**New technologies and data science applied on commercial sheep properties in Australia**

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Data from new technologies in extensive sheep production offer great opportunities to improve animal welfare, sustainability, and profitability. Production of both wool and sheep meat is largely affected by growth rate, body condition, and survival of both young and adult animals. The present work focusses on experiences and results on the development and utilisation of an automatic monitoring system of live weight, pastures, and survival of grazing sheep in commercial properties of Australia. These data were then used to develop real-time prediction models of performance and survival. Data was collected across 7 commercial sites over 3 years in Merino, Poll Dorset, and Border Leicester. Of all technologies evaluated, automatic in-paddock weighing provided the most practical and useful information for the detection of missing and dead animals, changes in live weight, lambing events, lactation status, maternal parentage, and mortality risk. The survival risk models can also consider other factors in the real-time monitoring system such as disease prevalence and dog predation, amongst others such as genetic information. Low nutritional status monitored through live weight loss during the dry season and lactation was the largest welfare and profitability risk even though other factors such as disease and dog predation are also important.

The monitoring system provides automatic monitoring of live weight and growth rate, body condition, automatic mothering up, nutritional management, and animals present in the paddock. The latter is more accurate if water is used as the attractant instead of supplemental mineral blocks and it is also affected by the forage characteristics and size of the paddock, amongst others.

The use of remote monitoring technologies in extensive sheep production systems could play a critical role in the viability of these systems into the future. The automated system developed can be tailored to multiple purposes such as nutritional management, reproduction, genetic improvement, and animal welfare.

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