INFLUENCE OF HYDROTHERMAL PROCESSING UPON SOLUBLE PHOSPHORUS CONCENTRATION FROM BARLEY

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SUMMARY

The cereals and cereal based products represents an essential part of the daily diet. Nowadays most of the cereal based products are refined having a lower content of dietary fibres complex, vitamins and minerals. Recent researches showed a remarkable influence of the processing way of cereals on bioavailability and variability of the bioactive components due to the fact that these substances are concentrated in the outer layers of the grains. Phytase is an enzyme that breaks down the undigestable phytic acid (phytate) which is found in higher quantities in the grains. Applying a hydrothermic treatment one can create optimal conditions for phytase activation. This enzyme, once it is activated, hydrolyses the phytate (myo-Inositol-1,2, 3, 4, 5, 6- hexaphosphate) to myo-inositol, phosphorus and small quantities of myo-inositol tri- and penta-phosphate. It also produces an increase of the bioavailability of Ca$^{2+}$, Mg$^{2+}$, Zn$^{2+}$ and Fe$^{2+}$ ions.

The parameters which should be monitored during the hydrothermic treatment are: the ratio between cereals weight and soaking solution, the pH of the soaking solution, the soaking period, the maintaining period after removing the soaking solution, the temperature of the soaking and maintaining period and the method used to dry the cereals.

The aim of this paper was to shed light on the individual effect of each parameter of the hydrothermic treatment on the residual phytate contents and on bioavailability of the divalent ions of barley.

The content of soluble phosphorus was determined through its extraction in trichloroacetic acid and dosing through the spectrophotometrical method with ammonium phosphomolybdat [1].

Our results indicate that in case of applying a hydrothermic treatment using solutions of lactic acid (1.5%) and citric acid (0.04M), at 55ºC, 82%, respectively 64% of the phytate of the barley is hydrolyzed. The residual quantity of phytate is very little for having a negatively significant influence on the absorption of Ca$^{2+}$ and Mg$^{2+}$ ions. Toward barley out-of hydrothermic treatment bioavailability of the divalent ions increase to 5.5 times, for treatment with lactic acid, and to 2.9 times, for treatment with citric acid. The results showed that the best range for temperature is 45...55ºC, and for the lactic and citric acid solution 0...1.5%, respectively 0...0.04 M all time for treatment should be 18 h.

References


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