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Comparison of Mob Average Liveweights, With and Without Individual Animal Identification

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Capture of individual animal liveweights is possible using remote walk over weighing (WOW) technology. As an animal passes over a weighing platform on the way to water or supplementary feed, liveweight and identity can be captured without the necessity to take animal's to yards for crate weighing. Currently this system is able to work by capturing the animals' identity from a radio frequency identification (RFID) tag, read by a tag reader and stored with the weight in a data capture device.

Correlations of 0.89 – 0.93 between liveweights collected using this method (Richards *et al.* 2006) showed that it is an effective method of capturing weight measurements with minimal labour input.

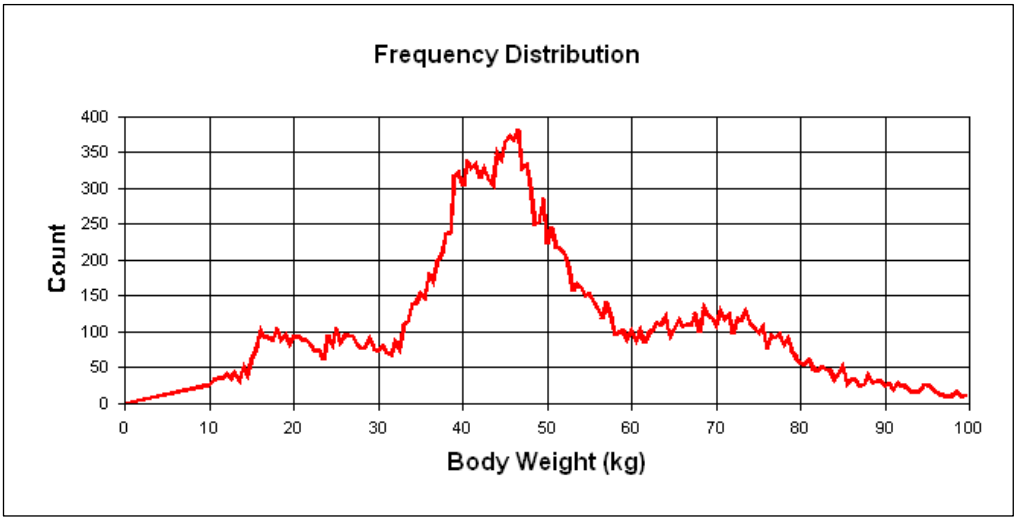
Amalgamation of liveweights based on RFID information is possible through a data screening program called Weigh Matrix, developed by I&I NSW and the Australian Sheep Industry CRC. Lee *et al* 2008 showed that using this program improves liveweight measurement precision and therefore repeatability between weights.

The major obstacle to potential widespread use of this management tool is the capital cost of purchasing the RFID and associated weighing equipment, approximately $11,500. See cost breakdown in Table 1 below.

To attempt to reduce the start-up cost of remote weighing the Weigh Matrix software has been updated to allow processing of data without the use of RFID equipment, thereby removing the expenditure required for RFID equipment and reducing solar power requirements, and potentially reducing costs to about $6000. This method uses the data to produce mob based walk over weights (MWOW) which is the mob average weight on any given date throughout the data collection period.

To validate the effectiveness of the changes to the Weigh Matrix software, data was analysed using the previous method using individual animal identification (WOW) and a new filtering method using no RFID (MWOW).

- WOW
  - An individuals identity is used to identify new weights which are then compared to a previous base weight with all legitimate weights being used to calculate an average over the time period of the file
- MWOW
  - All weights within the data file are compared to an estimated mob weight. Initially, the mode is used as the best estimate of mean and then each weight is compared to a specified filtering proportion, with those within the range being used to calculate a daily mob average weight. The chart below shows distribution of weights from a large data set, indicating the mode used for processing.



A mob of approximately 200 Merino X White Suffolk lambs were RFID tagged and put on improved pasture with RFID & liveweights being recorded over a 3 month period from 2/2/2009 to 18/5/2009. During this time 16 weight files were recorded with each file containing between 3 – 10 days of recorded data.

