A simple and accurate Computed Tomography approach for measuring the lean meat percentage of pig carcasses
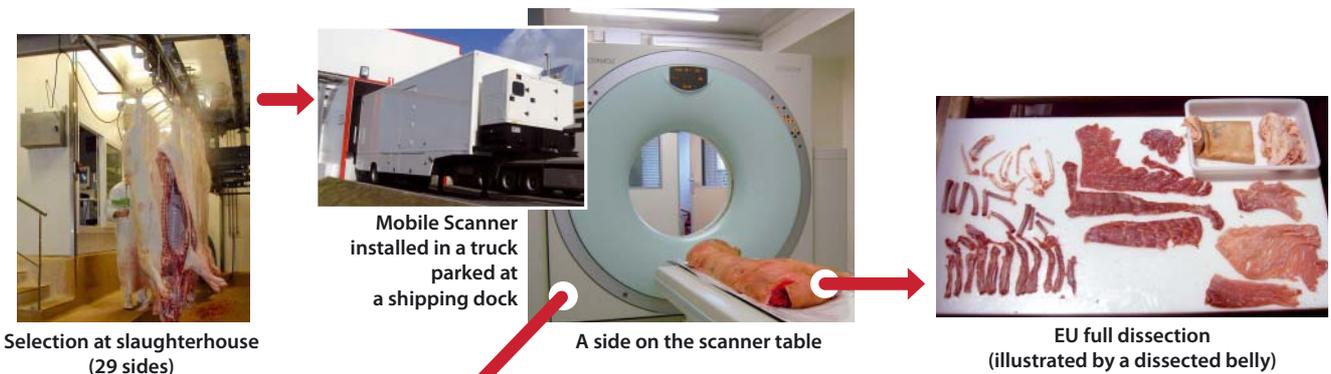
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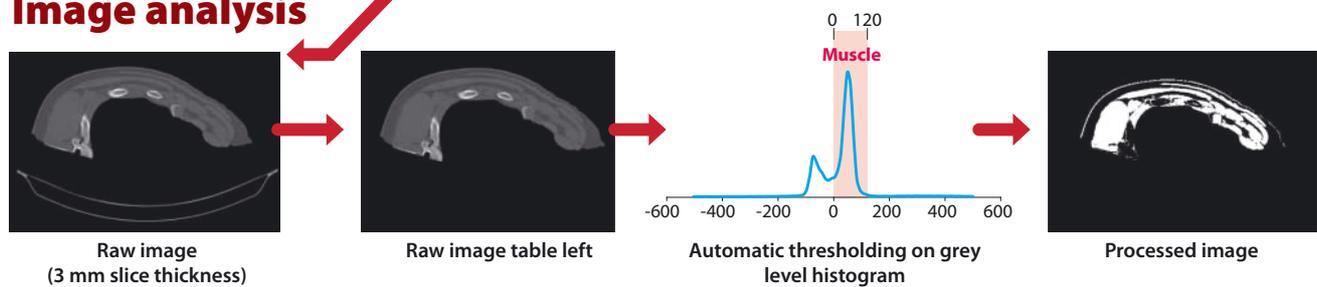**gerard.daumas@ifip.asso.fr**

The aim was to assess the accuracy of a simple CT procedure for measuring the Lean Meat Percentage (LMP) of pig carcasses. This procedure was initially developed on pig cuts, facing the challenge of robustness and unbiasedness.

Materials and methods

A representative sample of the French pig slaughtering was scanned by spiral Computed Tomography and then fully dissected.

Selection at slaughterhouse (29 sides)

Mobile Scanner installed in a truck parked at a shipping dock

A side on the scanner table

EU full dissection (illustrated by a dissected belly)

Image analysis

Raw image (3 mm slice thickness)

Raw image table left

0   120
Muscle

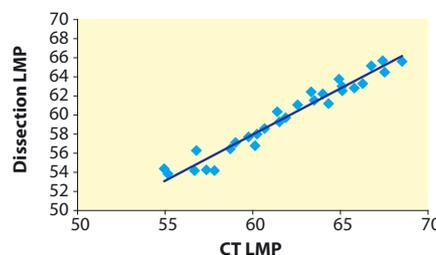**Automatic thresholding on grey level histogram**

Processed image

Results

Both LMP are defined as follows:

$$\text{Dissection LMP} = \frac{\text{Muscle Weight}}{\text{Side weight}}$$

$$\text{CT LMP} = \frac{\text{Muscle Volume} \times \text{Muscle Density}}{\text{Side weight}}$$

A constant muscle density of 1.04 (ICRU, 1989) was applied.

Correlation between CT and dissection was 0.99 for muscle weight and 0.98 for LMP.

The regression of dissection on CT gave a RSD of 384 g muscle weight and 0.81 % LMP (see figure).

Conclusions and Implications

This CT procedure is a fairly accurate method to measure LMP of pig carcasses and will therefore be used in France for composition studies.

It is the simplest CT procedure accepted in the EU. As it is not calibrated against dissection (but just compared), the independency towards population should guarantee good robustness property. Thus, it might be a good starting point to build a harmonised international CT procedure.

Variability of muscle density is under investigation to assess the robustness of this approach. The detection of the different tissues in the less valuable cuts may need further improvement.

Reference : *ICRU, 1989. Tissue Substitutes in Radiation Dosimetry and measurement. ICRU report 44.*