GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN

Raising entire males:
A framework for sensory quality control

Daniel Mörlein
University of Göttingen, Germany

IPEMA

http://www.ca-ipema.eu/

Stakeholders and why there is a need for reliable sensory quality control

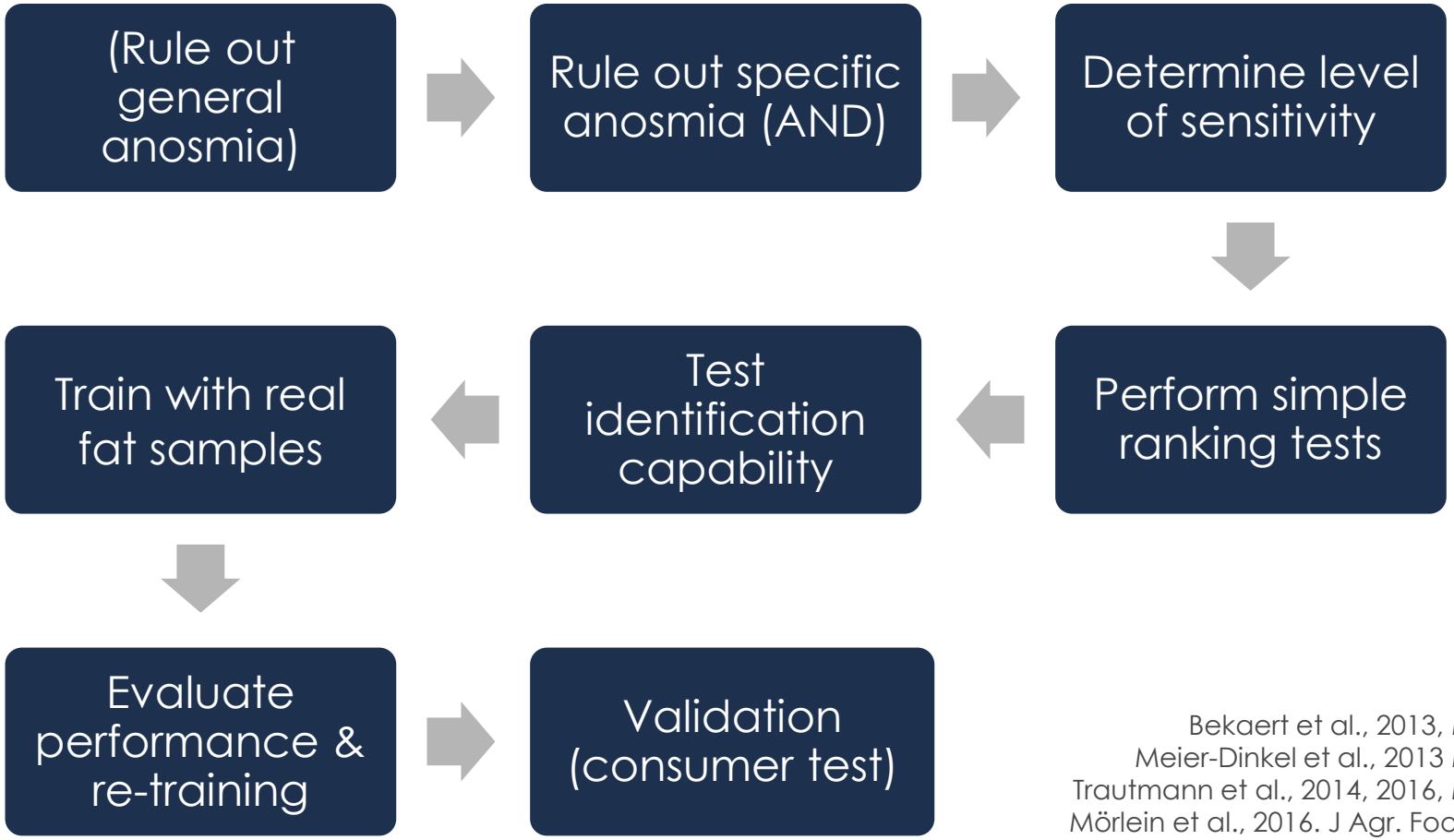
Am I paid fairly?

