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Design and development of a low fat/ dietetic hamburger

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Abstract

The aim of this study was to determine the optimum level of fish protein isolate (FPI) as a fat replacer for the production of a low fat hamburger using Quantitative Descriptive Analysis (QDA) and investigating some of the functional characteristics of the product. For this purpose, FPI was developed from yellowfin tuna fish (*Thunnus albacares*) canning by-product by pH-shift method. On the other hand, veal burger was produced by the replacing fat with FPI with the ratios of 0 (control), 3%, 6%, 9% and 12%. Samples containing FPI were compared for sensory attributes and evaluation of the proximate compositions, pH, reduction in product diameter, cholesterol, water holding capacity (WHC), color and texture profiles. The results showed that the increase in FPI did not affect the odor of the product, but this had a significant effect on other sensory properties such as flavor, texture, color and overall acceptance ($p < 0.05$). On the other hand, the moisture, ash and protein contents of the samples increased with increasing FPI in the hamburger and these indexes in the prototype containing 12% FPI were 67.84, 4.97 and 26.40% respectively which were significantly the highest levels among other prototypes ($p < 0.05$). The highest WHC (52.50%) and cooking yield (91.75%), as well as the lowest decrease in diameter (9.85%), were found in this sample. The texture of this prototype also had the most elasticity (0.49), cohesiveness (0.74) and chewiness (165.15 mj) among the samples. Using QDA sensory data and principal component analysis (PCA) for comparing the results revealed that the optimum level of FPI in low fat hamburger formulation was 12%. Therefore, complete replacement of fat with FPI in the hamburger formulation is possible and by decreasing the amount of cholesterol, a good marketable product can be produced for those who are looking for low-fat and low-cholesterol products.

Keywords: Low-fat hamburger, fish protein isolate (FPI), sensory evaluation, QDA, PCA