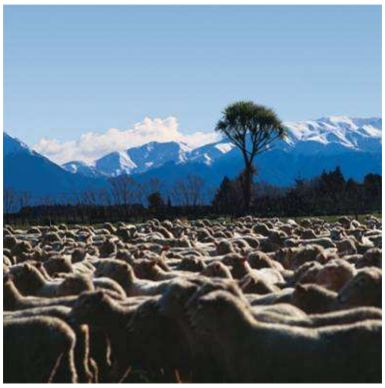
Farming, Food and Health. First

Te Ahuwhenua, Te Kai me te Whai Ora. Tuatahi

Upper Waitaki Farm Systems and Nutrient Assessment

Stage 3: Base case nutrient assessments

August 2008



2020 SCIENCE

New Zealand's science. New Zealand's future.

Upper Waitaki Farm Systems and Nutrient Assessment
Stage 3: Base case nutrient assessments

Report prepared for GHD

August 2008

Val Snow, Duncan Smeaton, David Houlbrooke

Table of Contents

Executive Summary

- Purpose of this report is to provide estimates of nutrient losses from existing farm systems in the Upper Waitaki region. These estimates will contribute to the estimation of current nutrient loads to the local rivers and lakes.
- The approach taken here was to collate long-term pasture and forage growth rates using a combination of review and pasture growth modelling, combined with information from station managers, to provide inputs to the Farmax farm system model. A combination of information from the station managers and Farmax was then supplied to the nutrient budget model OVERSEER® (see below) to calculate a long-term average nutrient loss.
- Six stations in the Upper Waitaki region (Haldon, Ribbonwood, Grays Hill, Ohau Downs, Simons Pass, and Simons Hill) were modelled to provide information on nutrient losses for a range of stocking rate, climate, and soil conditions.
- Detailed information about the Stations modelled, the model inputs, and the modelled nutrient losses can be found in Appendix 3 and a summary block by block modelled nutrient losses are presented in Appendices 1 and 2.
- Nutrient losses from each station, using the effective farm area, were:

Table E1. Brief description of each station with estimated N and P loss. Where stations have existing irrigated blocks an estimate of effective whole-farm N loss assuming a "Highly Developed" status on the irrigated blocks is also given.

Station	Farm Type	N loss (kg/ha) "Developed"	N loss (kg/ha) "Highly Developed"	P loss (kg/ha)
Simon's Hill	sheep 3 su /ha	5.3	7.6	0.10
Simon's Pass	sheep/beef 1.2 su /ha	4.0	4.3	0.02
Gray's Hill	sheep/beef 1.8 su /ha	3.6	4.1	0.09
Ohau Downs	sheep/beef 1.7 su /ha	5.1		0.06
Ribbonwood	sheep/beef 1.6 su /ha	3.3		0.14
Haldon	sheep/beef/deer 1.2 su /ha	2.8	3.1	0.43

- Nutrient losses from each category of block within station were:

Table E2. Estimated N and P loss and range by block type within Station.

Block Type	Count	N loss (kg N /ha)			P loss (kg P /ha)		
		Range	Average	Median	Range	Average	Median
Pasture	27	2 - 4	2.6	3.0	0.0 - 1.0	0.14	0.00
Forage	6	30 - 54	43.3	45.5	0.5 - 0.5	0.50	0.50
Grain	1		28.0			1.00	
Irrigated (Developed)	5	6 - 12	9.0	9.0	0.2 - 1.9	0.68	0.40
Irrigated (Highly dev)	5	11 - 58	31.4	37.0			

- At a block level nutrient losses were strongly influenced by usage. Losses were particularly high from forage crop blocks and were higher from irrigated than dryland pasture blocks. The assumption of development status had a significant effect on modelled N loss. The selection of "Highly Developed" forces OVERSEER® to assume no immobilisation of N into the soil organic matter. While the farming system will eventually lead to a steady-state soil organic matter (no immobilisation) it will take some considerable time to reach a steady state and the estimates for the “Highly Developed” status must be regarded as very conservative in terms of nutrient accessions.

- There was a strong relationship between effective stocking rate and N loss (Figure E1) when two stations were removed from the analysis. The outlier stations were Ohau Downs and Simon’s Pass. The likely reasons for the outliers were a high percentage of area in forage cropping in the Ohau Downs Station and the large area of light soils on Simon’s Pass Station.

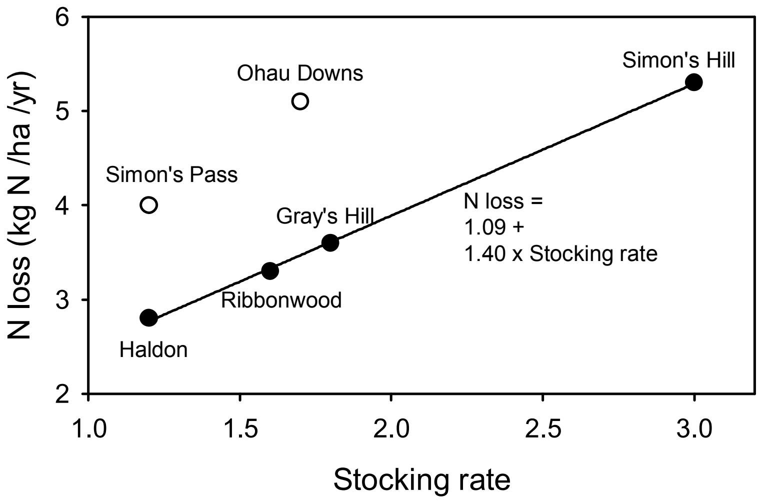


Figure E1. Station effective stocking rate and estimated N loss. Regression line and equation are for the four stations marked with a solid symbol

- Estimated P losses were low, less than 0.15 kg P /ha with the exception of Haldon Station. The higher P losses on Haldon station were a result of the deer stock. There was a moderate relationship between P loss and stocking rate (Figure E2) once Haldon and Ribbonwood Stations were removed from the analysis. The P losses from Ribbonwood were influenced by the effects of the Hill Country soil.

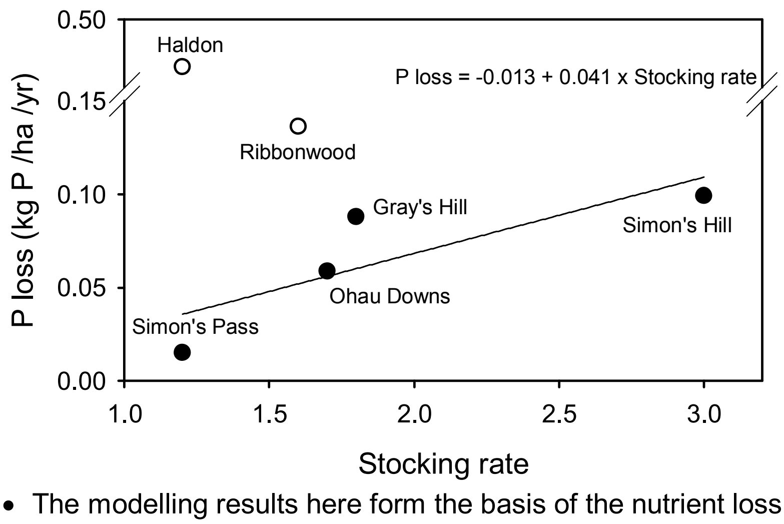


Figure E2. Station effective stocking rate and estimated P loss. Regression line and equation are for the four stations marked with a solid symbol

- The modelling results here form the basis of the nutrient loss estimates for the six major stations in the proposed irrigation scheme and will be used as input information to ground and surface water modelling (by GHD) to give baseline, or effective dryland, nutrient accessions to the water bodies. In the next stage of this work the stations will be modelled with and without irrigation available for a range of farm system types. This information will be combined with farm system information from Agribase to provide whole-catchment nutrient for both the dryland and irrigated cases.

1. Introduction

Purpose of this report is to provide estimates of nutrient losses from existing farm systems in the Upper Waitaki region. These estimates will contribute to the estimation of current nutrient loads to the local rivers and lakes.

Following sections of this report describe the approach taken in the modelling, the models used and the assumptions applied in the modelling, and then gives estimates of nutrient losses from existing primarily dryland stations in the Upper Waitaki region. Details of the modelling of each of the stations are given in the Appendices.

2. Approach taken to assess nutrient loads from existing farms

The estimation of nutrient losses from pastoral farms is complex. The losses resulting from a combination of climate and climate variability; soil type; animal stocking rate, types and pattern during the year; supplement conservation and feeding strategies; nitrogen and other fertiliser usage; forage crop integration into the system; and other factors. There are dynamic simulation models capable of mimicking pastoral farm systems (Moore et al. 2007; Bryant & Snow 2008; Johnson et al. 2008) and such a model would have advantages for the purpose here in that there would be a single modelling step between input information (soil, climate and management information) and the desired nutrient loss estimates. However, it is well known that the characteristics of urine patches (number, size, and time of deposition) are critical in controlling nitrogen losses from pastoral farms (Haynes & Williams 1993) and although there is active work in developing models that take specific account of urine patches (Bryant et al. 2007; Snow et al. 2007) such models are currently only suitable for research purposes. There are also significant challenges associated with dynamically modelling the management of pastoral farms (Snow & Lovatt 2008) in a manner that will provide a robust and realistic representation of the changes in stocking rate during the year. All of these limitations mean that a multi-step modelling process is needed for the estimation of nutrient losses.

The approach taken here was to collate long-term pasture and forage growth rates using a combination of review (King 2008; Trolove 2008) and pasture growth modelling (Snow & King 2008) to, long with information from station managers, provide inputs to a farm system model (Farmax, see below). This step ensured that the stocking rate and farm system information collated from the farmers was appropriate for a long-term average representation of these farm systems operating in a highly variable climate. A combination of information from the station managers and Farmax was then supplied to the nutrient budget model OVERSEER® (see below) to calculate a long-term average nutrient loss.

