ICAR CONFERENCE & IDF/ISO ANALYTICAL WEEK
2019 PRAGUE
CZECH REPUBLIC

Conditions of mechanical milk meters through in a Uruguay test platform

Hirigoyen, D.; Calvo, M.; González-Revello, A.; and de los Santos, R.

INIA
Instituto Nacional de Investigación Agropecuaria
URUGUAY

FVET Facultad de Veterinaria
Universidad de la República
Uruguay

LABORATORIO AGROINDUSTRIAL
COOPERATIVA
COLAVECO
Socios en la evolución

Structure of the Presentation

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

Uruguay presentation

RANKINGS

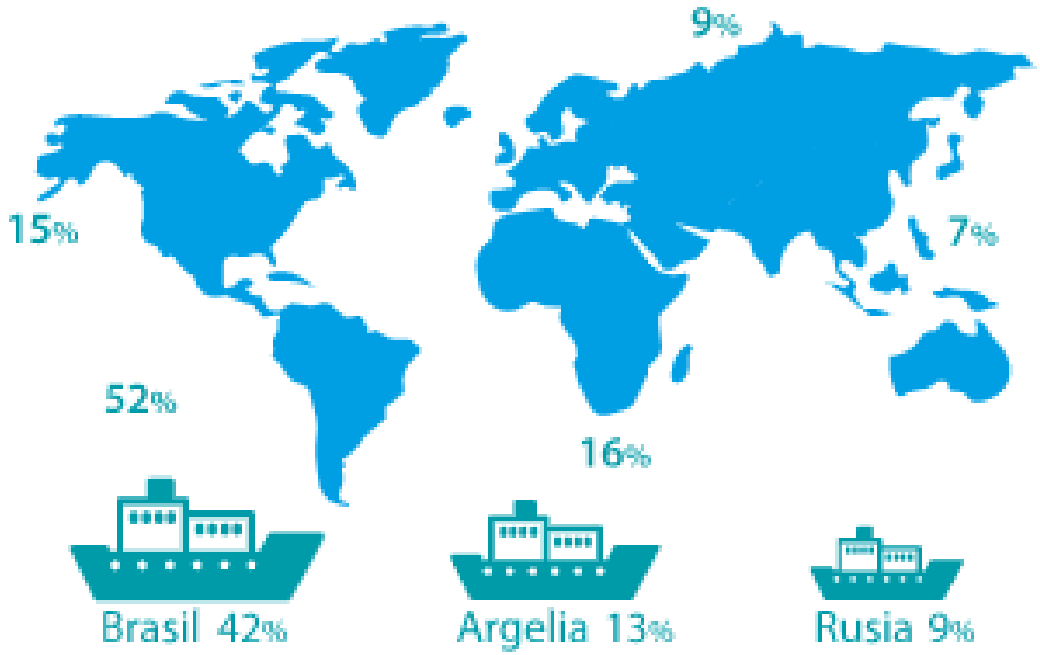
Area:	91st
Population:	133rd
FIFA:	6th (two World football cup)
Food production	1st (per capita)

73% of the exports

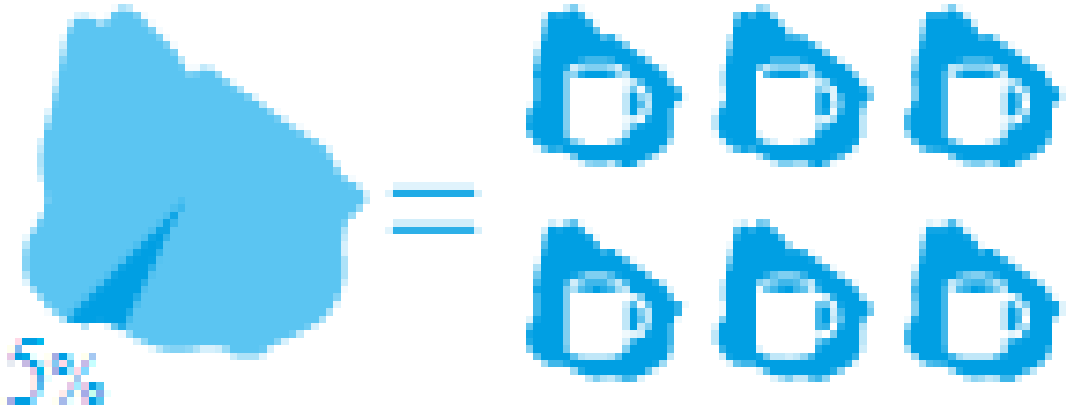
25% of GDP corresponds to agricultural sector

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.

