



DIGESTIBILITY CHANGES EVALUATION OF BEAN PROTEIN (*Phaseolus vulgaris* y *Phaseolus coccineus*) AS RESULT OF HEAT TREATMENT

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Introduction.

Beans are one of the main source of protein for many sectors of Mexican population. Genetic diversity is important due main and secondary components may vary as result of this. Beans are not consume fresh, for its consume they are exposed to a heat treatment during cooking. Many reports discuss the improvement of digestibility as a consequence of this treatment however interactions between other components and protein may occur impeding the digestibility improvement. Therefore the aim of this work was to correlate the chemical composition changes with the protein *in vitro* digestibility measured by the activity of gastrointestinal enzymes of ten commercial varieties of Mexican grow beans and associated with cooking time.

Methods.

The commercially common beans were white, Peruano, red, Pinto Saltillo, Cacahuete Nacional, Negro Americano, Negro Bola and Flor de Mayo. The two ayocote samples were purple and brown. Crude protein (Micro Kjeldahl), and moisture, values were estimated by standard methods (1). Total phenolic compounds content was determined according to the Folin-ciocalteu method and Fitic acid were determined by the Wade reactive. Condensed tannins (proanthocyanidins) were determined by the vainillin-HCl method (2). Trypsin inhibitory activity was carried out by the enzymatic method (3). Cooking time was according to normativity (4).

Results.

Physical characterization showed significant differences in weight and seed size. The common bean varieties had lower cooking times compared with those of runner bean, the size and weight of the seeds did not correlated with the cooking time obtained for each variety.

Statistical analysis indicated that thermal processing after the concentration of phytic acid, condensed tannins, phenolic compounds and total trypsin inhibitors decreased significantly. This increase and decrease did not correlate with the cooking time of each variety.

In vitro digestibility of all varieties proteins improved by increasing from 9 to 17% as a result of the cooking process, but also correlated with thermal treatment times for each variety or decreased with nutritional components capable of interacting with these polymers.

Correlation matrices carried based on the specific chemical components in the seeds, allowed bean varieties classification in groups according to its content of protein, since this parameter positively correlated with the trypsin-inhibiting units content and negatively with the total phenolics concentration and condensed tannins, however, not cooked samples showed the same behavior.

Conclusions.

Cooking improved *In vitro* digestibility of protein in all the bean varieties analyzed being painted saltillo, national peanut ayocote purple which showed better values at the end of the process, however this parameter was not associated to the cooking time or degradation of other components. Based on established correlations between their chemical components and bean varieties a digestibility group classification was possible.

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References.

- (1) AOAC. (1997). Official methods of analysis (16th ed.). Gaithersburg, Md: Association of Official Analytical Chemists.
- (2) Singleton, V. L., Orthofer, R., & Lamuela-Raventos, R. M. (1999). Analysis of total phenols and other oxidation substrates and antioxidants by means of Folin–Ciocalteu reagent. In P. Lester (Ed.).
- (3) Welham T., Domoney C. (2000). Temporal and spatial activity of a promoter from a pea enzyme inhibitor gene and its exploitation for seed quality improvement. *Plant Sci.*, 159: 289-299.
- (4) NMX-FF-038-SCFI-2002. Productos alimenticios no industrializados para consumo humano - fabáceas - frijol (*Phaseolus vulgaris* L.) - especificaciones y métodos de prueba (cancela a la nmx-ff-038-1995-scfi).