2.1 Farm system modelling - Farmax

FARMAX Pro (version 6.3.25.3) was the primary tool used in this modelling exercise. This whole-farm management software lets the user explore the consequences of changes to farm stocking policy. FARMAX Pro evolved from an earlier model, StockPol (Marshall et al. 1991). The key function of FARMAX Pro is to determine if the planned stocking policy is *biologically feasible*. FARMAX Pro determines biological feasibility by calculating the minimum whole farm pasture cover required to meet animal requirements and comparing it to the farm cover predicted from the whole-farm feed supply and demand data e.g. animal types, numbers, live weight, live weight gain, starting pasture cover, pasture quality, pasture growth rates, forage crops and supplements fed. If predicted pasture cover is below or excessively above the minimum required then the farm is declared not feasible.

2.2 Nutrient modelling – OVERSEER®

The role of OVERSEER® in this study was to provide effective whole-farm nutrient losses given feasible farm management, production and input data.

The OVERSEER® model (Ledgard et al. 1999; Wheeler et al. 2003; Wheeler et al. 2006) uses empirical relationships, internal databases, and readily available data from an "existing" farm to estimate the nutrient inputs and outputs at farm or paddock scale, and presents them as a nutrient budget. Here an "existing" farm refers to the fact that OVERSEER® does not simulate production but instead requires farm productivity and fertiliser use as inputs to the model. These quantities are usually known for existing farms or can be estimated for hypothetical farms using models such as Farmax (Marshall et al. 1991; Webby et al. 1995) or Udder (Larcombe 1999).

The model has been developed reviewing the knowledge obtained primarily in New Zealand and in consultation with end-users (farmers, consultants), thus it is well suited for handling management practices and environmental conditions particular to New Zealand. For reliable performance, the OVERSEER® model requires that reasonable input data appropriate to long-term average conditions are given. This includes, for example, that the level of fertiliser inputs to the farm is sufficient to support the level of production. It is also assumed that the system is in quasi-equilibrium and that good management practices are followed (Ledgard et al. 1999). The model is designed to predict the long-term average behaviour of the system and so it is not suitable for examination of extreme-case scenarios or systems in transition. Likewise, it is not suitable for estimating nutrient losses from particular years.

Initially OVERSEER® was primarily used to assist fertiliser management, but it has evolved to become a tool for evaluating farm systems, including its impact on the environment (Wheeler et al. 2006). OVERSEER® is widely used in New Zealand as a decision support model by consultants. Training in the usage of the model has been integrated into the Sustainable Nutrient Management Programme (see flrc.massey.ac.nz). OVERSEER® has also been used in a series of studies for evaluating different systems and scenarios, for comparing nutrient efficiency of New Zealand farms with overseas counterparts (Ledgard et al. 2000; Thomas et al. 2005), and to examine the effects of land use change and management practices on nutrient loss (Condron et al. 2000; Ledgard et al. 2001; Ledgard & Power 2006). More recently the model has been also considered for monitoring farm nutrient losses as an instrument for enforcing new environmental policies (Dragten & Thorrold 2005). Recent evidence tabled during the hearings in relation to Waikato Regional Council's Regional Plan Variation 5 (Ledgard 2007; Clothier 2008) have found OVERSEER® to be the most suitable model for assessing the long-term average nutrient losses from pastoral farms.

Input information and assumptions used in the OVERSEER® simulations included:

- Site specific rainfall and district average temp were obtained from (Webb 1992);
- Irrigation water nutrient concentrations were taken from Webb (1992) as mean concentration of the water in Lake Tekapo;
- The soil types for each block taken from soil maps in Webb (1992) with (DSIR 1964) as a secondary reference for stations beyond the extent of the Webb (1992) map
- Plant-available water was supplied by Aqualinc Research from GIS data derived from Webb (1992);

- Annual drainage was supplied by Aqualinc Research modelling based on PAW and water inputs;
- Animal and farm productivity was derived from the Farmax modelling;
- Soil test information and fertiliser inputs were supplied by each station manager;
- Pasture types were assumed to be a ryegrass/white clover mix except for the hill country blocks which were assumed to be unimproved tussock land;
- Following local observations very low clover content was assumed for dryland areas and medium clover content on irrigated pasture.

Data from a combination of the Farmax simulations of the stations and additional information derived from station managers and maps were used to provide the input data for OVERSEER®. Analysis of the OVERSEER® outputs for irrigated blocks within otherwise dryland farms showed large accumulations of nitrogen in the soil organic matter (immobilisation – see for example the nutrient assessment for the irrigated block on Haldon Station, p 19). While it is normal for there to be substantial increases in soil organic nitrogen after a dryland is irrigated (e.g. Gillabel et al. 2007) such a rate of immobilisation cannot be sustained indefinitely so we consider the estimates of N leaching for these particular cases to be low compared to the expected long-term values. It is not correct to simply add the amount of N immobilised to the estimated leaching to get better long-term values because once the irrigated pasture is more developed generally N fixation will reduce and gaseous losses of N will increase. To obtain better long-term estimates of leaching under irrigated conditions the OVERSEER® simulations were run again with the development status of the irrigated blocks set to "Highly Developed". This option in the model prevents any immobilisation and so gives an upper bound on the leaching from the irrigated blocks providing a highly conservative estimate of N leaching from these blocks. Compare, for example, the leaching from the "Developed" irrigated block on Haldon Station (p 19) to the "Highly Developed" case (p 25).

2.3 Farm systems modelled

Six stations in the Upper Waitaki region were modelled to provide information on farm systems for a range of stocking rate, climate, and soil conditions. The modelled stations were chosen to span a range of key farm characteristics including stocking rate, stock type, existing irrigation systems, area of winter forage cropping. These stations, with brief details, were:

- Haldon Station
  - Haldon Station is about 50 km from Lake Tekapo and comprises Haldon farm (6200 ha) on the north-east shore of Lake Benmore and Kirkliston farm (8200 ha) approximately 15 km to the north-east. The combined area of both properties is 14400 ha. The farms combined consist of approximately 900 ha of flat rolling country, 680 ha of irrigated land (mostly border dyke with some centre pivot) and 12400 ha of rolling to very steep hill country. Approximately 500 ha of land is currently unused due to rabbit predation. A rabbit control programme will be undertaken soon. The overall nominal stocking rate is 1.2 stocking units /ha consisting of 8000 su of Merino sheep, 1800 su of Merino x Border Leicester sheep, 9500 su of deer and 6050 su of Hereford breeding cows.
- Ribbonwood Station
  - Ribbonwood Station and Shelton Downs butt onto each other at one corner and are run. Here they are modelled as one unit under the Ribbonwood Station name. Shelton Downs is rolling to flat and is 2700 ha in size and comprises mostly oversown topdressed semi-developed pastures. Ribbonwood is 7300 ha

and contains 1200 ha of productive flats at its eastern end and 600 ha of much less productive flats at its western or Auriri River end. In the middle, there are 5500 ha of hills. The entire property, (both farms) is stocked at 1.6 su /ha with 12200 su of Merino sheep and 3800 su of cattle based on a breeding cow system. The farm is 15 km north west of Omarama and experiences a colder climate than some of the other stations modelled.

- Grays Hill Station
    - The northern boundary of Grays Hill is 10km south of Lake Tekapo. Grays Hill Station is nearly 22000 ha in size of which 13000 ha is flat, very unproductive and grazed only rarely. The rest of the farm comprises 150 ha of centre pivot irrigation, 2200 ha of flat to rolling slightly wetter country that is a lot more productive than the large (13000 ha) flat area. Finally, there are 6000 ha of hill country (Grays Hills). Because of this the effective farm area is considered to be only 8400 ha and it is this area that has been modelled. The effective farm area is stocked at 1.82 su /ha. Enterprises include 11200 su of Merinos, 1100 su of Merino x Border Leicester and 3000 su of cattle centered on breeding cows.
- Ohau Downs Station
    - Ohau Downs Station is located at the southern end of Lake Ohau, 20km north of Omarama. The Station consists of a mix of rolling and flat country, with the flats in several terraces. This farm is undergoing a development programme and contains approximately a quarter undeveloped “native” pasture, a quarter rarely grazed QE II reserve land with the rest in developed dryland pasture and ryecorn. The farm is 5100 ha in size and carries 8300 su sheep (Merino and some Merino x Suffolk) and 400 su young cattle. The effective farm stocking rate is 1.71 su/ha.
- Simons Pass Station
    - Simons Pass Station is located at the south end of Lake Pukaki and.is mostly flat to rolling. Large areas of the flats are essentially unproductive. The farm has 70 ha of border dyke irrigation which operates between 1 and 5 months of the year depending on the flow rate of the contributing Maryburn Stream. The farm has about 3500 ha of variously developed pasture and 2900 ha of much less productive land. The farm stocking rate is 1.2 su /ha comprising 7000 su of Merino sheep and 600 su of 2 and 3 year steers.
- Simons Hill Station.
    - Simons Hill Station is adjacent to the eastern side of Simons Pass and is 20km north east of Twizel. The Station is 6000 ha but only half of this is considered to be effective farm area because there are 3000 ha of unproductive flats that are currently ungrazed. Of the remaining 3000 ha there are 150 ha of irrigated by centre pivot when flow rates from the Maryburn permit, nearly 900 ha of developed flat to rolling country and 1900 ha of oversown, topdressed hills. The effective farm carries 3 su /ha (excluding the unproductive flats) of Merino sheep, 9600 su in total excluding the area. In the last year some cattle have been introduced to the system.