We want tasty pork

I don‘t want to lose my clients

Images:
https://www.tnhomeandfarm.com/agriculture/brandon-whitt-farmer-with-some-pig/
https://www.blick.ch
http://blog.spiffster.club/the-best-barbecue-tips-youll-ever-get/

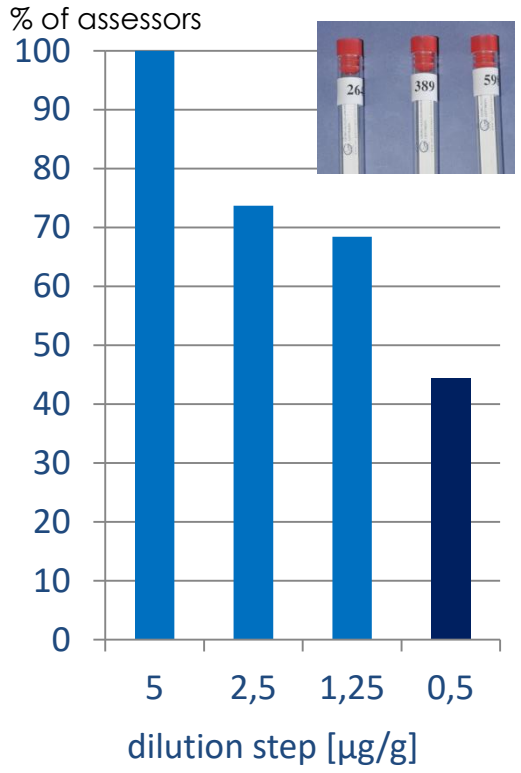
Selection and training of assessors -fundamental steps-



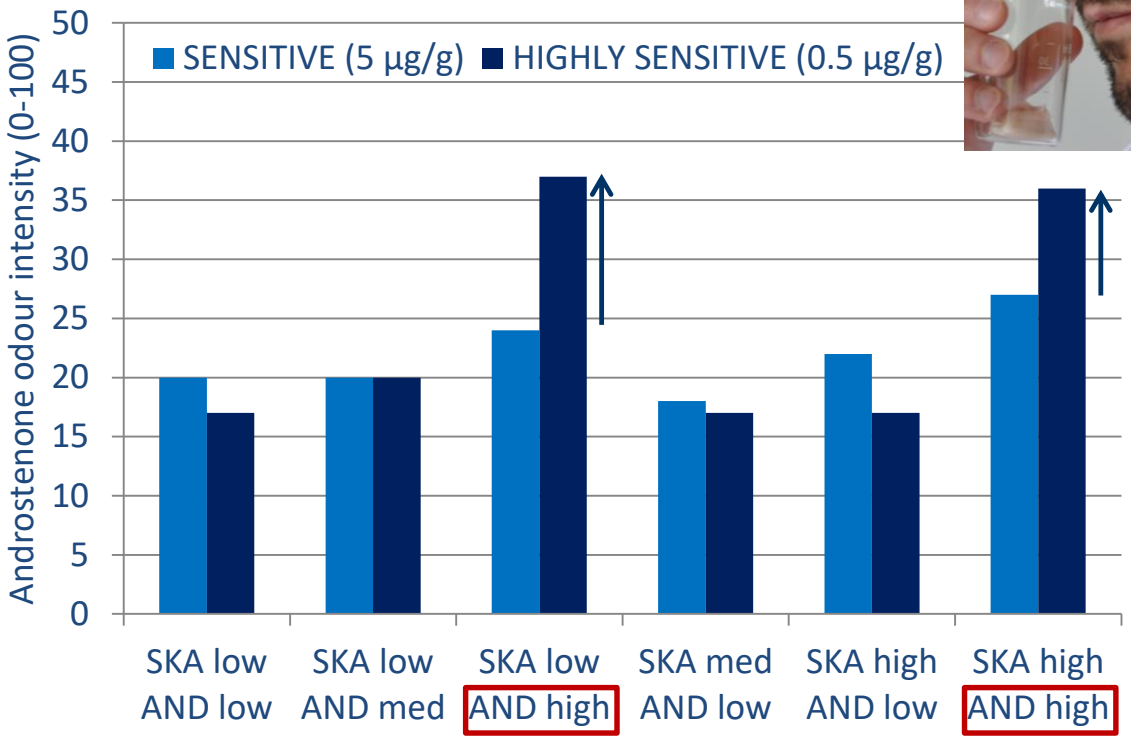
Bekaert et al., 2013, Meat Sci.
Meier-Dinkel et al., 2013 Meat Sci.
Trautmann et al., 2014, 2016, Meat Sci.
Mörlein et al., 2016. J Agr. Food Chem.
Wauters et al., 2017. Food Chem.
Heyrman et al., 2017 Animal

Assessors' olfactory acuity affects their perception and evaluation of meat.

