

# Quick sniff into boar taint using integrated volatilomics and metabolomics with GC×GC-MS

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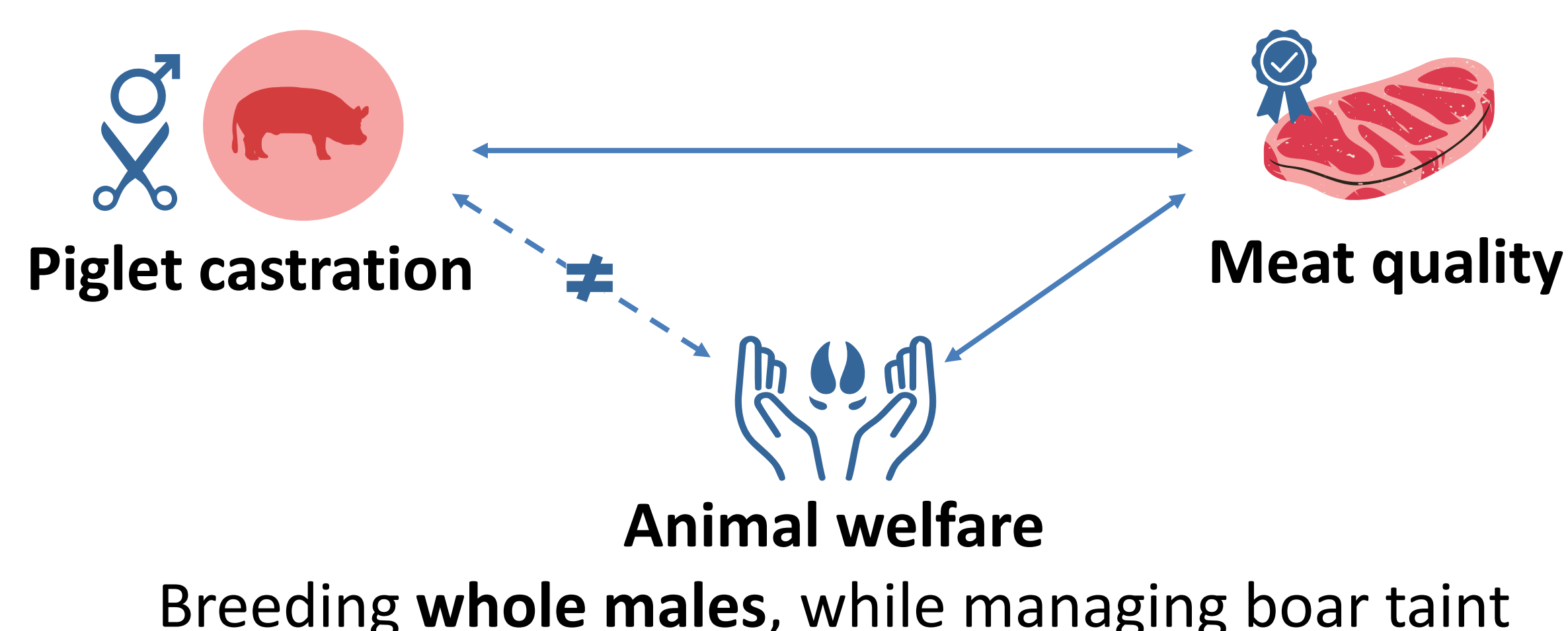
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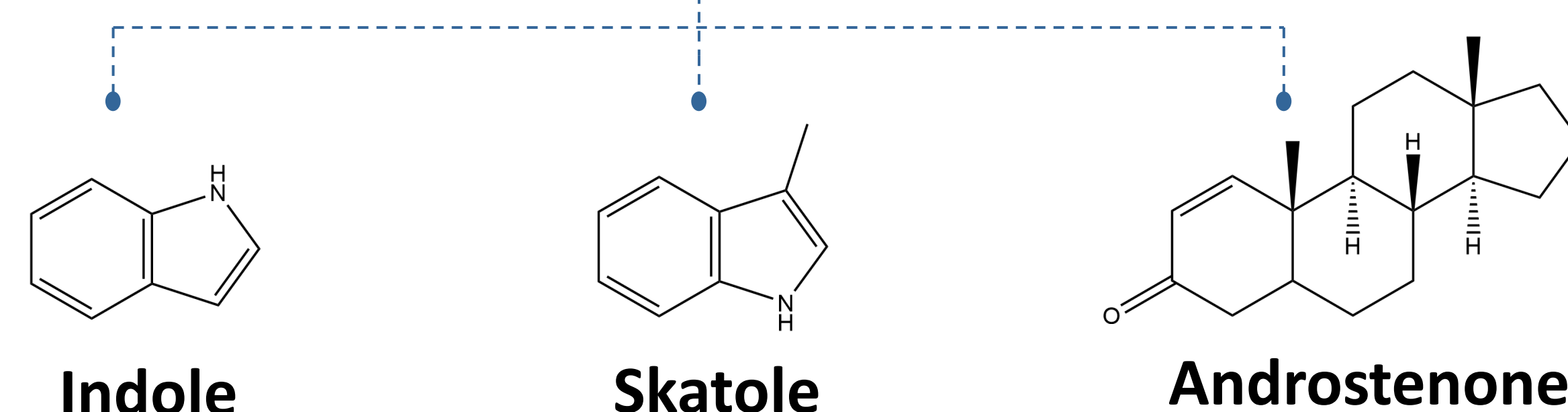
## Context and scientific issues

