Nutrient Budgeting

An Overview of What, How and Why

June 2014

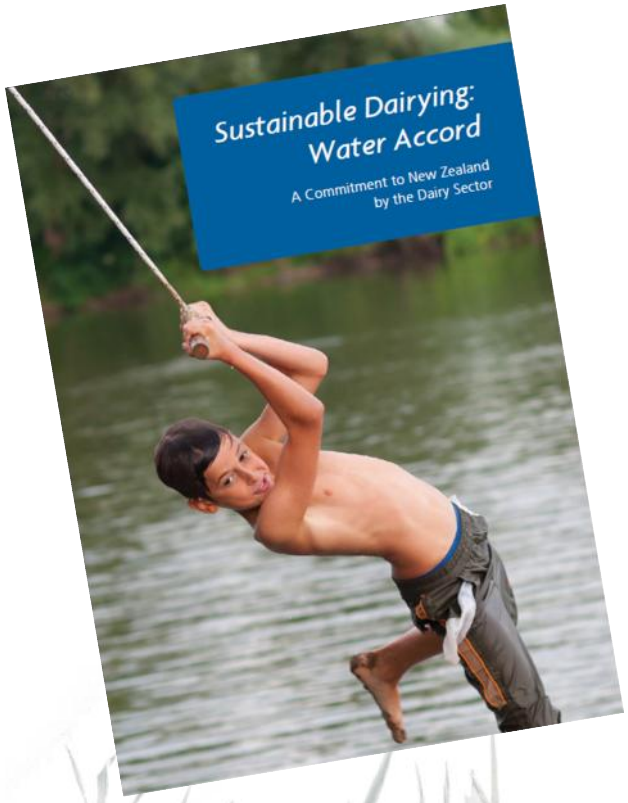
agri-nutrients Ballance

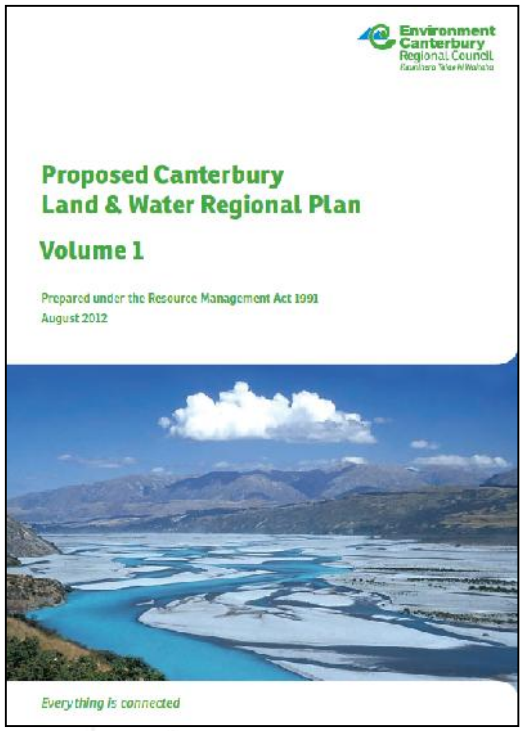
Topics to Cover

1. Why the need for nutrient budgets
2. What is OVERSEER® ?
3. Principles Behind OVERSEER®
4. User Inputs
5. Importance of accurate information
6. OVERSEER® Reports / Outputs
7. Drivers that effect N loss
8. Nutrient Budgets – Key Points

