Development, optimization and characterization of Enriched noodles

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ABSTRACT

Noodles are one of the staple foods consumed in Nigeria. Wheat, which is a major component in noodles formulation has suffered decline in production in recent times and in addition to this, noodles made from wheat lacks adequate essential nutrient needed for growth considering the awareness that the demography of the population that consumes noodles are mostly children. This study developed and optimized and characterized instant noodles from blends of sweet potato flour, corn flour, and soybean flour. Experiments were conducted using a four-component constrained D-optimal mixture-process experimental design, with thirty-nine (39) randomized experimental runs. The formulation design constraints were: sweet potato flour (10%–61%), soybean flour (5%–20%), corn flour (5%–30%), and water (25%–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 (2min - 10min), frying time (1min - 3min), and frying temperature (140 °C–160 °C). The formulated noodles were analyzed and evaluated for the moisture content, crude protein, crude fibre, ash content, crude fat, carbohydrate, energy value, water absorption index, cooking time, cooking weight, bulk density and sensory characteristics, using standard procedures. The result of the formulated noodles optimization gave optimal formulated noodles with overall desirability index of 0.518, based on the set optimization goals and individual quality desirability indices. The optimal noodle was obtained from 23.228% sweet potato flour, 8.815% corn flour, 27.508% soybean flour, 36.449% water, 2.500% salt, 0.500% sodium carbonate, 0.500% guar gum, 0.500% soy lecithin; with 8.169min mixing time, 2.5min frying time, and 144 °C frying temperature. The quality properties of this optimal noodle were 13.654% moisture content, 19.131% crude protein, 5.171% crude fibre, 7.798% ash content, 21.818% crude fat, 32.231% carbohydrate, 32.231 kcal/100g energy value, 109.275 g/g water absorption index, 6min cooking time, 20.928 (% increase in g) cooking weight, 0.645 (g/cubic centimeters) bulk density, and overall acceptability of 6.54, based on 9-point hedonic scale. The result of the study showed that the optimal formulated noodles was of high quality and that improving nutritional quality of noodles is possible through composite formulation. It is recommended that further study be carried out on formulation of nutritionally improved noodles using other nutritionally rich resources. Enrichment of noodles with protein-rich sources will result in noodles with improved nutrient quality that meets the consumer's dietary needs.

1. Introduction

Instant noodles are gaining wider acceptability especially in the developing world due to their versatility, simplicity, organoleptic appeal, satiety, and affordability. Noodles are widely consumed throughout the world and their global consumption is second only to bread [1]. The consumption of noodles in Africa is on the increase. Nigeria, has been ranked as the 12th highest consumer of noodles in the world by the World Instant Noodles Association [2], Nigeria recorded

the highest consumption level of 941 million tons of noodles, pasta and rice in Africa. In comparison, Kenya consumed a total of 105 million tons, while South Africa consumed 597 million tons. In Nigeria, consumers were reported to have a noodle portion of 240 and 280 g per meal, which was the highest in Africa and also higher than some South Asian markets such as India. In 2015, the five-year sales revenue recorded by the noodle category was 25% for Nigeria versus 11% for South Africa [3]. Noodles have become more widely accepted by consumers far beyond the shores of Asia, where it is a staple food,

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