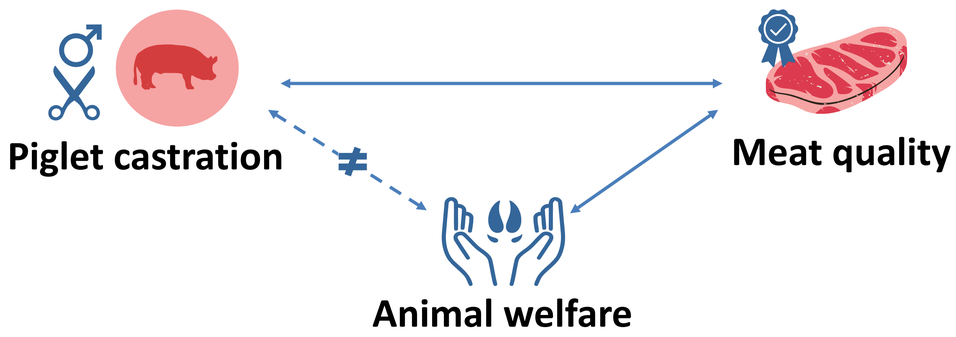
Développement et validation d'un modèle statistique pour la détection de l'odeur de verrat dans la graisse porcine

Djulia BENSAADA[1], Anaïs RODRIGUES[1], Thibault MASSENET[1], Lena M. DUBOIS[1], Anne-Catherine HUET[2], Alice MARKEY[3], José WAVREILLE[4], Nicolas GENGLER[3], Pierre-Hugues STEFANUTO[1], Jean-François FOCANT[1]

1 – University of Liège, MolSys Research Unit, Organic and Biological Analytical Chemistry Group, Allée du 6 Août 11 (Bât B6c), Quartier Agora, Sart-Tilman, Liège 4000, Belgium.
2 – CER Groupe, Marloie, Belgium.
3 – TERRA Teaching and Research Center, Gembloux Agro-Bio Tech, University of Liège,5030 Gembloux, Belgium.
4 – Animal Production Unit, Walloon Agricultural Research Centre, 5030 Gembloux, Belgium.

Context and scientific issues

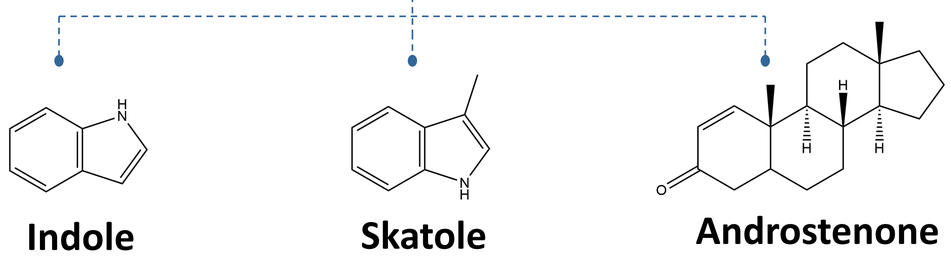
Ensuring **animal welfare** is a key challenge in pig farming, with **piglet castration** remaining a controversial issue. An alternative is to breed whole males; however, this approach must address meat quality concerns, notably the risk of **boar taint (BT)** – a foul odor during cooking that could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



Breeding **whole males**, while managing boar taint

Our study

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



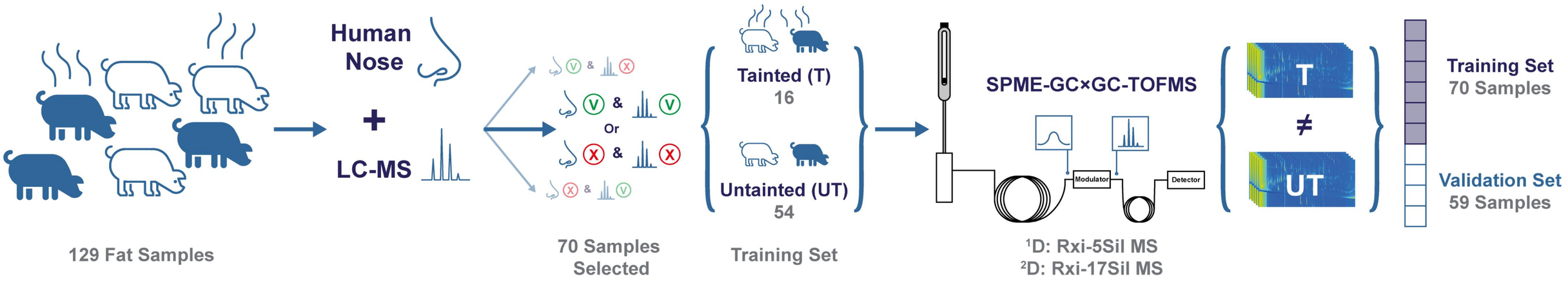
In this study

- **Targeted** analyses by **LC-MS** (CER Groupe)
- **Untargeted** analyses by Headspace-**SPME-GC×GC-TOFMS**

Aim

Fully **characterize** the **VOC profile** – **volatolome** – 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