Ballance agri-nutrients

1. Why the need for Nutrient Budgets

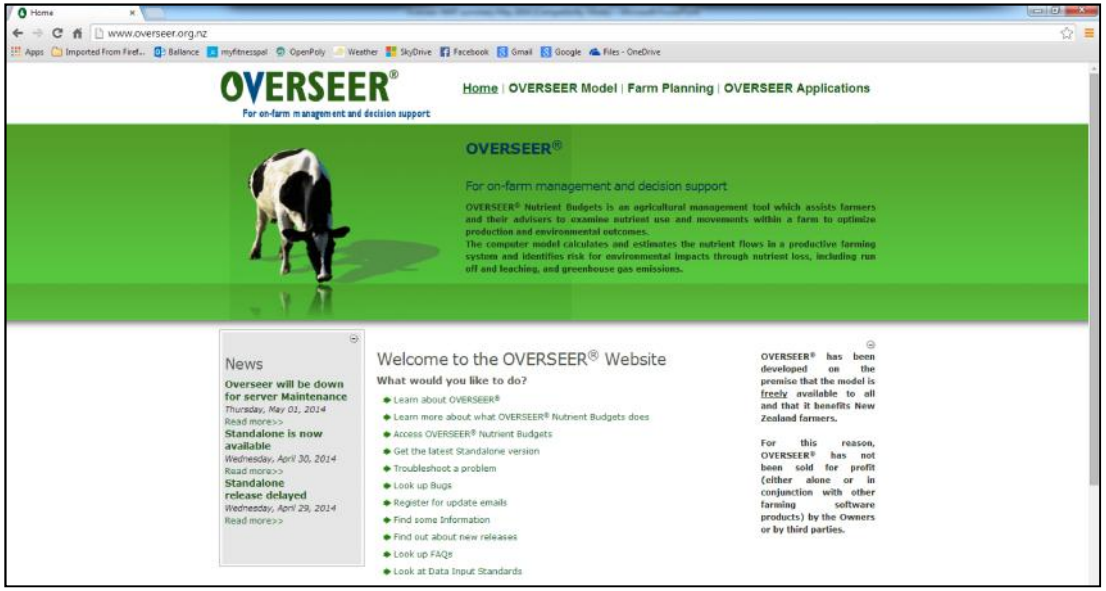




agri-nutrients Ballance

2. What is OVERSEER® ?

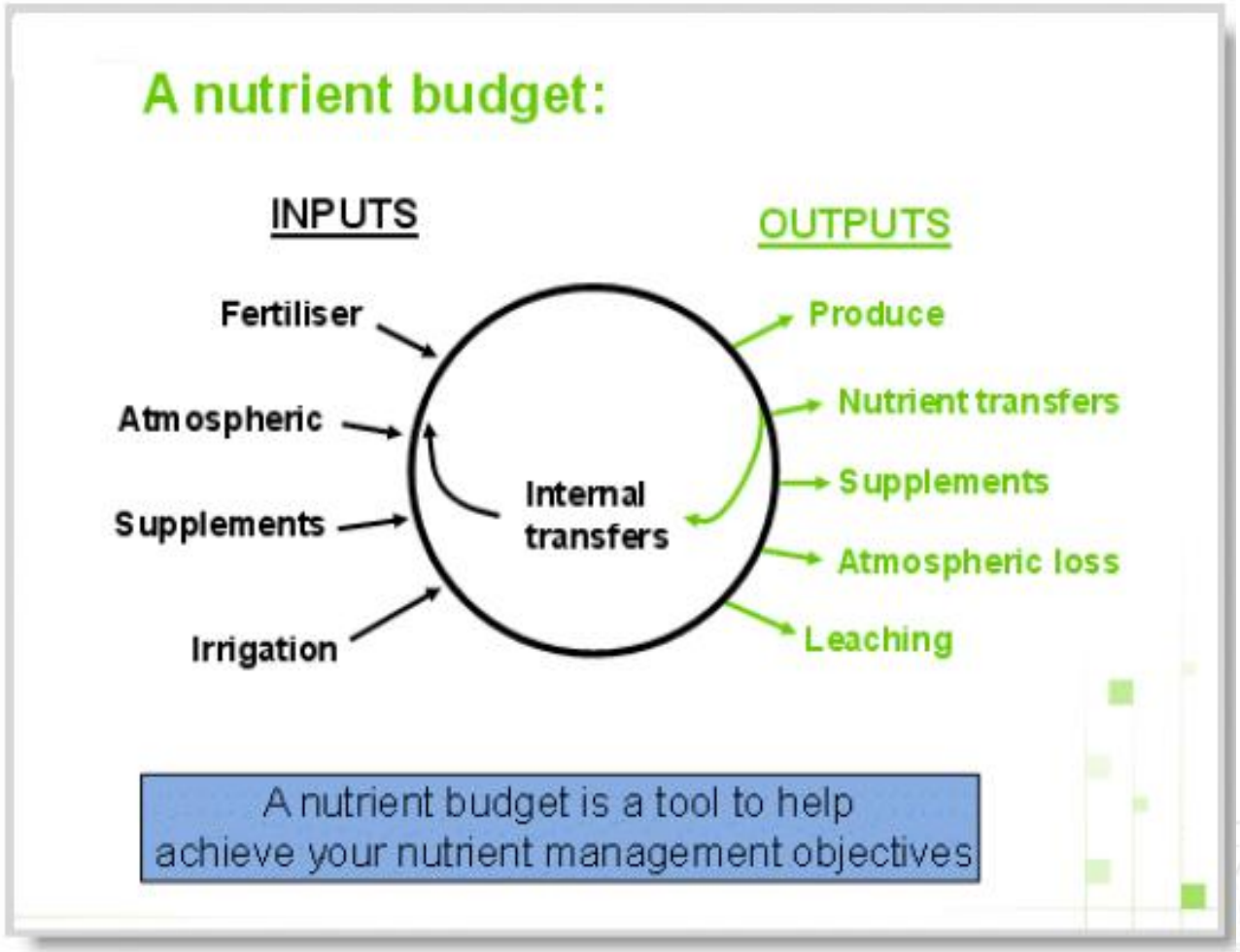
- OVERSEER® is a Decision Support Tool
- The program is jointly owned by MPI, AgResearch and The NZ Fertiliser Association
- The program models nutrient flows for a farm system



- OVERSEER® Nutrient Budgets are a valuable tool for a range of users, in particular farmers and their advisers.
- It also has a potential role informing policy that includes nutrient management in conjunction with other tools, and in the implementation of policy.

