

A monitoring station prototype for feed troughs of beef cattle on pasture

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Keywords: animal behavior, automated trough, beef cattle, precision farming, precision nutrition

Abstract: An important characteristic of the Brazilian livestock is, traditionally, the grazing system, mainly because it is the most economical and practical way of producing and supplying feed for cattle (IBGE, 2015). Due to this factor, Brazil has one of the lowest costs of meat production in the world (MAPA, 2015); however, the potential productivity of livestock farming can be reduced when done extensively (Ferraz & Felício, 2010). Thus, one of the great challenges faced in livestock production is the increase of efficiency and, consequently, the yield of the productive system by using technologies and the development of monitoring systems that permit the technological advance of the sector (ABIEC, 2015; MAPA, 2016; DA SILVA, 2013). There are several applications in the livestock industry for the use of electronic identifiers, but the broad adoption is repressed due to the high costs of existing equipment. In this context, the project aims to develop a low-cost alternative to monitor the simultaneous visit of animals in collective troughs, in order to measure physiological, behavioral and productive indicators of the animals under pasture conditions, which improve management strategies. The aim of the monitoring station is to identify the presence of the animals in the troughs by reading the RFID tag already existing in the herds, using a reading mechanism embedded in the low cost capture station. The station has expert software embedded in a microcontroller, is equipped with temperature and humidity sensors, and with real-time clock to capture the data, adding this information in a file stored in the station itself, on a micro-SD card. The station is equipped with an Ethernet interface that communicates with wireless bridges for long-distance file transmission to a central point, but there is the alternative of Bluetooth reading in the trough by means of applicative installed in mobile device for cases where the communication is not available. Once it is a reduced device, the energy consumption is supported by the use of batteries and photovoltaic cells. An standard file format was created, taking into account the needs of different decision-software that uses the station information to manipulate the generated data. A concern before the field tests was if this low-cost device would present enough robustness for field operation. Regarding the operating conditions (ambient temperature and humidity and vibrations in the trough from the animal contact), no discontinuity of operation was detected, and the station remained, for more than forty days in operation in the trough. The module showed to be functional to identify the visit of the animal in the trough and the environmental conditions at the moment of the visit, as well as to make available the data for use in the decision software. The equipment demonstrated functionality and, by the comparison with existing similar products in the market that the construction of this station presents a competitive cost along with the flexibility to add new functions to capture new data, through other sensors and actuators.

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ABSTRACT – 2017 EFITA CONGRESS – Montpellier, France – 02.07-06.07.2017

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