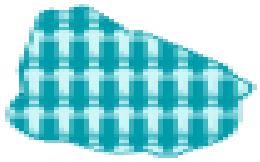
Continuous improvement
of processes with increasing
technological incorporation.

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.

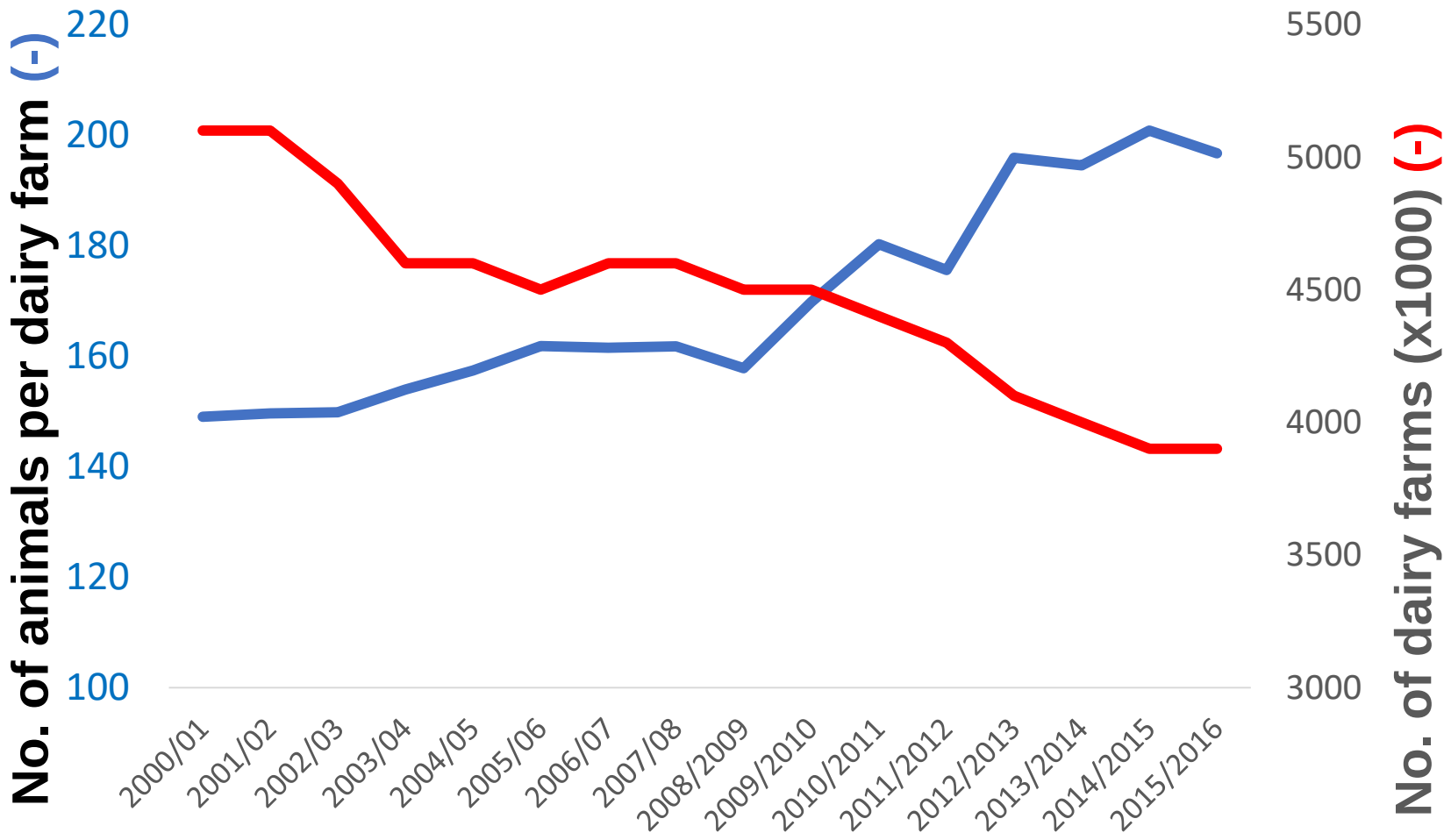
Most in the industry are permanent workers.

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.



