

Protein Alternatives - Pulses And Legumes

Pulses include beans, peas, chickpeas, lentils, and other pulses. The food group plays an important role as part of healthy, balanced diets. Regular consumption has been linked to disease prevention, including cancer, diabetes and heart disease. The 2013 South African food-based dietary guidelines includes: "Eat dry beans, split peas, lentils and soya regularly". The guideline was introduced to address both under- and overnutrition in South Africa, as these foods are considered to be nutrient-rich, economical sources of protein, slow-release carbohydrates, dietary fibre, various vitamins and minerals and non-nutritive components which may have several beneficial health effects (Venter et al., 2013).

Several studies have shown that pulses and other legume foods are associated with longevity. Examples include the Japanese consuming soy, tofu, natto and miso; the Swedes consuming brown beans and peas; and the Mediterranean populations who consume lentils, chickpeas and white beans regularly.

Pulses have various nutritional benefits:

- Pulses are a low fat source of protein.
- On average, pulses contain about twice the amount of protein found in whole grains like wheat, oats, barley or rice.
- Pulses have a low glycemic index.
- Pulses are very high in fibre, containing both soluble and insoluble fibres.
 - Regular consumption of soluble fibre has shown to decrease cholesterol and control blood sugar.
 - Insoluble fibre helps with digestion and regular bowel movement.
- Pulses contain essential vitamins and mineral. Key minerals include iron, potassium, magnesium, calcium and zinc. Pulses are particularly abundant in B vitamins such as folate, thiamine and niacin and various essential amino acids, including lysine.

In addition to contributing to a healthy, balanced diet, pulses nutritional qualities make them an important part of healthy diets to fight the increasing epidemic of non-communicable diseases. The World Health Organisation (WHO) estimates that up to 80% of heart disease, stroke, and type 2 diabetes and more than 1/3 of cancers could be prevented by eliminating risk factors, such as unhealthy diets and promoting better eating habits, of which pulses can be an essential component.

- Pulses can help lower blood cholesterol and attenuate blood glucose, which is a key factors in against diabetes and cardiovascular disease.
- Eating pulses as a replacement to some animal protein also increases the intake of fibres (Table 1).
- Pulses have been shown to be helpful in the prevention of certain cancers, mainly because of their fibre content (Table 1), but also because of their vitamin, mineral and amino-acid contents.
- Pulses are included in all 'food baskets' and dietary guidelines throughout the world. The World Food Programme (WFP) recommends 60 grams of pulses daily in its typical food basket.

Table 1: Nutrient content of pulses (Venter et al., 2013)

Nutrient	Sugar beans	Chick Peas	Lentils	Soy beans
Total fat (g)	0.5	2.6	0.2	9.0

Protein (g)	7.1	8.9	8.6	16.6
Carbohydrate (g)	19.5	20.8	13.7	4.8
Magnesium (mg)	32	49	27	102
Potassium (mg)	55	48	27	86
Iron (mg)	368	291	270	515

Table 2: Fibre content of pulses and other sources of fibre (FAO, 2016)

	Serving	Fiber (g)	% daily value*
Navy bean	1 cup cooked	19.1	76
Split pea	1 cup cooked	16.3	65
Lentil	1 cup cooked	15.6	62
Pinto bean	1 cup cooked	15.4	62
Chickpea	1 cup cooked	12.5	50
Bran Flakes	1 cup dry	7.1	28
Whole wheat spaghetti	1 cup cooked	6.3	25
Whole wheat bread	2 slices	3.8	15

*Recommended daily value: 25 grams fibre/day

Protein quality

The protein content of pulses typically ranges from 20% to 30%. However, for food labelling purposes, protein content claims are based not only on quantity but also on quality, or nutritional value, of the protein in the food product.

The Protein Digestibility Corrected Amino Acid Score (PDCAAS) value of a food is a product of the amino acid score and the percent true protein digestibility of the specific food. PDCAAS values for pulses are shown in Figure 1 and compared with casein.

Protein quality of foods is further dictated by their limiting essential amino acid content. However, combining pulses with other plant-based protein sources such as cereal grains can generate a more complete protein. Products containing a combination of plant protein sources can improve protein quality due to their complementary amino acid profiles. For example, the protein in pulses is higher in lysine and lower in sulphur-containing amino acids, while cereal grains such as wheat or rice are lower in lysine and higher in sulphur-containing amino acids. The optimal addition of lentils, black beans or peas to either wheat or rice dishes will increase the overall PDCAAS values ranging from 0.43 and 0.64 in the individual pulse or cereal to 0.71 and 0.75 in the blends (www.pulsecanada.com). Locally, legumes are a valuable source of lysine-rich protein, complementing maize as the staple food of most South Africans.

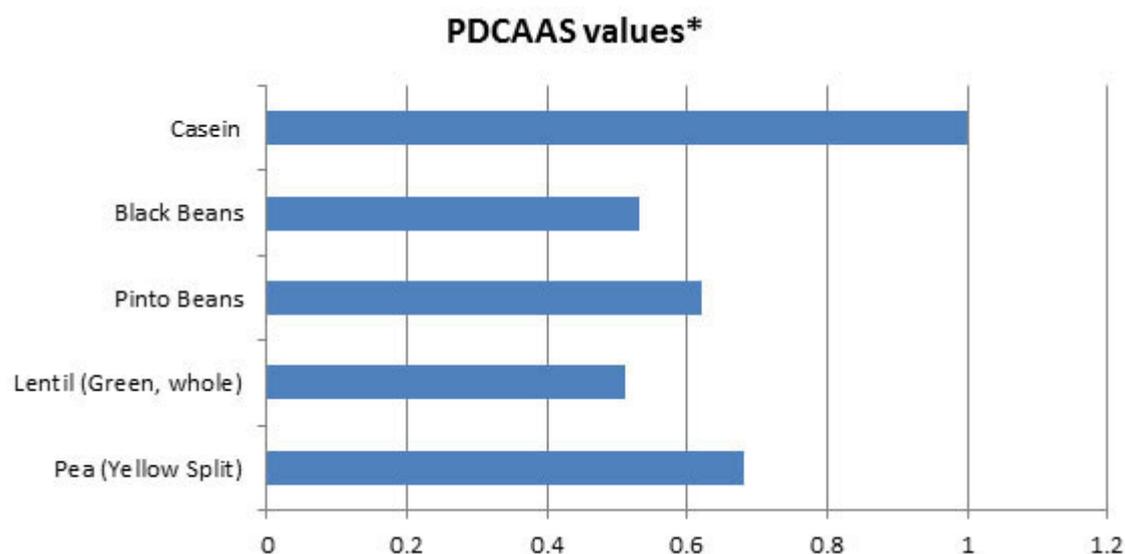


Figure 1: PDCAAS values for selected pulses compared to casein (FAO/WHO Joint Report, 1989)

Non-nutrients

Legumes contain a number of compounds that have potential health benefits, but also some that can reduce the bioavailability of other nutrients once ingested. These inhibiting compounds include saponins, phytic acid, plant sterols, phenolic compounds, enzyme inhibitors and lectins.

Consumption

Over 60 percent of pulses are utilised for human consumption, with the role in human diets varying between countries. Generally, a higher consumption is observed in lower income nations. Certain pulses, especially dry peas, are also used as feedstuff. About a quarter of pulses produced are used for feeding of pigs and poultry.

An investigation into food diversity in South Africa showed that legumes were one of the groups least consumed, by only 15% of the population (Steyn et al., 2003). In the Prospective Urban Rural Epidemiology (PURE) study, the average daily intake of legumes was less than 35g (Venter et al., 2013)

References

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