A) Smell tests to characterize androstenone sensitivity



B) Perceived odor intensity of loin chops as affected by AND-sensitivity



Meier Dinkel et al., 2013 Meat Science 94, 19–26.

Training: The various faces of „Boar taint“

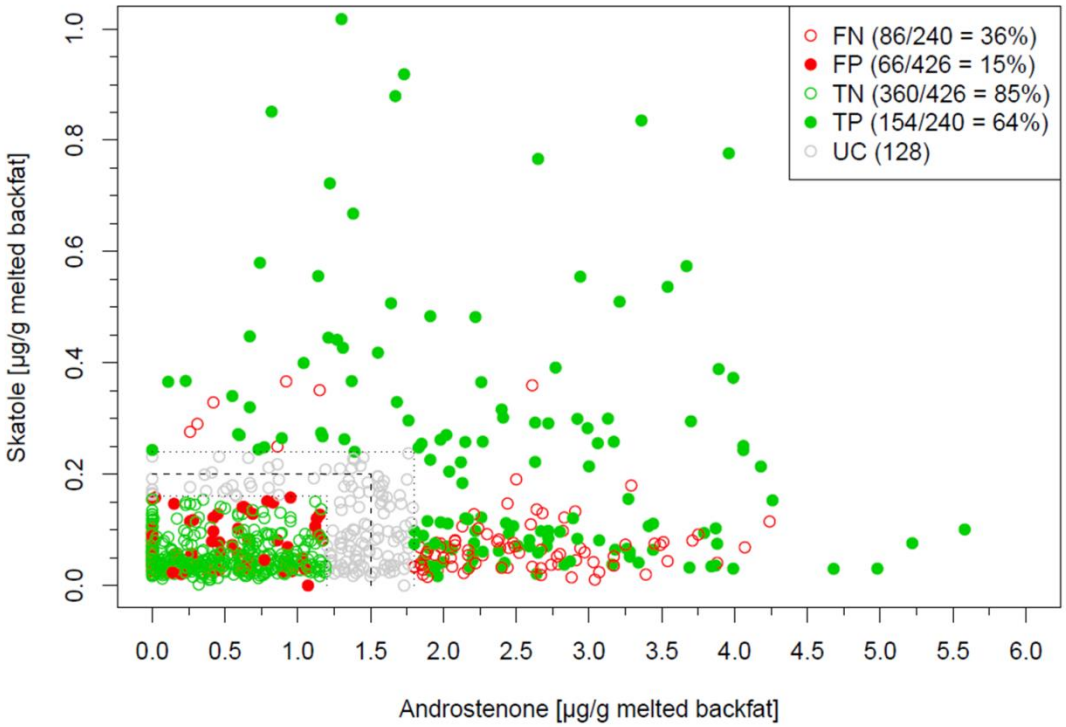
https://sites.duke.edu/dukeidlab/files/2016/08/AdobeStock_56647072.jpeg

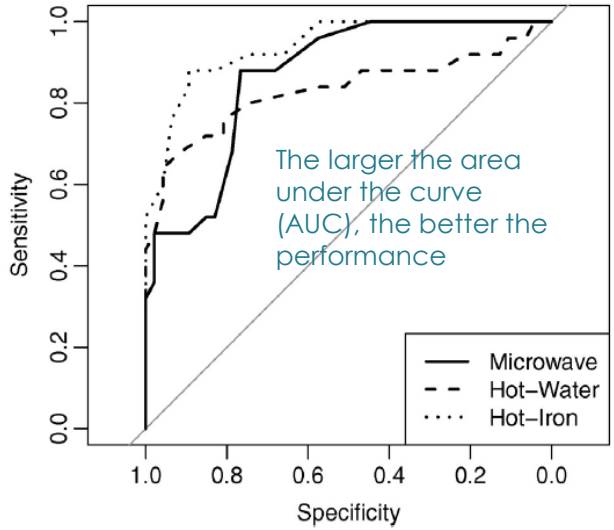
Androstenone and skatole levels in boars vary. Hence, their odour quality and intensity vary.

Statistical parameters should be applied to evaluate the panel performance.