2.4 Model data requirements

Several sources of information were used to supply the model data requirements. The sources and information supplied were:

- Supplied through personal interview with the relevant Station managers and/or advisors

    - Farm system information: stocking rate; pattern of stock classes during the year; animal trading; production; supplements bought, made, and sold; fertiliser (N & P) used; soil test information
- Supplied by Aqualinc Research
    - Station soil type by plant-available water category
- Supplied by GHD and Aqualinc Research
    - Station rainfall and drainage category
- Supplied through existing reports (DSIR 1964; Webb 1992; King 2008; Snow & King 2008; Trolove 2008)
    - Forage and pasture growth, fertiliser response rate, supplementary soil information

3. Nutrient assessments for existing farm systems

Detailed information about the Stations modelled, the model inputs, and the modelled nutrient losses can be found in Appendix 3 and a summary block by block modelled nutrient losses are presented in Appendices 1 and 2.

Nutrient losses from each station, using the effective farm area, are summarised in Table 1 with a breakdown by block usage in Table 2. Station N losses ranged from 2.8-5.3 kg N /ha for the "developed" cases and 3.1-7.6 kg N N/ha for the "Highly Developed" cases. Station P losses ranged from 0.02 to -.43 kg P /ha.

At a block level nutrient losses were strongly influenced by usage. Losses were particularly high from forage crop blocks (Table 2) and were higher from irrigated than dryland pasture blocks. The assumption of development status (Table 2) had a significant effect on modelled N loss. The selection of "Highly Developed" forces OVERSEER® to assume no immobilisation of N into the soil organic matter. While the farming system will eventually lead to a steady-state soil organic matter (no immobilisation) it will take some considerable time to reach a steady state and the estimates for the "Highly Developed" status must be regarded as very conservative in terms of nutrient accessions.

Table 1. Brief description of each station with estimated N and P loss. Where stations have existing irrigated blocks an estimate of effective whole-farm N loss assuming a "Highly Developed" status on the irrigated blocks is also given.

Station	Farm Type	N loss (kg/ha) "Developed"	N loss (kg/ha) "Highly Developed"	P loss (kg/ha)
Simon's Hill	sheep 3 su /ha	5.3	7.6	0.10
Simon's Pass	sheep/beef 1.2 su /ha	4.0	4.3	0.02
Gray's Hill	sheep/beef 1.8 su /ha	3.6	4.1	0.09
Ohau Downs	sheep/beef 1.7 su /ha	5.1		0.06
Ribbonwood	sheep/beef 1.6 su /ha	3.3		0.14
Haldon	sheep/beef/deer 1.2 su /ha	2.8	3.1	0.43

Table 2. Estimated N and P loss and range by block type within Station.

Block Type	Count	N loss (kg N /ha)			P loss (kg P /ha)		
		Range	Average	Median	Range	Average	Median
Pasture	27	2 - 4	2.6	3.0	0.0 - 1.0	0.14	0.00
Forage	6	30 - 54	43.3	45.5	0.5 - 0.5	0.50	0.50

Grain	1		28.0		1.00
Pivot Irrig (Dev)	3	6-12	9	0.2-0.6	0.4
Border Irrig (Dev)	2	7-11	9	0.3-1.9	1.1
Pivot Irrig (H. Dev)	3	11-58	35.3		
Border Irrig (H. Dev)	2	13-38	25.5		

There was a strong relationship between effective stocking rate and N loss (Figure 1) when two stations were removed from the analysis. The outlier stations were Ohau Downs and Simon's Pass. The likely reasons for the outliers were a high percentage of area in forage cropping in the Ohau Downs Station (see Table 2 below and Table 3; Appendix 1) and the large area of light soils on Simon's Pass Station (see Table 3; Appendix 1).

Figure 1. Station effective stocking rate and estimated N loss. Regression line and equation are for the four stations marked with a solid symbol. Irrigated blocks are assumed to be in a "Developed" status.

With the exception of Haldon Station, phosphorus losses were low, less than 0.15 kg P /ha. The higher losses on Haldon station were a result of the deer stock units (10% of the total stock units) that, through fenceline running and wallowing behaviour, cause higher sediment and P losses than other stock classes. There was a moderately string relationship between effective stocking rate and P loss (Figure 2) when the Haldon and Ribbonwood stations were removed from the analysis. The high P loss from Haldon is explained by the deer on the property. The high estimated P loss from Ribbonwood seems to result from the prevalence of the Hill Country soils on the property.

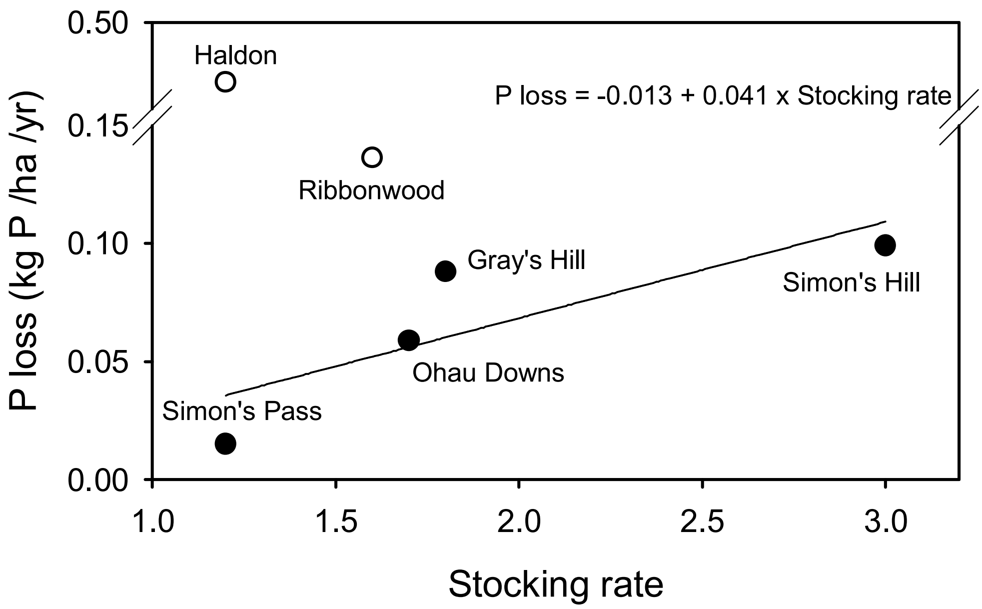


Figure 2. Station effective stocking rate and estimated P loss. Regression line and equation are for the four stations marked with a solid symbol.

4. Linkage to future work

The modelling results here form the basis of the nutrient loss estimates for the six major stations in the proposed irrigation scheme and will be used as input information to ground and surface water modelling (by GHD) to give baseline, or effective dryland, nutrient accessions to the water bodies. In the next stage of this work the stations will be modelled with and without irrigation available for a range of farm system types. This information will be combined with farm system information from Agribase to provide whole-catchment nutrient for both the dryland and irrigated cases.

5. References

Bryant JR, Hoogendoorn CJ, Snow VO 2007. Simulation of mitigation strategies to reduce nitrogen leaching from grazed pasture: Proceedings of the New Zealand Grassland Association 69: 145-151.

Bryant JR, Snow VO 2008. Modelling pastoral agro-ecosystems: a review: New Zealand Journal of Agricultural Research 51: *in press*.

Clothier BE 2008: Statement of evidence of Brent Euan Clothier. In the matter of the Resource Management Act 1991 and in the matter of appeals under Clause 14 of the First Schedule of the Act. 29p.

Condron LM, Cameron KC, Di HJ, Clough TJ, Forbes EA, McLaren RG, Silva RG 2000. A comparison of soil and environmental quality under organic and conventional farming systems in New Zealand: New Zealand Journal of Agricultural Research 43: 443-466.

Dragten R, Thorrold BS 2005: Consents for farming: regulating nutrient loss in the lake Taupo catchment. Fertilizer and Lime Research Centre Conference - Developments in fertiliser application technologies and nutrient management, Palmerston North, NZ.

DSIR 1964: New Zealand Soil Bureau Map, South Island Series, Sheet 8.

Gillabel J, Denef K, Brenner J, Merckx R, Paustian K 2007. Carbon sequestration and soil aggregation in center-pivot irrigated and dryland cultivated farming systems: Soil Science Society of America Journal 71: 1020–1028.

Haynes RJ, Williams PH 1993. Nutrient cycling and soil fertility in the grazed pasture ecosystem: Advances in Agronomy 49: 119-199.

Johnson IR, Chapman DF, Snow VO, Eckard RJ, Parsons AJ, Lambert MG, Cullen BR 2008. DairyMod and EcoMod: biophysical pasture simulation models for Australia and New Zealand: Australian Journal of Experimental Agriculture 48: 621-631.

King W 2008: Upper Waitaki Farm Systems and Nutrient Assessment Stage 2: Pasture growth literature review. Report prepared for GHD. May 2008. 8p.

Larcombe MT 1999: UDDER for Windows: A desktop dairyfarm for extension and research - operating manual. Maffra, Victoria, Australia, Maffra Herd Improvement Co-op:

Ledgard SF 2007: Statement of evidence of Stewart Francis Ledgard. In the matter of the Resource Management Act 1991 and in the matter of appeals under Clause 14 of the First Schedule of the Act. 29p.

Ledgard SF, Power I 2006: Nitrogen and phosphorus loss from "average" Waikato farms to waterways as affected by best or potential management practices. Hamilton, AgResearch Ltd.: 11p.

Ledgard SF, Steel K, Roberts AHC, Journeaux PR 2000: Use of OVERSEER™ to compare farm systems and countries for nutrient balances, losses and efficiency. *In* Currie LD, Loganathan P *ed*. Soil Research-A knowledge industry for land-based exporters - Occasional Report No.13, Palmerston North. 83-91.