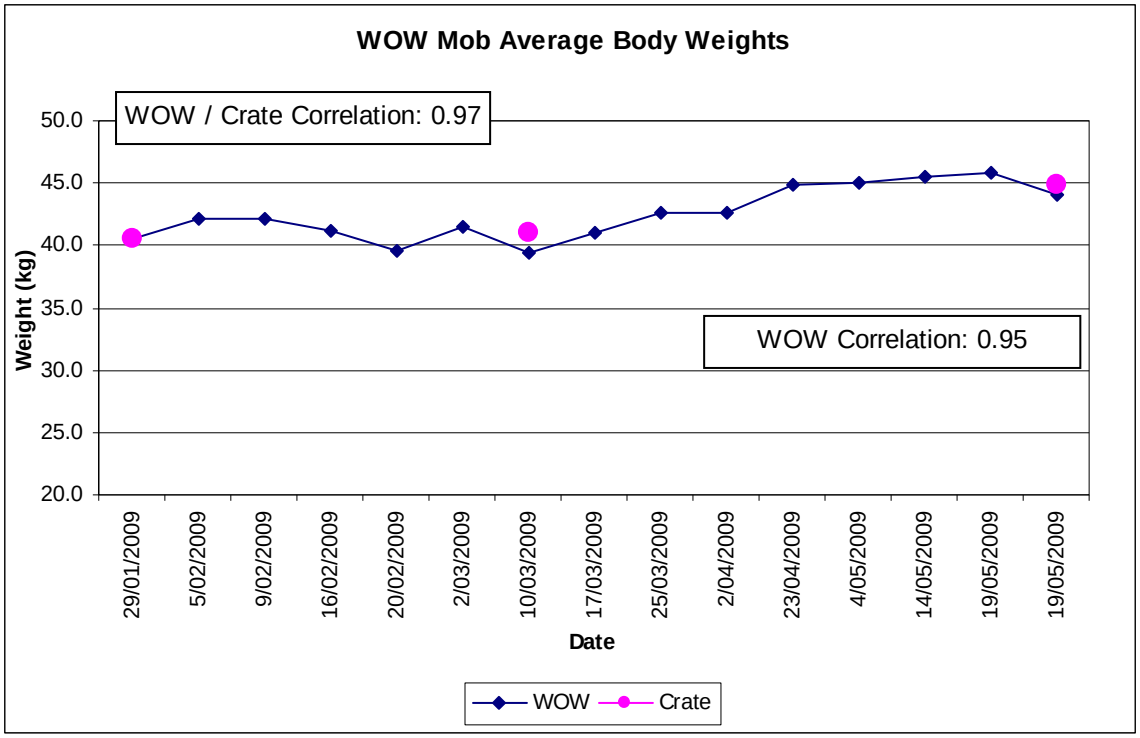
The animals were yarded and weighed through a weigh crate on 3 separate occasions during this period. The first of these weights was used as a base weight for weigh matrix processing, and the other 2 were used as validation weights against the processed WOW & MWOW data.

The data from the first WOW file was processed using the 1st crate weight as a base file and weights filtered on the individual's base weight compared to all the WOW weights in the file. Each animal's accepted weights were then averaged to get a single weight, for each individual over the time period of the file.

The results from this first analysis were then used as the base weight for the second WOW file, and so on, as more files were available for processing. These individual animal weights were then averaged to get a mob average weight for the time period of the data file.

All 16 files were processed in this manner and Chart 1 below shows the results of these processing runs and also 3 crate weights.

Chart 1. Mob average WOW liveweight for each period, with weights filtered using RFID and liveweight measured in a crate.



The complete set of 16 files were then re-processed through Weigh Matrix using the No RFID option and Chart 2 below shows the results of these processing runs and also 3 crate weights.

Chart 2. Mob daily average liveweight, with weights filtered without using RFID filtering and liveweight measured in a crate.

