

Estimation by vision of pork cuts composition for sex and halothane genotype subpopulations



Gérard Daumas & Mathieu Monziols

Ifip-Institut du porc, BP 35104, 35651 Le Rheu Cedex, France
Contact: gerard.daumas@ifip.asso.fr

The meat industry is interested in the prediction of the cut yields in order to drive the cutting as efficiently as possible. These yields can be predicted with the variables used in the compulsory task of carcass weighing and grading. Nevertheless, the factors having an effect on carcass grading could have a different effect on the cut grading, specific to each cut. This work aims to quantify the systematic deviations for sex and halothane genotype subpopulations in the estimation of pork cuts composition by the automatic vision system called CSB Image-Meater®.

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

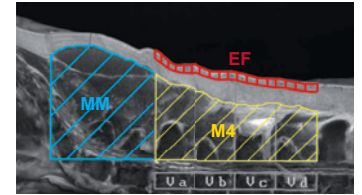
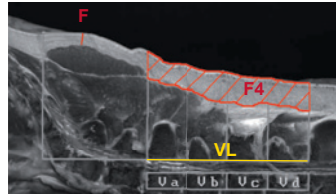
Methods

- Measurements by vision (CSB Image-Meater® = IM)
- Standardised EU cutting (Walstra & Merkus, 1996)
- Scan of the 4 main EU cuts (ham, loin, shoulder & belly)
- Calculation of the Lean Meat Percentage (LM%) in each cut:
 - muscle segmentation: 0-120 HU (Hounsfield Units)
 - application of an average muscle density of 1.04
- Extraction of a pool of 6 predictors from IM
- Regression analysis for each cut:
 - fitting LM% on IM & carcass weight
 - systematic deviations for each level (sex & Hal): = Fitted – Observed values

Results

- Complete results on 208 carcasses
- Sexual types and Hal genotypes well balanced
- Females were underestimated:**
 - from 0.5 LM% in ham,
 - to 1.4 LM% in belly.
- Hal heterozygotous (Nn) were underestimated:**
 - from 0.3 LM% in shoulder,
 - to 0.8 LM% in belly.

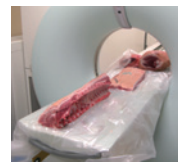
Methods



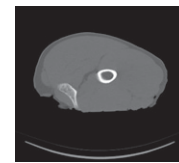
The 6 pre-selected predictors measured by the CSB Image-Meater®: 3 fat depths (F, F4, EF), 2 muscle depths (MM, M4), 1 length (VL)



The 4 main EU cuts



CT acquisition (3 mm slices)



Raw image (ham example)

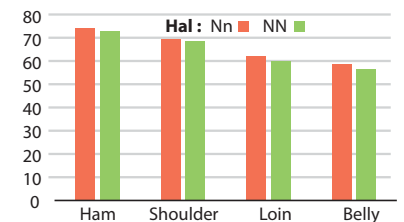
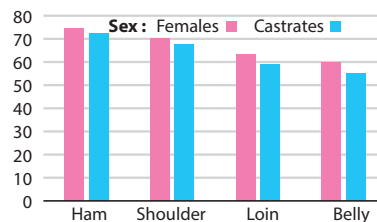


Thresholded image (muscle in orange)

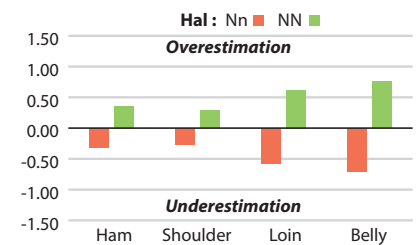
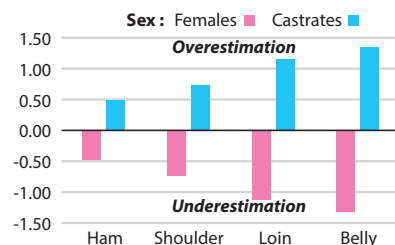
$$\text{LM\%cut} = 100 \frac{1.04 * \text{Muscle volume of the cut}}{\text{Weight of the cut}}$$

Results

Mean LM% in cut per:



Mean deviation of fitted LM% in cut per:



Conclusion

- There was a systematic underestimation of the LM% in all cuts (ham, shoulder, loin and belly) for females and Hal Nn genotypes by the vision method CSB Image-Meater®; conversely, castrated males and NN genotypes were overestimated.
- The deviations per sex could be removed by at least a different intercept in the prediction equations. We recommend analysing Hal status during the body composition experiments.