Ledgard SF, Thorrold BS, Petch RA, Young J 2001: Use of OVERSEER as a tool to identify management strategies for reducing nitrate leaching from farms around Lake Taupo. *In* Currie LD, Loganathan P *ed*. 14 Fertilzer and Lime Research Centre Conference - Precision tools for improving land management, Palmerston North, NZ. 187-194.

Ledgard SF, Williams PH, Broom FD, Thorrold BS, Wheeler DM, Willis VJ 1999: Overseer™ - A nutrient budgeting model for pastoral farming, wheat, potatoes, apples and kiwifruit. *In* Currie LD, Hedley MJ, Horne DJ, Loganathan P *ed*. Best Soil Management Practices for Production - Occasional Report No.12, Palmerston North. 143-152.

Marshall PR, McCall DG, Johns KL 1991. Stockpol: a decision support model for livestock farms: Proceedings of the New Zealand Grasslands Association 53: 137-140.

Moore AD, Holzworth DP, Herrmann NI, Huth NI, Robertson MJ 2007. The Common Modelling Protocol: A hierarchical framework for simulation of agricultural and environmental systems: Agricultural Systems 95: 37-48.

Snow VO, King W 2008: Upper Waitaki Farm Systems and Nutrient Assessment Stage 2: Pasture and ryecorn growth modelling. Report prepared for GHD. May 2008. Palmerston North, AgResearch: 20p.

Snow VO, Lovatt SJ 2008. A general planner for agro-ecosystem models: Computers and Electronics in Agriculture 60: 201-211.

Snow VO, Zyskowski RF, Cichota R, Lilburne LR, Jamieson PD 2007: The effect of temporal aggregation on modelling pasture growth and nitrate leaching from urine patches. *In* Kulasiri D, Oxley L *ed*. MODSIM 2007 International Congress on Modelling and Simulation. Modelling and Simulation Society of Australia and New Zealand, December

2007. ISBN : 978-0-9758400-4-7. www.mssanz.org.au/MODSIM07/papers/25_s25/TheEffect_s25_Snow_.pdf, University of Canterbury. 1646-1652.

Thomas SM, Ledgard SF, Francis GS 2005. Improving estimates of nitrate leaching for quantifying New Zealand's indirect nitrous oxide emissions: Nutrient Cycling in Agroecosystems 73: 213-226.

Trolove S 2008: Yields of dryland and irrigated crops grown in the Upper Waitaki Catchment – literature review. Crop & Food Research Confidential Report No 2105. Report prepared for AgResdearch. May 2008. Palmerston North, New Zealand, Crop and Food Research: 19p.

Webb TH 1992: Soils of the Upper waitaki Basin, South Island, New Zealand. DSIR Land Resources Scientific Report No. 3. Lower Hutt, New Zealand, DSIR Land Resources: 100p.

Webby RW, McCall DG, V.J. B 1995. An evaluation of the Stockpol™ model Proceedings of the New Zealand Society of Animal Production 55: 145-159.

Wheeler DM, Ledgard SF, deKlein CAM, Monaghan RM, Carey PL, McDowell RW, Johns KL 2003. OVERSEER® nutrient budgets – moving towards on-farm resource accounting.: Proceedings of the New Zealand Grassland Association 65: 191-194.

Wheeler DM, Ledgard SF, Monaghan RM, McDowell RW, DeKlein CAM 2006: OVERSEER nutrient budget model – what it is, what it does. *In* Curries LD, Hanly JA *ed*. Implementing sustainable nutrient management strategies in agriculture, Palmerston North, New Zealand. Occasional Report No. 19: 231–236.

Appendix 1: Station nutrient losses by block – irrigated blocks at a "Developed" status

Table 3. Estimated N and P loss from each block with each modelled Station.

Station	Block Type	Block ID	Area (ha)	PAW (mm)	N loss (kg/ha)	P loss (kg/ha)
Simon's Hill	Irrigated	Irrigated block	150	130	12.0	0.20
	Pasture	Well drained	354	30	2.0	0.00
	Pasture	Deep poor drained	158	130	2.0	0.00
	Pasture	Deep well drained	224	130	3.0	0.00
	Pasture	Hill country	1907		3.0	0.10
	Forage	Forage crop	140		45.0	0.50
	Effective farm area		2933		5.3	0.10
Simon's Pass	Irrigated	Border dyke	70	130	11.0	0.30
	Pasture	Heavy soils	565	90	4.0	0.00
	Pasture	Medium soils	2665	60	4.0	0.00
	Pasture	Shallow soils	2900	30	2.0	0.00
	Forage	Forage crop	150		38.0	0.50
	Effective farm area		6350		4.0	0.02
Ohau Downs	Pasture	Arable pasture	800	90	2.0	0.00
	Pasture	Perm pasture	1500	90	2.0	0.00
	Pasture	QEII undeveloped	1200	130	2.0	0.00
	Pasture	Native undeveloped	1200	90	2.0	0.00
	Forage	Forage crop	200		54.0	0.50
	Grain	Grain crop	200		28.0	1.00
	Effective farm area		5100		5.1	0.06
Gray's Hill	Irrigated	Irrigated pasture	150	130	9.0	0.60
	Pasture	Floodplain pasture	2151	130	3.0	0.00
	Pasture	Hill country	6000		3.0	0.10
	Forage	Ryecorn forage	100		46.0	0.50
	Effective farm area		8401		3.6	0.09
Ribbonwood	Pasture	Shelton arable	160	130	3.0	0.00
	Forage	Turnips	100		47.0	0.50
	Pasture	Shelton native	330	90	3.0	0.00
	Pasture	Shelton oversown	2170	60	3.0	0.10
	Pasture	E flats dry	607	90	2.0	0.00
	Pasture	E flats wet	547	90	3.0	0.00
	Pasture	Ahuriri flats	607	60	2.0	0.00
	Pasture	Hill wet	2740		3.0	0.20
	Pasture	Hill dry	2740		3.0	0.20
	Effective farm area		10001		3.3	0.14
Haldon	Pasture	Kirk Basin	2833	60	2.0	0.00
	Pasture	Kirk Downs	2023	60	3.0	0.00
	Pasture	Kirk Hill	3345		3.0	0.00
	Irrigated	Border irrigation	485	90	7.0	1.90
	Irrigated	Pivot irrigation	190	130	6.0	0.40
	Pasture	Dry flats	500	130	2.0	1.00
	Pasture	Lucerne	300	130	2.0	1.00
	Pasture	Hill Home	4145		2.0	1.00
	Forage	Ryecorn forage	100		30.0	0.50
	Effective farm area		13921		2.8	0.43

Appendix 2: Station nutrient losses by block – irrigated blocks at a "Highly Developed" status

Table 4. Estimated N and P loss from each block with each modelled Station for those Stations with irrigated block assuming a "Highly Developed" status for the irrigated blocks.

Station	Block Type	Block ID	Area (ha)	PAW (mm)	N loss (kg/ha)
Simon's Hill (Highly developed)	Irrigated	Irrigated	150	130	58.0
	Pasture	Well drained	354	30	2.0
	Pasture	Deep poor drained	158	130	2.0
	Pasture	Deep well drained	224	130	3.0
	Pasture	Hill country	1907		3.0
	Forage	Forage crop	140		45.0
	Effective farm area		2933		7.6
Simon's Pass (Highly developed)	Irrigated	Border dyke	70	130	38.0
	Pasture	Heavy soils	565	90	4.0
	Pasture	Medium soils	2665	60	4.0
	Pasture	Shallow soils	2900	30	2.0
	Forage	Forage crop	150		38.0
	Farm	Effective farm	6350		4.3
	Irrigated	Irrigated pasture	150	130	37.0
	Pasture	Floodplain pasture	2151	130	3.0
	Pasture	Hill country	6000		3.0
	Forage	Ryecorn forage	100		46.0
	Effective farm area		8401		4.1
Haldon (Highly developed)	Pasture	Kirk Basin	2833	60	2.0
	Pasture	Kirk Downs	2023	60	3.0
	Pasture	Kirk Hill	3345		3.0
	Irrigated	Border irrigation	485	90	13.0
	Irrigated	Pivot irrigation	190	130	11.0
	Pasture	Dry flats	500	130	2.0
	Pasture	Lucerne	300	130	2.0
	Pasture	Hill Home	4145		2.0
	Forage	Ryecorn forage	100		30.0
	Effective farm area		13921		3.1
Gray's Hill (Highly developed)	Irrigated	Irrigated pasture	150	130	37.0
	Pasture	Floodplain pasture	2151	130	3.0
	Pasture	Hill country	6000		3.0
	Forage	Ryecorn forage	100		46.0
	Effective farm area		8401		4.1

Appendix 3: Detailed Station Farm System and Nutrient Information

Haldon Station

Farm system information

Haldon Station is about 50 km from Lake Tekapo and comprises Haldon farm (6200 ha) on the north-east shore of Lake Benmore and Kirkliston farm (8200 ha) approximately 15 km to the north-east. The combined area of both properties is 14400 ha. The farms combined consist of approximately 900 ha of flat rolling country, 680 ha of irrigated land (mostly border dyke with some centre pivot) and 12400 ha of rolling to very steep hill country. Approximately 500 ha of land is currently unused due to rabbit predation. A rabbit control programme will be undertaken soon. The overall nominal stocking rate is 1.2 stocking units /ha consisting of 8000 su of Merino sheep, 1800 su of Merino x Border Leicester sheep, 9500 su of deer and 6050 su of Hereford breeding cows.

