

Sensor systems availability in dairy farms

Potential tools for innovative cow selection

Problem

The need for resilient and sustainable animal production systems implies improving resilience and efficiency of cattle against environmental challenges. The advanced herd management technologies already installed on dairy farms could provide relevant phenotypic¹ data on individual cows. However, despite enormous potential, there is little knowledge on the actual distribution and type of sensor technologies present on dairy farms.

Solution

Thanks to the collaboration with the regional breeders' association (ARAV), a large survey was performed on dairy farms of the North East of Italy in 2017. Information on both the type of sensor system installed and parameters recorded were collected.

The survey covered 964 dairy farms rearing 65,375 dairy cows, mainly Holstein (72%), Brown Swiss (7%), and Simmental (6%). The herd size ranged from 10 to 662 cows, with an average of 68 cows. Nearly 40% of farms were equipped with sensor systems to measure individual milk yield, against 15% recording behavioural parameters, such as oestrus and rumination. As shown in Figure 1, the proportion of farms with sensor systems for monitoring cow behaviour increased with herd size. Collars and pedometers were the most common devices (55 and 44%, respectively), whereas ear tags were found only in 1% of farms. Behavioural parameters such as activity or rumination were recorded only in a small proportion of farms (Figure 2). Consequently, individual behaviour data are available only for 2 to 29% of the dairy cow population.

Outcome

The results of this study pointed out the low distribution of sensor systems for monitoring cow behaviour on Italian dairy farms. Additional constraints for scientific purposes could derive from the heterogeneity of the types of sensor systems installed and from the risk of improper use by farmers. However, sensor data represent enormous potential for cow phenotyping purposes.

Practical recommendations

- Information from sensor systems for monitoring cow behaviour is extremely useful to monitor real-time cow health and has huge potential for the development of proxies² for selecting new complex traits in dairy cattle, such as resilience and efficiency.
- Aside from poor distribution of such systems in the dairy sector, data quality is of fundamental importance for developing innovative algorithms for selecting more resilient and efficient cows.
- Proper use, regular maintenance of sensor devices together with regular updating and backup of data are key strategies for maximizing data quality.

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Activity

Illustrations

Figure 1 Distribution of sensor systems for monitoring cow behaviour in Italian dairy farms (overall n = 964)

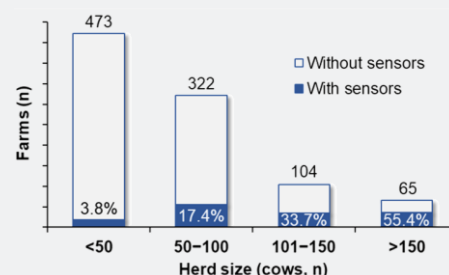
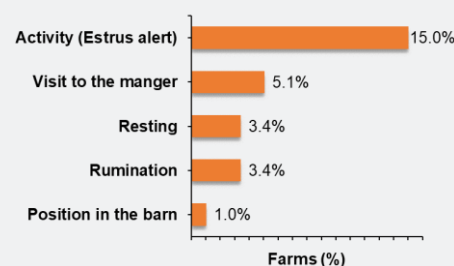


Figure 2 Parameters recorded by the sensor systems for monitoring cow behaviour in Italian dairy farms (overall n = 964)



"GENomic management Tools to Optimize Resilience and Efficiency - GenTORE" is an H2020 project which aims to develop innovative genome-enabled selection and management tools to empower farmers to optimize cattle resilience and efficiency in different and changing environments.
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¹ All the observable physical characteristics of an organism including colour, shape, size, biochemical properties, and behaviour, which result from the expression of its genotype in a given environment.

² A measured variable used to infer the value of a variable of interest that is usually difficult to measure directly, such as resilience or efficiency.

