Effect of replacement of pork backfat fat by microencapsulated fish liver oil on nutritional profile of pork burgers

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Introduction: Nowadays, meat industries are forced to reformulate their products due to consumer demands for healthier products. Reduction of fat content and improving fatty acid composition were the strategies most used to reformulate burgers (Barros et al., 2021). Fish and seafood are important sources of omega-3 fatty acids (EPA and DHA) (Shavandi et al., 2019). In addition, the production of omega-3 derived from marine side streams would allow to recover and transfer these important nutrients from the sea to the human food chain, promoting economic growth, environmental protection and human health at large (Ciriminna et al., 2017). Therefore, the development of meat products enriched in omega-3 fatty acids appears to provide a good opportunity for increasing the intake of this type of fatty acids with important benefits for human health (Domínguez et al., 2017). Thus, the objective of this study was to assess the effect of microencapsulated fish liver oil addition on nutritional profile of pork burgers.

Materials and methods: For this study, 4 batches of healthy pork burgers reformulated with microencapsulated fish oil were prepared: control with pork backfat (CON) and ME25, ME50 and ME75 where the pork backfat was replaced with 25, 50 and 75% by microencapsulated fish oil, respectively. Chemical composition was determined according ISO standards (ISO 1442, 1997; ISO 936, 1998; ISO 937, 1978). Total fat was determined following the methodology described by the American Oil Chemists' Society (AOCS, 2005). Fatty acid profile was determined according to the methodology described by Barros et al. (2020).

Results: The differences in formulation achieved significant changes in the proximate composition of pork burgers. The greater was the replacement of animal fat, the lower was the fat content (8.48 vs. 6.27% for CON and ME75, respectively). The reformulation significantly improved the fatty acid profile of pork burgers, decreasing SFA (36.71 vs. 34.05% for CON and ME25) and increasing PUFA (19.41 vs. 21.02% for CON and ME75) contents. This fact is due to the particular fatty acid composition of these oils (18.25, 41.45 and 40.29 g/100 g for SFA, MUFA and PUFA, respectively). Positive effects were observed on the nutritional values since the contents of n-3 PUFAs increased from 1.18 g/100 g to 3.12 g/100 g. EPA and DHA also reached higher values in samples with microencapsulated fish oils (0.39% and 0.95%, respectively). Similar results were observed in other meat products reformulated with fish oils (Lorenzo et al., 2016). The replacement of animal fat by fish oil improved nutritional n-6/n-3 ratio (15.43 vs. 5.78 for CON and ME75, respectively), which approached the FAO recommendations for human diet (n-6/n-3<4.0; FAO, 2010).

Conclusions: Lipid modification of pork burgers by substitution of pork backfat with liver fish oil has been shown to be a good strategy to improve their nutritional quality.

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