Pasture growth rates by block

Block name	Area (ha)	Total growth (kg DM /ha /yr)	Rel growth %
K Basin	2833	1561	87%
K Downs	2023	2140	119%
K High	3345	856	48%
Irrigation	600	14366	798%
Dry heavy	600	2129	118%
Lucerne	300	2656	148%
Hill home	4220	856	48%
Unused	500	92	5%
Whole farm	**14421**	**1801**	**100%**

Soil test results	pH	P	K	Sulphate S	Mg	Na	Ca
Typical soil test results March 07	6+	30+	15+ (one value = 7)	4 to 6	11 to 40	1 to 9	

Fertiliser applications

Irrigation area	Super 10 maintenance at 250kg/ha
Ryecorn regrassing areas	150kg/ha reverted super
Heavy dry soils	200kg/ha super 10 depending on soil test
Fertiliser on hill country	None for 3 years, in average year, apply 100kg/ha super
	Does not apply fertiliser during droughts

Nitrogen for K High
Haldon Stn (Jul 08 - Jun 09)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	01 Sep 08	40	10	60			
Total						**0**	**0**

Nitrogen for Irrigation
Haldon Stn (Jul 08 - Jun 09)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	01 Mar 08	30	10	60	167	5010	10020
Total						**5010**	**10020**

Nitrogen for Pink dry heavy
Haldon Stn (Jul 08 - Jun 09)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	01 Mar 09	30	8	60	167	5010	10020
Total						**5010**	**10020**

Nitrogen for Green lucerne
Haldon Stn (Jul 08 - Jun 09)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	15 Mar 08	40	10	60			
Total						**0**	**0**

Crops Table for Irrigation
Haldon Stn (Jul 08 - Jun 09)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Wrapped Silage	53.0	01 Sep 08	30 Nov 08	91	Wrapped Silage	31	15.0	795	Big Bales	22260	
Total										**22260**	

[a] No production cost for crops which begin on start date (01 Jul 08), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for Pink dry heavy
Haldon Stn (Jul 08 - Jun 09)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Rye corn 2	100.0	01 Jul 08	30 Nov 08	153	Rye corn	100	1.5	150	tDM	90000	[a,b]
Big Bales	80.0	01 Sep 08	18 Nov 08	79	Big Bales	85	5.0	400	bales	18000	
Rye corn	100.0	01 Feb 09	30 Jun 09	150	Rye corn	100	3.0	300	tDM	40000	
Total										**148000**	

[a] No production cost for crops which begin on start date (01 Jul 08), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for Green lucerne
Haldon Stn (Jul 08 - Jun 09)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Lucerne Hay	200.0	15 Sep 08	29 Nov 08	76	Lucerne Hay	85	10.0	2000	bales	4000	
Total										**4000**	

[a] No production cost for crops which begin on start date (01 Jul 08), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Supplements Amounts for Haldon Stn

Jul 08 - Jun 09

Month	Big Bales bales	Rye corn tDM	Lucerne Hay bales	Wrapped Sila... Big Bales	Sheep Nuts tonnes	Barley tonnes
On-Hand at Start	300.0		1500.0	600.0		
Bought		350.0			2.0	150.0
Produced	400.0	450.0	2000.0	795.0		
Jul 08	100.0	100.0	500.0	200.0	0.5	
Aug 08	100.0	100.0	500.0	200.0	0.5	
Sep 08	100.0	100.0	500.0	195.0		
Oct 08		100.0				
Nov 08						50.0
Dec 08						50.0
Jan 09						50.0
Feb 09		100.0				
Mar 09		100.0			0.5	
Apr 09		100.0			0.5	
May 09		50.0				
Jun 09	100.0	50.0	500.0	200.0		
Total Fed	400.0	800.0	2000.0	795.0	2.0	150.0
Sold						
On-Hand at End	300.0		1500.0	600.0		

Stock Reconciliation for Haldon Stn

Jul 08 - Jun 09

Stock Class	Open	Aged		Wean	Die	Buy	Sell	Transfer		Close
		Out	In					In	Out	
Ewe Lamb				4413	122		2616			1675
Ewe Hogget	1675				20		1		1654	
Ewe	8500				330		1262	1654		8562
Ram	115				10	10				115
Wether Lamb				4414	100		4130			184
Wether Hogget	184						184			
Total Sheep	**10474**			**8827**	**582**	**10**	**8193**	**1654**	**1654**	**10536**
Heifer Calf				242	4		53			185
1-Year Heifer	185				4					181
2-Year Heifer	181				1				180	
Cow	400				5		175	180		400
Bull Calf										
1-Year Bull	240						120	1		121
2-Year Bull	121						121			
Bull	15				1	4	3			15
Mixed Calf				243	4				1	238
Total Beef	**1142**			**485**	**19**	**4**	**472**	**181**	**181**	**1140**
Hind Fawn				1135	15					1120
1-Year Hind	1120				6		414			700
2-Year Hind	700						100		600	
Hind	2100				10		600	600		2090
Stag Fawn				1134	15					1119
1-Year Stag	1119						969			150
2-Year Stag	150						25		125	
Stag	700				15	5	115	125		700
Total Deer	**5889**			**2269**	**61**	**5**	**2223**	**725**	**725**	**5879**

Numbers by Month for Haldon Stn

Jul 08 - Jun 09

	31 Jul	31 Aug	30 Sep	31 Oct	30 Nov	31 Dec	31 Jan	28 Feb	31 Mar	30 Apr	31 May	30 Jun
Ewe Lamb							4388	3544	2285	1700	1688	1675
Ewe Hogget	1670	1668	1666	1665	1665	1664	1659	1655	1654	1654	1654	
Ewe	8471	8443	8414	8386	8358	8329	8301	8272	6981	6958	6934	8562
Ram	105	105	105	105	105	105	115	115	115	115	115	115
Wether Lamb							4378	2424	1055	184	184	184
Wether Hogget	184	184	184	184								
Total Sheep	**10430**	**10400**	**10369**	**10340**	**10128**	**10098**	**18841**	**16010**	**12090**	**10611**	**10575**	**10536**
Heifer Calf									242	242	240	185
1-Year Heifer	185	185	182	181	181	181	181	181	181	181	181	181
2-Year Heifer	181	180	180	180	180	180	180	180	180	180	180	
Cow	400	400	400	395	395	395	395	395	395	395	220	400
Bull Calf												
1-Year Bull	240	240	240	120	120	120	120	120	120	120	120	121
2-Year Bull	121	121	121									
Bull	19	19	19	19	19	18	18	18	18	18	18	15
Mixed Calf									243	240	239	238
Total Beef	**1146**	**1145**	**1142**	**895**	**895**	**894**	**894**	**894**	**1379**	**1376**	**1198**	**1140**
Hind Fawn									1131	1127	1124	1120
1-Year Hind	1119	1117	1114	1114	1114	1114	700	700	700	700	700	700
2-Year Hind	700	700	700	700	700	700	700	700	700	600	600	
Hind	2099	2098	2097	2096	2095	2094	2094	2093	2092	1491	1490	2090
Stag Fawn									1122	1121	1120	1119
1-Year Stag	1119	1119	1119	1119	1119	1119	150	150	150	150	150	150
2-Year Stag	150	150	150	150	150	150						
Stag	699	697	696	695	694	623	701	705	703	703	701	700
Total Deer	**5886**	**5881**	**5876**	**5874**	**5872**	**5800**	**4345**	**4348**	**6598**	**5892**	**5885**	**5879**

Nutrient assessment

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:42 p.m.

Paddy Boyd	David Houlbrooke
Haldon	Invermay Agriculture Centre
Client Reference: Upper Waitaki	AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		12
Fertiliser N	kg N/ha/yr		0
Other N	kg N/ha/yr		0
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	3
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.3
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	12
N conversion efficiency	%	**15-25**	4
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	na

na : N in drainage not calculated for farms with easy and steep blocks.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:43 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

Paddy Boyd	David Houlbrooke
Haldon	Invermay Agriculture Centre
Client Reference: Upper Waitaki	AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current.ovp

Nutrient Budget

Block Budget for: Current Block: Border Irrigation

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	24	0	29	55	0	0	-0.8
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	58	0	1	1	0	1	2	0.0
Irrigation	3	1	4	7	26	6	24	0.0
Slow release	0	3	26	0	1	2	2	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	2	0	0	0	1	0	0	-0.2
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	18	0	0	0	0	0	0	0.0
Leaching/runoff	7	2	20	35	84	4	12	-0.4
Immobilisation/absorption	34	18	0	3	0	0	0	0.0
Change in inorganic soil pool	0	8	11	0	-2	5	17	-0.3

* Acidity - kg H+/ha

Soil P loss status is high. Check Olsen P levels are within economic optimum levels.

Estimated change in soil P, K and Mg test is 1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:39 p.m.

Paddy Boyd | David Houlbrooke
Haldon | Invermay Agriculture Centre
Client Reference: Upper Waitaki | AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Dry flats

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	19	0	23	44	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	1	0	1	2	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	21	0	1	2	2	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	0	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	2	0	0	0	0	0	0	0.0
Leaching/runoff	2	1	8	29	42	2	5	0.0
Immobilisation/absorption	5	14	0	-5	0	0	0	0.0
Change in inorganic soil pool	0	7	14	0	4	1	-1	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is 2, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:40 p.m.

Paddy Boyd | David Houlbrooke
Haldon | Invermay Agriculture Centre
Client Reference: Upper Waitaki | AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Hill Home

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	5	0	6	11	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	1	0	1	2	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	21	0	1	2	2	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	0	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	2	1	4	19	17	1	3	0.0
Immobilisation/absorption	7	11	0	-12	0	0	0	0.0
Change in inorganic soil pool	0	-5	18	0	-5	2	1	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:38 p.m.

