Conditions of mechanical milk meters through in a Uruguay test platform

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Structure of the Presentation

• Brief Uruguay overview
• Objective of the presentation
• Summary of milk meter failures verified
• Results
• Discussion
• Conclusions
Uruguay presentation
RANKINGS

Area: 91st
Population: 133rd
FIFA: 6th (two World football cup)
Food production 1st (per capita)
73% of the exports

25% of GDP corresponds to agricultural sector
We are the 5th exporting country
World Milk

Export to more than
60 markets (3)

5% of the territory of the country produce milk to feed annually more than 20 million people, equivalent to 6 Uruguay.
Production and industry conditions

We produce 2,200 million liters annually.

90% of the production of milk is processed by our industry.

Continuous improvement of processes with increasing technological incorporation.

Quality standards according to the most demanding markets.

3,800 dairy farmers

73% send milk industry

27% produce artisanal cheese on site
20,000 people linked to dairy work.\(^{(4)}\)

In the dairy farms family labor predominates.

Most in the industry are permanent workers.

Fed cattle pastoralism based on open pit.

Genetic recognized internationally

Traceability: 100% of registered cattle
The average Dairy farm “Tambo”, has 170-200 milking cows and 250 hectares. It produces 18 liters of milk per cow per day.
Objective of the presentation

• The main intention of this paper is to present the state found in mechanical lactometers, used by independent dairy controllers and some dairy farmers.

• This paper attempts to present the levels of functionality and accuracy, of 193 milk meters, verified and tested on a basic milk meter test platform (PPML), in Uruguay.

• The Milk Meters, were equipment's that belonged to 8 Dairy farmers and 9 independent dairy controllers, who went to each dairy farm to take the samples and the milk production record.
Milk meters, are basic compound instruments by at least 5 fundamental parts: cover; base; flask; 3-way valve and gaskets, which experience wear and tear continuous.
How mechanical lactometers are used?

They are inserted between the collector and the milk line in each of the falls, permanently or when the control milk.
Basic milk meters test platform (MMTP)

It consisted of a room, with a group of vacuum motor pump SAC, of 1.5 Hp set at 50 kPa, (15 "Hg), 20 L stainless steel vacuum and interceptor lines, dead weight type vacuum regulator, 30 L stainless steel bucket, an inlet tube, a vacuum gauge (indicates Vacuum level) and a shut-off valve . To perform the mass adjustment, a MercoCity scale, model ACS-L2 III, with a range between 0.2 - 30 Kg, and an accuracy of 0.010 Kg was available.
Milk meters analysed corresponded to the brands Waikato (75%) and Tru Test (25%)

193 instruments

17 owners of different sites of the dairy basin, who attended by 1, 2 and 3 times, in 70%, 26%, and 4% respectively.
Summary of milk meter failures verified.
Deterioration and failures in cap and flask base

New rubber
Deteriorated rubber
Filtration caused through the plug
Valve seal deterioration

The damaged valve loses in the seat of the measuring flask.
Fracture of pipe entry to the base and meter water entering the bottle

Fracture in a measuring jar fixed with glue

Failure in the settlement between the cover and base
Three-way wrench deterioration

New three-way key

Failure in the settlement between the key and the cone housing, generally causing the light turns key filtration.

The filtration generates a few large bubbles or many barely visible bubbles through the center of the measuring tube.
Worn and dry hoses can cause leakage and, therefore, the measurement error.
Scale deterioration and failure

A small scale visible, can cause errors in the measurement. Similarly, by misapplying a new scale.
Results
Deviation values in the measurement (%) with respect to the reference method in the mechanical milk meters.

<table>
<thead>
<tr>
<th>Ranges (%)</th>
<th>N° Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fit</td>
<td></td>
</tr>
<tr>
<td>0-2,9</td>
<td>95</td>
</tr>
<tr>
<td>3,0-5,0</td>
<td>49</td>
</tr>
<tr>
<td>Unfit</td>
<td></td>
</tr>
<tr>
<td>5,1-10</td>
<td>44</td>
</tr>
<tr>
<td>&gt;10</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>191</td>
</tr>
</tbody>
</table>

* Deviation from the value of the reference method, according to the criteria of IRAM 8042 which establishes the fitting as ≤ 3%.
Frequent defects observed in milk meters which cause incorrect measurements \( (n = 127) \)

<table>
<thead>
<tr>
<th>Error’s Cause</th>
<th>N° Equipment (%) /Brand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Waikato</td>
</tr>
<tr>
<td>Wear of Gaskets</td>
<td>62 (49%)</td>
</tr>
<tr>
<td>Wear of Gaskets + Tap</td>
<td>0</td>
</tr>
<tr>
<td>with strap</td>
<td></td>
</tr>
<tr>
<td>Wear of Gaskets + Flask</td>
<td>11 (8.6%)</td>
</tr>
<tr>
<td>Wear of Gaskets + Cover plastic</td>
<td>18 (14.2%)</td>
</tr>
</tbody>
</table>
Discussion

Milk meters are needed to establish management measures in the herd, in terms of genetic, productive and reproductive management.

MMs tested showed strong wear due to continuous and permanent use for work on dairy farms.

Of the 193-equipment verified, 2 MMs were discarded, due to severe deterioration of some of its parts, not being able to be replaced, and its disposal recommended.

97% of MMs classified as unfit presented a deviation with respect to the reference measurement, in values between 3 and 10%,
Conclusions

• The results of the checks carried out on MMs, show that it is necessary and indispensable, created in Uruguay, a regulatory body that establishes limits of error and technical requirements in accordance with international standards. (ISO: 5725-6, 1994)

• The authors suggest that the verification be carried out every year, ensuring the accuracy of the measurements.

• A creating a milk meter test platform, help to:

be an independent guarantor, which maintains a unique record of the life of each milk meter.

Provide an independent and trackable history of MM that are used in the operational plaza.
Thanks you!