A) Risk analysis (Reference = GC/MS) to obtain **sensitivity** and **specificity.**
here using the **„safe box“** (with uncertainty range of GC/MS)

B) Receiver operating characteristic (**ROC**) curves show **sensitivity** and **specificity.**
ex.: *method comparison*

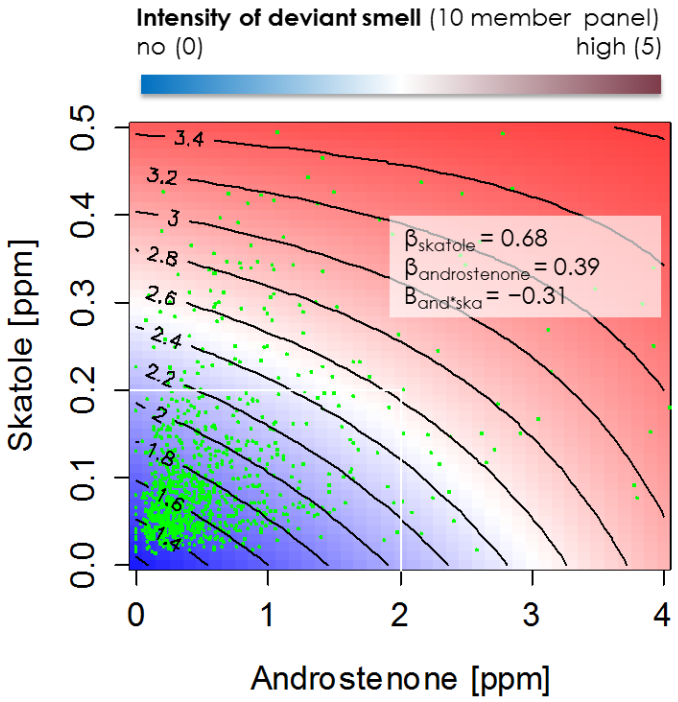


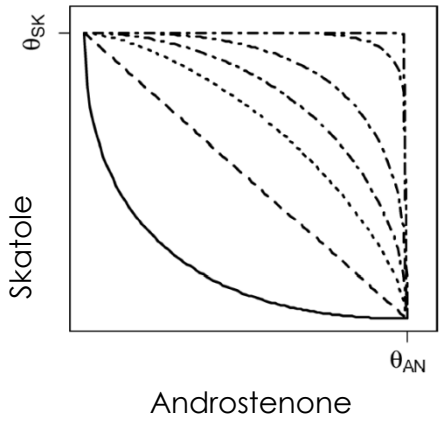


Meier-Dinkel et al. (2015) Meat Science 100, 73–84
Trautmann et al. (2016) Meat Science 111, 92–100

Safe box? A curve better describes the sensory perception and should thus be used.

Empirical data to model the intensity of smell (>1000 boars) → Mathematical model (thresholds + 1 shape parameter) → **New: curved approach for risk analysis (sensitivity vs. specificity)**