Paddy Boyd	David Houlbrooke
Haldon	Invermay Agriculture Centre
Client Reference: Upper Waitaki	AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Kirk Basin

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	5	0	6	11	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	24	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	7	13	19	4	15	0.0
Immobilisation/absorption	5	13	0	-5	0	0	0	0.0
Change in inorganic soil pool	0	-5	18	0	-4	2	-7	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:38 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

Paddy Boyd | David Houlbrooke
Haldon | Invermay Agriculture Centre
Client Reference: Upper Waitaki | AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Kirk Basin

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	5	0	6	11	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	24	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	7	13	19	4	15	0.0
Immobilisation/absorption	5	13	0	-5	0	0	0	0.0
Change in inorganic soil pool	0	-5	18	0	-4	2	-7	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:38 p.m.

Paddy Boyd — David Houlbrooke
Haldon — Invermay Agriculture Centre
Client Reference: Upper Waitaki — AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Kirk Downs

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	5	0	6	11	0	0	-0.2
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	28	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	2	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	6	12	18	4	14	-0.1
Immobilisation/absorption	5	12	0	-5	0	0	0	0.0
Change in inorganic soil pool	0	-5	24	0	-3	2	-5	-0.1

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:38 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

Paddy Boyd — David Houlbrooke
Haldon — Invermay Agriculture Centre
Client Reference: Upper Waitaki — AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Kirk Hill

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	5	0	6	11	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	28	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	0	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	5	13	18	1	5	0.0
Immobilisation/absorption	6	12	0	-6	0	0	0	0.0
Change in inorganic soil pool	0	-5	24	0	-3	5	4	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:40 p.m.

Paddy Boyd — David Houlbrooke
Haldon — Invermay Agriculture Centre
Client Reference: Upper Waitaki — AgResearch

\\gfile\Snow\V$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Lucerne

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	19	0	23	44	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	1	0	1	2	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	22	0	1	2	2	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	2	0	0	0	0	0	0	0.0
Leaching/runoff	2	1	8	30	42	2	5	0.0
Immobilisation/absorption	4	14	0	-6	0	0	0	0.0
Change in inorganic soil pool	0	7	14	0	4	1	-1	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is 1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:43 p.m.

Paddy Boyd — David Houlbrooke
Haldon — Invermay Agriculture Centre
Client Reference: Upper Waitaki — AgResearch

\\gfile\Snow\V$\UpperWaitaki\Stage3\FromDavid\Haldon current.ovp

Nutrient Budget

Block Budget for: Current Block: Pivot Irrigation

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	24	0	29	55	0	0	-0.8
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	58	0	1	1	0	1	2	0.0
Irrigation	3	1	4	7	26	6	24	0.0
Slow release	0	3	25	0	1	2	2	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	5	1	0	1	1	0	0	-0.2
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	15	0	0	0	0	0	0	0.0
Leaching/runoff	6	0	25	37	85	4	13	-0.2
Immobilisation/absorption	35	20	0	0	0	0	0	-0.1
Change in inorganic soil pool	0	7	5	0	-3	5	15	-0.3

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is 1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:40 p.m.

Paddy Boyd
Haldon
Client Reference: Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Ryecorn

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	10	0	13	26	8	0	0.0
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release/mineralisation	38	10	16	5	1	1	5	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	3	0	0	0	1	0	0	-0.1
Transfer	0	0	0	0	0	0	0	0.0
Fodder crop sold	0	0	0	0	0	0	0	0.0
Atmospheric	15	0	0	0	0	0	0	0.0
Leaching/runoff	30	2	4	19	78	24	36	-1.9
Immobilisation/absorption	0	18	0	0	0	0	0	0.0
Change in inorganic soil pool	0	0	13	0	-51	-14	-28	2.0

* Acidity - kg H+/ha

Nutrient assessment – Farm and irrigated blocks at "highly developed" status

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:37 p.m.

Paddy Boyd
Haldon
Client Reference: Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		11
Fertiliser N	kg N/ha/yr		0
Other N	kg N/ha/yr		0
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	3
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.3
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	11
N conversion efficiency	%	**15-25**	5
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	na

na : N in drainage not calculated for farms with easy and steep blocks.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:39 p.m.

Paddy Boyd
Haldon
Client Reference: Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Border Irrigation

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	24	0	29	55	0	0	-0.8
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	39	0	1	1	0	1	2	0.0
Irrigation	3	1	4	7	26	6	24	0.0
Slow release	0	3	26	0	1	2	2	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	2	0	0	0	1	0	0	-0.2
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	27	0	0	0	0	0	0	0.0
Leaching/runoff	13	2	20	35	84	4	12	-0.4
Immobilisation/absorption	0	18	0	3	0	0	0	0.0
Change in inorganic soil pool	0	8	11	0	-2	5	17	-0.3

* Acidity - kg H+/ha

Soil P loss status is high. Check Olsen P levels are within economic optimum levels.

Estimated change in soil P, K and Mg test is 1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:39 p.m.

Paddy Boyd
Haldon
Client Reference: Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\Snow\$\UpperWaitaki\Stage3\FromDavid\Haldon current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Pivot Irrigation

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	24	0	29	55	0	0	-0.7
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	37	0	1	1	0	1	2	0.0
Irrigation	3	1	4	7	26	6	24	0.0
Slow release	0	3	25	0	1	2	2	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	5	1	0	1	1	0	0	-0.2
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	24	0	0	0	0	0	0	0.0
Leaching/runoff	11	0	25	37	85	4	13	-0.2
Immobilisation/absorption	0	20	0	0	0	0	0	0.0
Change in inorganic soil pool	0	7	5	0	-3	5	15	-0.3

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is 1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Ribbonwood Station

Farm system information

Ribbonwood Station and Shelton Downs butt onto each other at one corner and are run as one farm. Here they are modelled as one unit under the Ribbonwood Station name. Shelton Downs is rolling to flat and is 2700 ha in size and comprises mostly oversown topdressed semi-developed pastures. Ribbonwood is 7300 ha and contains 1200 ha of productive flats at its eastern end and 600 ha of much less productive flats at its western or Auriri River end. In the middle, there are 5500 ha of hills. The entire property, (both farms) is stocked at 1.6 su /ha with 12200 su of Merino sheep and 3800 su of cattle based on a breeding cow system. The farm is 15 km north west of Omarama and experiences a colder climate than some of the other stations modelled.

Block name	Area (ha)	Total growth (kg DM /ha /yr)	Rel growth %
Shelton cult	200	2367	142%
Shelton native	330	885	53%
Shelton OSTD	2170	1971	118%
E flats dry	607	1253	75%
E flats wet	607	3160	190%
Ahuriri flats	607	1939	117%
Hill wet	2740	1971	118%
Hill dry	2740	855	51%
Whole farm	**10001**	**1664**	**100%**

Fertiliser

S super at 250kg/ha on 40ha of lucerne annually
5 to 10t/ha lime on new grass out of native
Baleage/silage paddocks get Crop 20 at 150kg/ha in spring
Turnips sown with 200kg/ha crop 20 at establishment
100ha fertilised with SOA at 200kg/ha only if rain is likely
Every second or third year 100t super goes on the warm hills at 120kg/ha

Nitrogen for Shelton Cultivated
Ribbonwood23Jun08 (Jul 08 - Jun 09)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Sulphate of Ammonia	10 Dec 08	30	10	60	90	2700	3375
Total						**2700**	**3375**

Nitrogen for E Flats wet
Ribbonwood23Jun08 (Jul 08 - Jun 09)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
SOA	10 Dec 08	30	10	60	210	6300	7875
Total						**6300**	**7875**

Crops Table for Shelton Cultivated
Ribbonwood23Jun08 (Jul 08 - Jun 09)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Turnips old	40.0	01 Jul 08	30 Oct 08	122	Turnips	100	2.5	100	tonnes	18000	[a,b]
Wrapped Silage	50.0	30 Oct 08	08 Jan 09	71	Wrapped Silage (100%DM)	100	15.0	750	Big Bales	21000	
Turnips new	40.0	15 Dec 08	30 Jun 09	198	Turnips	100	0.5	20	tonnes	19200	
Total										**58200**	

[a] No production cost for crops which begin on start date (01 Jul 08), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for E Flats wet
Ribbonwood23Jun08 (Jul 08 - Jun 09)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Old Turnips	60.0	01 Jul 08	30 Nov 08	153	Turnips	100	2.5	150	tonnes	27000	[a,b]
Wrapped Silage	150.0	02 Nov 08	11 Jan 09	71	Wrapped Silage (100%DM)	100	15.0	2250	Big Bales	63000	
Turnips new	60.0	15 Dec 08	30 Jun 09	198	Turnips	100	1.5	90	tonnes	28800	
Total										**118800**	

[a] No production cost for crops which begin on start date (01 Jul 08), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for Ahuriri Flats
Ribbonwood23Jun08 (Jul 08 - Jun 09)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Wrapped Silage	1.0	01 Nov 08	20 Jan 09	81	Wrapped Silage (100%DM)	100	15.0	15	Big Bales	420	
Total										**420**	

[a] No production cost for crops which begin on start date (01 Jul 08), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Supplements Amounts for Ribbonwood23Jun08

Jul 08 - Jun 09

Month	Wrapped Silage (100%DM) Big Bales	Turnips tonnes
On-Hand at Start	2315.0	70.0
Bought		
Produced	3015.0	360.0
Jul 08	715.0	90.0
Aug 08	700.0	90.0
Sep 08	700.0	90.0
Oct 08	200.0	50.0
Nov 08		
Dec 08		
Jan 09		
Feb 09		
Mar 09		
Apr 09		
May 09		
Jun 09	700.0	40.0
Total Fed	3015.0	360.0
Sold		
On-Hand at End	2315.0	70.0

