



## Effect of Partial Replacement of Fat by Flour on Quality of Beef Nuggets

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### Objectives

The rise in demand for safe, wholesome and convenient meat products by health-conscious consumers has necessitated the need for functional reformation of the available meat products by both researchers and producers to meet up with this demand. This study was conducted to explore the nutritional potential and functional values of Wheat, Irish potato and Corn flours at varying levels of inclusion in beef nuggets.

### Materials and Methods

The flours were used as partial replacement of fat in beef nuggets in a Completely Randomized Design. Treatments I-III had 5% of the flours (Wheat, Irish potato and Corn respectively) + 15% fat, treatments IV-VI had 10% of the flours + 10% fat and treatments VII-IX had 15% of the flours + 5% of fat and their effects were evaluated against control (0% flour + 20% fat). Functional property indices such as foaming stability, foaming capacity, bulk density, oil and water absorption capacity, water and oil retention, pH and microbial analysis were determined on Wheat, Irish potato and Corn flours. Proximate composition using standard procedure, physical characteristics, colorimetry parameters and sensory evaluation using a 9-point hedonic scale were determined on the freshly prepared beef nuggets. Lipid oxidation, pH and microbial analysis evaluated on d 0, 3, 6, and 9 were determined on refrigerated (40°C) beef nuggets.

### Results

Significant ( $p < 0.05$ ) differences were observed in the functional properties, pH and microbial load of

the flours. Corn flour had the highest foaming stability ( $99.02 + 0.01$ ), water absorption capacity ( $157.00 + 1.00$ ) and water retention capacity ( $1.57 + 0.01$ ) while Irish potato flour had lowest pH ( $5.69 + 0.01$ ) and microbial ( $0.59 + 0.11$  cfu/g) values. The proximate composition of the beef nuggets was significantly ( $p < 0.05$ ) influenced by flour inclusion. Control had the least values of moisture ( $56.97 + 0.47$ ) and ash ( $6.30 + 0.09$ ) but was highest for ether extract ( $18.26 + 0.24$ ). There was significant ( $p < 0.05$ ) increase in the product yield and water holding capacity of the treatments compared to the control. Control however had highest value of cooking loss ( $26.62 + 0.15\%$ ) and thermal shrinkage ( $26.63 + 0.18\%$ ). Sensory evaluation showed significant ( $p < 0.05$ ) differences in color, aroma, juiciness, flavor, texture, and overall acceptability scores. However, the scores were in a range of acceptability and treatment III (5% corn flour + 15% fat) was more acceptable among the treatments. Significant ( $p < 0.05$ ) difference in color of the nuggets among treatments and control was also observed. Control had the highest value for lightness  $L^*$  ( $43.57 + 0.22$ ), redness  $a^*$  ( $8.43 + 0.20$ ) and yellowness  $b^*$  ( $4.18 + 0.97$ ). The values for pH, lipid oxidation and microbial counts showed significant differences among the treatments and control, the values for microbial counts were all within the standard acceptable limit.

### Conclusion

In conclusion, 5% inclusion level of corn flour had better yield and high overall acceptability compared to control and fat can be partially replaced with corn flour at 5% inclusion level in beef nuggets production.