Unpublished Report

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Title:	Walk Over Weighing of Lambs in a Feedlot
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*Title*: Electronic Management of Lambs in a Feedlot; Demonstration

NSW DPI Staff members: D. Stanley, S. Semple
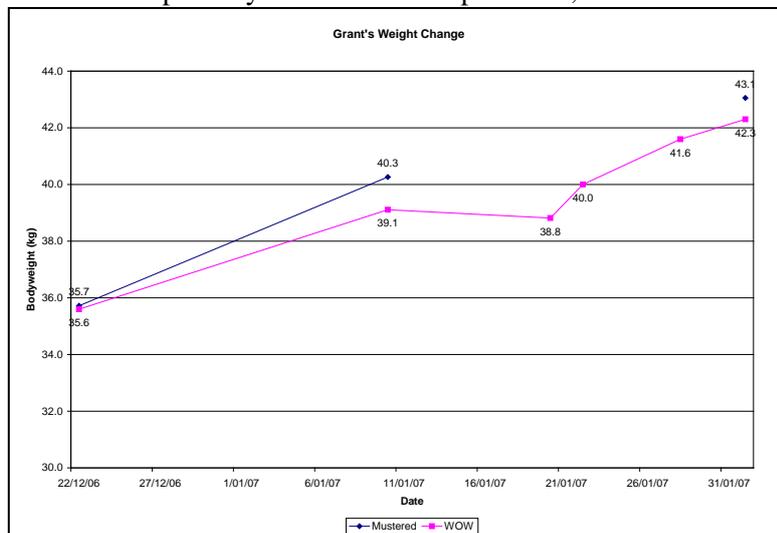*Location of Farm: "Riverside", Pride of Oak Rd., Canowindra*
Date: Trial 1 December 2006 – Trial 2 March 2007

Aim: To identify and solve any practical issues with electronic management.

Brief Description: Trial 1. About 75 xbd lambs in this feedlot were electronically tagged and their initial live weight was recorded over a Racewell auto drafting platform. The animals were forced to walk through a trap gate to get to water and they were then weighed a number of times as they walked over a "Walk Over Weighing" (WOW) scale platform to exit the water yard. A one-way gate allowed them to return to the feeding supplement, the picture below shows the weigh platform in place with the water point in the background. Animals proceeded into water via a one way gate and then exited over the weigh platform.
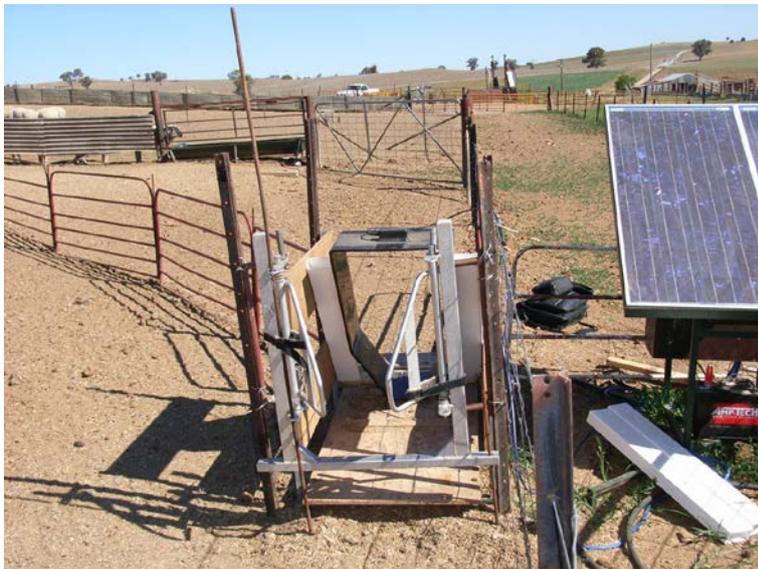
There were numerous "teething" problems when the platform was first put in. The RFID read range was very poor, apparently from some sort of interference inhibiting the effectiveness of the reader. Originally a set of Allflex rubberised flap readers were used, with the animals tagged with FDX-B tags. More than 50% of the tags were not being read, so the reader was changed for an Allflex portal reader. This partially solved the read problems, but as can be seen from the above photo, if the setup moved slightly, the reader was able to rest on the platform and so distort the weights. The chart left shows the final weights that were achieved both through the weigh platform and the Racewell system. Even though there were many weights discarded, the equipment did a reasonable job of tracking the weight change of the animals.