agri-nutrients Ballance

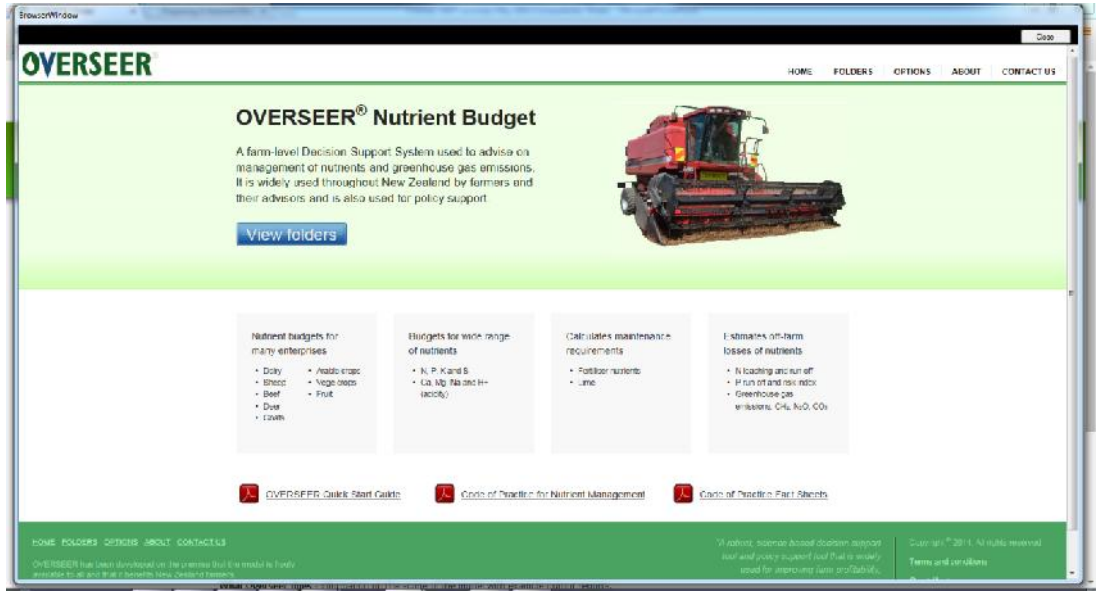
An OVERSEER® Nutrient Budget



agri-nutrients Ballance

3. Principles Behind OVERSEER®

- Simple to use – once users are trained.
- Farm specific.
- Empirical, based on NZ research.
- Annual time step.
- Long term averages.

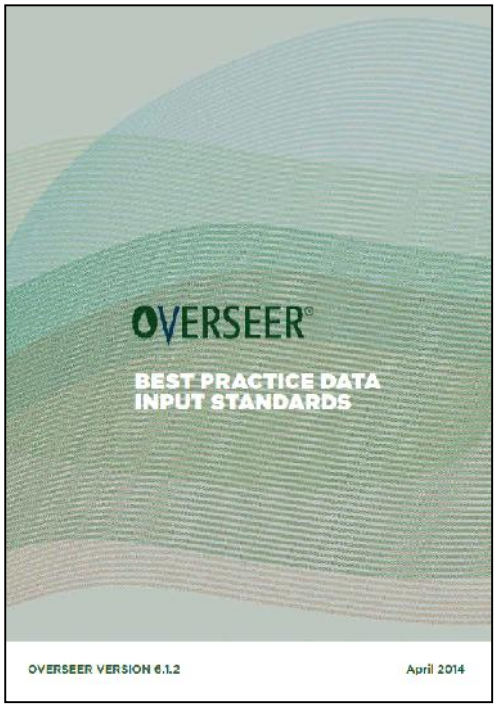


- When collating data, it is important to understand that the model assumes:
  - the user supplies actual and reasonable inputs;
  - the system is at an equilibrium, or that productivity (stock, milk yield, crop yields) is in equilibrium with the inputs (fertiliser, supplements, irrigation both for rate and timing);
  - any management practice implemented on the farm follows best practice.

agri-nutrients Ballance

OVERSEER® Version 6

- Version 6 represented a major new version of the model
- On the positive side, OVERSEER® v6 incorporates:
  - Latest science
  - Enhanced user interface – now predominantly web based
  - Provision for monthly inputs of farm activities
  - Integration of cropping and pastoral models
  - Provision for cut and carry blocks
  - Differential grazing of blocks
  - Provision for composts and biosolids
  - Upgraded N leaching model
  - Addition of dairy goat farming model
  - Revised DCD model
  - Life Cycle Assessment capability

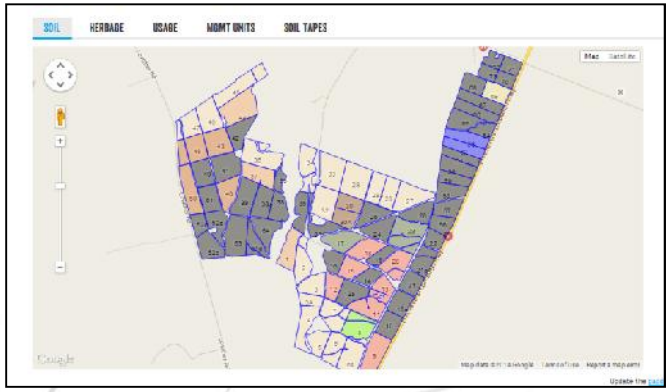


agri-nutrients Ballance

4. User Input Requirements – Farm scale

Information required for the model.

