DMRI
Danish Meat Research Institute

DANISH TECHNOLOGICAL INSTITUTE

Newsletter

Calibration of on-line classification instruments

Using CT as a reference method

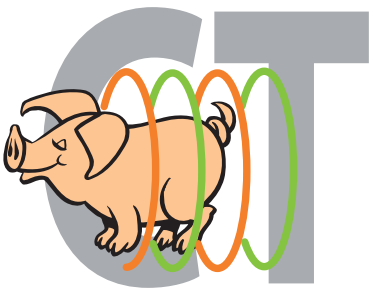
- DMRI offers to assist in calibrating on-line classification instruments using a mobile CT scanner

The total lean meat content (LMP) in pig carcasses is the standard method to express the carcass value in the EU. The use of objective methods for estimating LMP on-line on the slaughter line is stated in the Commission Regulation No. 1249/2008. The primary reference method for calibration of on-line classification instruments is based on dissections of a representative sample of carcasses. However, it is now possible to use CT scanning and virtual dissection as an instrumental reference method.

LMP calibrations in compliance with the EU regulation

The complete setup includes:

- Experimental design
- Draft of EU documents
- Assistance in carrying out the experiment
- Data analysis and estimation of calibration models



Preconditions

- A representative sample of at least 120 carcasses to be measured by the on-line classification instrument in question and subsequently CT scanned
- A subsample to be either partially or totally dissected (legal EU standard methods) to establish a calibration hierarchy

Calibration models for sorting parameters

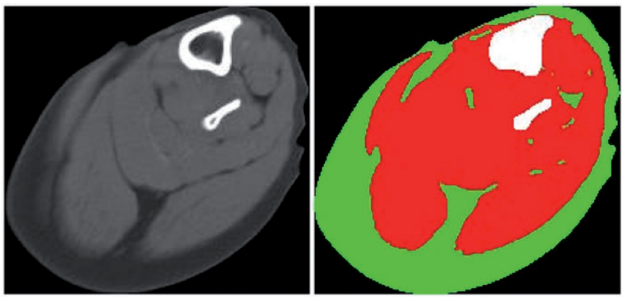
Once corresponding data for on-line measurements and CT scanning has been established, it is possible to estimate reference parameters like:

- The weight of the ham, middle piece and fore-end
- The lean meat content in the ham, middle piece and fore-end
- Customer defined quality characteristics and product yields

and subsequently, calibration models for these parameters can be estimated aimed at sorting and/or production control.

Facts about CT scanning

The Danish reference method is based on scanning of an entire carcass to obtain an image for each 10 mm, as for example the left image below. Each image consists of a number of voxels representing 1 x 1 x 10 mm3 of the carcass. A numerical value is linked to each voxel determined by the amount of meat, fat, membranes, bones etc. in the position in question. All voxels are grouped into three groups: Fat, meat and bones, see the right image below, as a parallel to traditional dissection performed by a butcher with a knife.



The number of voxels representing fat, meat and bone is combined in the model below estimating the total weight W

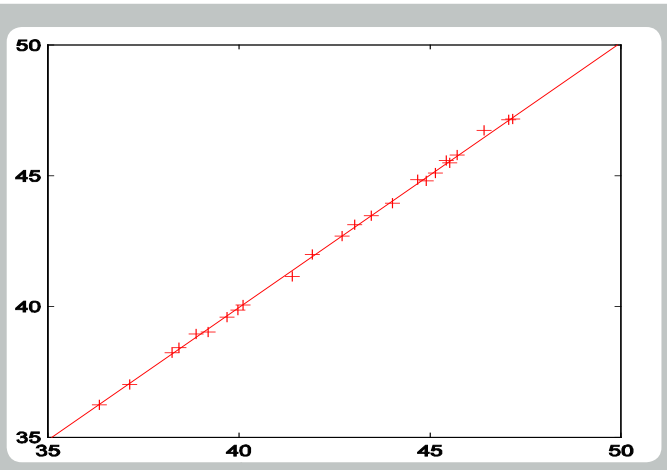
$$W = b_{fat}V_{fat} + b_{meat}V_{meat} + b_{bone}V_{bone}$$

where the β's are average densities for each tissue group.

The percentage of Lean Meat (LMP) is estimated by

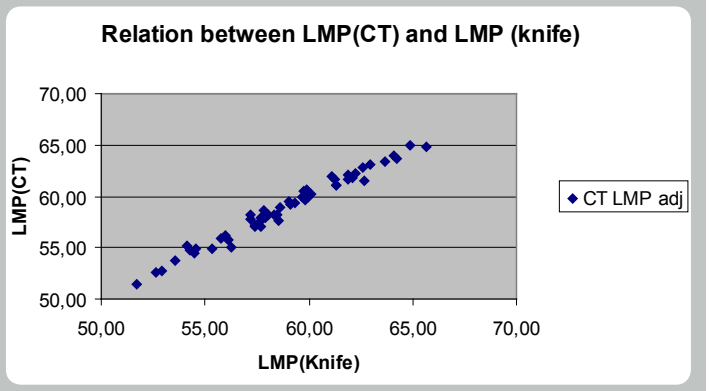
$$LMP_{\%} = \frac{b_{meat}V_{meat}}{W} \times 100\%$$

However, CT is more capable of differentiating between fat, meat and bone tissues than a butcher. Therefore it is necessary to supply the images with a small number of dissections that are used to correct the results to the traditional level.



Relation between predicted weight using CT (y-axis) and weighted total weight (half a carcass) (x-axis)

Precision std. = 150 gram



Relation between LMP using CT (y-axis) and the EU standard partial dissection with knife (x-axis)

Residual std. = 0.5 LMP

Please contact

Principal Researcher, MSc, PhD Eli V. Olsen
Tel. +45 7220 2598
E-mail: EVO@dti.dk

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Profile

DMRI offers consultancy and innovation to the meat industry based on research into:

- Improving efficiency
- Managing product quality
- Maximizing food safety

Key services

- Animal welfare – transportation, lairage and stunning
- Optimisation of byproduct handling
- Design and optimisation of chilling facilities
- Improvement of meat quality
- Improvement of food safety and hygiene
- Improvement of efficiency through automation and methods
- Optimized raw material utilisation through sorting and management
- Odour abatement
- Waste water treatment
- Reduction of water and energy consumption

DMRI Danish Meat Research Institute

Danish Meat Research Institute • Maglegaardsvej 2 • DK-4000 Roskilde
Tel. +45 7220 2000 • Fax +45 7220 2744 • Email dmri@dti.dk
www.dti.dk

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