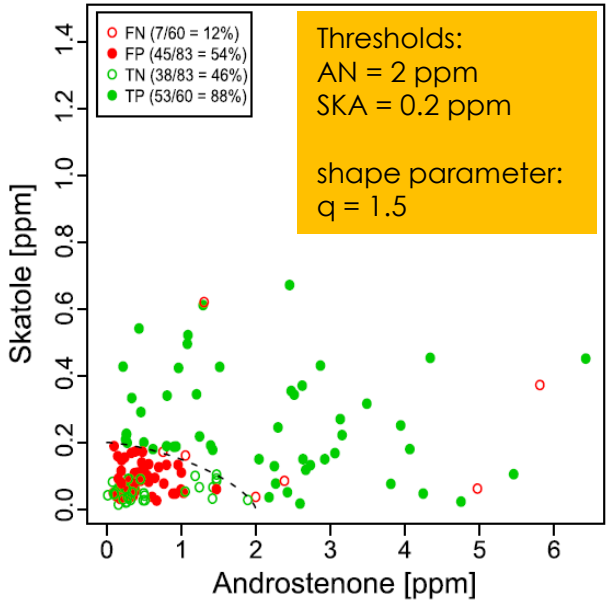
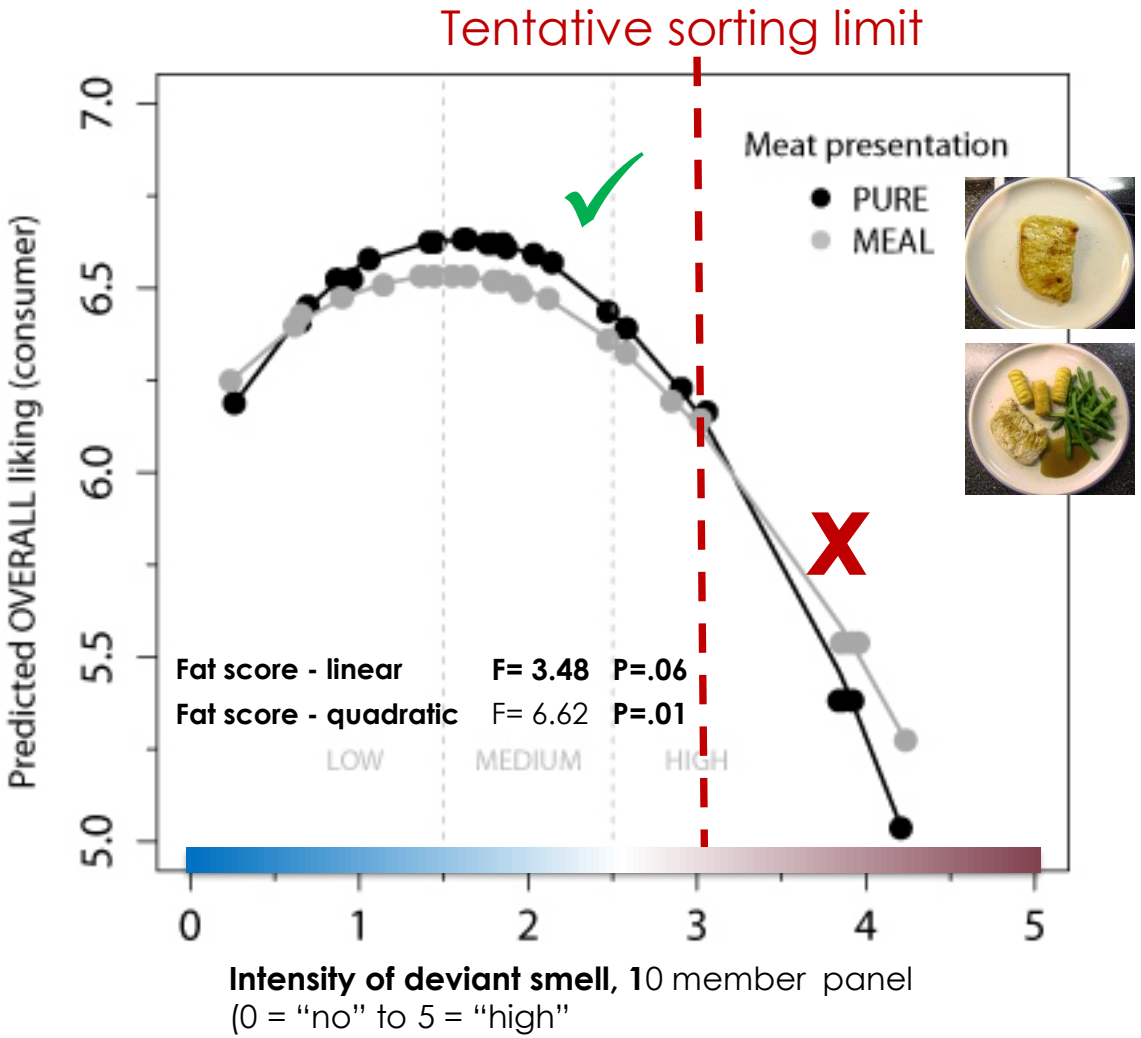


Fig. 1. Agreement of binary classification (tainted/untainted) of back fat samples (n = 143) according to sensory analysis compared to chemical analysis using the "curved approach" as suggested in Mörlein et al., 2016 applying thresholds θ_{AN} = 2.0 ppm, θ_{SK} = 0.2 ppm and the shape parameter q = 1.5.

Mörlein et al. (2016), Journal of Agricultural and Food Chemistry
Liu et al. (2017) Food Chemistry 231, 301–308.