- **Farm level:**
  - Region, block set up.
  - Feed pads, animal shelters.
  - Farm dairy & associated effluent management.
  - Animal species, stocking rates and management.
  - Supplements imported onto farm.
  - Use of nitrification inhibitors, areas of wetlands

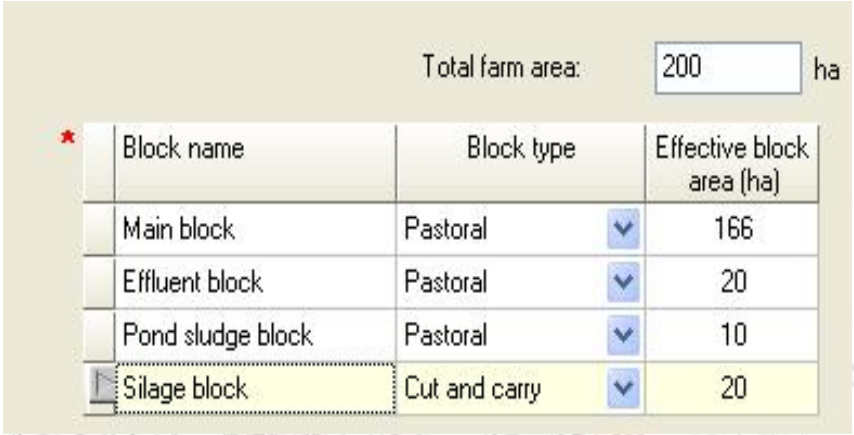


- **NB.** Errors in farm data are scaled up when used in models such as OVERSEER®, creating errors on errors...

agri-nutrients Ballance

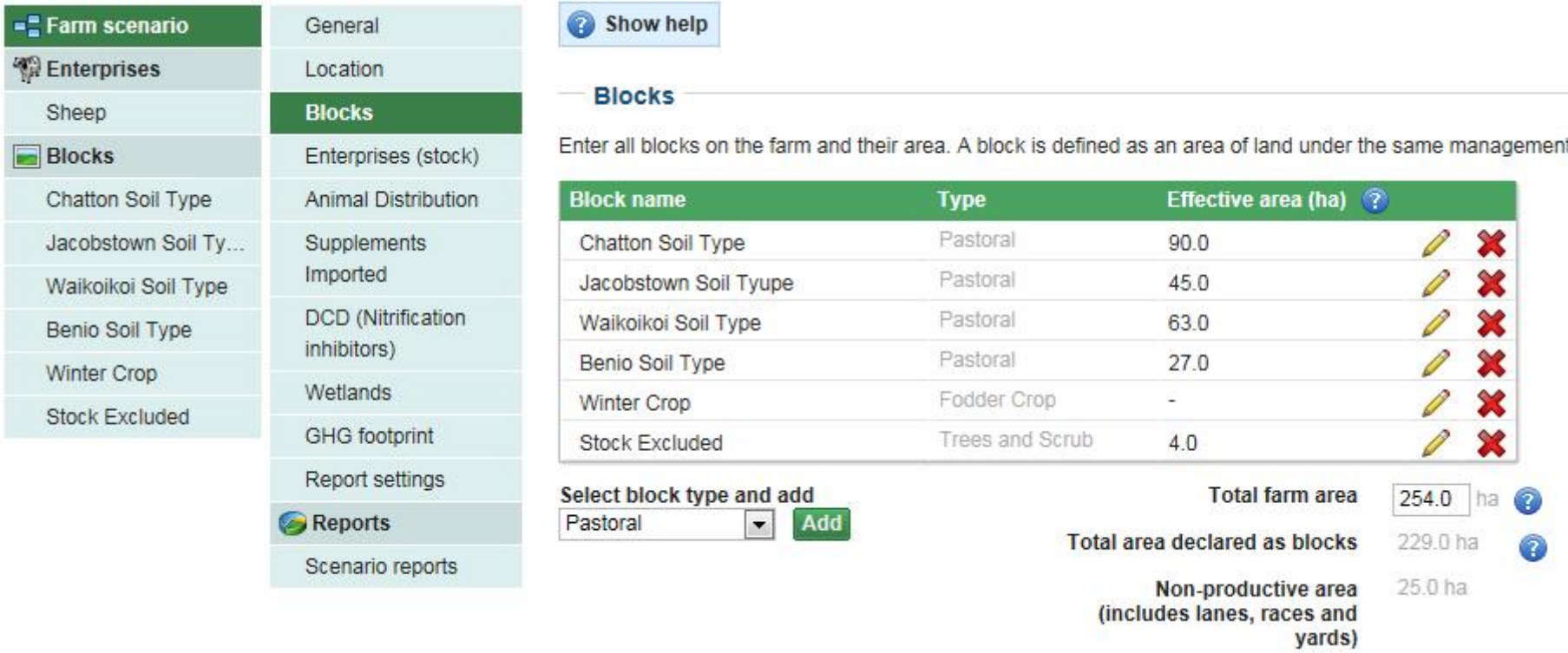
User Input Requirements – block setup

- Blocks should be defined based on land uses, management systems (i.e. effluent and/or sludge applied, irrigation applied, cut and carry, support block/runoff), stock or crop types, soil types, topography and enterprise.
- **Typical blocks will be:**
  - Pastoral
  - Pasture block with fodder crop rotation
  - Cut and carry
  - Crop
  - Fruit crop
  - Tree and scrub
  - Riparian
  - Wetlands
  - House
  - Effluent area.