Grant's Weight Change

Brief Description: Trial 2. 207 xbd lambs in this feedlot were electronically tagged (this time with HDX RFID tags) and their initial live weight was recorded over a Racewell auto drafting platform.

The direction of flow was reversed this time, with the animals walking over the platform to get to water and exiting the water yard via a trap gate. The WOW platform was re-designed to force the animals to go around a 90° corner to leave the platform. This design was to keep the animal on the weigh platform for a longer period to allow a more accurate weight.

Initially the platform used was 1500 mm long, which proved to be too long for the size of the lambs. It was shortened to 1200 mm, to try and alleviate the possibility of 2 animals being on the platform at the same time. This appears to have worked reasonably well but there is still the possibility of this happening if 2 animals follow closely together or an animal "loiters" on the platform. In the feedlot situation, with the animals having little to do, they tend to use the WOW platform as a playground and quite commonly will spend time standing on the platform. The updated processing software is able to now do a better filtering job of removing the outliers from the data, thereby giving a more accurate weight.

The tables below summarise the output now available through the processing software and show the number of recordings since this trial started. Note that the platform was shortened on 3rd March, the longer platform in use before this date probably accounts for the higher weight at this time, with many animals being recorded with heavier weights because 2 animals consistently crossed the scale together. After the platform was shortened the proportion of records used increased.

Date	Total Number of Records Recorded	Number of Records with Valid Weight	Average Body Weight (kg)	Number of Records with no RFID
19/02/2007	207	Weights from Racewell Autodrafter		
26/02/2007	6198	5505	49.0	693
3/03/2007	2999	2275	36.2	724
9/03/2007	7111	5439	35.3	1672
12/03/2007	4705	4288	41.6	417
14/03/2007	2372	2184	39.5	188

Date	Final Number of Records Used	Final Average Body Weight	Number of Records per Animal	Standard Deviation of Weight (kg)	Proportion of Records Used
19/02/2007		31.6			
26/02/2007	2143	32.8	10.3	5.6	39%
3/03/2007	1176	31.5	5.7	6.0	52%
9/03/2007	2832	32.1	13.4	5.1	52%
12/03/2007	2458	34.8	11.4	5.6	57%
14/03/2007	1383	35.3	6.7	5.8	63%