Ensuring **animal welfare** is a key challenge in pig farming, with **piglet castration** remaining a controversial issue. An alternative is to breed whole males; however, this approach must address meat quality concerns, notably the risk of **boar taint (BT)**.



## Our study

**Boar taint (BT) : Unpleasant smell and taste**



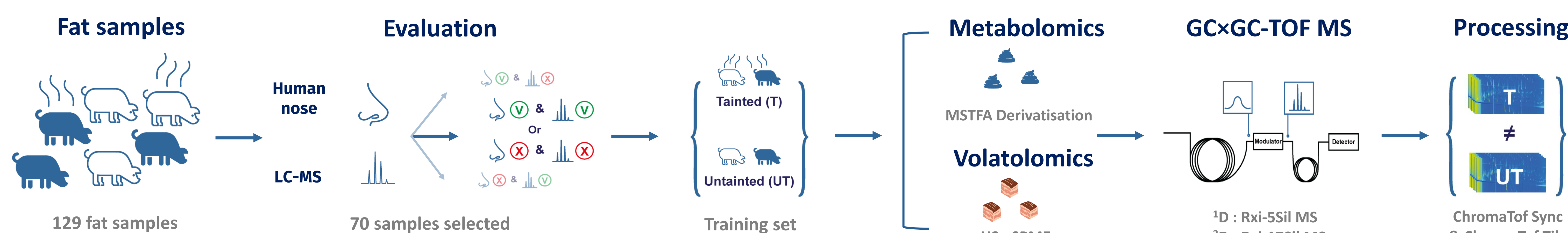
In this study

- **Targeted** analyses by LC-MS (CER Groupe)
- **Non-targeted** analyses by GC×GC-TOFMS

Aim

Fully **characterize** the **VOCs** and **metabolite profile** specific to **whole BT males** and build a statistical model for BT detection by GC×GC-TOFMS as *classification standard for genomics profiling*.

