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Quantification of odour active compounds and calculation of their orthonasal and retronasal detection thresholds in alcohol-free beer

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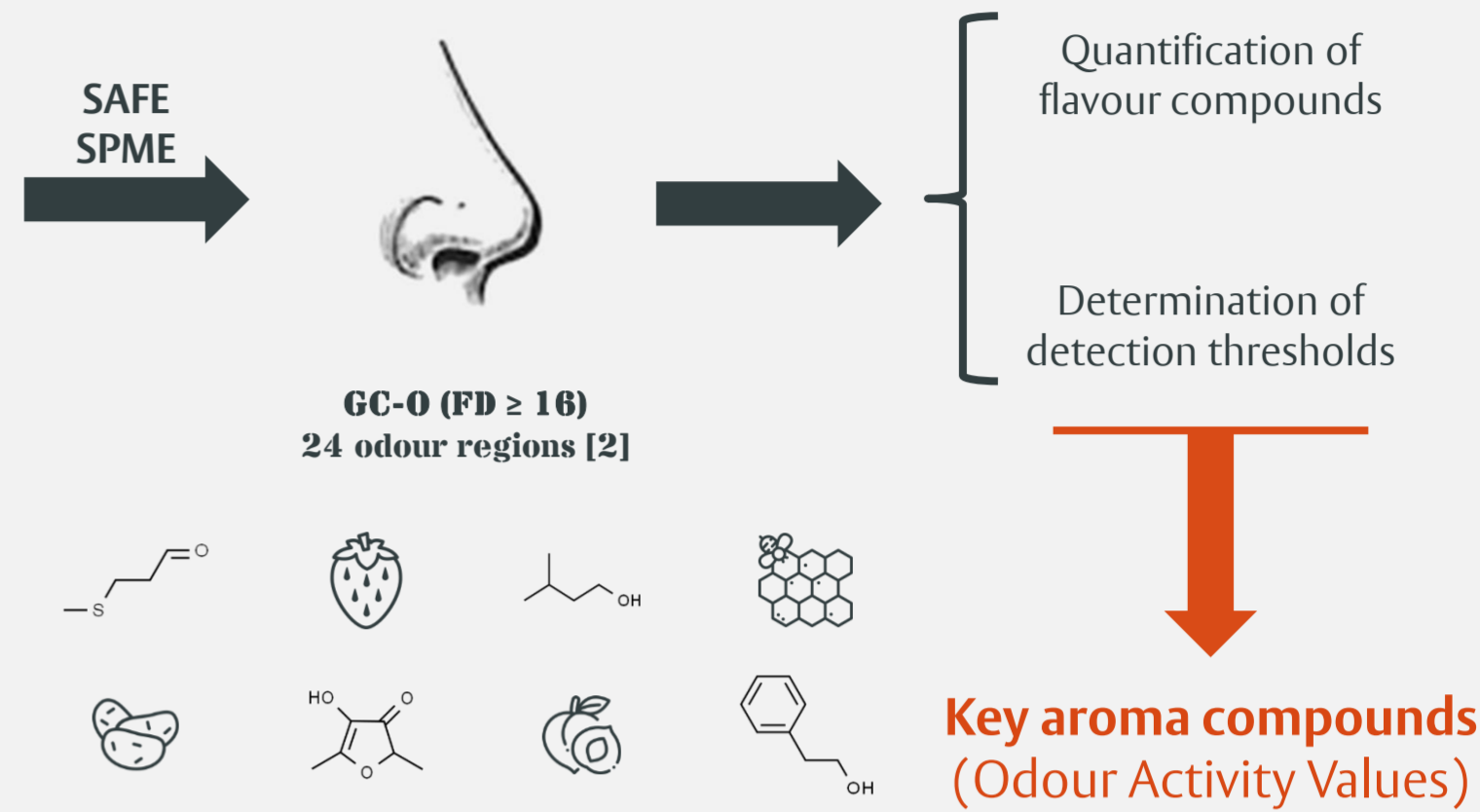
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Introduction

- Alcohol-free beers brewed by cold contact fermentation exhibit a **flavour reminiscent of wort** [1].
- Their **low alcohol** content (<0.05% v/v) and the high content of **sugars** alter the release properties of these beers, and thus the perception threshold of flavour compounds.
- Different **threshold calculation methods** were found in the literature, but the effect of the different methods has not been studied yet.