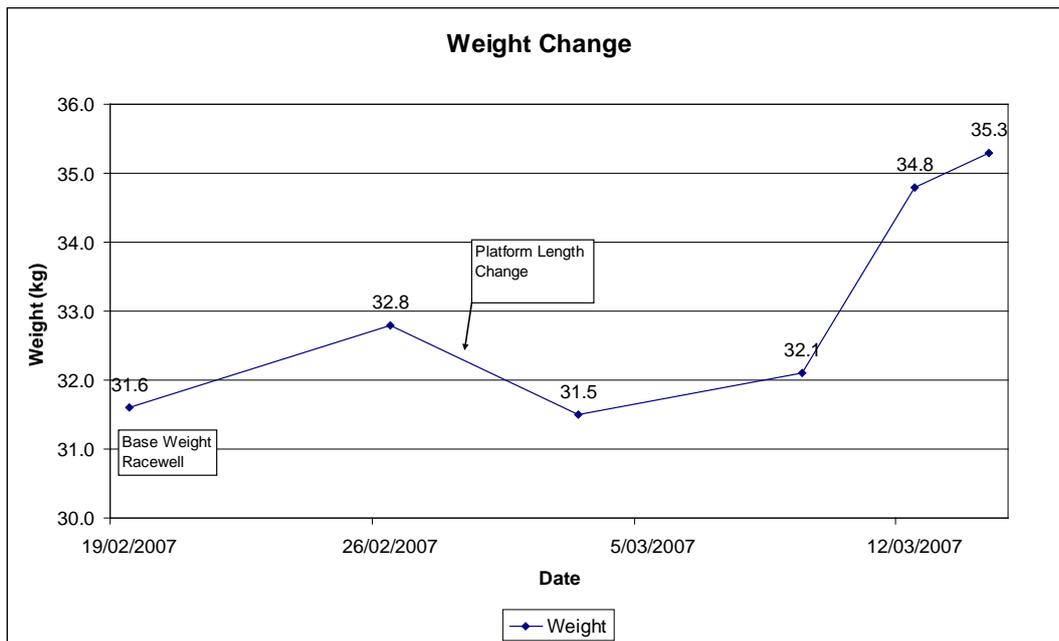The chart below shows weight change over time.

Weight Change

Chart 1 Initial average weight change

These animals were re-weighed on 21st March over the Racewell platform and the results for both the WOW weight and crate weight added to the chart below. The difference in average weight recorded by both methods was less than 1 kg.
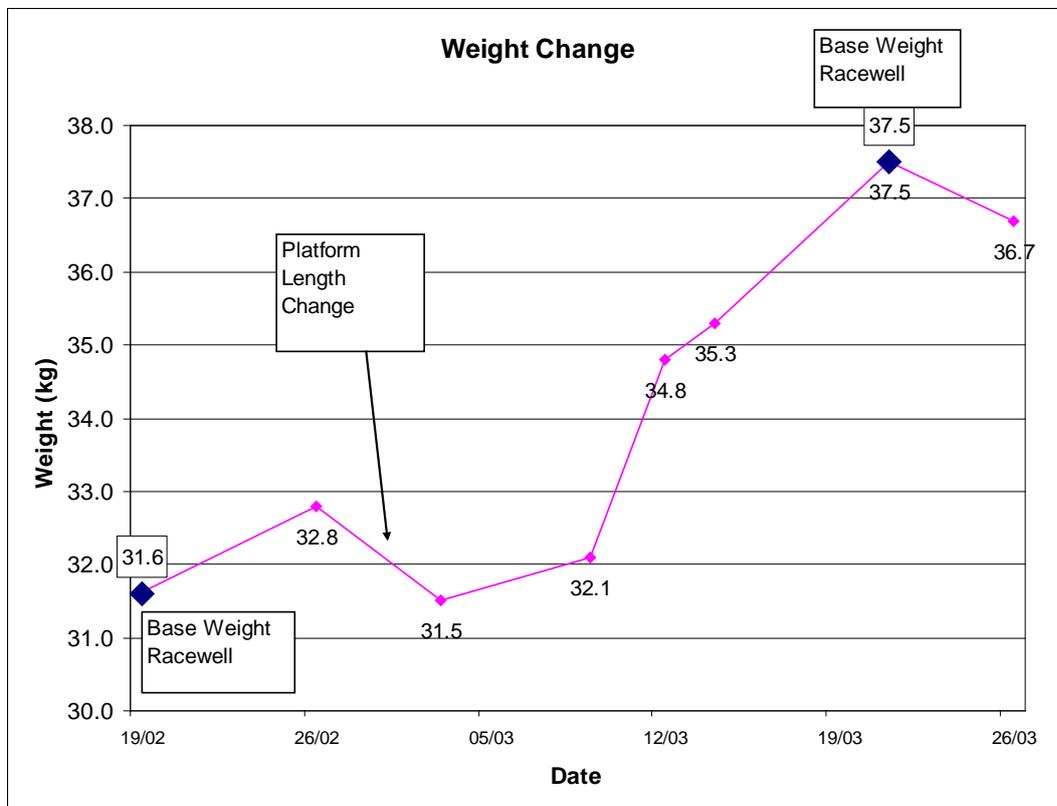