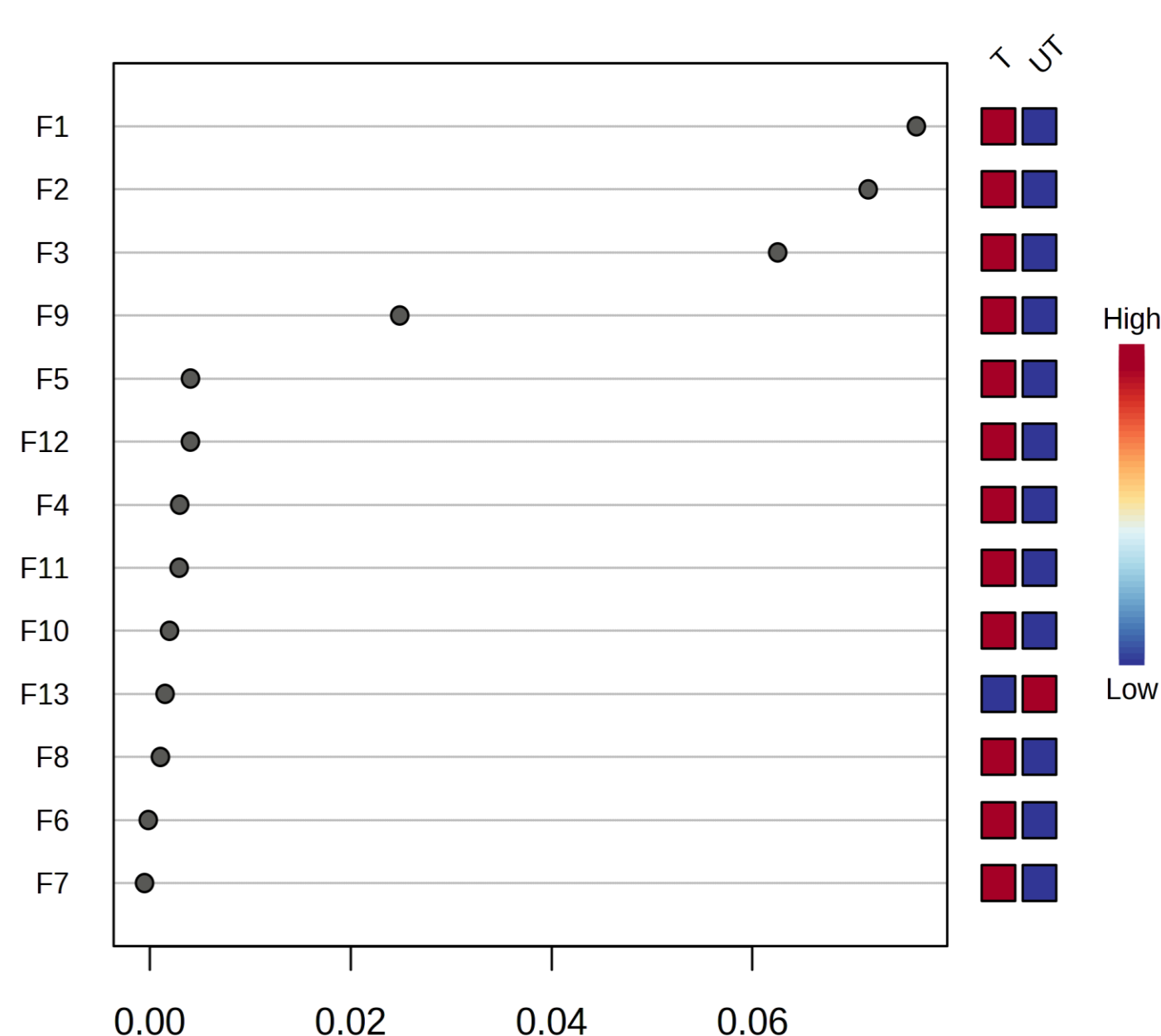
## Materials and methods



## Results and discussion

### Volatilomics

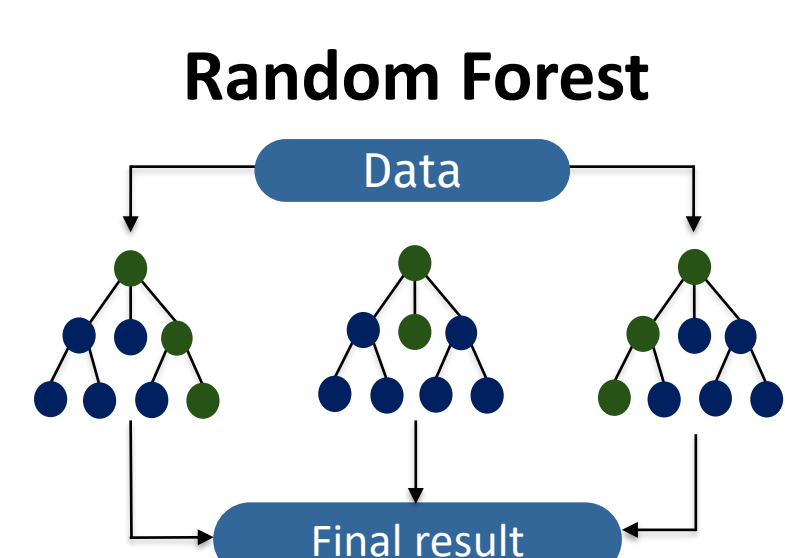
- **18 Discriminant** compounds in fat samples from tainted animals.
- **Androstenone** (F1), **skatol** (F2), and **indol** (F4) well detected with **higher contribution** for F1 and F2 in **T** samples.



