

Effect of parboiling on the reduction of phytates in different varieties of rice

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Phytic acid (*myo*-inositol hexaphosphoric acid) is an abundant plant constituent of edible cereals, legumes, oil seeds and nuts. Numerous studies have indicated that phytates reduce the bioavailability of iron, magnesium, calcium and zinc, in diets of monogastric animals. This study investigates the effect of rice processing (parboiling) on the reduction of phytates from different varieties of rice.

Eight commonly consumed rice varieties, namely, Bathalagoda (Bg 450, Bg 352, Bg 300 and Bg 94-1), Bombuwela (Bw 351, Bw 267-3, and Bw 272-6B) and Labuduwa (Ld 356) were obtained from Rice Breeding Institutes in the country. The samples were subjected to parboiling by soaking (12 h), steaming (20 min) and air-drying (48 h). Both non-parboiled and parboiled rice were milled and polished using "Satake" rice machines. The phytic acid content in the rice (cooked and uncooked) was determined using an anion exchange column separation, followed by acid hydrolysis to liberate inorganic phosphate, which is measured spectrophotometrically.

The results are summarized as follows: (a) The phytate content in the rice was variety dependant (3.0 to 5.3 mg/ g). (b) When the non-parboiled, non-polished rice was cooked the reduction in the phytates were in the range of 1.1 to 3.2 mg/ g. (c) A reduction in the phytate content was observed after the parboiling process, showing over 80 % reduction in three varieties, Bw 267-3 (87%), Bw 272-6B (94%) and Ld 356 (91%). (d) On cooking the phytate content in the parboiled rice was further reduced, except in four varieties, namely, Bg 300 (2.0 mg/ g), Bg 94-1 (2.1 mg/ g), Bg 352 (1.2 mg/ g) and Bw 351 (1.1 mg/ g). (e) The phytates in non-parboiled rice reduced with polishing (degree of polishing= 6-8%) to a range of 0.8 to 3.3 mg/ g. The parboiled rice, when well-polished showed a reduction in phytates in the range of 0.02 to 0.9 mg/ g, excepting Bg 94-1 which contained a phytate content of 2.2 mg/ g. However, when this rice is cooked the amount reduced to 0.05 mg/ g. The loss of phytates in the parboiling process can be attributed to the enzymatic hydrolysis taking place during soaking in water and the breakdown of the ring structure during the heat treatment.

The reduction of phytates in rice, during the parboiling process was variety dependant. Parboiled, non-polished rice varieties with less phytates and without loss of bran, has a nutritional advantage arising from reduced phytate concentrations over the well-polished, non-parboiled rice varieties (Bw 267-3, Bw 272-6B, and Ld 356).

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