Optimized formulation & processing protocol for a bean-based complementary porridge

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Dry Grain Pulses CRSP

Aim

To develop a nutrient-dense, fast-cooking, bean-based weaning food

Introduction

Common beans (*Phaseolus vulgaris* L.) are diverse and nutritious. However, dry beans have long cooking times and the digestibility and bio-availability of their nutrients are limited by anti-nutritional factors such as trypsin inhibitors, lectins, polyphenols and phytic acid. Processing methods for reducing cooking time and removing anti nutrients in beans include soaking, germination & cooking.

Methodology

- Dry beans, rice and grain amaranth were formulated into a nutritionally adequate composite flour suitable for children aged 2-5 years, using Concept 4 software.
- A processing protocol involving soaking, sprouting, steaming, drying and milling, was developed .
- The protocol variables were optimized using Response Surface Methodology; to reduce anti nutrients & cooking time, improve protein & starch digestibility and maximize sensory acceptability.

Results

- The nutritionally adequate composite contained 40:30:30 beans: amaranth: rice flour
- Optimal pre-processing conditions for bean-flour were: soaking for 24 hours, sprouting for 48 hours, cooking under pressure for 19 minutes

Table 1: Nutritional Characteristics of porridge from optimized bean-based composite flour

Protein digestibility	Starch digestibility	Phytate content	Polyphenol content	Protein content	Acceptability	Desirability
91.16%	87.73%	0.22%	0.57%	18.27%	7.67	0.9423

Discussion: Pre-cooking increased acceptability of the porridge through reduction of polyphenols. Soaking & sprouting reduced polyphenol & phytate content through enzymatic activity & leaching Cooking & sprouting increased starch and protein digestibility by reducing anti-nutrients & activating enzymes (proteases and amylases). Sprouting increased protein content due to shift of dry matter through depletion of carbohydrates during sprouting.

Value added product

Value added product introduced into 18 leading supermarkets in Kampala city and processing protocol demonstrated in (rural) Kamuli District

Preparation of porridge demonstrated

Conclusions:

The developed processing protocol for beans resulted in significant improvements in the nutritional quality of the resulting bean flour, making the flour suitable for feeding infants and young children. The model equations developed can be used for predicting the quality of the bean flour and the bean-based composite porridge. The product s' high sensory acceptability, reduced cooking time, and low technological requirements increase its potential for use in rural & urban communities.

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