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DOUGHNUTS USING GROUND SOYBEAN HULLS AND THE EFFECT
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Ground soybean hulls are by-products from the soybean milk industry. Ground soybean hulls consist mainly of dietary fiber and contain a lower quantity of antinutritional factors, namely phytate than other common dietary fiber sources. Ground soybean hulls were studied as a potential source of dietary fiber in the formulation of 2 types of fiber-enriched doughnuts: yeast and cake doughnuts. The effectiveness of fiber in reducing oil uptake during frying was also assessed.

It was found that the maximum quantity of ground soybean hulls which could be used to substitute for wheat flour was 30% in cake-type doughnuts and 15% in yeast-type doughnuts. For sensory evaluation, the overall acceptability and general appearance were determined on a nine-point hedonic scale. In cake-type doughnuts, the overall acceptability score of the product (6.40 ± 1.30) was between like slightly (6) and like moderately (7), and the scores of color, flavor, shape, and texture also were between like slightly and like moderately. For yeast-type doughnuts, it was found that the overall acceptability score of the products (6.38 ± 1.15) was between like slightly and like moderately and other characteristics, color, flavor, shape, and texture, were between like slightly and like moderately. Moreover, for both types of doughnuts, when the amount of ground soybean hulls was increased, the sensory score of overall acceptability seemed to decrease but no significance was found ($p > 0.05$). Both types of dietary fiber-enriched doughnuts contained more total dietary fiber when compared with each control formula.

The effect of added ground soybean hulls on oil absorption during frying of doughnuts was determined. A criterion, U_R , expressing the oil uptake ratio between the weight of oil uptake and the weight of water removed, was used to assess the effectiveness of reducing oil uptake. In yeast doughnuts, using ground soybean hulls to substitute some portion of wheat flour in the formulation did not affect oil-uptake. In cake doughnuts, ground soybean hulls were effective in reducing oil absorption. It was found that enriching dietary fiber in cake doughnuts can reduce oil absorption by 5-23% when compared with control products. Moreover, when comparing different percentages of ground soybean hulls, it appeared that a higher percentage was more effective than a lower percentage in reducing oil uptake, resulting in lower U_R values.