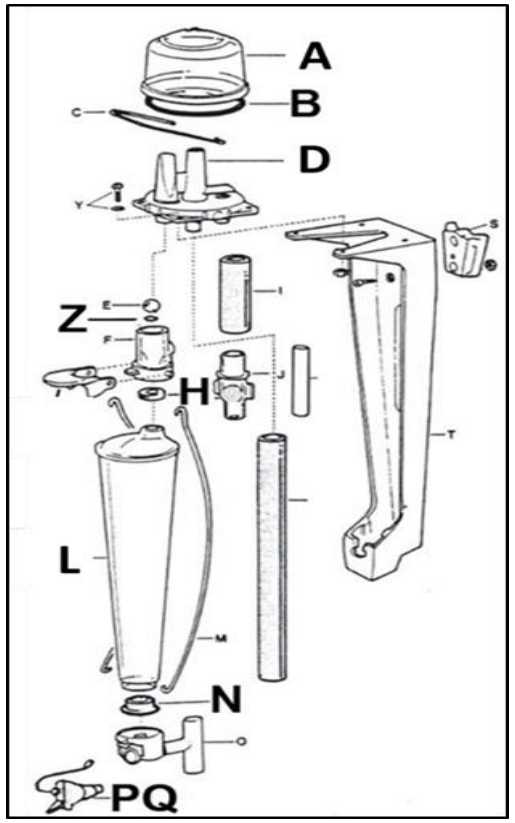
Objective of the presentation

- 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.

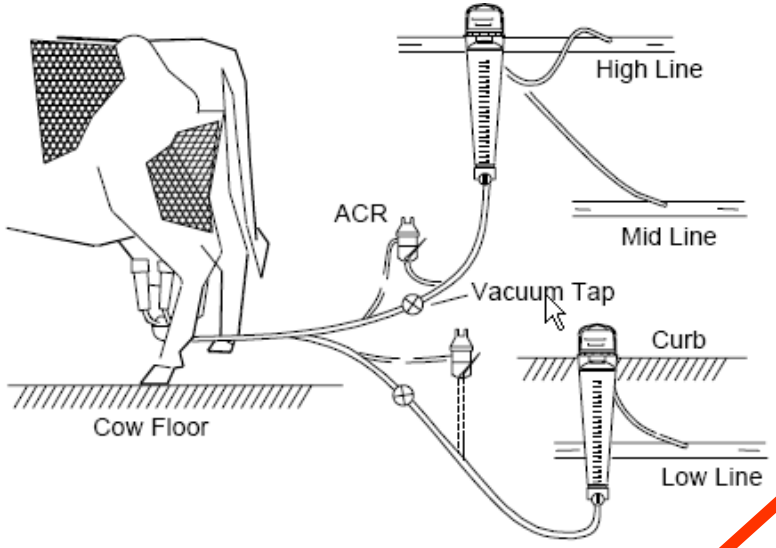
- The Milk Meters, were equipment's that belonged to 8 Dairy farmers and 9 independent dairy controllers, who went to each dairy farm to take the samples and the milk production record.

Basic scheme of milk meter (Waikato). Parts: Cover Plastic (A), Base assembly (D), Flask (L), Tap with strap (P-Q), rubber gaskets (B, Z, H y N).

