



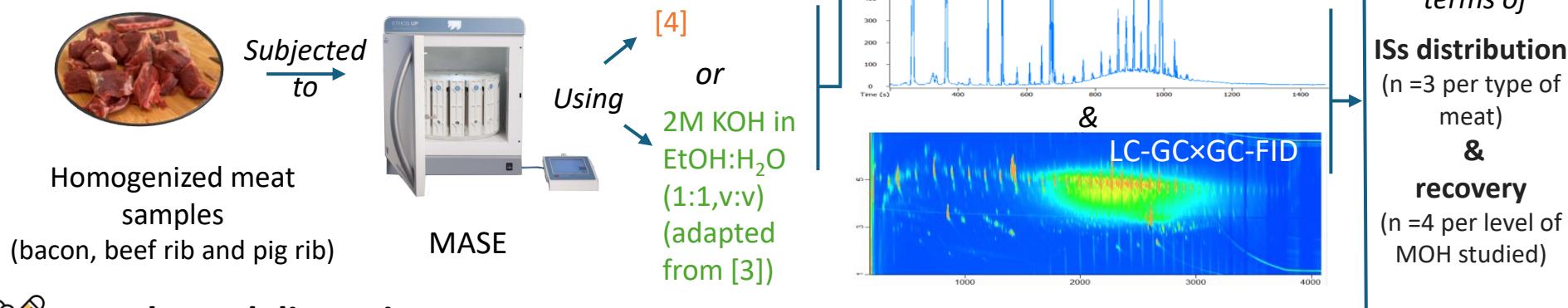
Background: Mineral oil hydrocarbons (MOH) are a complex mixture of liposoluble environmental and processing contaminants of petrogenic origin. They may pose different toxicological risks to humans depending on their structure (i.e., saturated (MOSH) or aromatic (MOAH)) [1]. Due to the complexity of MOH and food matrices, an efficient sample preparation method must be performed. One of the steps commonly included in the sample preparation for MOH analysis is saponification, which allows the complete extraction of MOH from the lipids present in the matrix [2]. Nonetheless, this step impacts the distributions of some internal standards (ISs) used for quantification due to a different partition in the solvent phases [3].



Aim: To compare two different microwave-assisted saponification and extraction (MASE) methods for the analysis of MOH in various types of meat.

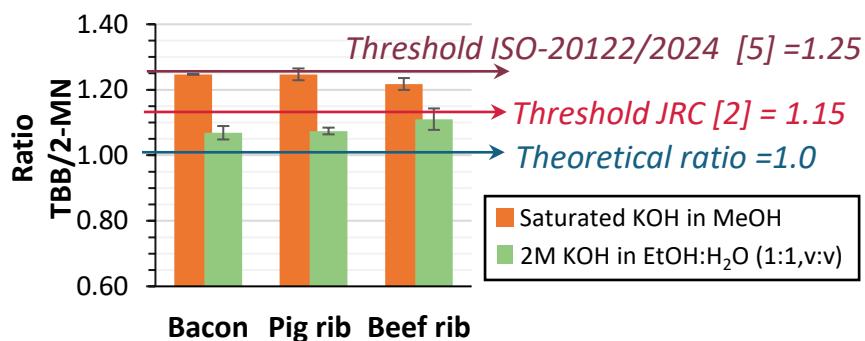


Experimental design:

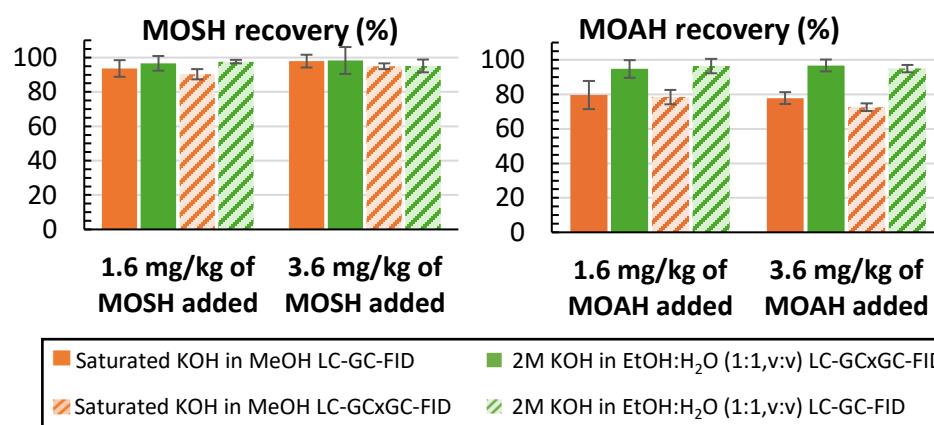


Results and discussion:

ISs distribution → Focused on the ratio tri-tert-butyl benzene (TBB) and 2-methyl naphthalene (2-MN), which are commonly used to quantify MOAH:



Recovery → Beef rib was used, and it was spike with two different levels of MOH:



- ❖ When the **saturated KOH in MeOH** was used, the ratio TBB/2-MN (1.24 ± 0.02 on average) was higher than the **threshold proposed by the JRC guidance [2]** and near the one included in the ISO-20122/2024 [5].
- ❖ With the **2M KOH in EtOH:H₂O (1:1,v:v)**, the ratio TBB/2-MN (1.06 ± 0.06 on average) was lower than both thresholds.
- ❖ For MOSH → the recovery with both MASE methods was higher than 90% in both spiked levels.
- ❖ For MOAH → the accuracy was lower with **saturated KOH in MeOH** (73 – 80%) in comparison to **2M KOH in EtOH:H₂O (1:1,v:v)** (95 – 97%).
- ❖ Similar results were obtained with LC-GCxGC-FID and with LC-GC-FID.



Conclusions: The use of MASE with **2M KOH in EtOH:H₂O (1:1,v:v)** to determine MOH in meat allowed to decrease the differences on the distribution of ISs between the liquid phases obtained after MASE and to increase the recovery of MOAH in comparison to the use of **saturated KOH in MeOH**. The similar results obtained with GCxGC and GC make the use of GCxGC feasible for evaluating the MOSH subclasses present in meat, as requested by EFSA [1], which will be the ultimate target of this research.

References:

- [1] EFSA CONTAM Panel, J. EFSA 21 (2023) 1–143
- [2] S. Bratinova, et al, 2nd ed., Publications Office of the European Union, Luxembourg, 2023
- [3] G. Bauwens, G. Purcaro Anal. Chim. Acta 1312 (2024) 34278
- [4] P. Albendea, et al., Animals 14 (2024) 1450
- [5] ISO/DIS 20122. <https://www.iso.org/obp/ui/en/#iso:std:iso:20122:dis:ed-1:v1:en>

Acknowledgments:

The authors thank Milestone, LECO and Restekpaula for their support

Contact:

donatella.ferrara@unito.it
paula.albendea@uliege.be
gpurcaro@uliege.be