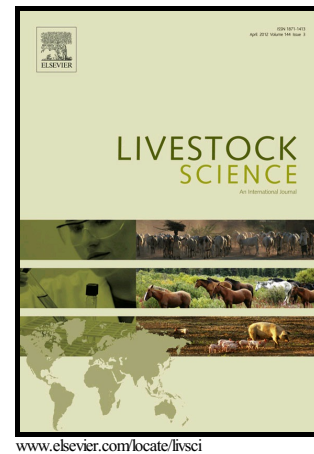


Author's Accepted Manuscript

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PII: S1871-1413(16)30290-6
DOI: <http://dx.doi.org/10.1016/j.livsci.2016.12.011>
Reference: LIVSCI3117

To appear in: *Livestock Science*

Received date: 15 September 2016
Revised date: 21 December 2016
Accepted date: 22 December 2016

Cite this article as: V. Giovanetti, M. Decandia, G. Molle, M. Acciaro, M. Mameli, A. Cabiddu, R. Cossu, M.G. Serra, C. Manca, S.P.G. Rassu and C. Dimauro, Automatic classification system for grazing, ruminating and resting behaviour of dairy sheep using a tri-axial accelerometer, *Livestock Science* <http://dx.doi.org/10.1016/j.livsci.2016.12.011>

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Automatic classification system for grazing, ruminating and resting behaviour of dairy sheep using a tri-axial accelerometer.

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ABSTRACT

A device based on a tri-axial accelerometer was used to measure behavioural parameters of dairy sheep at pasture. Short tests were performed in grazing conditions to collect accelerometer data simultaneously with video recordings of sheep behavioural activities (grazing, ruminating and resting). The raw acceleration data was processed to create 12 variables: mean, variance and inverse coefficient of variation (ICV; mean/standard deviation) for the X-, Y- and Z-axis and the resultant at 1-min intervals. A database inclusive of the 12 acceleration variables and the three behavioural activities detected for each minute was then created. Three multivariate statistical techniques were used to discriminate the behavioural activities using the acceleration data: stepwise discriminant analysis (SDA), canonical discriminant analysis (CDA), and discriminant analysis (DA). Based on the acceleration variables selected by SDA, the subsequent CDA significantly discriminated the three behaviours by extracting two canonical functions. The first canonical function (CAN1) discriminated the grazing activity from the resting and ruminating, whereas the second (CAN2) differentiated the grazing from the ruminating behaviour. After bootstrap resampling, the DA correctly assigned 93.0% of minutes to behavioural activities. Stepwise regression analysis was used to estimate the bite frequency (total number of bites/min) using a subset of acceleration data that contained only

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