agri-nutrients Ballance

User Input Requirements – block setup

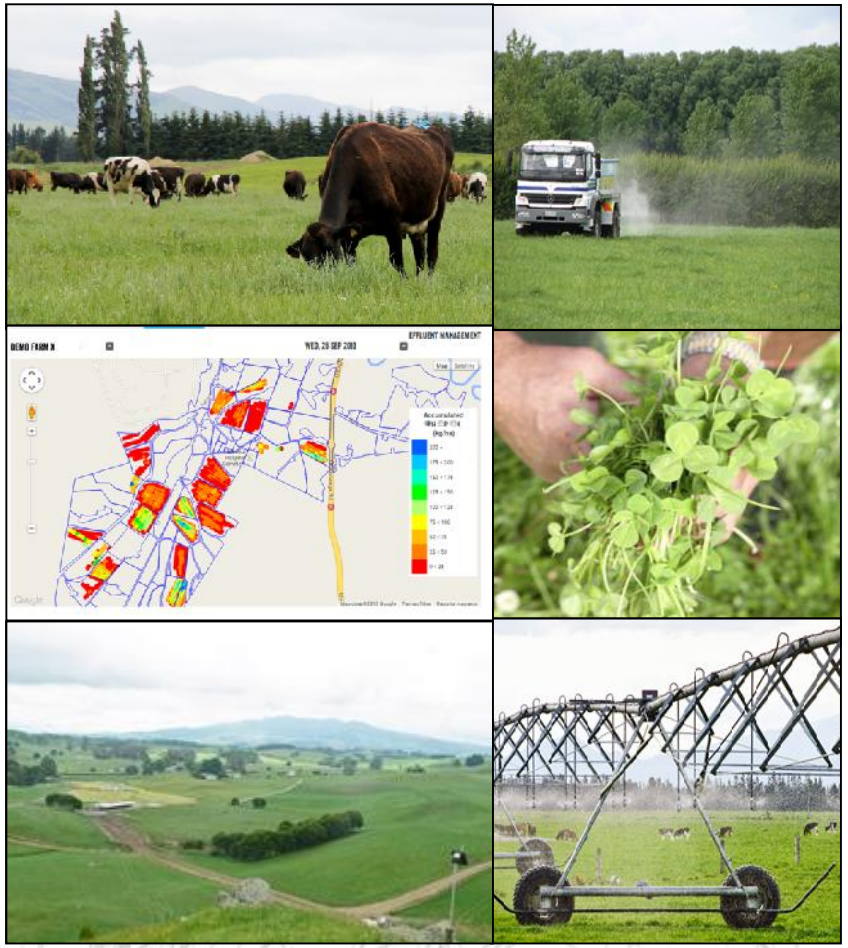


agri-nutrients Ballance

User Input Requirements – block scale

Information required for the model

- **Block level:**
  - Topography, climate.
  - Soils, irrigation.
  - Effluent application management.
  - Pasture type and development phase.
  - Crops and management.
  - Animal species present.
  - Soil analysis and fertiliser inputs.
  - Supplements made.



agri-nutrients Ballance

User Input Requirements – Enterprises

- Farm scenario
- Enterprises
  - Sheep
- Blocks
  - Chatton Soil Type
  - Jacobstown Soil Ty…
  - Waikoikoi Soil Type
  - Benio Soil Type
  - Winter Crop
  - Stock Excluded

- Numbers
- Production
- Health Supplements

Show help

Sheep enterprise

How would you like to enter your sheep stock numbers?

Specify based on specific stock numbers

Mean lambing date 21 September RESET

Mean weaning date 12 December RESET

Weaning weight 30.0 kg

Breeding ewes lambing rate 140 %
(lambs weaned/ewes in July)

Breeding ewes replacement rate 26 %/yr

Monthly stock numbers

Generate breeding mob

Mob name	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Breeding ewes (mixed age) 1	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700
Breeding replacements 1	0	0	0	0	0	702	702	702	702	702	702	702
Breeding replacements 2	702	702	702	702	702	702	702	702	702	702	702	702
Breeding replacements 3	702	702	702	702	702	0	0	0	0	0	0	0
Breeding rams (mixed age) 1	35	35	35	35	35	35	35	35	35	35	35	35
Lambs 1	0	0	0	0	0	4270	3129	2416	1524	1238	954	702

Add a new mob

Ballance agri-nutrients

5. Importance of accurate information

- Collecting accurate farm data
  - Important to record accurate farm data e.g. fertiliser inputs and placement
  - Access to farm resource data e.g. soil information
  - Overseer – errors in farm data scaled up when used in models such as Overseer Errors on Errors.

- Industry Initiatives
  - Best practice data input standards for Overseer
  - Certified nutrient management advisor

6. OVERSEER® Nutrient Budget Reports

Pastoral block reports

Nutrient budget | Nitrogen | Phosphorus | Graph - N pools | Graph - changes in N pools | Comments | Maintenance nutrients | Relative yield | Other values

Nutrient budget

(kg/ha/yr)	N	P	K	S	Ca	Mg	Na	H+*
Nutrients added								
Fertiliser, lime & other	22	46	26	48	162	8	0	0.0
Rain/clover N fixation	119	0	1	1	1	1	3	0.1
Irrigation	0	0	0	0	0	0	0	0.0
Supplements fed on block	5	1	4	0	1	0	0	0.1
Nutrients removed								
As animal products	29	5	2	4	11	0	1	0.0
As supplements	19	2	13	2	3	1	0	-0.2
Net transfer by animals	2	0	2	0	0	0	0	-0.1
To atmosphere	30	0	0	0	0	0	0	0.0
To water	19	0.4	13	42	16	6	48	-0.9
Change in block pools								
Organic pool	47	9	0	3	0	0	0	-0.1
Inorganic mineral	0	15	-8	0	-2	0	-7	0.0
Inorganic soil pool	0	14	9	0	135	3	-40	1.5

* Acidity - used in calculation of maintenance lime requirements. A gain in acidity indicates that soil pH will decrease.

