

# Vision versus reflectance technology for deviations for sex and halothane genotypes in pig carcass classification



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Automation of pig carcass classification entailed a change in the location of the measured variables. Since mid-2013 in France the thicknesses measured on the back, laterally to the splitline, were replaced by thicknesses measured at the ham-loin junction on the splitline. Systematic deviations by sub-population, whose knowledge is of great interest in the chain, have thus been modified. The objective of this work was to quantify the systematic deviations related to sex and halothane genotype factors for CGM and CSB Image-Meater® classification methods, well known for their effects on carcass composition.

## Material & Methods

### Material

- Sample of 250 carcasses
- Selected in 3 slaughterhouses
- Stratified by sex in the same proportions as in the population in 2012: 50 % castrated males & 50 % females

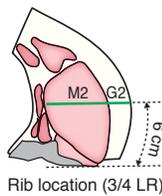
### Methods

- Measurements by vision (CSB Image-Meater® = IM) and reflectance (CGM)
- Standardised EU cutting (Walstra & Merkus, 1996)
- Scan of the 4 main EU cuts (ham, loin, shoulder & belly)
- Calculation of the Lean Meat Percentage (LMP):
  - LMPct: similar definition as LMP from dissection
  - muscle segmentation: 0-120 HU (Hounsfield Units)
  - application of an average muscle density of 1.04
- Regression analysis by device (CGM or IM):
  - Ordinary Least Squares: LMPct on depths
  - systematic deviations for each level: = Fitted – Observed values

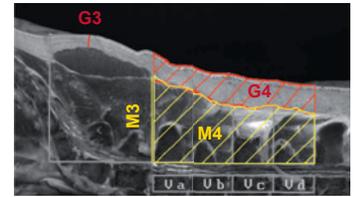
## Results

- Complete results on 211 carcasses, including 2 Hal nn, removed before statistical analyses.
- LMP overestimation for castrated males:
  - from 0.4% (\*\*\*) with CGM
  - to 0.7% (\*\*\*) with IM
- LMP overestimation for Hal NN:
  - from 0.0% (ns) with CGM
  - to 0.5% (\*\*\*) with IM
- Increase in systematic deviations consistent with the greater error of IM in LMP estimation.

### Methods



The 2 CGM depths



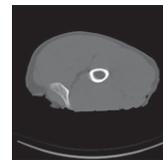
The 4 CSB Image-Meater® depths



The 4 main EU cuts



CT acquisition (3 mm slices)



Raw image (ham example)



Thresholded image (muscle in orange)

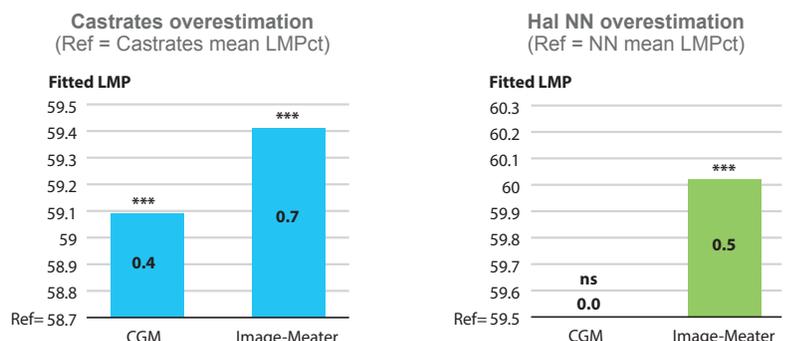
$$\text{LMP ct} = 0.89 * 100 \frac{\text{tenderloin} + 1.04 * \sum \text{muscle\_volume (shoulder, loin, ham, belly)}}{\sum \text{weight (shoulder, loin, ham, belly, tenderloin)}}$$

### Sample description

Number of carcasses per subpopulation

|     |           | HALOTHANE GENE |     |         |
|-----|-----------|----------------|-----|---------|
|     |           | Nn             | NN  | All Hal |
| SEX | Females   | 53             | 53  | 106     |
|     | Castrates | 55             | 48  | 103     |
|     | All Sexes | 108            | 101 | 209     |

### Results



## Conclusion

- The change from CGM to IM almost doubled the overestimation of castrated males and the underestimation of females, both now reaching 0.7% LMP. The systematic deviations could be cancelled by a specific offset in the prediction equation.
- The effect of halothane genotype has become significant and of practical importance: the overestimation of the NN genotype and the underestimation of the Nn genotype increased to about 0.5%.

