42]

Legumes & Abdominal Discomfort

Many people don't eat legumes for fear they will experience an increase in gas and flatulence. However, a study from the US suggests that not everyone is affected and most people adjust after just a few weeks. Healthy adults were asked to eat half a cup legumes (pinto beans, black-eyed peas or navy beans) or carrots each day for eight to twelve weeks. Initially, half the people reported increased gas during the first week of the study and by the second week, 70% or more of the participants felt that any increase in gas had dissipated.[43]

Legumes do contain galacto-oligosaccharides (GOS), small unabsorbed carbohydrates that are rapidly fermented by the gut bacteria.[44] These, together with other FODMAPs, may cause gas and bloating in people that suffer Irritable Bowel Syndrome (IBS).[45] As a treatment for IBS, people may follow a low FODMAP diet that excludes legumes for a period of time.[45] Dr Jane Muir, Head of Research at Central Clinical School, Monash University explains, 'The low FODMAP diet is not a diet for the long-term; it is designed to alleviate symptoms associated with IBS. We recommend that it is followed for six to eight weeks and then reviewed with a specialist dietitian at which point foods containing FODMAPs can be slowly be re- introduced. It is not advisable to stay on a low FODMAP diet for the longer term because the potential 'prebiotic' effect of certain FODMAPs means they are probably essential for maintaining a healthy population of gut bacteria as well as maintaining normal bowel function through important laxative effects.'

Rapidly increasing legumes in the diet may lead to gas as the body adapts to the higher fibre intake. Gradually increasing intake, regular exercise and plenty of water will all help reduce the effects of increased fibre. Soaking and rinsing dry legumes before cooking, as well as rinsing of canned legumes, can also reduce the effects.

"Participants in our latest research on legumes have commented on how easy it is to incorporate the ½ a cup of legumes each day. They particularly like the convenience of the small cans which they can have as part of lunch or as a snack"

Dr Alison Coates, University of South Australia.

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