GC×GC-TOFMS for boar taint volatolomics

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As a response to growing ethical constraints, the meat production industry has agreed to ban surgical castration of male piglets towards 2019. However, raising uncastrated pigs increases the risk commercializing meat with an undesirable taste know as boar taint. The main compounds contributing to this as fecal, urine, and sweat-like described taste are androstenone, skatole, and indole. Different analytical methods have been proposed and validated for their quantification in plasma or fat tissue. However, the application of these methods is oftentimes not feasible at-line in a slaughterhouse routine due to time constraints related to high throughput processes. Therefore, it is common practice to conduct olfactive screening based on so called 'soldering iron sensory methods' carried out by trained assessor. Tainted carcasses are then pushed aside from commercialization. This is currently the fastest and least onerous procedure to determine boar taint presence but it is believed to suffer from inter-individual variations and limited correlation to instrumental measurements. As genetic predisposition to boar taint might exist, a selection of suitable boars at an early stage, possibly before reproduction, could tremendously reduce suffering, resources and costs in pork meat production. However, currently no genetic tests are commercially available. In this study, back fat samples were analyzed with comprehensive two-dimensional gas chromatography (GC×GC) coupled to time-of-flight mass spectrometry (TOFMS) for volatile fingerprinting. A dual approach combining targeted and non-targeted analysis was applied. In addition, fat samples were assessed by a sensory panel, and target compounds were quantified using liquid chromatography (LC)-MS.