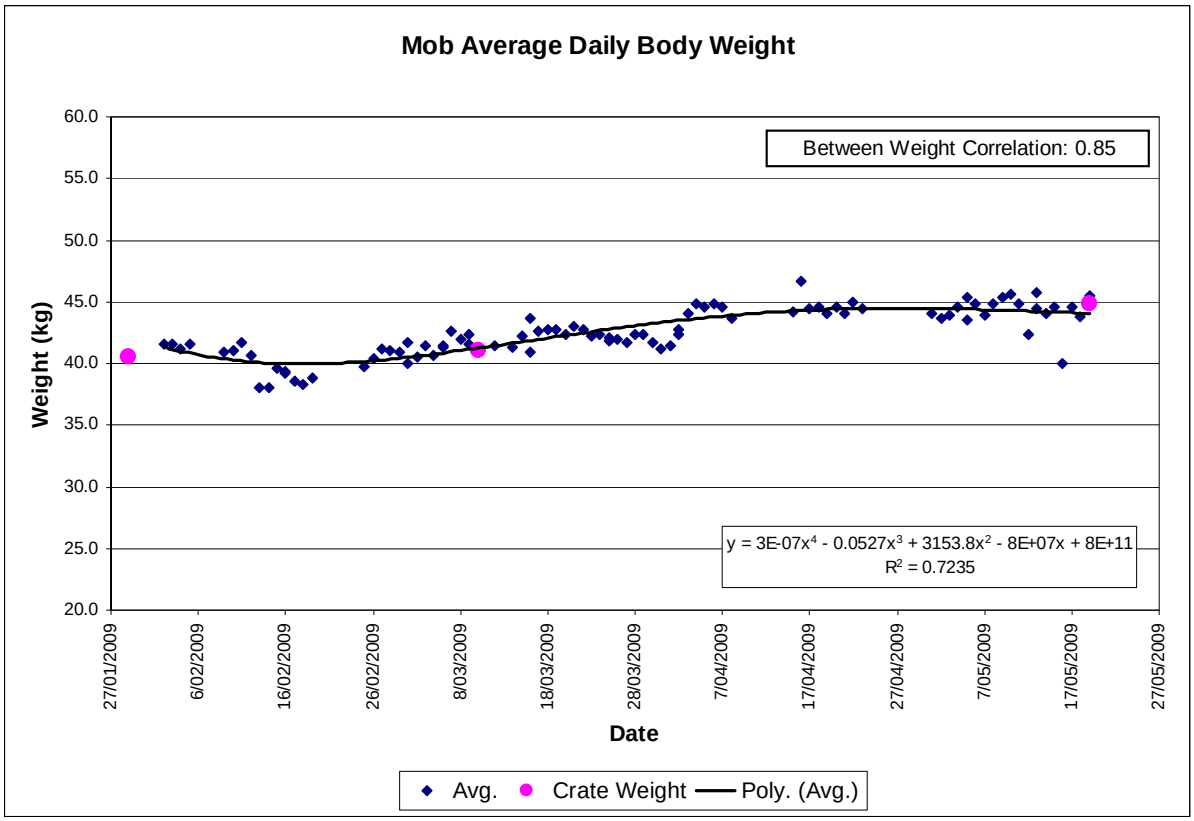
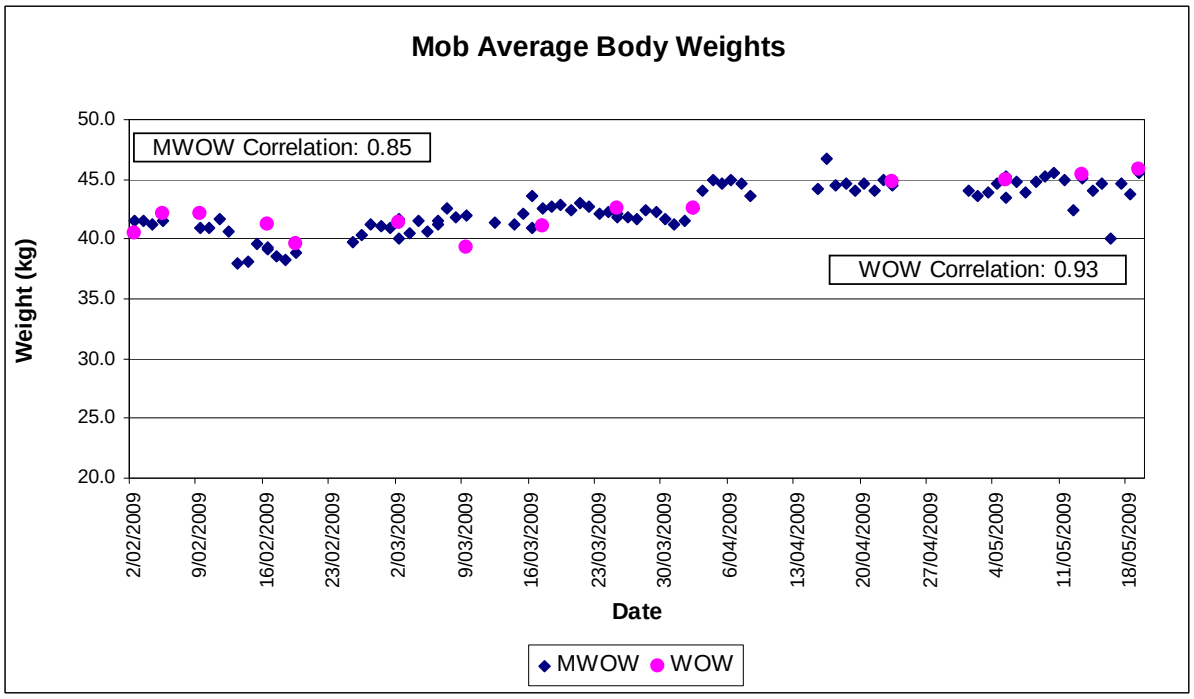


Chart 3 below shows the mob average weights for both WOW and MWOW processing.

Chart 3. Mob daily average MWOW liveweight and average WOW liveweight for each period, without and with RFID filtering, respectively.



