



# Production and Quality Evaluation of Complementary Food Produced from Millet, Soybean, Cashew Nuts and Carrot Flour Blends

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## Introduction

Protein-energy malnutrition remains a critical public health concern among children under five in developing countries, largely due to reliance on cereal-based complementary foods with low protein content and limited nutrient density. This study aimed to develop and evaluate nutrient-dense complementary food formulations from finger millet, soybean, cashew nuts, and carrot flours.

## Materials and methods

The raw materials were purchased from local market, sorted and processed into flour using standard methods. It was then blended in varying proportions to create four samples: A (100% finger millet – control), B (70:15:10:5), C (60:20:15:5), and D (50:25:20:5) of millet, soybean, cashew nut, and carrot, respectively. The resulting formulations were used to produce pap and were subjected to proximate, mineral, vitamin, anti-nutrient analysis using standard analytical techniques. Statistical analysis was performed on the results using SPSS version 20.0.

## Results and discussion:

The proximate results showed a progressive increase in protein and fat contents with increasing inclusion of soybean and cashew nut. Sample D recorded the highest protein (12.52%) and fat (10.22%) contents, compared to the control (Sample A), which had the lowest protein (8.52%) and fat (1.72%). Carbohydrate content decreased significantly from 73.57% in Sample A to 59.62% in Sample D. Moisture content decreased slightly across the samples, which ensures potential shelf stability, while ash content increased from 2.22% in Sample A to 3.13% in Sample D. Crude fibre content, though reduced from 3.82% to 3.22%, remained within acceptable limits for infant consumption. Anti-nutritional factors including oxalate, tannin, and phytate were significantly reduced across the samples. Sample A had the highest anti-nutrient levels (oxalate: 5.70 mg/100g, tannin: 2.60 mg/100g, phytate: 80.02 mg/100g), while Sample D exhibited the lowest levels (oxalate: 4.42 mg/100g, tannin: 1.84 mg/100g, phytate: 15.22 mg/100g). Mineral analysis indicated that potassium, magnesium, and calcium contents increased with incorporation of cashew nut and carrot flours. Sample D recorded the highest mineral values: potassium (342.42 mg/100g), magnesium (110.92 mg/100g), and calcium (270.52 mg/100g), while Sample A had the lowest. Vitamin analysis revealed that vitamins A, C, and D levels also increased significantly across the formulations. Sample D had the highest values for vitamin A (26.32 µg), vitamin C (13.22 mg), and vitamin D (2.32 µg), primarily due to the inclusion of carrot and cashew nuts, both known for their micronutrient richness. Sensory evaluation results showed no significant differences in flavour, aroma, taste, texture, and overall acceptability among the samples. However, Sample A had slightly higher scores in appearance and overall acceptability.

## Conclusion

The inclusion of soybean, cashew nut, and carrot significantly improved the nutritional quality of finger millet-based complementary food without compromising sensory attributes. Sample D (50:25:20:5) was identified as the most nutrient-dense and acceptable, offering a promising, locally sourced solution for improving infant nutrition in resource-constrained settings.

**Keywords:** Complementary food, Finger millet, Cashew nut, Soybean, Infant nutrition