

Utilization of okara in bread making

Soyamilk and milk based products are nutritionally rich, promising food products in local and international markets. Okara, the residue remaining after soyamilk extraction is the main byproduct of the soyamilk industry. Currently okara is being utilized as a miscellaneous food ingredient, feed ingredient, or as a source of fertilizer. Although okara is a rich source of nutrients, it has not been fully exploited as an important food source. This study was conducted to evaluate the proximate composition of okara and to investigate the possibility of utilizing okara in bread making to improve the nutritional quality of bread. Fresh okara was analyzed for proximate composition. Fresh okara was dried in a cross flow cabinet dryer (Pheonix TK - Mini 10) at 60 0C, 20 m/s air flow velocity for 3 hours. The dried okara was ground into flour and sieved (standard test sieve (ASTM), size 20). Bread was prepared by substituting okara for wheat flour (w/w) at 10, 20 and 30 % levels. Sensory evaluation was conducted by 30 untrained panelists using five-point hedonic scale on crust colour, crumb

colour, taste, odour, appearance, mouth feel and overall acceptability. Results were analyzed by Freedman nonparametric test (MINITAB).

Based on preliminary results, level of substitution was narrowed down to 10, 15, and 20 % and prepared bread were subjected to sensory evaluation. The results revealed that the optimum level of substitution was at 10 % okara flour. Moisture content of fresh okara was 79.7 %. The proximate composition of dried okara was crude fat (11.8 %), crude fiber (6.7 %), crude protein (34.3 %) and total ash (3.6 %). Trypsin inhibitor activity of okara was 6.6 %, 81 % lower than that in whole soyabean. Volume/ mass ratio of the control and okara (10 %) substituted bread were 2.51 and 2.5 respectively. There was a significant difference in crust colour between the control (white) and okara (10 %) substituted bread (red) ($P < 0.05$). The calorific value of okara (10 %) substituted bread (15.9 kJ/g) was higher than that of the control (14.4 kJ/g). Okara consists of high protein and fat, therefore calorific value of okara substituted bread was higher than the control. There was no significant difference on aerobic spore count of pure wheat flour (10 spores/g) and okara (10 %) substituted wheat flour (7 spores/g) ($P < 0.05$). The sensory qualities and physicochemical characteristics of okara (10 %) substituted bread were not significantly different ($P < 0.05$). It could be concluded that bread substituted up to 10 % with okara was acceptable in terms of sensory properties as compared to control.