Variability in fat content and fatty acid composition in selected porcine offal

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Introduction: Edible porcine offal from slaughtered animal represent about 14% of the body weight including organs and glands (Erickson et al., 2019). They exhibit high functional value relevant to many different sectors such as food and beverage, biomedical, nutrition and pet food production (Mullen et al., 2017). They are a high-value source of protein and the mineral content is higher than that of muscle tissue (Tomovic et al., 2015), but some edible offal from pig are relatively rich in saturated fatty acids, therefore should be consumed moderately in a varied and well-balanced diet (Pestana et al., 2019). Many factors, may affect the quality and composition of meat, therefore, there may be differences between batches (Van Der Wal et al., 1997). Probably such variability between every batch can also be observed in the offal composition, which is unfavorable from the processor and producer point of view. Materials with deviating composition obstruct to obtain repeatable final product. The aim of this study was to investigate whether there are significant differences in fat content and fatty acids profile of selected porcine offal between the independent batches from the same supplier.

Material and methods: Raw porcine livers, kidneys and spleens were supplied in four independent batches by a local meat processor. Every batch consisted of approx. 3 kg of livers and spleens and 5 kg of kidneys. After homogenization representative samples from each offal were obtained. The fat was extracted using the Soxhlet method. The fatty acid profile was determined using gas chromatography and was presented as % of saturated (SFA), monounsaturated (MUFA) and polyunsaturated fatty acids (PUFA). Index of atherogenicity (IA) and index of thrombogenicity (IT) were calculated regarding to equations in study by Ghaeni & Ghahfarokhi (2013). All data was subjected to the analysis of variance (ANOVA) using STATISTICA 13 software. When significant differences were found. the Tukey test was used to determine differences between individual means ($P < 0.05$). The results are presented as average values ± standard deviation.

Results: Fat content varied between parties, and was in the range of 1.35 - 3.06, 3.90 - 5.72 and 13.60 -21.81 for porcine livers, kidneys and spleens respectively. Liver had the highest PUFA content compared to other analyzed offal samples. Statistical analysis showed significant differences in fatty acids profile between separated batches of livers, kidneys and spleens, what translated into differences in IA and IT. The highest differences could be observed in spleen, where the lowest average value of IA ranged between batches from 0.80 to 1.18. Moreover, IT different significantly between the batches of kidneys resulting in significant difference of IT value, whereas in the case of livers and spleens significant differences were not indicated.

Conclusion: The differences in the fatty acids profile detected in some porcine organs may cause obstructions in processing and difficulties in setting the standardized production

Literature:

Erickson, A. K., Fuhrman, M., Mikel, W. B., Ertl, J., Ruesch, L. L., Murray, D., & Lau, Z. (2019). Microbiological evaluation of pork offal products collected from processing facilities in a major United States pork-producing region. Journal of Swine Health and Production, 27(1), 34–38.

Ghaeni, M., & Ghahfarokhi, K. N. (2013). Fatty Acids Profile, Atherogenic (IA) and Thrombogenic (IT) Health Lipid Indices in Leiognathusbindus and Upeneussulphureus. Journal of Marine Science: Research & Development, 03(04), 3–5.

Mullen, A. M., Álvarez, C., Zeugolis, D. I., Henchion, M., O'Neill, E., & Drummond, L. (2017). Alternative uses for co-products: Harnessing the potential of valuable compounds from meat processing chains. Meat Science, 132, 90–98.

Pestana, J., Alfaia, C., Alves, S., Madeira, M., Santos-Silva, J., Moreira, O., Bessa, R., Toldrá, F., & Prates, J. A. M. (2019). Total Lipid Content and Fatty Acid Composition in Edible Offal From Pigs. Journal of Food Safety and Food Quality, 70(3), 60–65.

Tomovic, V., Jokanovic, M., Sojic, B., Skaljac, S., Tasic, T., & Ikonic, P. (2015). Minerals in Pork Meat and Edible Offal. Procedia Food Science, 5, 293–295.

Van Der Wal, P. G., Engel, B., & Hulsegge, B. (1997). Causes for variation in pork quality. Meat Science, 46(4), 319–327.