Download this report

agri-nutrients Ballance

OVERSEER® Nitrogen Loss Reports

Nutrient budget | Nitrogen | Phosphorus | Graph - N pools | Graph - changes in N pools | Comments | Maintenance nutrients | Relative yield | Other values

Block name	Total N lost kg N/yr	N lost to water kg N/ha/yr	N in drainage * ppm	N surplus kg N/ha/yr	Added N ** kg N/ha/yr
Block A	7387	18	3.1	106	22
Block B	6820	19	3	118	22
Block C	1886	16	3.2	106	22
Retired Areas	7821	2	N/A	0	0
Block D	4964	16	3.7	106	22
Block E	2309	16	N/A	106	22
Block F	1556	13	2.9	106	
Block G	1612	20	N/A	107	
Crop Block	3357	50	8.8	334	
Other sources	526				
Whole farm	38238	8			
Less N removed in wetland	0				
Farm output	38238	8			

* N concentration due to leaching in drainage water at the bottom of the root zone. Maximum recommended level for dri

** Fertiliser, organic and effluent inputs.

N/A: N in drainage not calculate for easy and steep pastoral blocks, or for tree and shrubs, riparian, wetland or house block

Download this report

Scenario reports

Nutrient Budget | Nitrogen | Phosphorus | Comments | Summary | Nitrogen c

Footprint units | Footprint product | Pasture production | Other values | Full para

Whole farm report		Benchmark farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		36
Fertiliser N	kg N/ha/yr		7
Other N added	kg N/ha/yr		7
Indices			
Average N loss to water	kg N/ha/yr	5-20	8
N_2O emissions	kg N/ha/yr		0.1
Farm N surplus	kg N/ha/yr	30-80	41
N conversion efficiency	%	15-25	20

Download this report

OVERSEER® Phosphorous Loss Report

Pastoral block reports

Nutrient budget | Nitrogen | Phosphorus | Graph - N pools | Graph - changes in N pools | Comments | Maintenance nutrients | Relative yield | Other values

Block name	Total P lost	P lost to water	P loss categories		
	kg P/yr	kg P/ha/yr	Soil	Fertiliser	Effluent
Block A	493	1.2	Medium	High **	N/A
Block B	143	0.4	Low	Medium	N/A
Block C	69	0.6	Low	Medium	N/A
Retired Areas	375	0.1	N/A	N/A	N/A
Block D	364	1.2	Low	High **	N/A
Block E	335	2.3	High	Extreme **	N/A
Block F	234	2.0	High	High **	N/A
Block G	304	3.8	High	Extreme **	N/A
Crop Block	47	0.7	Low	N/A	N/A
Other sources	131				
Whole farm	2493	0.5			

** Fertiliser loss is outside the range for New Zealand data - see comments for each block

Download this report

agri-nutrients Ballance

7. N leaching – Main drivers (1)

Largest driver is Drainage

- Drainage is influenced by soil type and rainfall.

- **Irrigation -** irrigation adds water which tends to increase drainage

- **Animals -** Urine patches greatest single source of N leached
  - High volume of liquid leading to excess drainage
  - High concentration of N in urine which is leached
  - Urine patches are influenced by Animal species, stocking rate, gender of cattle
  - Grazing management (e.g. wintering off, deferred grazing, pads, shelters)
  - Timing of grazing
    - crops; summer grazing lower N loss than winter grazing

N leaching – Main drivers (2)

- **Fertiliser N**
  - Rate and timing
    - winter N fertiliser increases losses to water – higher drainage

- **Supplements**
  - N content of supplements imported
  - High N supplement v Low N supplement

- **Supplement removed off farm**
  - Takes N out of the system

8. Nutrient budgets – Key points

Benefits of nutrient budgets.

1. Estimate of nutrient inputs.
2. Provides estimates of both N & P losses.
3. Effluent value utilisation.
4. Provides indication of soil test trends P, K, Mg, acidity.
5. Provides maintenance nutrient recommendation.

What to look for in nutrient budgets

1. Effluent nutrient inputs.
2. Fertiliser input rates.
3. Nitrogen and phosphorus losses.
4. Nitrogen surplus.
5. Nitrogen conversion efficiency

Drivers to reduce N loss

1. Stock wintering practice.
2. Timing and rate of fertiliser N.
3. Stock management (stocking rate, % replacements etc)
5. Supplementary feed N content & feed substitution
6. Effluent management.
7. Matching N to crop requirements.

(kg/ha/yr)	N	P	K	S	Ca	Mg	Na	H+*
Nutrients added								
Fertiliser, lime & other	196	36	0	42	88	0	0	0.0
Rain/clover N fixation	44	0	1	2	1	3	7	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Effluent added	63	9	71	7	12	7	2	-2.5
Supplements fed on block	19	2	16	2	4	1	1	0.6
Nutrients removed								
As animal products	78	14	18	5	19	2	5	0.0
As supplements	12	2	11	1	3	1	0	-0.4
Net transfer by animals	11	-1	5	-1	1	0	-1	-0.3
To atmosphere	57	0	0	0	0	0	0	0.0
To water	35	0.5	11	38	50	3	10	-2.2
Change in block pools								
Organic pool	130	10	0	10	0	0	0	-0.2
Inorganic mineral	0	13	-17	0	-4	-7	-8	0.0
Inorganic soil pool	0	8	61	0	37	12	3	1.2