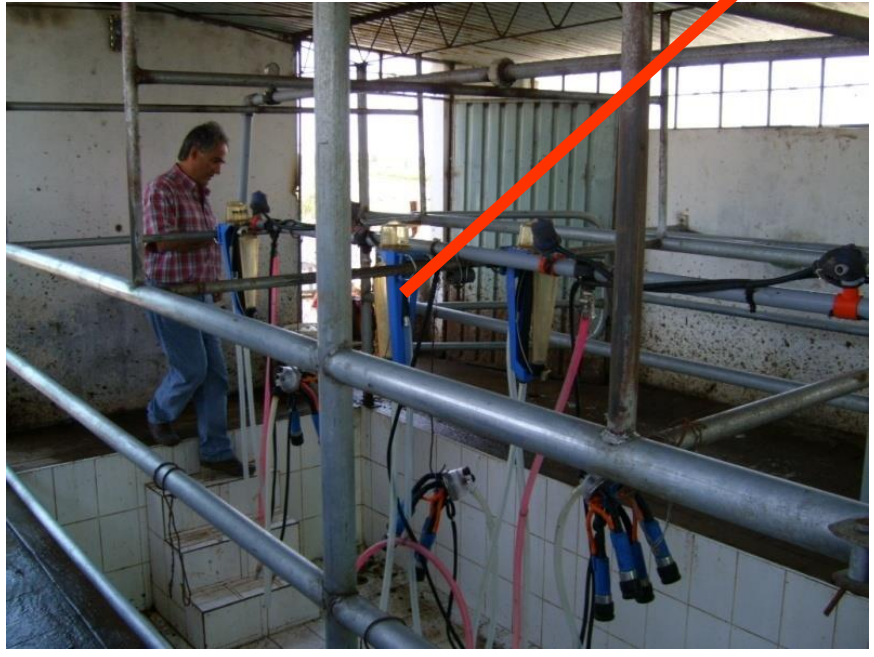


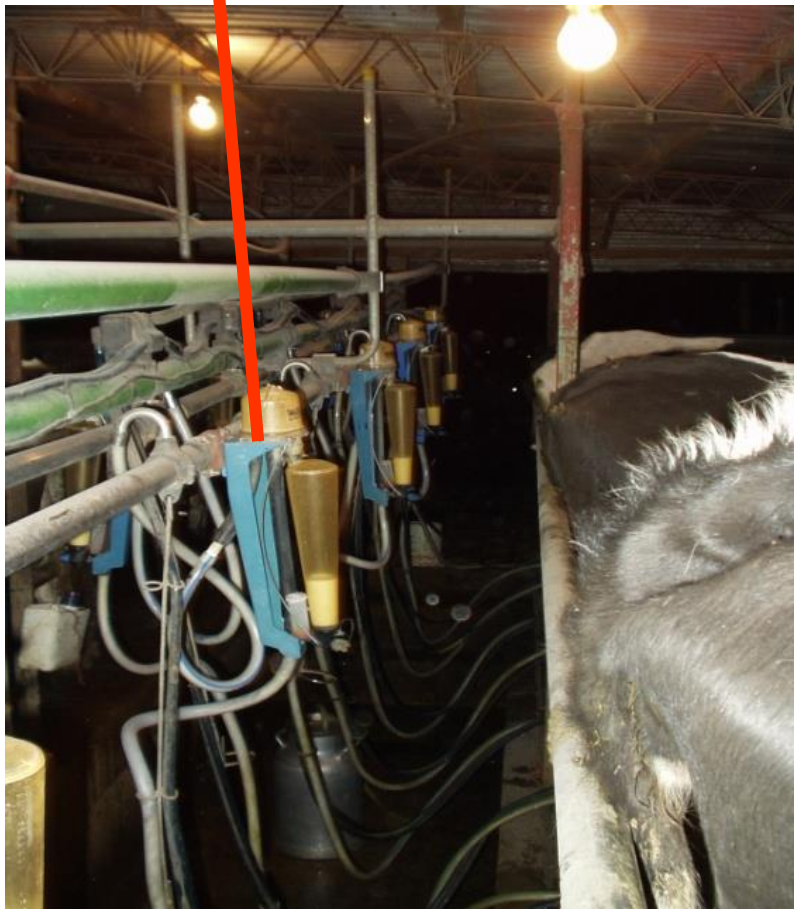
Milk meters, are basic compound instruments by at least 5 fundamental parts: cover; base; flask; 3-way valve and gaskets, which experience wear and tear continuous.

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

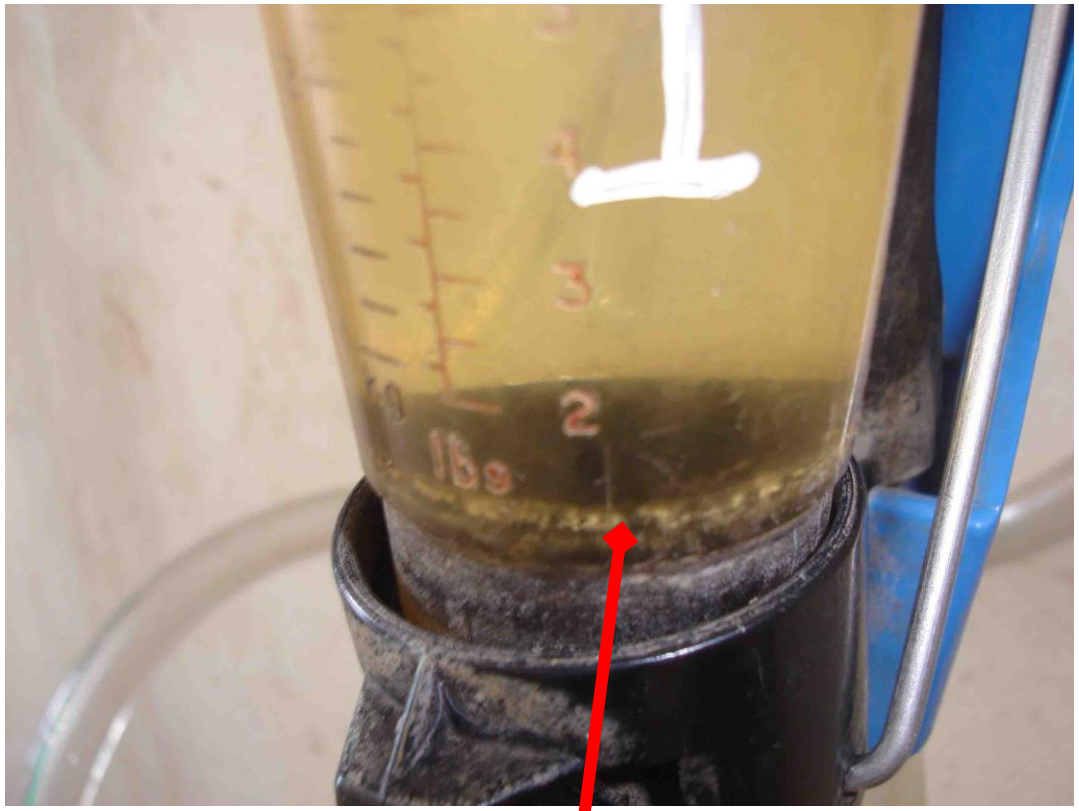
17 owners of different sites of the dairy basin, who attended by 1, 2 and 3 times, in 70%, 26%, and 4% respectively.