Calibration: Adjust (objective) sorting levels using hedonic (subjective) consumer tests



Meier-Dinkel et al. (2016) Meat Science 122, 119–124

Overall risk assessment of sorting scenarios based on consumer data and pig data

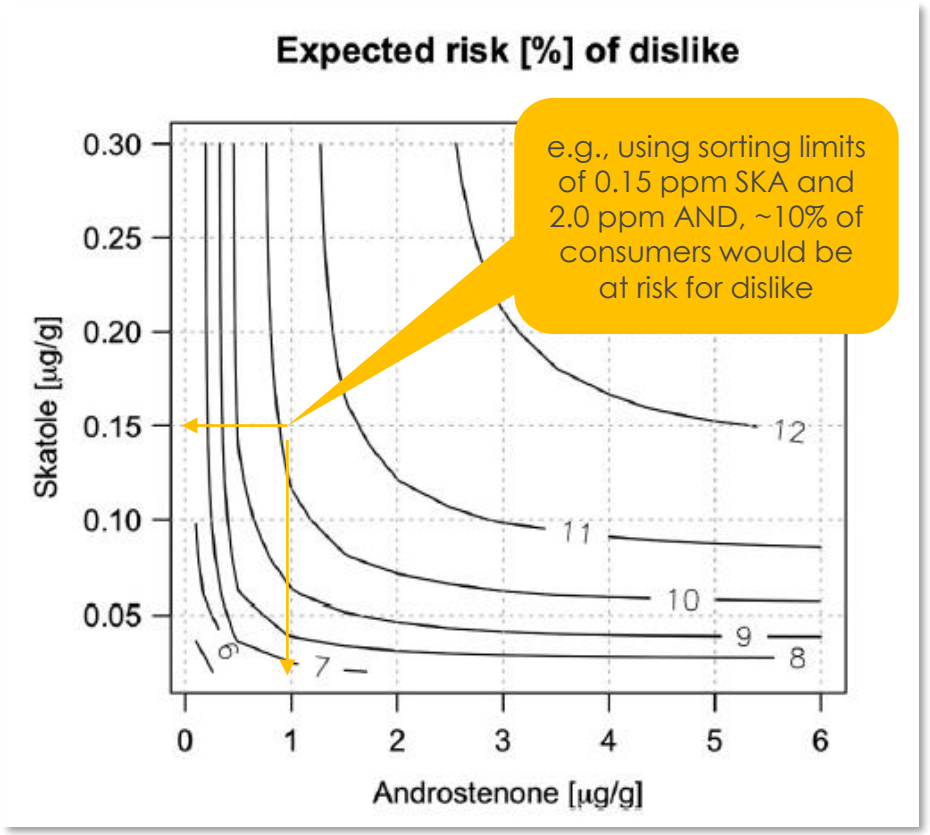
Model 1:
Prediction of **consumer liking** based on AND + SKA

+

Model 2:
bivariate distribution model of **AND + SKA** in representative pigs

=

Model 3:
Expected risk for consumer dislike given the pig population



Christensen et al. (2019), Food Quality and Preference

So, when marketing entire male pigs one should carefully…

- ✓ Characterize assessors‘ olfactory acuity („LOD“)
- ✓ [Develop methods, scales & references]
- ✓ [Follow a *Good Sensory Practice*]
- ✓ Train the multiple facets of boar taint
- ✓ Quantify the assessors’ performance* (mind the confidence intervals)
- ✓ Calibrate/validate vs. consumer tests

*… establish such procedures for veterinarians, too

And think responsibly about the use of „tainted“ meat

In memoriam Prof. Dr. Michael Wicke & Prof. Dr. Christoph Knorr (Uni Göttingen)

Dr. Lisa Meier-Dinkel
Dr. Johanna Mörlein
Prof. Dr. Jan Gertheiss (TU Clausthal)

Dr. Margit D. Aaslyng (DMRI, DK)
Dr. Gé Backus (WUR, NL)
Dr. Mark Bücking (Fraunhofer LME)
Dr. Jochen Fischer (Uni Bonn, ELFI Neufahrn)
Dr. Holm Frauendorf (Uni Göttingen)
Dr. Luc Frieden (Uni Bonn)
Dr. Reza Sharifi (Uni Göttingen)
David Starr (Göttingen)
PD Dr. Micha Strack (Uni Göttingen, isi GmbH)
Dr. Ernst Tholen (Uni Bonn)
PD Dr. Ulrike Weiler (Uni Hohenheim)

Thank you!

Want to know more?
daniel.moerlein@uni-goettingen.de

Thanks to funding by:
Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz
ptble Projektträger Bundesanstalt für Landwirtschaft und Ernährung
QS. Ihr Prüfsystem für Lebensmittel.
Directorate-General for Health & Consumer
IPEMA
http://www.ca-ipema.eu/

At-line vs. off-line sensory evaluation

photographs: SUS