

Determination of Calcium in Selected Eggshell Types and Selection of Best Calcium Level for Bread Enrichment

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Eggshell powder (ESP) is an underutilized waste in Sri Lanka, which can be identified as a natural source of calcium (Ca) with other elements. Enrichment of bread with ESP might be a more effective way to diminish the nutrient deficiencies as well as a new approach to waste management. The Recommended Daily Allowance (RDA) of Ca is 1000 mg for adults. The developed bread will be beneficial for people, who cannot access the required amount of Ca in a country like Sri Lanka. The objective of this work was to select the best Ca level for bread enrichment without affecting its physicochemical and sensory properties. The mineral composition was analysed in ten different types of eggs and Shaver white eggshell which has the highest amount of Ca (175.63 mg/g) was selected for the enrichment of bread. The microbiological safety of ESP was determined by *Salmonella* and Total *Coliform* tests. Three levels of ESP (0.5 %, 1.0 %, 1.5 %) were selected to compare the different parameters of ESP incorporated bread compared to that of the control (0 % ESP). Leavening index (LI), dough firmness, baking loss, bread color, moisture content, crude fiber, acid insoluble ash, ash content, the mineral content of prepared bread, pH value, crumb firmness, and crust firmness were compared between ESP incorporated bread samples and the control bread. The product was stable in terms of microbial quality (TPC, Yeast, and mold). Bread porous structure was compared by using total porous count and porosity (area fraction %) which were analysed using ImageJ software. The optimum level of ESP to be incorporated into the bread without affecting negatively its physicochemical and sensory properties compared to that of the control bread is 1.5 %. The bread made with 1.5 % ESP contains 205.33 mg Ca/100 g of bread and it contributes significantly to the RDA. Only 1/4 of bread (146.3 g) is enough to supply the amount of calcium that can be taken from one cup of milk (300 mg).

Keywords: ESP, Bread, Calcium, Minerals, Recommended Daily Allowance