Textural characteristics of pasta enriched with full fat soy flour;  
An optimization study using Response Surface Methodology

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Abstract

The influence of 0-27 g/100g of full-fat soy flour (FFSF), 31-35g/100g of water content and extrusion conditions on the textural characteristics of spaghetti were evaluated. Process was performed with screw speed of 10-40 rpm and water circulating temperature of 35-70°C. This enrichment resulted in significant differences in mechanical strength and cutting parameter. Based on the mixture surface and contour plots, it was found that the optimum textural characteristic of spaghetti could be obtained by addition of 20.6 g/100g FFSF and 35.0 g/100g water and process in screw speed of 40 rpm and temperature of 35°C.

Keywords: Spaghetti; Mixture design; Rheology.

Introduction

Durum wheat flour is the main ingredient in the formulation of pasta products; however, it is deficient in lysine. Therefore, many researchers have focused on improving of pasta quality by addition of ingredients such as lupine (Rayas et al., 1996; Morad et al., 1980), cowpea (Bergman et al., 1994), gluten (Cubadda, et al. 2007), quinoa, broad bean, chick pea and buck wheat (Chillo, et al., 2008), corn (Taha et al., 1992), wheat bran (Manthey et al., 2002), barley bran (Marconi et al., 2000) and dietary fiber of pea (Edwards et al., 1995).

Dough rheology effects by substitution of gluten by proteins such as legume seeds proteins. This substitution causes dilution of gluten, and consequently, it weakens dough. Therefore, the gluten network has a great influence on the rheological parameters of the dough. Furthermore, the quantity of added water is very important, and it affects dough material distribution, dough hydration and subsequently gluten system development. The conversion of dough rheology may be due to the physicochemical changes of flour. This supported by the work of Kordonowy et al. (1985), who showed that as bran content in mixture of flour was increased, dough development time and water absorption was also increased. In addition, Morad et al. (1980) indicated that adding lupin and defatted soybean to wheat flour increased water absorption and dough stability and decreased dough development time. Moreover, Sroan et al. (2004) confirmed that soy lecithin (natural antioxidant) even at the minimum concentrations improves rheological properties of the dough.

Soybean has many valuable components and consumption of soybean products is useful for bone’s health, healthy brain, immune function, controls the heart attack and some cancers. In our previous research, sensory and nutritional characteristic (Nasehi et al. 2009a) and cooking quality (Nasehi et al. 2009b) of spaghetti enriched with full fat soy flour were evaluated. Thus, the objective of this paper was to study the textural properties of this kind of enriched spaghetti.

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