

In-paddock walk-over weighing: understanding the factors affecting its potential for the Australian Sheep industry

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Declaration

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in preparing this thesis and all sources used have been acknowledged in this thesis.



David Brown

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Abstract

The association between liveweight and a range of production and economic outcomes has been demonstrated in sheep production systems. Change in ewe liveweight affects her wool production, reproductive performance, survival and lifelong performance of her progeny. Similarly, liveweight in young sheep post-weaning is strongly associated with their survival. This breadth of sheep production parameters with demonstrated association with liveweight suggests that regular liveweight monitoring would provide a robust and versatile tool for managing sheep flocks.

Walk-over weighing (WOW) technology has the potential to remotely monitor sheep liveweight either individually or collectively and is commercially available. It functions by collecting liveweight data as sheep voluntarily cross a weighing platform as part of their normal daily routine. The liveweight data is then collected, processed and interpreted by livestock managers to aid nutritional management. Despite the documented benefits of managing ewe liveweight, and the potential of WOW to aid ewe liveweight management, there is a paucity of literature on the subject. This thesis draws on a series of experiments, data analyses and economic models to investigate the factors affecting WOWs potential for commercial application.

Key outcomes of the research show that the use of WOW to monitor sheep liveweights collectively, namely mob-based walk-over weighing (MBWOW), can generate flock average liveweights with 95% confidence intervals of less than 2 kg within 5-day timeframes. Conversely, the repeatability and timeliness of individual WOW data, namely radio frequency identification (RFID)-linked WOW, is insufficient for reliable individual liveweight estimates. This implies that WOW may aid the nutritional management of

commercial flocks, but not of individual sheep. This was reinforced by results demonstrating the inability of WOW to reliably differentiate between sheep with respect to liveweight. A common theme identified throughout the research was that the amount of WOW data collected on individual sheep was less than the required 12 or more records to reliably estimate individual animal liveweight, in particular during the initial stages of data collection, and this was considered as a key constraint to the commercial adoption of the technology. Ensuing research demonstrated that exposure of suckling lambs to WOW from birth for six weeks increased their acceptance of the equipment and subsequent data collection frequency post-weaning, though this effect diminished within a week and its potential to increase data collection on flocks over the long term is limited. The final aspect of the research, an economic evaluation, demonstrated that there is \$13.09 of potential profit per ewe available to average commercial ewe flocks through ensuring ewes lamb at optimal liveweights. Should livestock managers require regular (i.e. monthly or more often) liveweight assessment to achieve this, then WOW applied on a whole flock basis is the least cost method available (\$1.85 per ewe per year) when compared to condition scoring (\$2.17 per ewe per year) and static weighing (\$2.44 per ewe per year).

List of publications

Brown DJ, Savage DB, Hinch GN & Semple SJ (2012) Mob-based walk-over weights: similar to the average of individual static weights? *Animal Production Science* **52**(7), 613-618. doi: <http://dx.doi.org/10.1071/AN11306>

Brown DJ, Savage DB & Hinch GN (2013) Repeatability and frequency of in-paddock sheep walk-over weights: implications for individual animal management. *Animal Production Science*. doi: <http://dx.doi.org/10.1071/AN12311>

Brown DJ, Savage DB & Hinch GN (2013) Repeatability and frequency of in-paddock sheep walk-over weights: implications for flock-based management. *Animal Production Science*. doi: <http://dx.doi.org/10.1071/AN12402>

Brown DJ, Savage DB, Hinch GN & Hatcher S (2013) Monitoring liveweight in sheep is a valuable management strategy: A review of available technologies. *Animal Production Science* (accepted).

Brown DJ, Savage DB & Hinch GN (2013) The use of walk-over weighing for preferential feeding in sheep production systems. In 'Proceedings from the Recent Advances in Animal Nutrition 22nd Biennial Australian Conference'. (Eds. P Cronje), pp. 3-4. (Animal Science: University of New England, Armidale, New South Wales, Australia).

Brown DJ & Young JM (2013) Mob-based walk-over weighing: a low-cost alternative to condition scoring and static weighing for managing ewe liveweight for higher profitability. *Animal Production Science* (submitted).

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