Weight Change

Chart 2. Weight change after addition of base weights

Trial 2 Continuation

The animals were weighed periodically through the Racewell drafter to monitor animals suitable for sale at a target weight greater than 44 kg. These weights were taken on 11/4/2007 and 30/4/2007, with animals being sold in the days following the weights being taken. WOW weights collected throughout this period and processed every 4 – 5 days. After the sale of animals following the 30/2 weighing, the final 33 animals were monitored via WOW until the trial was finished on 31/5/2007.

Processing Program changes

The Weigh Matrix program that is used to process the WOW files was altered to allow

1. the possibility to accept a base weight file, either from a set crate or previously processed WOW file
2. this base file was then used to limit the range of weights, to allow an animal's data to be either accepted or rejected, depending on previously captured weights

The data for all the WOW files was re-processed to determine if this filtering method was effective for capturing more accurate records, by limiting the number of outliers that remained in the data.

Table 1 below shows the results from the re-processing of data files, with a slight increase in proportion of values used for most files, plus a marginally tighter range of accepted weight values indicated by a lower SD of weight and increase in number of animal records..

Table 1   Re-processed WOW data file results

Date	Final Number of Records Used	Final Average Body Weight	Number of Records per Animal	Standard Deviation of Weight (kg)	Proportion of Records Used
19/02/2007		31.6			
26/02/2007	2145	32.2	10.4	5.1	39%
19/03/2007	1446	36.0	7.1	5.1	49%
22/03/2007	748	37.5	3.6	5.5	47%
26/03/2007	3176	36.7	14.8	5.1	74%
29/03/2007	1978	37.4	10.0	4.9	62%
5/04/2007	5602	38.2	28.3	4.6	63%
11/04/2007	**2473**	**33.7**	**12.6**	**4.1**	**39%**
18/04/2007	4428	39.8	22.4	4.6	64%
24/04/2007	3573	41.2	18.1	4.8	68%
11/05/2007	606	36.5	18.9	4.5	69%
16/05/2007	455	37.6	13.0	4.9	66%
21/05/2007	296	38.7	9.5	3.8	70%
25/05/2007	318	40.3	9.6	4.2	64%
28/05/2007	221	40.9	7.4	4.3	73%
31/05/2007	188	42.0	6.1	5.5	72%

Chart 3 below shows the full range of weights (WOW and Racewell crate) over the period of the trial. The weights depicted, reasonably follow the trend between crate weights, except for the weights processed on 11/04. For some reason there was a marked decrease in weight for this group associated with a high proportion of discarded weights.

