

Lipid profiling of boar tainted and untainted pig plasma using GC×GC-ToFMS: An exploratory study

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Boar taint is a strong, unpleasant smell or taste found in the meat of some uncastrated male pigs. This smell is caused by a complex mixture of molecules released upon heating the meat. The surgical castration of male piglets is a traditional practice to prevent boar taint meat worldwide. Furthermore, it is performed without anesthesia or analgesia, causing pain to the piglets. European pork production stakeholders agreed to prohibit surgical castration of piglets due to increased animal welfare concerns by 2018. These objectives are yet to be achieved successfully.

To understand the difference between boar-tainted (BT) pigs and untainted (UT) pigs based on a fatty acid profiling of pig plasma using two-dimensional gas chromatography time-of-flight mass spectrometry (GC×GC-TOFMS).

In GC, conversion into a more volatile and stable component is essential to analyze saturated and unsaturated fatty acids. To improve measurement efficiency and obtain chromatographic separation of the lipids, a two-step sample extraction and derivatization (base-catalyzed transesterification and acid-catalyzed esterification) approach was optimized using DoE. A total of 40 pig plasma samples were analyzed. 37 FAMES standard mixture was used as QC at an interval of 5 samples. Moreover, QC was used to calculate the analytical correction factor due to a decrease in instrumental sensitivity. The chemometric tests, unsupervised screening (PCA, HCA), univariate analysis (Volcano plot), and multivariate analysis (PLS-DA) were performed.

The results suggested that the concentration of PUFA ω -6 and cholesterol derivatives were significantly increased in BT pigs, whereas SFA and PUFA ω -3 were increased in UT pigs.