Summary of milk meter failures verified.

Deterioration and failures in cap and flask base

New rubber

Deteriorated rubber

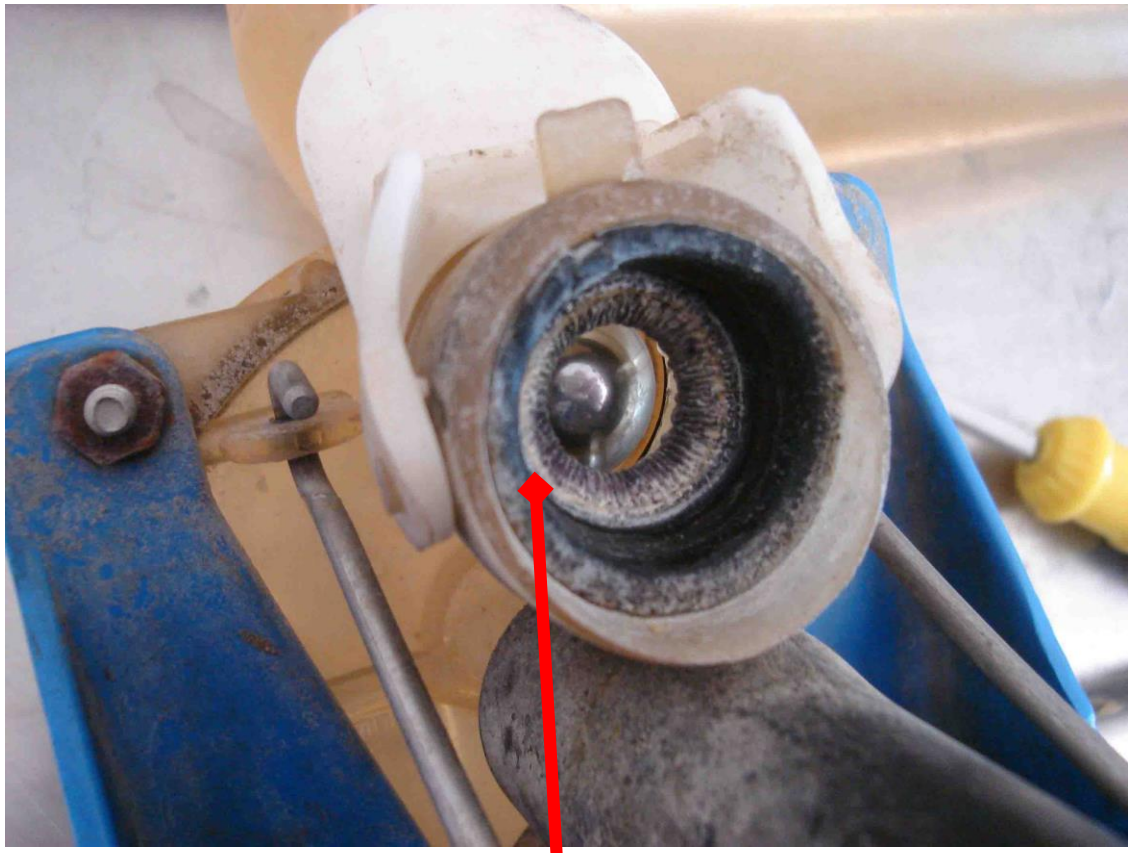


Filtration caused through the plug

Valve seal deterioration

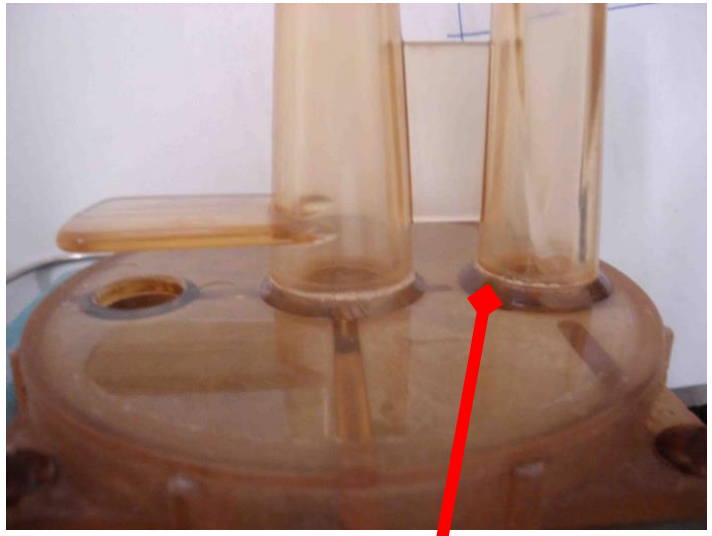
valve seal damaged

New valve seal