Features ranked by their contributions to classification accuracy

### Model evaluation

- AUC: 1
- Accuracy: 100%
- Sensitivity: 100%
- Specificity: 100%



### Volatilomics & Metabolomics

**Dual origin of boar taint**

**Steroid metabolism & Gut microbial activity**

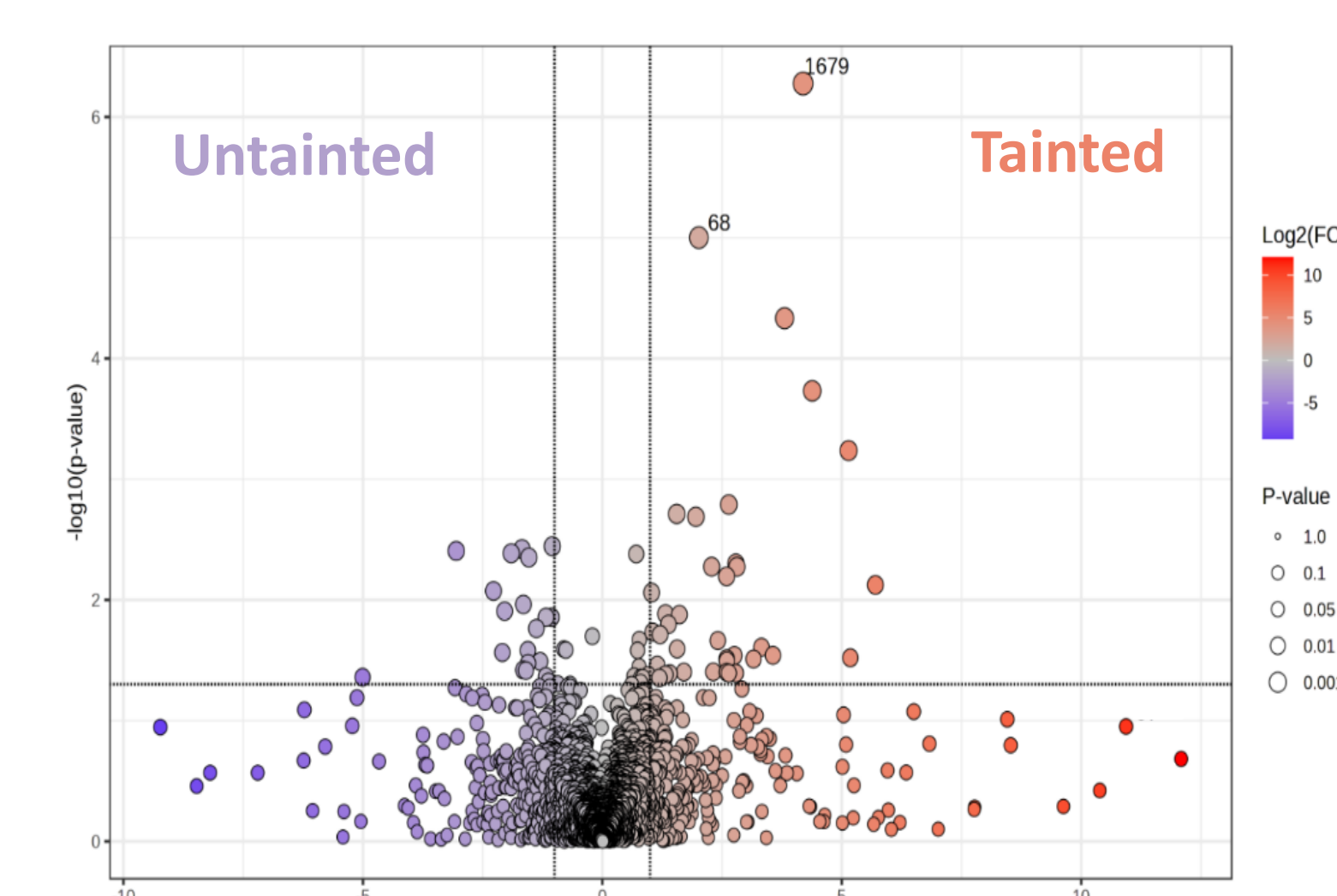
Support **genetic selection** of pigs with reduced boar taint risk