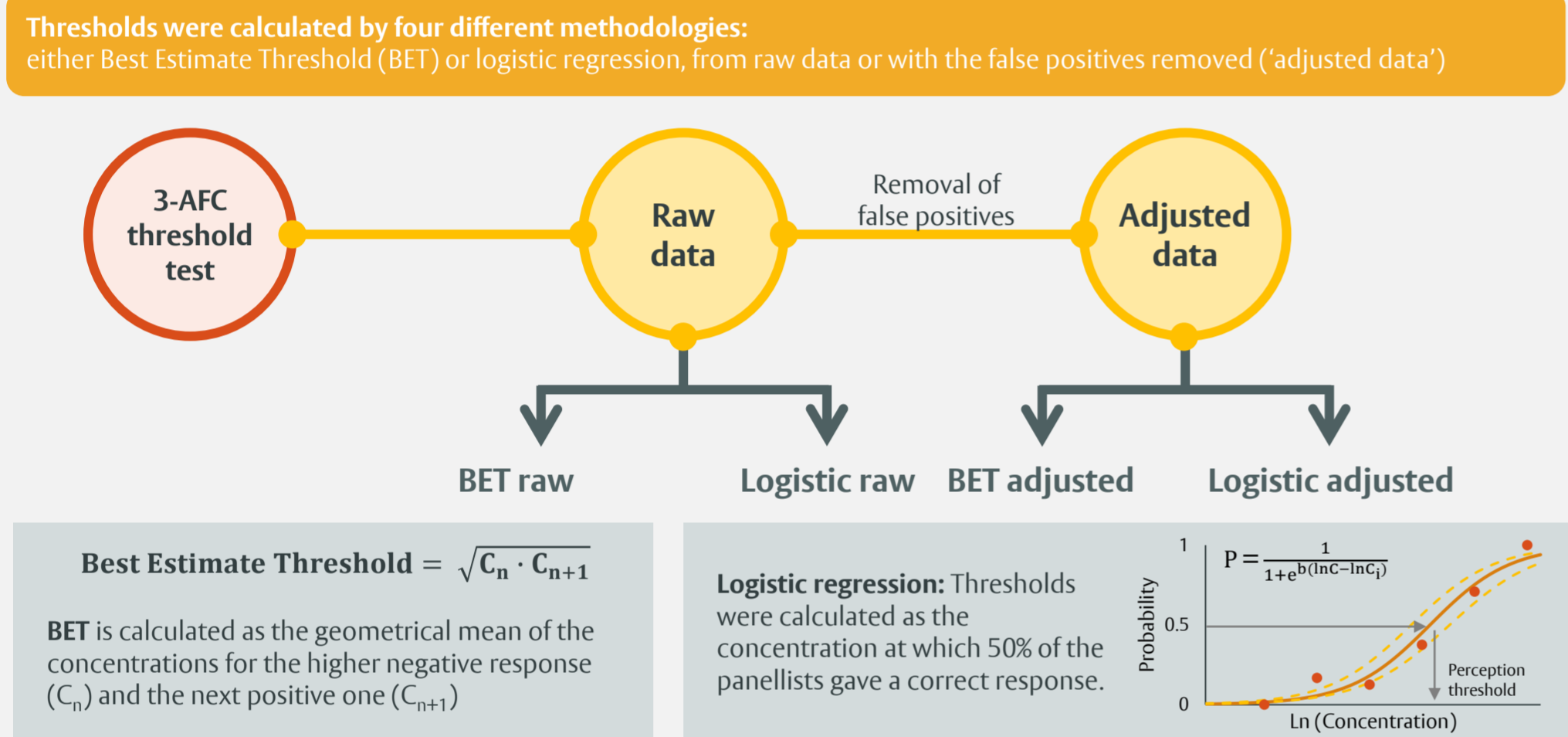
Aims of the study

- to determine **orthonasal and retronasal detection thresholds** of flavour compounds in a model alcohol-free beer.
- to check the effect of the **threshold calculation method**.
- to find their **odour activity values** (OAV) in a reference alcohol-free beer.