Plotting of group average weight became difficult to follow as heavier animals were removed from the group periodically as they reached a marketable target weight (44 kg live weight) causing the group averages to decrease.
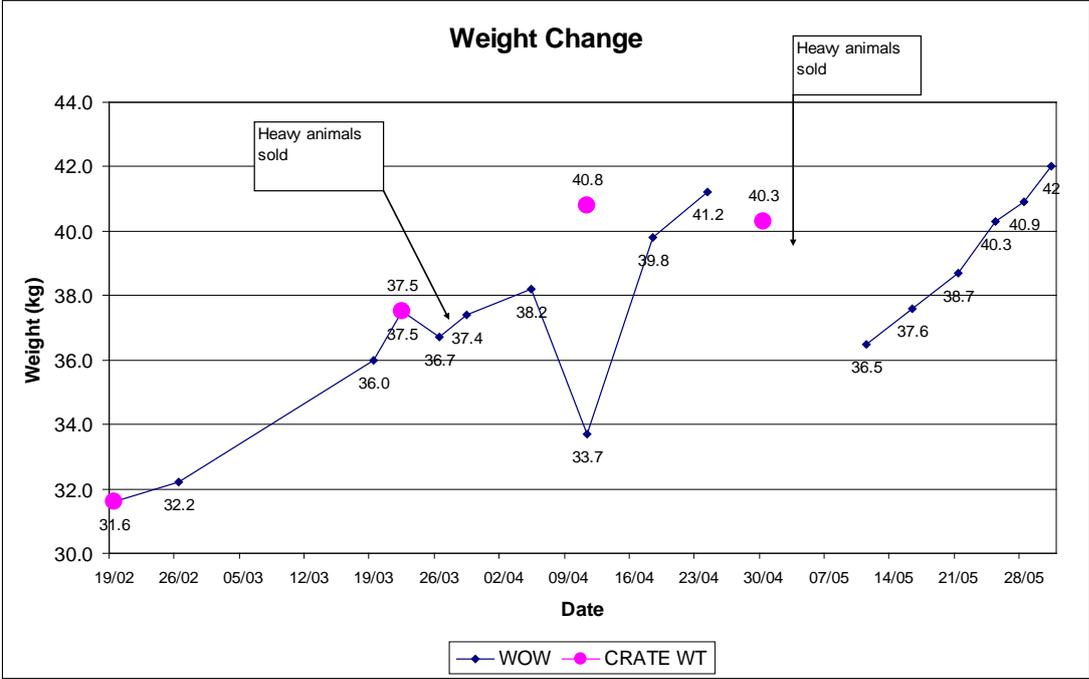

Chart 3. Weight change over full term of trial

Table 2 below shows the statistics for each weight period, based on the processed WOW data, and the reduction in numbers as animals reached target weight.

Table 2.	Weight Date Statistics			
Date	**Count**	**Min**	**Max**	**Mean**
19/02/2007	207	19.50	55.50	31.62
26/02/2007	207	18.00	47.44	32.15
19/03/2007	203	18.75	49.25	36.04
22/03/2007	204	21.83	48.50	37.56
26/03/2007	214	22.17	49.88	36.66
29/03/2007	196	24.88	47.61	37.27
05/04/2007	197	25.25	47.80	38.18
11/04/2007	**195**	**23.00**	**42.35**	**33.71**
18/04/2007	196	24.50	46.55	39.82
24/04/2007	195	26.15	49.94	41.24
11/05/2007	32	26.75	51.93	36.49
16/05/2007	35	25.50	52.35	37.57
21/05/2007	31	31.00	52.70	38.70

Table 2.	Weight Date Statistics			
Date	**Count**	**Min**	**Max**	**Mean**
25/05/2007	33	30.71	54.38	40.30
28/05/2007	30	31.75	54.50	40.86
31/05/2007	31	31.42	60.63	41.96

Weight Prediction

One of the aims of using the WOW system was to generate a steady stream of weight data that could then be used to predict finished weights (or predict dates) that animals would achieve a desired sale/slaughter weight.

After processing the WOW data through the Weigh Matrix program, the result files were added to a "Lamb Weight Predictor" model (Richards et al, 2006) to predict a future target weight.