### Conclusion and perspectives

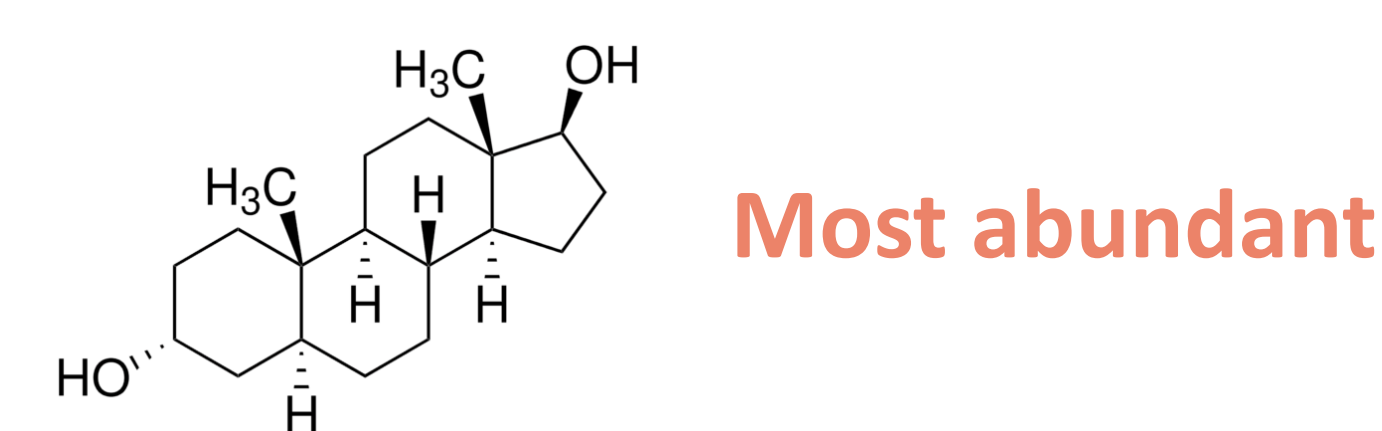
- **Multi-omics** signature of boar taint identified
- Reliable GC×GC-TOFMS **classification model** developed and validated
- Possible application to **unknown** samples for **boar-tainted detection** using **GC×GC-TOFMS**
- Toward **genetic selection** of low-boar taint pigs

### Metabolomics

**Volcano plot** Untainted Vs Tainted



- **37 significant** compounds identified in fecal samples from tainted animals
- **Steroid-reduction** - derived compounds
- **E.g., 5α-androstane-3α,17α-diol**



**Testosterone** reduction

Steroid-related **metabolic pathway**

### Acknowledgements

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### Reference:

Rodrigues, Anaïs, et al. "Development and validation of a classification model for boar taint detection in pork fat samples." *Food Chemistry* 443 (2024): 138572.



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