Pig carcass grading with the CSB–Image–Meater®

Improving margins with state-of-the-art image analysis
**BENEFITS OF THE CSB-IMAGE-MEATER® AT A GLANCE**

- Exact grading according to SEUROP
- Accurate prediction of primal yields
- Optimal carcass utilization in cutting, deboning and sales (yield optimization)
- Grading and value determination of warm and cold pigs through image analysis at the kill floor, receiving and cutting entry
- Grading of sows
- No-contact, hygienic measurement of values
- No rebuilding or changes to existing slaughter technology required
- 3 versions available to optimally meet your requirements
- Crucial: consistent level of measurement

**APPLYING NEW TECHNOLOGY**

The CSB-Image-Meater® is the optimal solution for objective and transparent grading of pigs with comprehensive automation of the grading process. The CSB-Image-Meater® utilizes a non-invasive image analysis technique to provide the necessary data.

The CSB-Image-Meater® technology consists of a powerful software that captures images of the carcasses, identifies structures and provides visualized evaluations of the different areas of the muscles, bones and backfat. The measurements take place at the loin/ham area of the inside of the split carcass. This enables an accurate assessment of the grade and market value in a no-contact and absolutely hygienic manner.

Using a validated method, the CSB-Image-Meater® can determine the market value of all important primals – loin, belly, shoulder and ham. This provides our customers with detailed information to assist in sorting and determining the best utilization of the carcasses.

**A solution for each business size**

- CSB-Image-Meater®: MA (manual)
- CSB-Image-Meater®: SA (semi-automatic)
- CSB-Image-Meater®: FA (fully-automatic)

**GRADING PROCESS**

The CSB-Image Meater® is an easy to use tool that can seamlessly integrate into your kill-floor data collection system.

**Process cycle**

- Alignment of the carcass
- Image capture
- Allocation of the kill number
- Analysis of the measurement images
- Display of the measurements
- Archiving of the data and images

**Grade determination**

The grade is determined using the measured distances and areas at the loin/ham complex below the musculus gluteus medius as well as the fat coverage, which are all clearly identified in the grading image.

**Market value determination**

Using certified mathematical procedures, the CSB-Image Meater® predicts the yield percentages of the most important primals (loin, shoulder, belly and ham) while also calculating the estimated weight of the primal. All data complies with weights and measures regulations.
All important grading process information is documented: grade, market value, lean meat percentage, date, grader ID, kill-sequence number, kill date, etc.

The quality data of the primals is calculated in absolute (kg) as well as relative (%) values. Additional quality criteria such as ham expression can be included as well.

### Approval of the CSB-Image-Meater® according to EC Standards (semi and fully automatic)

- **Austria**: Two-point measuring method (manually) 2007
- **China**: Grade 2007
- **France**: Grade 2008
- **Poland**: Grade 2011
- **Netherlands**: Grade 2011
- **Belgium**: Grade 2012
- **Italy**: Grade 2013
- **Germany**: Grade expected 2014

### Approval procedures currently planned (incl. MA):

- **USA**: Canada
- **Russia**: Great Britain
- **Switzerland**: Croatia
- **Spain**: Serbia
- **Austria**: Romania
- **Brazil**: Croatia
- **Serbia**: Romania

### Measuring Points for Grade and Market Value Assessment

**Fat measurement**

Measuring point for fat depth (F) including skin is on the midline of the split carcass at its thinnest part above the musculus gluteus medius.

**Fat tissue**

The fat is subdivided histologically by a connective tissue septum into an external and internal fat layer.

**Meat measurement**

Meat depth (M) is the distance of the loin muscle (in mm) measured at the cutting area of the carcass as the shortest connection between the front (cranial) end of the musculus gluteus medius and the upper (dorsal) edge of the vertebral canal.

