

## Dr Mark Shepherd: Supplementary evidence

### Case study farm #4

The current version of OVERSEER<sup>®</sup> Nutrient Budgets contains 3 separate farm models: pastoral, cropping and fruit. Following the initial visit to the farm in December 2008 to develop a FARM strategy, nutrient budgets were constructed using cropping model within the then current version of OVERSEER (5.3.6). After that, a completely new cropping model replaced the previous cropping model and was released within OVERSEER v. 5.4.3. This new model development was been a joint CRI collaborative effort by AgResearch, Crop and Food and HortResearch (now Plant & Food).

The original OVERSEER file for the Pencoed Trust Farm was rerun in this newer version. In addition, an alternative rotation suggested by owner Brendon Williams was also modelled. The effect of reducing the fertiliser N inputs to the maize crop was also investigated. A summary of the N losses via leaching from these results is presented in the tables below.

Pencoed Trust Farm nutrient budgets modelled in original Overseer 5.3.6 version and newer version 5.4.3.

Farm activity	Area (ha)	Overseer 5.3.6		Overseer 5.4.3	
		N-loss (kg N/ha/yr)	Total N loss (kg/yr)	N-loss (kg N/ha/yr)	Total N loss (kg/yr)
Potatoes	15	56	840	10	150
Winter wheat	20	67	1340	6	120
Maize	24	29	696	30	720
Spring wheat	25	8	200	35	875
Pasture <sup>1</sup>	27	14	378	14	378
Non-pastoral <sup>1</sup>	4	9	36	9	36
<b>Overall farm</b>	<b>115</b>	<b>30</b>	<b>3490</b>	<b>20</b>	<b>2279</b>

<sup>1</sup>Calculated using the pastoral model within OVERSEER

The revised cropping model is a fundamentally different approach to that previously embedded in OVERSEER. Publication of the model has been submitted to a journal for peer review; a summary was presented at the 16<sup>th</sup> Nitrogen Workshop (Cichota *et al.*, 2009).

Based on the reruns with the new cropping model, it would appear from these data that the previous version of OVERSEER had overestimated N leaching losses occurring from the arable part of the Pencoed Trust Farm.

The consequence of this is that the farm now meets its N leaching targets as proposed in the One Plan – for the baseline and subsequent years; previously, there was an indication that the farm would need to decrease nitrate leaching losses to meet the proposed targets in baseline + 5 years and beyond.

The alternative cropping rotation suggested by the Pencoed Trust Farm owner made no difference to the calculated N leaching losses, still remaining at 20 kg N/ha per year.

### Reference

Cichota, R., Brown, H. Snow, V.O., Wheeler, D.M., Zyskowski, R.F. & Hedderley, D. (2009). Assessing, nitrogen leaching from cropping systems using a nutrient budget tool. *Proceedings of the 16<sup>th</sup> Nitrogen Workshop 'Connecting different scales of N use in agriculture'*, p579-580.