Stock Reconciliation for Ribbonwood23Jun08

Jul 08 - Jun 09

Stock Class	Open	Aged Out	Aged In	Wean	Die	Buy	Sell	Transfer In	Transfer Out	Close
Ewe Lamb				4295	38				1355	2902
Ewe Hogget	2902				50		20		2832	
Ewe	10080				500		2350	2832		10062
Ram	150									150
Wether Lamb				4295					4295	
Wether	1000						295	299		1004
Mixed Lamb					50		4240	5650		1360
Mixed Hogget	1360				20		1041		299	
Total Sheep	**15492**			**8590**	**658**		**7946**	**8781**	**8781**	**15478**
Heifer Calf				185	2		100			83
1-Year Heifer	83				1					82
2-Year Heifer	82				1				81	
Cow	440				5		75	81		441
1-Year Bull										
2-Year Bull										
Bull	16									16
Steer Calf				185			185			
1-Year Steer										
2-Year Steer										
Total Beef	**621**			**370**	**9**		**360**	**81**	**81**	**622**

Numbers by Month for Ribbonwood23Jun08

Jul 08 - Jun 09

	31 Jul	31 Aug	30 Sep	31 Oct	30 Nov	31 Dec	31 Jan	28 Feb	31 Mar	30 Apr	31 May	30 Jun
Ewe Lamb								2932	2925	2917	2909	2902
Ewe Hogget	2895	2888	2881	2874	2847	2840	2832					
Ewe	10040	10001	9562	9523	9484	9046	9008	10241	10196	10151	10106	10062
Ram	150	150	150	150	150	150	150	150	150	150	150	150
Wether Lamb												
Wether	1000	1000	1000	1000	1000	705	1004	1004	1004	1004	1004	1004
Mixed Lamb								1400	1390	1380	1370	1360
Mixed Hogget	1356	1352	1349	1212	566	299						
Total Sheep	**15441**	**15391**	**14942**	**14759**	**14047**	**13040**	**12994**	**15727**	**15665**	**15602**	**15539**	**15478**
Heifer Calf										84	84	83
1-Year Heifer	83	83	83	83	83	82	82	82	82	82	82	82
2-Year Heifer	82	81	81	81	81	81	81	81	81	81	81	
Cow	440	440	440	435	435	435	435	435	435	435	360	441
1-Year Bull												
2-Year Bull												
Bull	16	16	16	16	16	16	16	16	16	16	16	16
Steer Calf												
1-Year Steer												
2-Year Steer												
Total Beef	**621**	**620**	**620**	**615**	**615**	**614**	**614**	**614**	**614**	**698**	**623**	**622**

Nutrient assessment

John Ryan
Ribbonwood
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		10
Fertiliser N	kg N/ha/yr		2
Other N	kg N/ha/yr		0
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	3
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.3
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	11
N conversion efficiency	%	**15-25**	10
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	na

na : N in drainage not calculated for farms with easy and steep blocks.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

John Ryan
Ribbonwood
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nutrient Budget

Block Budget for: Current Block: Ahuriri flats

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	0	0	0	0	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	29	0	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	2	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	2	20	1	8	38	0.0
Immobilisation/absorption	4	10	0	-19	0	0	0	0.0
Change in inorganic soil pool	0	-7	28	0	4	0	-28	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Mg may be limiting pasture production. Apply fertiliser Mg or dolomite.
Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

John Ryan
Ribbonwood
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nutrient Budget

Block Budget for: Current Block: E flats dry

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	0	0	0	0	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	23	0	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	8	40	31	11	29	0.0
Immobilisation/absorption	5	13	0	-38	0	0	0	0.0
Change in inorganic soil pool	0	-11	16	0	-26	-3	-19	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -2, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:14 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

John Ryan
Ribbonwood
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nutrient Budget

Block Budget for: Current Block: E flats wet

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	22	5	0	19	0	0	0	-0.9
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	9	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	24	0	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	2	0	0	0	0	0	0	-0.1
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	4	0	0	0	0	0	0	-0.2
Leaching/runoff	3	0	5	41	3	8	32	-0.1
Immobilisation/absorption	22	9	0	-20	0	0	0	-0.4
Change in inorganic soil pool	0	-1	20	0	1	0	-22	-0.1

* Acidity - kg H+/ha

Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:15 p.m.

John Ryan
Ribbonwood
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nutrient Budget

Block Budget for: Current Block: Hill dry

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	1	0	2	3	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	2	4	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	10	0	5	7	9	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	800	27	63	15	71	0.0
Immobilisation/absorption	6	13	0	-24	0	0	0	0.0
Change in inorganic soil pool	0	-9	-790	0	-54	-6	-59	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -2, -6.1 and -1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Soil Mg status is slowly declining. Mg containing fertiliser will eventually be needed to maintain current production.
Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:15 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

John Ryan
Ribbonwood
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nutrient Budget

Block Budget for: Current Block: Hill wet

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	1	0	2	3	0	0	-0.3
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	2	4	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	23	0	5	7	9	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	7	26	2	1	7	0.0
Immobilisation/absorption	4	12	0	-23	0	0	0	0.0
Change in inorganic soil pool	0	-8	16	0	7	8	6	-0.1

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -2, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:13 p.m.

John Ryan	David Houlbrooke
Ribbonwood	Invermay Agriculture Centre
Upper Waitaki	AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nutrient Budget

Block Budget for: Current Block: Shelton Cultivated

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	29	6	0	26	0	0	0	-1.0
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	9	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	24	0	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	2	0	0	0	0	0	0	-0.1
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	4	0	0	0	0	0	0	-0.2
Leaching/runoff	3	0	6	50	15	8	26	-0.1
Immobilisation/absorption	29	15	0	-23	0	0	0	-0.6
Change in inorganic soil pool	0	-6	19	0	-11	-1	-15	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:13 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

John Ryan	David Houlbrooke
Ribbonwood	Invermay Agriculture Centre
Upper Waitaki	AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nutrient Budget

Block Budget for: Current Block: Shelton native

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	0	0	0	0	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	30	0	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	2	22	1	7	35	0.0
Immobilisation/absorption	6	10	0	-20	0	0	0	0.0
Change in inorganic soil pool	0	-7	29	0	4	1	-25	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Mg may be limiting pasture production. Apply fertiliser Mg or dolomite.
Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:14 p.m.

John Ryan
Ribbonwood
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nutrient Budget

Block Budget for: Current Block: Shelton oversown

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	0	0	0	0	0	0	-0.2
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	30	0	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	2	20	1	7	35	0.0
Immobilisation/absorption	4	10	0	-19	0	0	0	0.0
Change in inorganic soil pool	0	-7	29	0	4	1	-25	-0.1

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Mg may be limiting pasture production. Apply fertiliser Mg or dolomite.
Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:13 p.m.

John Ryan
Ribbonwood
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ribbonwood current.ovp

Nutrient Budget

Block Budget for: Current Block: Turnips

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	39	20	0	24	0	0	0	0.0
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	2	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release/mineralisation	26	0	10	12	4	7	8	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	5	0	0	1	1	0	0	-0.2
Transfer	1	0	1	0	0	0	0	0.0
Fodder crop sold	0	0	0	0	0	0	0	0.0
Atmospheric	22	0	0	0	0	0	0	-0.1
Leaching/runoff	47	1	2	37	68	12	57	-3.3
Immobilisation/absorption	0	19	0	0	0	0	0	0.0
Change in inorganic soil pool	0	0	7	0	-64	-4	-45	3.6

* Acidity - kg H+/ha

Disclaimer

The contents of the software and the accompanying files (“Overseer”) are provided “AS IS” and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer’s, or Overseer’s outputs’, use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer’s outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Gray’s Hill Station

Farm system information

Grays Hill Station is nearly 22000 ha in size of which 13000 ha is flat, very unproductive and grazed only rarely. The rest of the farm comprises 150 ha of centre pivot irrigation, 2200 ha of flat to rolling slightly wetter country that is a lot more productive than the large (13000 ha) flat area. Finally, there are 6000 ha of hill country (Grays Hills). Because of this the effective farm area is considered to be only 8400 ha and it is this area that has been modelled. The effective farm area is stocked at 1.82 su /ha. Enterprises include 11200 su of Merinos, 1100 su of Merino x Border Leicester and 3000 su of cattle centered on breeding cows. The northern boundary of the farm is 10km south of Lake Tekapo.

Block name	**Area (ha)**	**Total growth**	**Rel growth %**
Hills	6000	673	39%
Irrigation	150	13760	795%
Swamp	2250	3747	217%
Whole farm	8400	1729	100%

Soil test results	pH	P	K	S	Mg	Na	Ca
Irrigation	6	23	7	1	9	1	2
Hill	5.8	14	10	3	38	4	8
Swamp	5.8	12	9	5	32	1	6

Fertiliser

N as per shown elsewhere

Other fertiliser as per fax sheets (very hard to follow)

Swamp = Super 10@175 kg/ha to 617 ha. Spring

Swamp = Sep Gold @150 kg/ha200 ha and Pasture Mag 300kg/ha to 70 ha

Hill = 20 tonne Super 30 s

Pivot = 250 kg/ha S10 150 ha

Nitrogen for Irrigation pivot area
Grays Hills (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	31 Aug 06	40	8	60	150	6000	7500
Sulphate of ammonia	20 Oct 06	40	15	60	150	6000	7500
Nitrogen 2	01 Mar 07	40	8	42	150	6000	7500
Total						**18000**	**22500**

Nitrogen for Swamps
Grays Hills (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	01 Sep 06	40	10	60	200	8000	10000
Nitrogen 2	28 Feb 07	40	7	60	100	4000	5000
Total						**12000**	**15000**