### Grade according to Percentage Lean

- **Kill-sequence number**
- **Gender**
- **Percentage lean**
- **Grade**
MARKET VALUE IN %
(VALUABLE MEAT PARTS)

<table>
<thead>
<tr>
<th>Com. Value</th>
<th>~[lb]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cuts</td>
<td></td>
</tr>
<tr>
<td>Ham</td>
<td>56.9</td>
</tr>
<tr>
<td>Ham PL</td>
<td></td>
</tr>
<tr>
<td>Loin</td>
<td>32.4</td>
</tr>
<tr>
<td>Loin PL</td>
<td></td>
</tr>
<tr>
<td>Shoulder</td>
<td>28.0</td>
</tr>
<tr>
<td>Shoulder PL</td>
<td></td>
</tr>
<tr>
<td>Belly</td>
<td>34.8</td>
</tr>
<tr>
<td>Belly PL</td>
<td></td>
</tr>
<tr>
<td>Bones</td>
<td>19.5</td>
</tr>
<tr>
<td>Bones PL</td>
<td></td>
</tr>
<tr>
<td>Σ</td>
<td>206.1</td>
</tr>
<tr>
<td>VMP</td>
<td>79.4</td>
</tr>
</tbody>
</table>

Addition to grade

VMP = Valuable Meat Parts
PL = Percentage Lean (%)

MEASUREMENT VALUES OF THE CSB-IMAGE-MEATER®:

F: Fat depth
M: Meat depth
MF: Mean fat depth of the musculus gluteus medius
MM: Mean meat depth of the musculus gluteus medius
VxF: Mean fat depth of vertebrae (Va ... Vd)
VxM: Mean meat depth of vertebrae (Va ... Vd)
EF: Mean fat depth of external fat layer above vertebrae
IF: Mean fat depth of internal fat layer above vertebrae
ML: Length of musculus gluteus medius
VL: Mean length of individual vertebrae including disk

VALIDATED DOCUMENTATION AND TRACEABILITY

Archiving all images and measurements used for grading ensures correct assignment to the animal ID/tattoo and to the grower. Slaughterhouses can guarantee seamless traceability of all carcasses back to the producer.
ADDING VALUE WITH THE CSB-IMAGE-MEATER®

BENEFITS OF THE CSB-IMAGE-MEATER® AT A GLANCE

- Objective grading results through automatic image analysis
- Detailed display of measured values and visualization of all individual measurements
- Quality control of grading results with integrated reporting tools
- Low maintenance due to modular structure and standardized components
- Optimal integration through compact technology
- Low investment and fast ROI (within one year)
- Grading speeds up to 1,500 pig carcasses per hour
- Automatic grading process

PROCEDURE
Grade (warm/cold)
Market value (warm/cold)
Option:
Additional quality data (e.g. ham expression)

RESULT (warm/cold)
PL=Percentage Lean (%)
VMP=Valuable Meat Parts
Ham (weight, %)
Shoulder (weight, %)
Belly (weight, %)
Loin (weight, %)

Data integration
Data transfer to livestock management
ID and quality data for rail destination control and sorting

Data evaluation
Farmers payment
Proof of origin & traceability
Online retrieval and control system
Integration into external database

Integration:
Easy installation and operation
Capturing of carcass quality:
Hygienic, transparent, economic, efficient
Variable:
Country and slaughterhouse specific formulas
Traceability:
Proof of origin, documentation
Via internet:
Access to quality and organizational data for all authorized market participants
Profitability:
Direct monitoring of marginal values, streamlining of grading, considerable improvement of efficiency, optimization of carcass utilization (yield optimization)
COMMISSION IMPLEMENTING DECISION of 20 May 2011 authorising methods for grading pig carcasses in the Netherlands

CSB-Image-Meater®

1. The rules provided for in this Part shall apply when the grading of pig carcasses is carried out by means of the apparatus known as 'CSB Image-Meater (CSB)'.

2. The CSB Image-Meater consists in particular of a video camera, a PC equipped with an image-analysis card, a screen, a printer, a command mechanism, a rate mechanism and interfaces. The Image-Meater variables (16) are all measured at the split line in the ham area (around M. gluteus medius): The results of the measurements shall be converted into estimates of the percentage of lean meat by using a computer.

3. The lean-meat content of carcasses shall be calculated according to the following formula:
   \[ LMP = 65.2212 - 0.2741 S + 0.0160 F - 0.0302 ML - 0.2648 MS + 0.0831 MF - 0.1002 WL - 0.0509 WaS + 0.0172 WaF - 0.0169 WbS + 0.0006 WbF + 0.0341 WcS - 0.0097 WcF + 0.0223 WdS - 0.0008 WdF + 0.0132 ES - 0.0124 IS \]

4. The measuring points are described in Part II of the Protocol presented to the Commission by the Netherlands in accordance with Article 23(4) of Regulation (EC) No 1249/2008. This formula shall be valid for carcasses weighing between 73.5 and 107.5 kilograms.