Materials & Methods

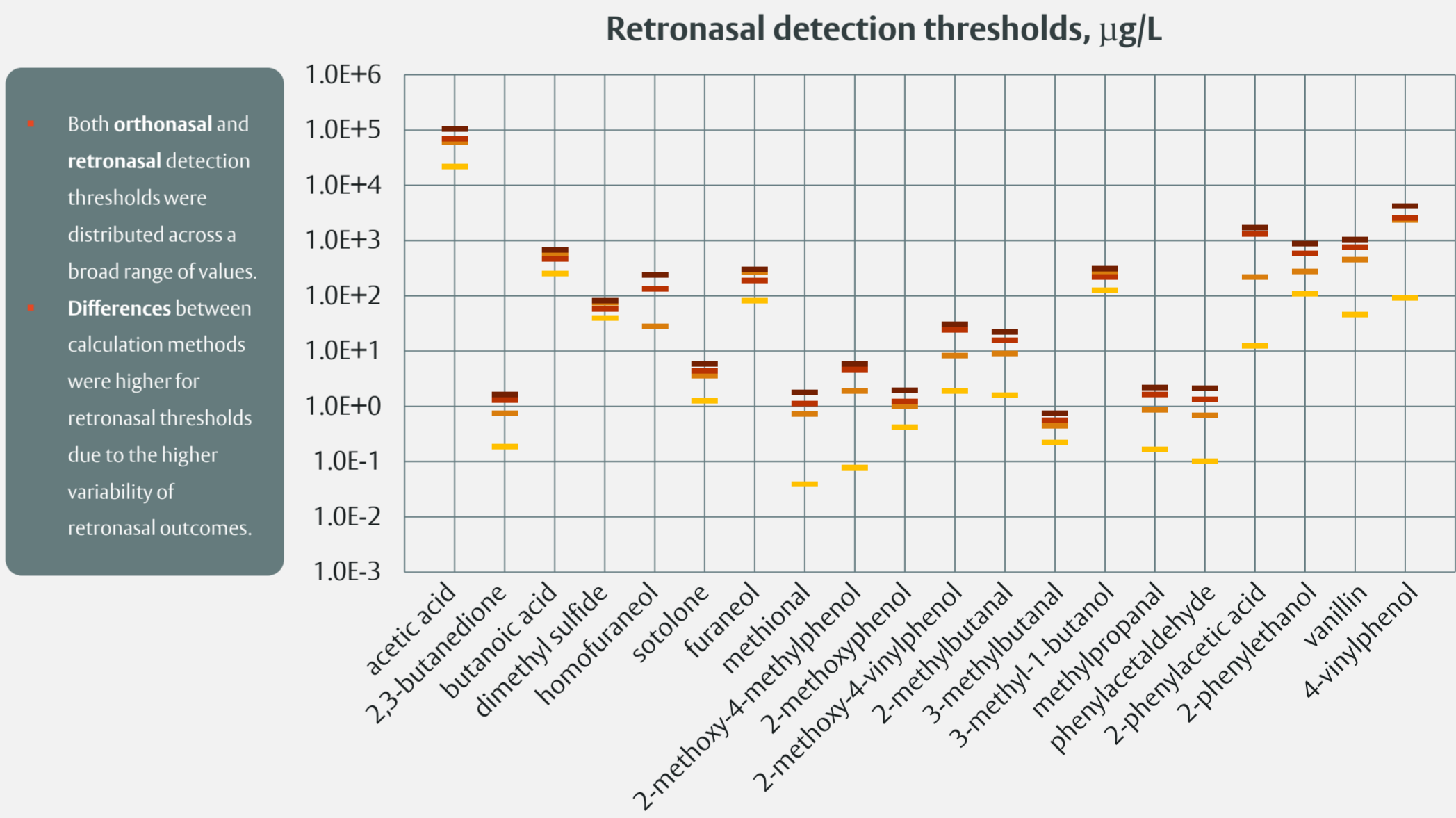
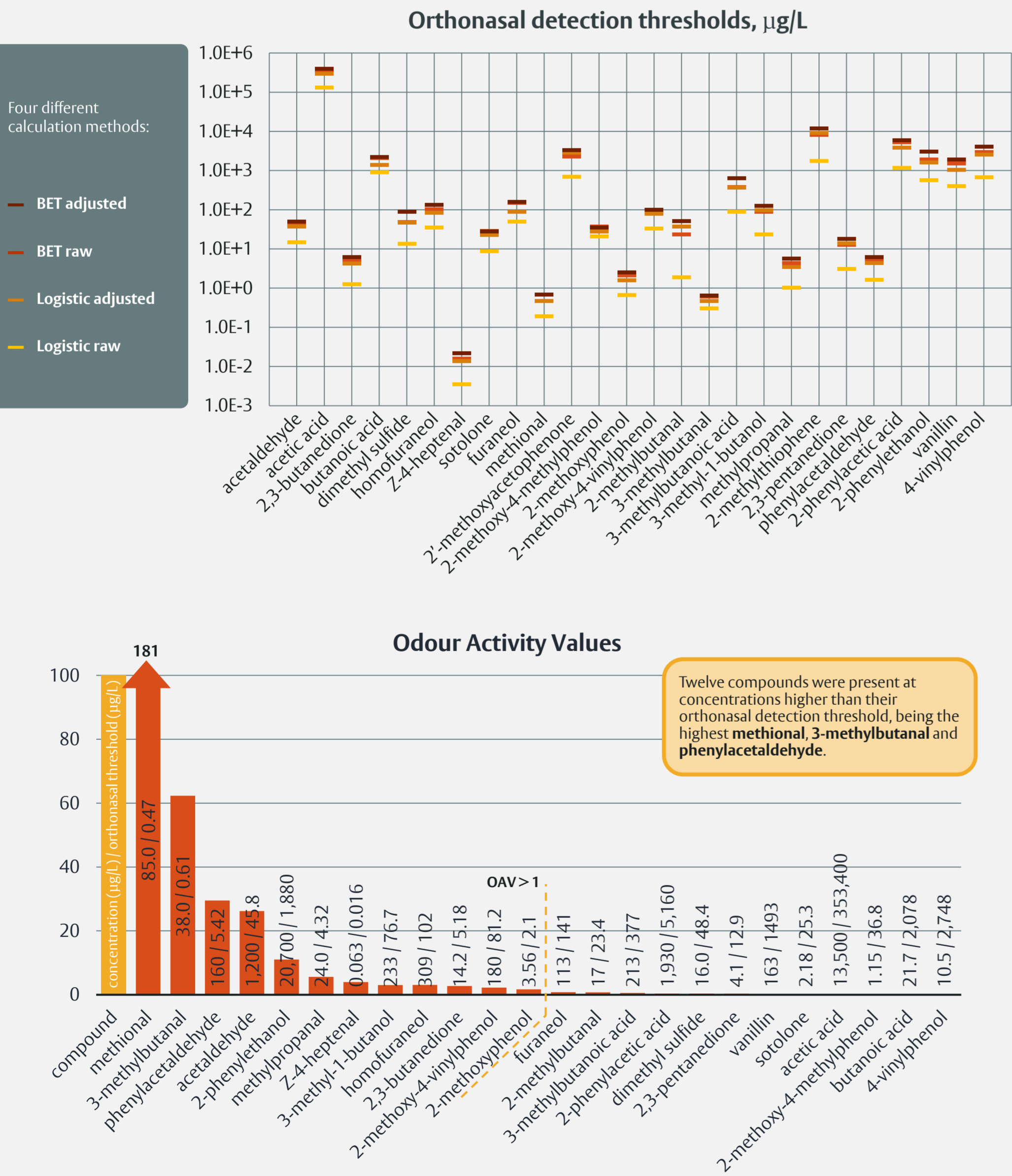
Detection thresholds



