Progress of the milk production register (DHI), in Uruguayan conditions by combining radio frequency (RFID) and bar code system

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Introduction

In Uruguay, the productivity of dairy farms in terms of relationship "cows in milking/cows mass", has been above 72%, (DIEA, 2018). With practically the same dairy herd (approximately 425,000 cows mass and 308,000 animals in milking) the production step of 1.073 million liters in the exercise 1994/1995 to 1,900 million remitted to plants in the first 9 months of 2018 (INALE, 2018).

The measurement of milk production per cow is carried out mostly by portable mechanical instruments and to a lesser extent by fixed electronic devices. Since 2006, producers have been mandated by the Ministry of Livestock, Agriculture, and Fisheries to identify 100% of livestock as, from 6 months of age. Only 25% of dairy cows of each dairy farm in Uruguay participate voluntarily in a monthly milk production register (DHI).

The objective of this work is to present the development of a tool that combines the use of barcode and radio frequency identification (RFID) to facilitate the process of recording samples of milk at the farm (DHI) and improve management and traceability at the laboratory.

Methodology

A sample level of 96075 ear tags on each milk vial arrived from 32 dairy farms that had different sizes and number of animals ranging from 44 to 470 ear tags. The work was carried out by 9 independent dairy controllers who went to each dairy farm to take the samples and the milk production record.

Several Device-type smartphones with a cane to capture the data have been used in different milking room designs and sizes by multiple users.(Photo 1 and 2).

280 dairy farm requirements were introduced into the laboratory system, and all data was sent in TXT file format. Approximately 90% were fish thorns designs with a minimum of 4 and a maximum of 28 milking organs for the milking parlor.

Photo 1. The first main display of smartphone app, second info codification display. Below RFID capture process in milking room parlor.

Photo 2. Device-type smartphone with a cane to capture the data of the ears identification tags of each cattle through RFID and milk samples, with a barcode on each vial, which is used by the milk production controller in the dairy barn.

Results

1- Advantages and improvements to the independent dairy controller at the milking parlor were achieved: Barcoded vial, no writing, more accurate; Facilitates the work and speed of data collection in the milking pit; Enables easy automatic processing response (txt to Excel); Avoids passing by hand from paper to Excel spreadsheet; It allows developments in new areas associated with animal health; A data is sent wirelessly to the laboratory from wherever place of the countryside.

Android system (Speedata), which has multiple data capture systems, also uses RFID, to collect information on the traceability of cattle ear tags, simultaneously has a system barcode of reading, to be able to associate each dairy cattle with each milk vial sample (Figure 1).
Independent controllers spent an average of 45 minutes less by using this technology compared to enter data manually to the computer.

2- From the point of view of the laboratory management: Automatization of the recording process (automatic response) occurs, preventing errors by human intervention; Logistic coordination of the analytical area since it can previously receive the volume of samples that will arrive at the analysis sector, being able to accommodate the processing times; Errors due to bad typing are reduced and illegible labels are avoided; Lab results electronically loaded to database.(Figure 2)
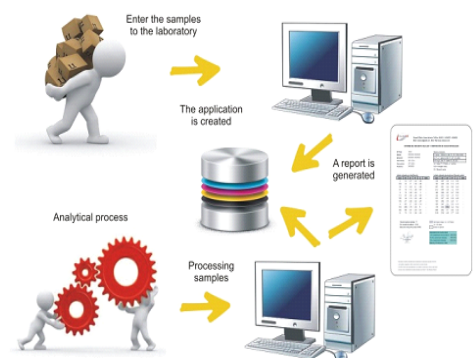

Figure 1. Logistics diagram at the farm link with the laboratory.

Figure 2. Logistics diagram in the laboratory.

Conclusion

This work reached the objective, allowing to evaluate in a practical way a versatile system adapted to the environmental conditions of Uruguayans dairy farms to capture, store and transfer the RFID identification system of the ears of animals in the dairy farm and link it with the reception of the laboratory, and then with the process of specific analysis of data in the laboratory.

The RFID technology shows enormous potential to reduce errors in data collection, animal identification and milk vials samples with barcode, from dairy farms, improving data accuracy and increasing management information in the laboratory.

Android language allows future developments directly connected with the Laboratory web applications mainly be applied in central milk testing laboratories analyzing individual cow milk samples for dairy herd improvement (DHI) testing.

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