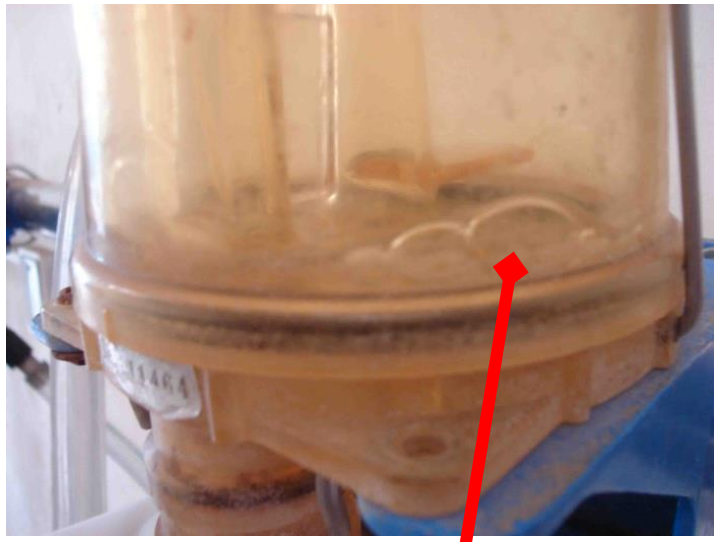
The damaged valve loses in the seat of the measuring flask.

Deterioration and failure of meter base and bottle



Fracture of pipe entry to the base and meter water entering the bottle

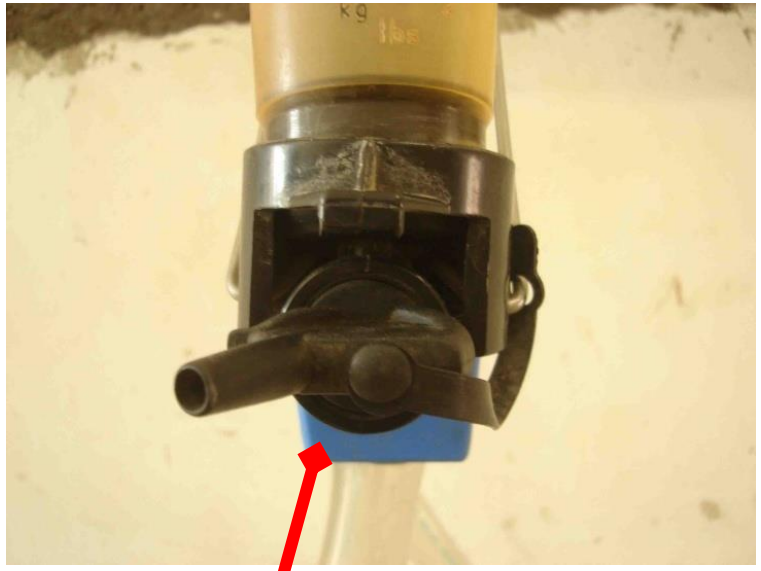
Fracture in a measuring jar fixed with glue



