Milking machines control: the calibration of flussometer, pulsation curves recorder, and vacuometer instruments with traceability of measurement

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Kuopio, June 2006

Why checking milk recording devices

• Gathering reliable data from herds is one the most important point of recording agencies in the world
• Italian Livestock Association (AIA) tests and certifies the correct functioning of milk recording devices
• In 2003, AIA established the center CPCM in order to standardize routine checks on testing devices used by AIA technician all over the country

CPCM Activity

Flowmeters
Pulsometer
Vacuometers
Balance
Weights
Thermometers

CPCM Framework

CPCM uses a framework which simulates a complete milking system

It is composed of:
• a vacuum pump with a maximum capacity of 6000 L/min regulated by inverter
• calibrated high precision sensors to measure the different parameters
• V-CONE to calibrate the flowmeter

Flowmeter calibration

Flowmeters are placed inside the soundproof chamber, set to a determined flow and tested by V-CONE
Flowmeter calibration

The flow is measured inside the V-CONE by two calibrated sensors ($S_1$ and $S_2$) at fixed $T$ and $P$. The two sensors are connected to an electronic recording device.

A particular of the V-cone

Two pressure sensors are placed at position 1 and 2. The measure is compared to the expected value of that particular flow according to ISO acceptance range.

Pulsometer calibration

Pulsometers are connected to the framework by two calibrated pressure sensors. Number of pulsations are simultaneously recorded by pulsometer and calibrated pulsocomputer.

Vacuumometer calibration

Analogical and digital vacuumometers are connected to a calibrated vacuumometer. Measurements are directly compared.
The vacuum pump with a maximum capacity of 6000 L/min regulated by an inverter.

It guarantees constant conditions of pressure during calibration checks.

All sensors and reference instruments are periodically tested in a primary reference institute.

At end of test a report is released to the customer showing measurement traceability from reference institute to farmer’s devices.

The number of calibrated instruments have increased over time. 90% of the received vacuometers have been calibrated.

<table>
<thead>
<tr>
<th>Instrument</th>
<th>2004</th>
<th>2005</th>
<th>2006*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulsometer</td>
<td>48</td>
<td>81</td>
<td>30</td>
</tr>
<tr>
<td>Vacuometer</td>
<td>65</td>
<td>87</td>
<td>23</td>
</tr>
<tr>
<td>Flowmeter</td>
<td>65</td>
<td>93</td>
<td>35</td>
</tr>
</tbody>
</table>

*data collected until May 2006

Thank you for your kind attention.