Quantification of flavour compounds

HS-SPME-GC-MS	Acetic acid, butanoic acid, 3-methylbutanoic acid, 3-methyl-1-butanol, 2-phenylethanol, 2-phenylacetic acid, dimethyl sulfide, 2,3-butanedione, 2,3-pentanedione, acetaldehyde. SPME fibre: DVB/CAR/PDMS. GC column: Stabilwax®-DA.
PFBHA-HS-SPME-GC-MS	Methional, methylpropanal, 2-methylbutanal, 3-methylbutanal, phenylacetaldehyde, Z-4-heptenal. The SPME fibre was exposed to O-(2,3,4,5,6-pentafluorobenzyl)-hydroxylamine (PFBHA) prior to be exposed to the sample's headspace. Fibre: PDMS/DVB. GC column: VF17MS.
HPLC-UV	4-Vinylguaicol. UV detection at 260 nm. LC column: Supelcosil Abz+ (250x4.6 mm).
UPLC-FLR	4-Vinylphenol. Fluorescence detection: excitation at 257 nm, emission at 334 nm. LC column: Acquity UPLC® BEH C18(1.7 µm, 2.1x150 mm).
LC-MS/MS	Sotolone (129.13→82.18), furaneol (129.1→43.1), homofuraneol (143.13→69.07), vanillin (153.10→93.10). Numbers in brackets correspond to MS/MS transitions. LC column: Acquity UPLC® BEH C18(1.7 µm, 2.1x150 mm).
Dansylation-LC-MS/MS	2-Methoxyphenol (358.1→171.1), 2-methoxy-4-methylphenol (372.1→171.1). Hydroxyl groups were derivatised with dansyl chloride. MS/MS transitions of the derivatised compounds in brackets. LC column: Agilent Zorbax® SB-18(1.8 µm, 2.1x100 mm).

Results & Discussion



Conclusions

- Threshold values were dependent on the calculation method chosen, as well as on the treatment of the data for the removal of false positives.
- Strecker aldehydes** were found to be of great importance for the warty, malty aroma of alcohol-free beers brewed by cold contact fermentation.
- The results from our study will help brewers and beer science researchers understand the contribution of aroma compounds to alcohol-free beer, and thus improve quality and consumer acceptance.

Want to know more details of our threshold study?
Check out our last publication!



<https://qrs.ly/ur9xq9f>