Failure in the settlement between the cover and base

Three-way wrench deterioration

New three-way key



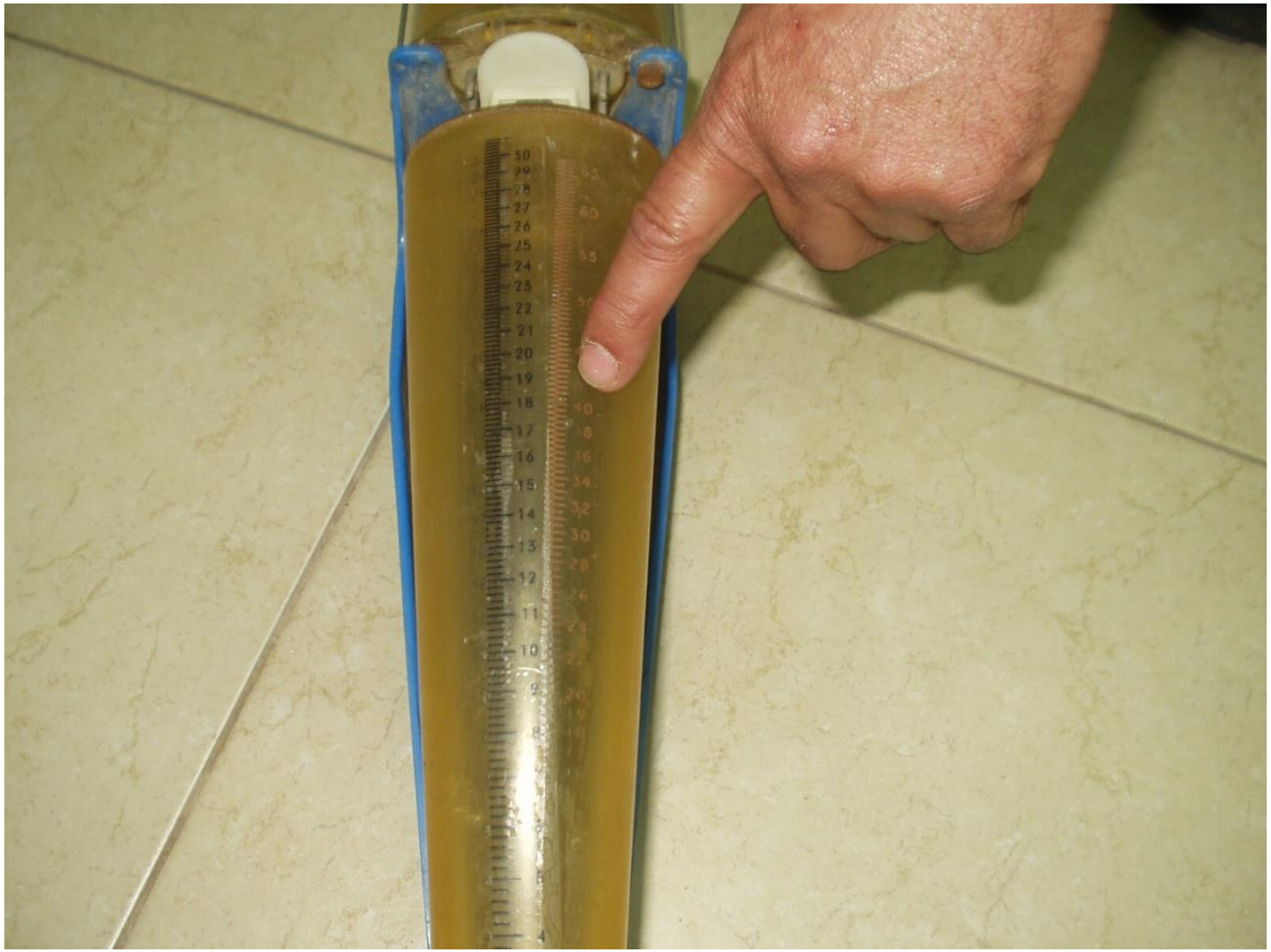
Failure in the settlement between the key and the cone housing, generally causing the light turns key filtration.

