

Incidence of Phytate In Raw And Cooked Beans Olathe

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Introduction

Phytate is a cyclic compound (inositol) containing six phosphate groups (Figure 1). It is the principal storage form of phosphorus in cereals, legumes, and nuts. However, this phosphorus is unavailable because it is tied up in the phytate molecule (40 to 60%). In addition, phytate chelates with di- and trivalent metals, such as calcium, magnesium, zinc, and iron, to form poorly soluble compounds that are not readily absorbed from the intestine, reducing its bioavailability. Phytates are also known to inhibit proteolytic and amylolytic enzymes. In soybeans and most soybean products, to the extent of 1.0 to 1.5% of the dry weight correspond to phytic acid.

The aim of this study was to check whether there was a reduction in phytic acid levels in Olathe beans (Figure 2) after cooking.

Results and Discussion

The samples come from three different centers of Embrapa. They were washed and cooked with ultrapurified water for approximately 40 minutes. Only the grains were analyzed and the cooking waters were discarded. Then, the grains were crushed and prepared according to the method 986.11, AOAC 2005 (modified). The phytate was determined in raw and cooked beans by ICP – OES, Inductive Coupled Plasma – Optical Emission Spectroscopy.

The Table 1 shows the results obtained in 2009 and 2010 of beans Olathe of five samples for each year. The concentration of phytate in raw beans, expressed as phytic acid, in 2009 ranged from 7.4 to 8.4 mg/g, while for the cooked beans the range of variation was 6.7 and 8.0 mg/g. In 2010, the amount of phytate, expressed as phytic acid, ranged from 12.8 to 14.5 mg/g, and cooked beans had values between 11.4 and 12.9 mg/g. The reported results are expressed on dry basis. Similar results were reported by Cardenas and collaborators (2008), when they analyzed common beans.

Figure 1. Phytic Acid

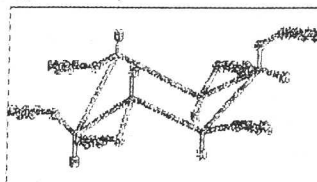


Figure 2. Olathe beans



Conclusion

The cooking process used in this experiment reduced the phytate content of the samples studied until 19.2%. The authors suggest that other thermal processes are tested in order to significantly reduce the quantities of anti-nutritional factor.

AOAC Official Methods of Analysis of AOAC INTERNATIONAL (2005). Rev. 3 (2010) 18th Ed., AOAC INTERNATIONAL, Gaithersburg, MD, USA. Official Methods 986.11.

CARDENAS, L.R.; LEONEL, A.J.; COSTA, N.M.B. Efeito do processamento doméstico sobre o teor de nutrientes e de fatores antinutricionais de diferentes cultivares de feijão comum. *Ciênc. Tecnol. Aliment.*, 28 (1), 200-213, 2008.

KHOKHAR, S., PUSHPANJALI, FENWICK, G.R. Phytate content of Indian foods and intakes by vegetarian Indians of Hisar region, Haryana state, *Journal of Agricultural and Food Chemistry*, Washington DC, v.42, n.11, p.2440-2444, 1994

SERRAINO, M.R., THOMPSON, L.L., SAVOIE, L., PARENT, G. Effect of phytic acid on the in-vitro rate of digestibility of rapeseed protein and amino acids. *Journal of Food Science*, Chicago, v.50, n.6, p.1689-1692, 1985.

Table 1. Concentration of Phytate (mg/g) in raw and cooked Olathe bean

	2009			2010		
	Raw	Cooked	Loss (%)	Raw	Cooked	Loss (%)
OLATHE 1	7.83	6.73	14.05	13.26	12.14	8.58
OLATHE 2	7.80	6.93	11.15	12.84	11.67	9.11
OLATHE 3	7.57	6.85	9.51	13.02	11.86	8.91
OLATHE 4	8.45	7.05	16.57	14.09	11.38	19.23
OLATHE 5	7.40	8.04	-	14.55	12.91	11.27