ifip institut du porc

Vision versus reflectance technology to estimate pork cuts composition

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

Sorting meat cuts is an ongoing challenge. Many pork plants use weighing and carcass grading information for pre-sorting. Automation of pig carcass classification entailed a change in the location of the measured variables. Since mid-2013 in France the thicknesses measured by reflectance (CGM) on the back, laterally to the splitline, were replaced by thicknesses measured by vision (CSB Image-Meater®) at the ham-loin junction on the splitline. The objective of this work was to compare the precision of these two classification methods to predict the proportion of muscle in the main cuts.

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®) 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 (LM%) in each cut:
- 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: LM% on depths
- R square (R^2) & Residual Standard Deviation (RSD)

Methods

Rib location (3/4 LR)

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)

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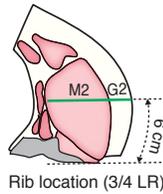
Results

- Complete results on 241 carcasses
- M4 non significant
- R square (R^2):
- better quality of fit for CGM,
- different hierarchy of cuts,
- decrease about 0.12 for limbs and 0.23 for trunk.
- Residual Standard Deviation (RSD) :
- same hierarchy of cuts,
- increase about 15% for limbs and 30-35% for trunk.

Results

Mean LM%

Standard Deviation of LM%

R square (R^2) of estimation of LM% in cut

RSD of estimation of LM% in cut

Conclusion

Moving from lateral (CGM) to median (IM) measurements increased the error, much more strongly in trunk than in limbs. Nevertheless, the hierarchy of cuts has been preserved: ham, shoulder, loin and belly, according to an increasing error. The error in estimating with IM the LM% in belly was almost double than in ham. Cutting directed with the help of carcass clas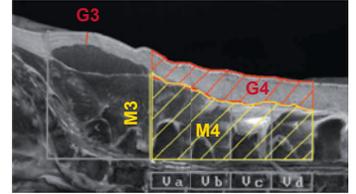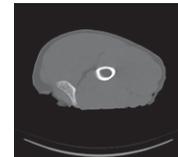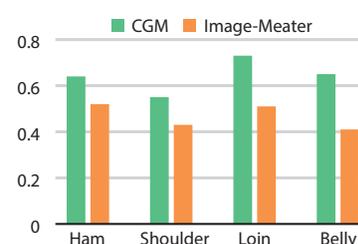sification would be less efficient.