The data points represented in this chart show mob average weights for either

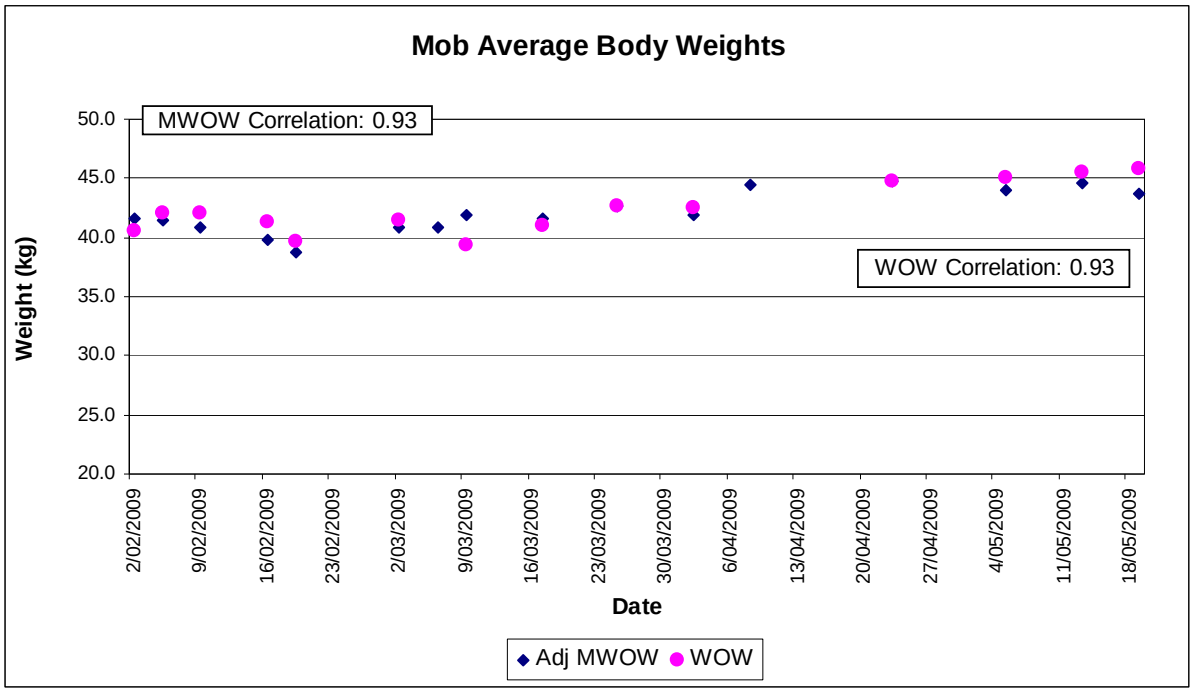
- a series of days (WOW), because there is usually more than one day's data in each file as it is processed, but the average mob weight is calculated for all animals over the whole time period
- each day's mob average (MWOW)

The correlations between weights using the WOW method was 0.93, whereas the MWOW method was slightly lower at 0.85

To examine the effect of these different time periods the MWOW average daily weights were accumulated into averages for the same time periods as the WOW weights. So, if the WOW data file produced a single average weight over a 5 day period, the corresponding MWOW dates were averaged to produce a single weight for the same period.

Chart 4 below shows the mob average weights for both WOW and MWOW processing and also 3 crate weights.

Chart 4. Mob average liveweight for each period, with and without RFID filtering.



The correlations between weights using the WOW method was 0.93, whereas the MWOW method when aggregated by the same dates is now 0.93, indicating that this method of data filtering without any RFID tags has a similar accuracy to the previous WOW method.

Conclusion

It is possible to remotely monitor liveweight of a mob of sheep using walk over weighing techniques. Both a mob based system (MWOW) or individual animal based system (WOW) can play a role in on-farm management decision making.

MWOW is cheaper than WOW, but it can only be used for mob based management decisions (monitoring mob liveweight, pasture utilisation/grazing pressure etc) while WOW has a much broader role in precision management of individuals or flock segmentation because individual animals have valid weights recorded against their individual identifying tag.

MWOW		**WOW**	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Cheaper setup			More expensive
Only mob based data available for mob based decision making	Individual animal records not available for management decisions	Individual animal data available for targeted decision making	
		Can also be used for mob-based decision making	

Table 1 Approximate costs of various components.

Item	**WOW**	**MWOW**
Weighing indicator (XR3000 – WOW enabled)	$4000	$4000
RFID reader	$2600	$
Weighing load bars	$1200	$1200
Solar panels & batteries	$3200	$300
Yards & Fencing	$500	$500
Total	$11500	$6000

References

Richards, J.S., Atkins, K.D., Thompson, T. and Murray, W.K. (2006) Data from Walk-Over Weighing – Where Are We At? Aus. Soc. Anim. Prod. 26th Annual Conf. 2006 Short Communication No. 32

Lee, G.J., Sladek, M.A., Atkins, K.D. and Semple, S.J. (2008) Variance Components of Liveweights of Pregnant Ewes Measured by Manual or Remote Control Methods, With and Without Processing By Data Screening. Proc. Aust. Soc. Anim. Prod. 2008 Vol 27