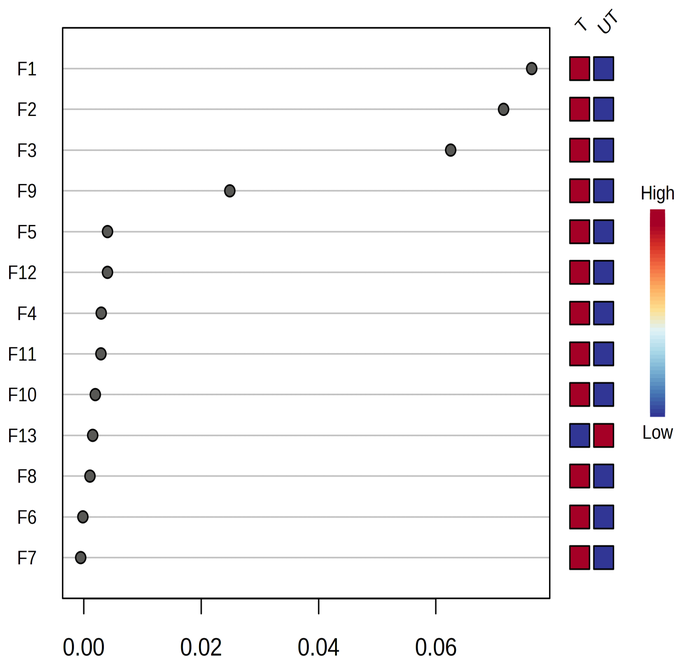


Results and discussion

Tile-based analysis on training set

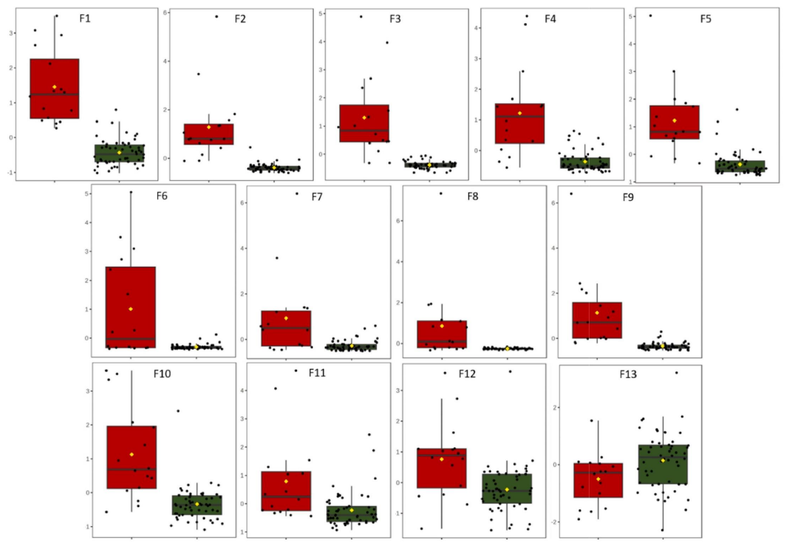
18 Discriminant compounds und and **selection of the top 13** (F1 to F13)

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

Concentration comparison



Comparison of the normalized concentration range T (in red), *and UT* (in green) *samples*

Conclusion and perspectives

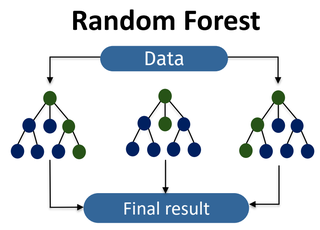
- **129 fat samples** analysed
- **18 features** found and **13 selected**
- **Statistical model built** as ***classification standard for genomics profiling***
- **Model validation on an external set**

→ *Possible application to **unknown** samples for **boar-tainted detection** using **GC×GC-TOFMS***

Classification model

Model evaluation

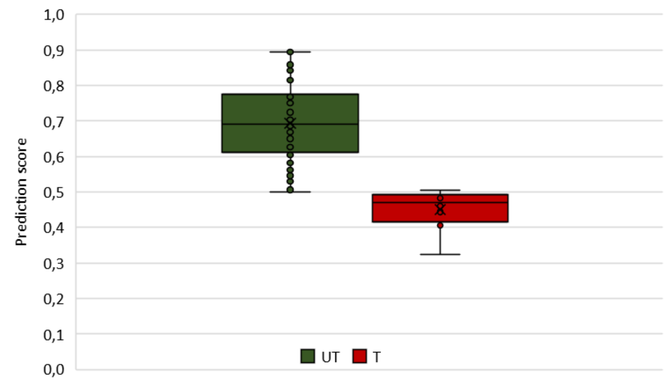
- AUC: 1
- Accuracy: 100%
- Sensitivity: 100%
- Specificity: 100%



A **high-performance** scores highlight the effectiveness of both human noses and UHPLC-MS/MS for sample classification

Validation set

Based on the 70 samples model built, 59 remaining samples were classified between **UT** (in green) and **T** (in red)



Prediction score and discrimination for BT odor on 59 remaining samples

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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.

OBiAChem
Organic and Biological Analytical Chemistry Group

Djulia Bensaada
Djulia.Bensaada@uliege.be