Food frying process with and without wrapping using different lipid sources

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Objectives: This work aimed to study the effects of the frying process with different lipid sources in chicken food and Tuscan-type sausage. The study was made regarding the exchanges between the lipid source components used in frying and the product compo- nents submitted to frying. The barrier effect of the wrap as an impediment to these exchanges has also been studied.

Materials and Methods: The products Tuscan-type Sausage (TtS) with wrap and Chicken Nuggets (CN) without wrap were submit- ted to frying with the Lipid Sources (FL): soy oils, canola, sunflower, coconut and swine fat. We evaluated the CNfects of the use of wraps and different lipid sources used in frying regarding the sum of saturated fatty acids - SFAs (C6:0; C8:0; C10:0; C12:0; C14:0; C16:0; C18:0 and C20:0); Sum of monounsaturated fatty acids - MUFAs (C16:1; C18:1 and C20:1); Quality Indexes (AI, Atherogenic Index; TI, Thrombogenic Index and ?6/?3 ratio. Each batch of product was immersed in each of the lipid sources at 120°C until it reached 72°C in its center for 10 and 15 min for CN and TtS, respectively. After frying, the products were crushed, homogenized and separated into samples for analysis. Lipid extractions were performed by cold extraction and esterification by saponification followed by methylation. The fatty acids were identified by the retention time in the column compared to the retention time of the chromatographic standard (PUFA 2, Sigma-Aldrich). The quantification of the fatty acids was performed by converting the peak areas into percentages in the sample. From the fatty acid results, the atherogenic index (AI), thrombogenic index (TI) ac- cording to Ulbricht and Southgate (1991), and ?6/?3 ratio were calculated.

Results and Discussion: The content of SFAs in raw products CN and TtS is 37.56% and 40.30%, respectively. This component in- creases in CN to 54.03% for coconut oil, is maintained for pork fat and sunflower oil, and is reduced to 30.42% and 20.59% in soy- bean oil and canola oil, respectively. The same effect was observed for the TtS product, except for coconut oil, which for this product did not show an increase in AGS. The MUFA content for raw CN (41.22%) increased for frying with canola oil (46.13%), remained for soybean oil, sunflower oil and swine fat and decreased for coconut oil (21.16%). In TtS frying, the content was main- tained for coconut oil, canola oil and swine fat in relation to the raw product (42.24%) and was reduced in relation to soybean and sunflower oil by 34.41% and 31.03%, respectively. The AI value for CN, raw (0.455), was increased in the coconut oil (0.903), maintained for soybean oil, sunflower and swine fat and reduced to 0.213 in the frying with canola oil. The crude TtS presented an AI of 0.521, which was maintained in frying with coconut oil, sunflower and swine fat and reduced 0.243 and 0.267 in frying with soybean oil and canola, respectively. The data of the TI Thrombogenic Index for the Raw CN showed a value of 1.158, which was kept in the fried coconut oils, soy, sunflower and swine fat and was reduced to 0.380 in the fried canola oil. The IT values for TtS presented a value of 1.321 for the raw product that was kept for frying with coconut oil and swine fat and reduced to 0.545, 0.998, and 0.500 for frying with soybean oil, sunflower and canola, respectively. The values of the / ratio for CN and TtS in the raw prod- ucts were 26.75 and 31.58 for both products, the frying with canola oil showed a reduction for the values of 4.34 and 5.59, and the other FL did not present reductions in the values of this component with nutritional significance.

Conclusions: The results of this research show that the components of lipid sources used in frying interact with the lipid components of the product submitted to frying and may change them depending on the difference between the lipid source used in frying and the fried product. It was also found that the existence of the wrap in the product submitted to frying constitutes a barrier with differentiated effects in the exchanges between the components of the lipid source of the frying and the product submitted to frying. Based on the results, canola oil positively influenced the lipid nutritional characteristics of both products evaluated. Sunflower soy- bean oils and swine fat do not influence the lipid nutritional characteristics of the product submitted to frying, and it is also ob- served that coconut oil has a negative influence on the lipid nutritional characteristics of both products evaluated.

References:

Ulbricht, T.L., Southgate, D. A. (1991) Coronary heart disease: seven dietary factors. Lancet. 338(8773): 985-992. doi: 10.1016/ 0140-6736(91)91846-m.

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