Block name	Total N lost	N lost to water	N in drainage *	N surplus	Added N **
	kg N/yr	kg N/ha/yr	ppm	kg N/ha/yr	kg N/ha/yr
Peat block	313	24	6.5	180	196
Effluent	6123	35	8.4	244	259
Pasture 1	5266	31	7.8	175	196
Pasture 2 rolling	510	27	8.9	181	196
Summer Turnips	562	28	6.2	247	43
Other sources	490				
Whole farm	13265	31			

Ballance agri-nutrients

Take home message

- Think about the management areas on your farm
- Start to record your relevant on farm data

  Blocks and Areas

  Stock numbers and class's

  Timings of these stock class's onto each Management area or Block

- Ensure that this data is as accurate as you can make it
- Fill in Ballance register sheet if you would like me to send you a PDF covering the main input fields

agri-nutrients Ballance

NOTE: THIS NUTRIENT BUDGET IS FROM JUNE 2012 TO MAY 2013

*Need farm map with topography, irrigation and crop area marked

FARM NAME:			
Farm Physical Address			
Total farm area (ha)		Effective area (ha)	

BLOCKS				
	Flat	Rolling	Easy hill	Steep hill
Topography (ha)				
Crop area (ha)				

IRRIGATION											
Irrigation Type (pivot, rotorainer, boarder dyke, kline)											
Irrigation Area (ha split in type)											
Months irrigated (if you irrigate 1 day or 1 week in a month include this month)											
June	**July**	**Aug**	**Sept**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**March**	**April**	**May**

BEEF STOCK NUMBERS (JUNE 2012 TO MAY 2013) Separate by stock type (weaners, R2, heifers, steers, breeding bulls, and breeding replacements) and breed.						
Stock type						
Breed						
June						
July						
August						
September						
October						
November						
December						
January						
February						
March						
April						
May						
Age in months at start:						
Start weight:						
End weight:						
Start calving date:			**Weaning date:**			

SHEEP STOCK NUMBERS Separate by stock type (weaned lambs, store brought lambs, hoggets, ewes, breeding rams) and breed.						
Stock type						
Breed						
June						
July						
August						
September						
October						
November						
December						
January						
February						
March						
April						
May						
Age in months at start:						
Start weight/End weight:						
Start lambing date:			**Weaning date:**			
Do you lamb your hogget's?	**YES/NO**	**Lambing % (Separate for ewes and hoggets)**			**Replacement %**	

SUPPLEMENTS IMPORTED		
Type (silage, straw, grain, molasses, PKE etc)	**How much supplement is imported (T DM)?**	**Destination of feed (what stock fed to, in paddocks etc.)**

SUPPLEMENTS MADE					
What type of supplement made?	**How much supplement made (T DM)**	**Area (ha) supplements made**	**Where is supplement made? (Irrigated, dryland, flats, rolling etc.)**	**Where is supplement fed? ((irrigated, dryland, flats, rolling etc. or is it exported)**	**Stock supplement fed to (sheep, cattle)**

PASTURE FERTILISER											
Maintenance/Capital fertiliser (months applied)											
Product used and rate (kg/ha)?											
Area applied to (ha) (flats, Lucerne, rolling country)?											
Urea fertiliser (kg/ha per month)											
June	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**
Fertiliser applied after supplement cut (silage/hay)											
Product, rate and month applied (months and kg/ha)											

Next: Crop Paddocks

- Overseer requires you to go back two years from the current crop (e.g. for 2012/2013 Nutrient Budget you will need to go back to June 2010)
- In the table below we also need crop area, topography and years in permanent pasture (this does not include annual ryegrass)

CROP AREA (Ha)			TOPOGRAPHY (flat, rolling)		YEARS IN PERMENANT PASTURE (in last 12 years)	
	Month	Crop sown and yield (t DM/ha)	Sowing method (conventional, direct drilled)	Fertiliser applied (type and application rate)	Irrigation type	Grazed (include what stock) or Harvested (fed out or exported)?
TWO YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
ONE YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
CURRENT YEAR	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					

COMMENTS AND NOTES:

CROP AREA (Ha)			TOPOGRAPHY (flat, rolling)		YEARS IN PERMENANT PASTURE (in last 12 years)	
	Month	Crop sown and yield (t DM/ha)	Sowing method (conventional, direct drilled)	Fertiliser applied (type and application rate)	Irrigation type	Grazed (include what stock) or Harvested (fed out or exported)?
TWO YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
ONE YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
CURRENT YEAR	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					

COMMENTS AND NOTES:

CROP AREA (Ha)			TOPOGRAPHY (flat, rolling)		YEARS IN PERMENANT PASTURE (in last 12 years)	
	Month	Crop sown and yield (t DM/ha)	Sowing method (conventional, direct drilled)	Fertiliser applied (type and application rate)	Irrigation type	Grazed (include what stock) or Harvested (fed out or exported)?
TWO YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
ONE YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
CURRENT YEAR	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					

COMMENTS AND NOTES:

CROP AREA (Ha)			TOPOGRAPHY (flat, rolling)		YEARS IN PERMENANT PASTURE (in last 12 years)	
	Month	Crop sown and yield (t DM/ha)	Sowing method (conventional, direct drilled)	Fertiliser applied (type and application rate)	Irrigation type	Grazed (include what stock) or Harvested (fed out or exported)?
TWO YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
ONE YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
CURRENT YEAR	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					

COMMENTS AND NOTES:

