

## Physicochemical properties of instant noodles produced from blends of sweet potato, soybean and corn flour

\*Olorunsogo, S.T., Adebayo, S.E., Orhevba, B.A. and Awoyinka, T.B

Department of Agricultural and Bioresources Engineering, School of Infrastructure, Process Engineering and Technology, Federal University of Technology, Minna, Niger State, Nigeria.

### Article history:

Received: 14 November 2018

Received in revised form: 23

January 2019

Accepted: 28 January 2019

Available Online: 22

February 2019

### Keywords:

Noodles,

Composite flour,

Proximate properties,

Formulation,

D-optimal design

### DOI:

[https://doi.org/10.26656/fr.2017.3\(5\).304](https://doi.org/10.26656/fr.2017.3(5).304)

### Abstract

Studies on substitution of wheat partially with other composite flour and analysis on their different characteristics had been reported; but there was a need to optimize both the formulation and process conditions to give optimum quality while substituting wheat wholly with composite blends of other flours. This study investigated the formulation of instant noodles made from blends of sweet potato, corn, soybean flours; with the quantity of water. The impact of baking temperature, mixing time, frying time and frying temperature on noodles quality were also investigated. Investigations were conducted employing a four-component constrained D-optimal mixture-process experimental design with 39 randomized experimental runs. The formulation design constraints were sweet potato flour ( $10\% \leq x_1 \leq 61\%$ ), soybean flour ( $5\% \leq x_2 \leq 20\%$ ), corn flour ( $5\% \leq x_3 \leq 30\%$ ), and water ( $25\% \leq x_4 \leq 37\%$ ). Other components of the formulation were salt (2.5%), sodium carbonate (0.5%), guar gum (0.5%), and soy lecithin (0.5%). The processing factors investigated were mixing time ( $2 \text{ mins} \leq z_1 \leq 10 \text{ mins}$ ), frying time ( $1 \text{ min} \leq z_2 \leq 3 \text{ mins}$ ), and frying temperature ( $140^\circ\text{C} \leq z_3 \leq 160^\circ\text{C}$ ). The D-optimal mixture-process design was used to evaluate the effect of changes in mixture compositions and the three processing factors on the main proximate qualities of the formulated instant noodles. The effects were established through analysis of variance at 5% level of significance. The formulated samples were evaluated for the proximate properties. From the numerical optimization through the desirability function, the formulation that produced noodles of highest desirability index of 0.723 was: 23.305% of sweet potato flour, 28.529% of soya bean flour, 18.021% of corn flour, 26.145% water, 2.749 mins mixing time, 1.35 mins frying time, and  $140^\circ\text{C}$  frying temperature. The proximate composition of this optimal formulation were: 13.17% moisture content, 6.616% ash content, 22.862% crude protein, and 37.707% energy value, 16.001% crude fat, and 4.643% crude fibre.

## 1. Introduction

Noodles are an important food throughout the world, especially in Asian countries such as China, Korea, Malaysia, Philippines and Thailand. Almost 40% of wheat products in Asian countries are consumed in the form of noodles (Gary, 2010; Ojure and Quadri, 2012). There are many types of noodles, but the "instant" types continue to show increasing popularity globally as these products offer ease in preparation while being economical and tasty (Akanbi *et al.*, 2011). However, their significant sales volume is not reflected in the amount of research work been carried out (Akanbi *et al.*, 2011).

In developing countries, there has been a high increase in the consumption of noodles owing to changes

in lifestyle and urbanization (Ando, 2010). Nigeria today has up to fifteen brands of noodles including, but not limited to, the following: (a) Golden penny produced by Flour Mills Nigeria Plc (b) Mimeo Noodles by May and Baker. (c) Honeywell Noodles by Honey Well Super Fine Food Limited. (d) Dangote Noodles by Dangote Groups. (e) Chef Me by Engels Foods. The nutritional profiles of some of these different noodles brand are shown in Table 1.

Noodles are produced basically from wheat flour. However, wheat production in Nigeria has been a roller coaster. Reports indicated that up to 1985, domestic wheat production in Nigeria was about 66,000 tons (Olugbemi, 1991). In 1988/89 crop production season about 600,000 tons of wheat was produced from a total of 214,000 hectares with an average yield of 2 tons per

\*Corresponding author.

Email: [olorunsogosam@yahoo.com](mailto:olorunsogosam@yahoo.com)