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

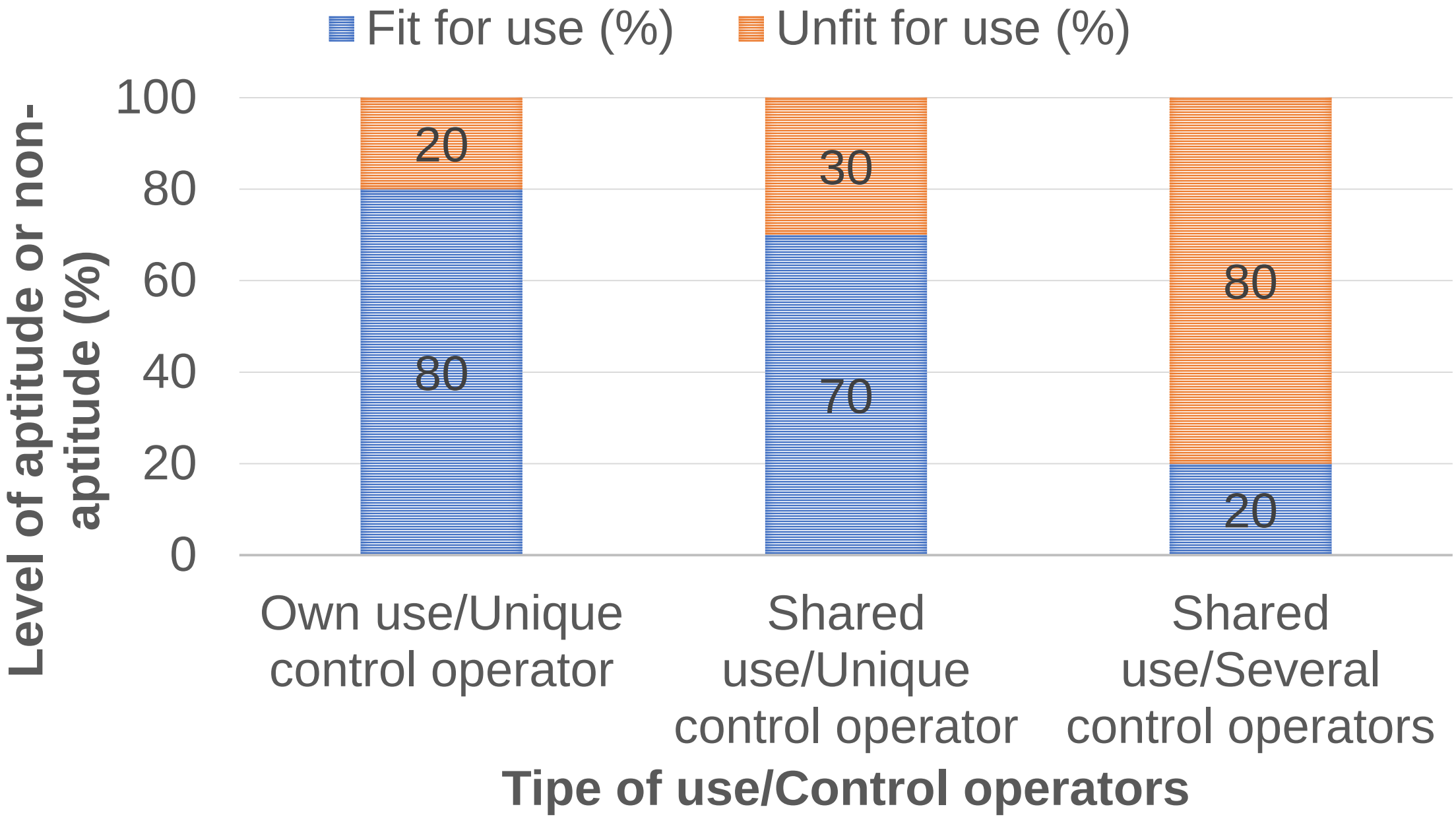
Deviation values in the measurement (%) with respect to the reference method in the mechanical milk meters.

	Ranges (%) *	**N° Equipment**
Fit	0-2,9	95
	3,0-5,0	49
Unfit	5,1-10	44
	>10	3
Total		191

** 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)

	N° Equipment (%) /Brand	
Error´s Cause	Waikato	Tru-Test
Wear of Gaskets	62 (49%)	27 (21,1%)
Wear of Gaskets + Tap with strap	0	9 (7,1%)
Wear of Gaskets + Flask	11 (8,6%)	0
Wear of Gaskets + Cover plastic	18 (14,2%)	0


Fit for use (%)
Unfit for use (%)
Level of aptitude or non-aptitude (%)
100
80
60
40
20
0
20
80
30
70
80
20
Own use/Unique control operator
Shared use/Unique control operator
Shared use/Several control operators
Tipe of use/Control operators

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!