Chart 4 below shows the correlation between crate weights taken on 11/4 and predicted weights for this date using a crate weight on 19/2 and processed WOW weights on 26/2, 19/3 and 5/4.
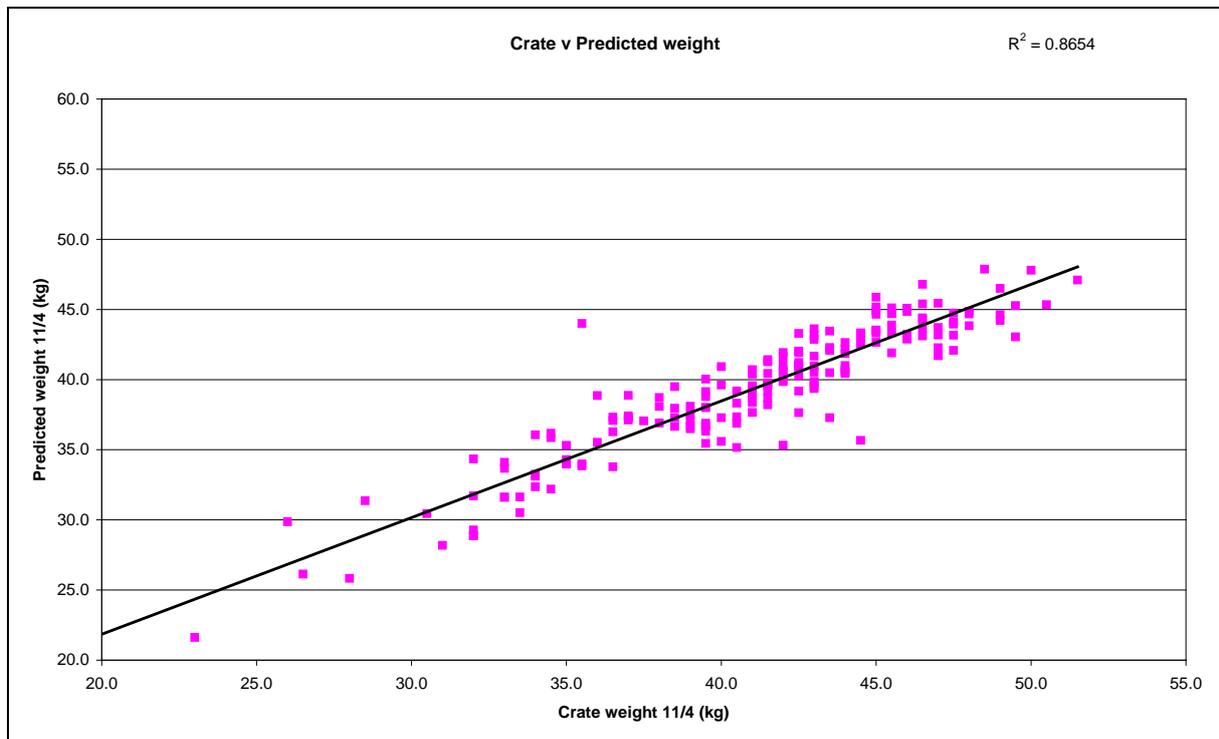

Chart 4 Predicted weights 11/4.