CROP AREA (Ha)			TOPOGRAPHY (flat, rolling)		YEARS IN PERMENANT PASTURE (in last 12 years)	
	Month	Crop sown and yield (t DM/ha)	Sowing method (conventional, direct drilled)	Fertiliser applied (type and application rate)	Irrigation type	Grazed (include what stock) or Harvested (fed out or exported)?
TWO YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
ONE YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
CURRENT YEAR	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					

COMMENTS AND NOTES:

CROP AREA (Ha)			TOPOGRAPHY (flat, rolling)		YEARS IN PERMENANT PASTURE (in last 12 years)	
	Month	Crop sown and yield (t DM/ha)	Sowing method (conventional, direct drilled)	Fertiliser applied (type and application rate)	Irrigation type	Grazed (include what stock) or Harvested (fed out or exported)?
TWO YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
ONE YEARS PREVIOUS	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					
CURRENT YEAR	June					
	July					
	August					
	September					
	October					
	November					
	December					
	January					
	February					
	March					
	April					
	May					

COMMENTS AND NOTES:

NOTE: THIS NUTRIENT BUDGET IS FROM MAY 2012 TO JUNE 2013

*Need farm map with effluent, irrigation and crop area marked

FARM NAME:			
Farm Physical Address			
Dairy supply number			
Total farm area (ha)		Effective area (ha)	

BLOCKS					
	Flat	Rolling	Easy hill		Steep hill
Topography (ha)					
Non effluent area (ha)		Effluent area (ha)		Crop area (ha)	

IRRIGATION											
Irrigation Type (pivot, rotorainer, boarder dyke, kline)											
Irrigation Area (ha split in type)											
Months irrigated (if you irrigate 1 day or 1 week in a month include this month)											
June	**July**	**Aug**	**Sept**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**March**	**April**	**May**

STOCK			
Peak cow numbers		Breed	
Mean calving date		Dry off date	

WINTER GRAZING	**May**	**June**	**July**	**August**
% animals grazed off per month				
Date left farm and date returned				
Total milksolids (kg/year)				
Winter milking (if YES see table on page 7)	YES/NO			
In shed feeding (Tick months occurring below)	YES/NO			

June	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb.**	**March**	**April**	**May**

OTHER STOCK NUMBERS	
Any other stock on farm? (R1, R2, Bulls, carry overs)	
What months?	
How many?	

STRUCTURES												
Feed-pad, Wintering barn, calving pad, stand-off pad												
	Jan	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Days used												
Number cows												
Hours/day												
Feed type												
Describe structure surface												
How long is solid effluent in storage (months) and when (month/s)												
Are solids storage open to rain or covered?												
Are solids separated from the liquid effluent?						YES/NO						
How are solids disposed of? (exported or spread where)												
Is liquid effluent captured and treated the same as dairy effluent?						YES/NO						
If NO, where is liquid effluent disposed?												
DAIRY SHED EFFLUENT												
Effluent – spray from sumps or holding pond?												
Effluent application method (travelling irrigator, pivot, k-line, tanker etc.)												
Separate solids						YES/NO						
If Yes – what blocks are solids spread on and month spread?												

SUPPLEMENTS IMPORTED		
Type (silage, straw, grain, molasses, PKE etc)	**How much of is imported (T DM)?**	**Destination of feed (in shed, effluent/non effluent block)**

SUPPLEMENTS MADE				
What type of supplement made?	**How much supplement made (T DM)**	**Area (ha) supplements made**	**Where is supplement made? (non-effluent/effluent block, dryland or irrigated)**	**Where is supplement fed? (or is it exported)**

FERTILISER											
Maintenance/Capital fertiliser (months applied)											
Product used and rate (kg/ha)?											
Area applied to (ha) (effluent/non-effluent area)?											
Do you treat effluent block differently to your non effluent block?	YES/NO										
Urea fertiliser (kg/ha per month)					**EFFLUENT Block**						
June	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**
Urea fertiliser (kg/ha per month)					**NON EFFLUENT Block**						
June	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**
Fertiliser applied after supplement cut (silage/hay)											
Product, rate and month applied (months and kg/ha)											

A fodder crop block is a crop which has pasture before and after the crop, often a fodder crop rotates around a farm and is never in the same area two years in a row. A crop block has crop in the same area for two or more years before returning to pasture.

FODDER CROP

Fodder Crop (May 2012 – May 2013)	Area (ha)	Crop yield (T)	Blocks crop rotates around (e.g. effluent/non-effluent)	Month sown	Fertiliser at sowing (product and kg/ha)	Urea applications (month and kg/ha)	Month grazed/harvested	Month sown back into pasture

CROP

Current Crop (May 2012 – June 2013)	Previous Crop (May 2011 – June 2012)	Crop area (ha)	Crop yield (T)	Month sown	Fertiliser at sowing (product and kg/ha)	Urea applications (month and kg/ha)	Month grazed/harvested	Month sown back into pasture	Years in permanent pasture out of last 12

Method of crop residual removal (baled, burnt, incorporated, grazed)	

ONLY FILL OUT FOR WINTER MILKING!!!

WINTER MILKING	
Number of cows calving in Autumn	
Mean Autumn calving date	
Dry off date for Autumn calvers	
Do they go off farm once dried off? (Autumn calvers)	
Number of cows calving in Spring	
Mean Spring calving date	
Dry off date for Spring calvers	