Chart 5 below shows the correlation between crate weights taken on 30/4 and predicted weights for this date using a crate weight on 19/2 and processed WOW weights on 26/3, 5/4 and 24/4.
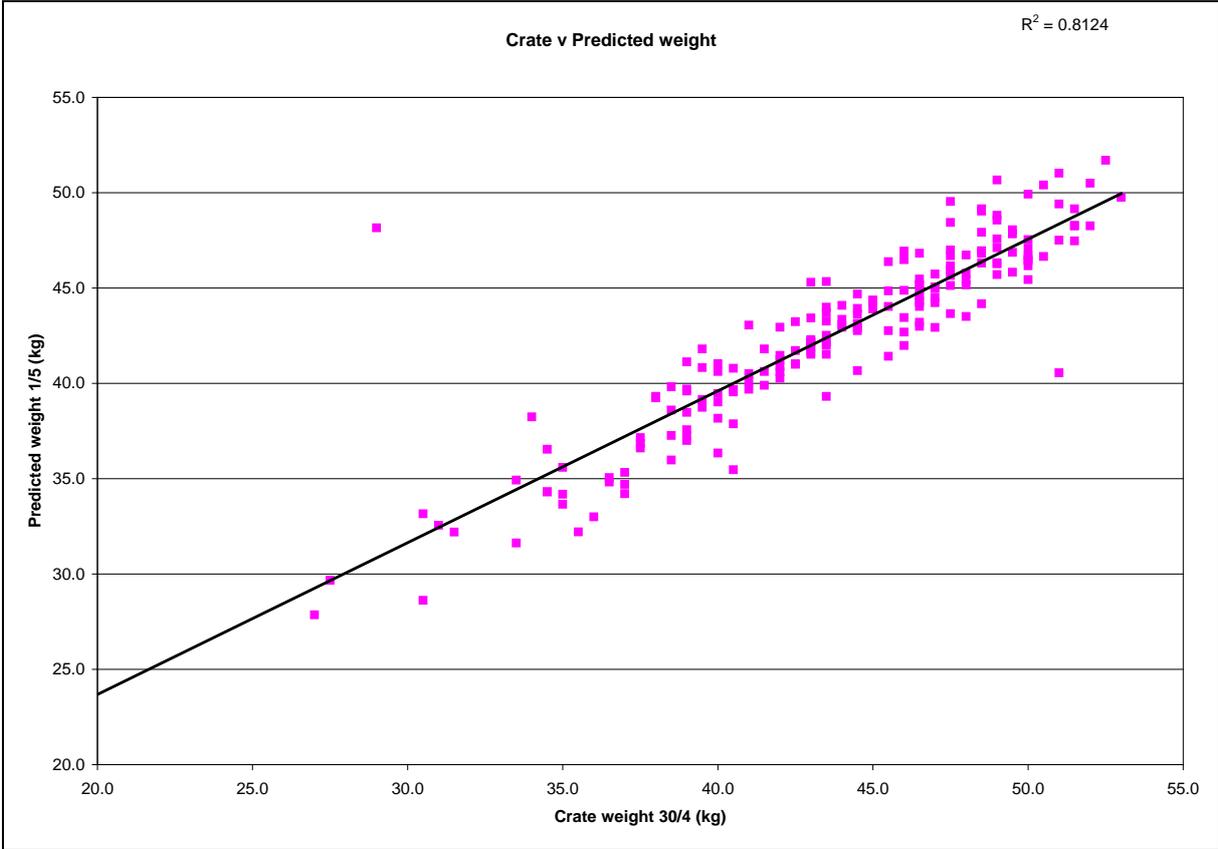

Chart 5 Predicted weights 30/4.

While it is important to be able to predict "Finishing Date", it is equally as important to be able to give some prediction of "Late Finishing". If it is possible to identify "Late Finishers" early, they can be removed from the feedlot, thereby reducing feed costs from animals taking a long time to finish.

The weight changes on the final 33 animals, those not suitable for sale by 30/4, were monitored. The data was re-processed through Lamb Weight Predictor model to examine the predicted finishing time. This was done by processing WOW weights from 19/2, 26/2, 19/3 and 26/3 and looking at the predicted weights on 1/5. The table below summarises the actual number of animals drafted into groups based on a crate weight on 30/4, and the predicted draft groups based on the 4 WOW weights up to 26/3.

Draft Range		Crate	WOW
1	Less than 38 kg)	34	35
2	38.1 – 43.9 kg)	68	77
3	Greater than 44 kg	97	87
	Total	199	199

This demonstrates that even from a relatively early stage, about 1 month into the feeding process, by monitoring growth, we can fairly accurately predict finishing time. More importantly of the 34 animals that were in the final draft group
- 21 out of 34 were correct
- 3 did not have enough WOW data for prediction
- 5 were within 2kg of 38 kg cut-off

- 3 had at least 1 WOW weight that was either too heavy/light which affected the prediction
- 2 had an incorrect crate weight and were drafted incorrectly (animal not on scales correctly)

Reference:

RICHARDS. J.S., ATKINS K.D., THOMPSON T. and MURRAY W.K.   (2006). *In* ASAP 26th Biennial Conference 2006 Short Communication N0. 32