Crops Table for Swamps
Grays Hills (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Ryecorn old	100.0	01 Jul 06	30 Nov 06	153	Ryecorn	100	1.5	150	tonnes		[a]
Oats	100.0	01 Jul 06	30 Nov 06	153	Oats	85	2.5	250	tonnes	45000	[a,b]
Lucerne Hay big	230.0	14 Sep 06	30 Dec 06	108	Lucerne Hay big	85	7.0	1610	Big Bales	45080	
Wrapped Silage	40.0	30 Sep 06	31 Jan 07	124	Wrapped Silage	31	10.0	400	Big Bales	11200	
Ryecorn new	100.0	01 Nov 06	30 Jun 07	242	Ryecorn	100	3.0	300	tonnes	48000	
Total										**149280**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

FARMAX

Supplements Amounts for Grays Hills

Jul 06 - Jun 07

Month	Lucerne Hay big Big Bales	Wrapped Silage Big Bales	Oats tonnes	Ryecorn tonnes
On-Hand at Start	950.0	400.0	50.0	200.0
Bought				
Produced	1610.0	400.0	250.0	450.0
Jul 06	450.0	75.0	50.0	
Aug 06	400.0	75.0	50.0	
Sep 06	100.0	75.0	50.0	100.0
Oct 06		25.0		100.0
Nov 06				
Dec 06				
Jan 07				
Feb 07				
Mar 07				60.0
Apr 07				100.0
May 07	210.0	75.0		
Jun 07	450.0	75.0	25.0	
Total Fed	1610.0	400.0	175.0	360.0
Sold				
On-Hand at End	950.0	400.0	125.0	290.0

Stock Reconciliation for Grays Hills

Jul 06 - Jun 07

Stock Class	Open	Aged		Wean	Die	Buy	Sell	Transfer		Close
		Out	In					In	Out	
Ewe Lamb				3949	56		916			2977
Ewe Hogget	2977				21		787	300	2469	
Ewe	7170				185		1980	2169		7174
Wether Lamb				3950	16		2074			1860
Wether Hogget	1860				66		800		994	
Wether	2780				39		950	994		2785
Total Sheep	**14787**			**7899**	**383**		**7507**	**3463**	**3463**	**14796**
Heifer Calf				161	2		69			90
1-Year Heifer	90				1		39			50
2-Year Heifer	50				2		3		45	
Cow	310				7		35	45		313
Bull	8									8
Mixed Calf				161			161			
Total Beef	**458**			**322**	**12**		**307**	**45**	**45**	**461**

Numbers by Month for Grays Hills

Jul 06 - Jun 07

	31 Jul	31 Aug	30 Sep	31 Oct	30 Nov	31 Dec	31 Jan	28 Feb	31 Mar	30 Apr	31 May	30 Jun
Ewe Lamb								3903	3805	3408	2987	2977
Ewe Hogget	2972	2970	2968	2967	2967	2967	2962	2958	2957	2957	2170	
Ewe	7142	7109	7091	7077	7065	7054	7036	5303	5030	5012	5007	7174
Wether Lamb								3710	3345	2266	1860	1860
Wether Hogget	1850	1845	1838	1028	1023	1019	1017	1014	1009	1004	999	
Wether	2770	2763	2757	2749	1791	1791	1791	1791	1791	1791	1791	2785
Total Sheep	**14734**	**14687**	**14654**	**13821**	**12846**	**12831**	**12806**	**18679**	**17937**	**16438**	**14814**	**14796**
Heifer Calf										92	91	90
1-Year Heifer	90	90	89	89	89	89	89	89	89	50	50	50
2-Year Heifer	50	48	48	48	48	48	48	48	48	45	45	
Cow	309	309	308	308	307	306	306	305	305	304	269	313
Bull	8	8	8	8	8	8	8	8	8	8	8	8
Mixed Calf												
Total Beef	**457**	**455**	**453**	**453**	**452**	**451**	**451**	**450**	**450**	**499**	**463**	**461**

Nutrient assessment

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:16 p.m.

Mark Urquhart
Grays Hill
Haldon rd
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\Snow\V$\UpperWaitaki\Stage3\FromDavid\Grays Hill.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		10
Fertiliser N	kg N/ha/yr		3
Other N	kg N/ha/yr		0
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	3
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.3
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	12
N conversion efficiency	%	**15-25**	10
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	na

na : N in drainage not calculated for farms with easy and steep blocks.

Disclaimer

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:17 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved
Mark Urquhart
Grays Hill
Haldon rd
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\Snow\V$\UpperWaitaki\Stage3\FromDavid\Grays Hill.ovp

Nutrient Budget

Block Budget for: Current Block: Flood plain pasture

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	1	6	0	7	13	1	0	-0.2
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	22	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	3	0	0	0	0	0	0	-0.1
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	4	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	9	15	2	1	1	-0.1
Immobilisation/absorption	1	11	0	-7	0	0	0	0.0
Change in inorganic soil pool	0	-3	14	0	14	6	7	0.0

* Acidity - kg H+/ha

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:17 p.m.

Mark Urquhart
Grays Hill
Haldon rd
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\Snow\/$\UpperWaitaki\Stage3\FromDavid\Grays Hill.ovp

Nutrient Budget

Block Budget for: Current Block: Hill block

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	1	0	3	2	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	20	0	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	0	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	10	11	16	1	1	0.0
Immobilisation/absorption	6	12	0	-6	0	0	0	0.0
Change in inorganic soil pool	0	-8	11	0	-9	7	9	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -2, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:16 p.m.

Mark Urquhart
Grays Hill
Haldon rd
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\Snow\/$\UpperWaitaki\Stage3\FromDavid\Grays Hill.ovp

Nutrient Budget

Block Budget for: Current Block: Irrigated pasture

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	120	24	0	72	55	0	0	-2.5
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	28	0	1	2	1	1	2	0.0
Irrigation	3	1	4	7	24	6	22	0.0
Slow release	0	3	27	0	2	4	4	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	10	1	0	2	1	0	0	-0.4
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	35	0	0	0	0	0	0	-0.6
Leaching/runoff	9	1	8	82	2	3	27	-0.5
Immobilisation/absorption	96	16	0	-3	0	0	0	-0.8
Change in inorganic soil pool	0	10	24	0	79	8	2	-0.3

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is 2, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:18 p.m.

Mark Urquhart
Grays Hill
Haldon rd
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\Snow\$\UpperWaitaki\Stage3\FromDavid\Grays Hill.ovp

Nutrient Budget

Block Budget for: Current Block: Ryecorn forage

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	40	17	0	20	39	0	0	0.0
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release/mineralisation	31	1	21	8	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	7	0	0	1	1	0	0	-0.2
Transfer	0	0	0	0	0	0	0	0.0
Fodder crop sold	0	0	0	0	0	0	0	0.0
Atmospheric	29	0	0	0	0	0	0	-0.1
Leaching/runoff	46	1	8	29	45	1	1	-3.3
Immobilisation/absorption	0	18	0	0	0	0	0	0.0
Change in inorganic soil pool	0	0	13	0	-2	6	9	3.6

* Acidity - kg H+/ha

Nutrient assessment – Farm and irrigated blocks at "highly developed" status

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:13 p.m.

Mark Urquhart
Grays Hill
Haldon Rd
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\Snow\$\UpperWaitaki\Stage3\FromDavid\Grays Hill current HD.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		10
Fertiliser N	kg N/ha/yr		3
Other N	kg N/ha/yr		0
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	4
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.3
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	11
N conversion efficiency	%	**15-25**	10
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	na

na : N in drainage not calculated for farms with easy and steep blocks.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 06:13 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

Mark Urquhart
Grays Hill
Haldon Rd
Upper Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\Snow\$\UpperWaitaki\Stage3\FromDavid\Grays Hill current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Irrigated pasture

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	120	24	0	72	55	0	0	-2.8
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	2	0.0
Irrigation	3	1	4	7	24	6	22	0.0
Slow release	0	3	27	0	2	4	4	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	10	1	0	2	1	0	0	-0.4
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	86	0	0	0	0	0	0	-0.6
Leaching/runoff	37	1	8	82	2	3	27	-0.5
Immobilisation/absorption	0	16	0	-3	0	0	0	-1.0
Change in inorganic soil pool	0	10	24	0	79	8	2	-0.3

* Acidity - kg H+/ha

Nitrate-N losses from this block exceed 11.3 ppm - the drinking water standard. Consider mitigation options to reduce this loss

Estimated change in soil P, K and Mg test is 2, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Ohau Downs Station

Farm system information

Ohau Downs Station consists of a mix of rolling and flat country, with the flats in several terraces. This farm is undergoing a development programme and contains approximately a quarter undeveloped “native” pasture, a quarter rarely grazed QE II reserve land with the rest in developed dryland pasture and ryecorn. The farm is 5100 ha in size and carries 8300 su sheep (Merino and some Merino x Suffolk) and 400 su young cattle. Estimated stocking rate is 1.71 su/ha. The farm is located at the southern end of Lake Ohau, 20km north of Omarama.

Block name	**Area (ha)**	**Total growth**	**Rel growth %**
Ryecorn	1200	3362	176%
Perm pasture	1500	3184	166%
Undev QE II	1200	581	30%
Undev native	1200	214	11%
Whole farm	**5100**	**1915**	**100%**

Soil test results		pH	P	K	S	Mg
Dev pasture	Stanleys	5.4	5	5	8	8
Dev pasture	Stoney	5.1	27	6	23	9
Native	Wairepo	5.4	10	8	15	11
QEII	Lake	5.4	14	9	8	19

Fertiliser

Every year: 225 t superphosphate applied at 250kg/ha on 900ha
Applied every second year
That is, an area fertilised this year generally does not get fert next year
No fertiliser applied to the Native area

Nitrogen for Ryecorn

Ohau (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	15 Mar 06	46	6	45	250	11500	14375
Nitrogen 2	01 May 06	46	15	45			
Total						**11500**	**14375**

Nitrogen for Permanent Pasture

Ohau (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	15 Mar 06	46	6	45	250	11500	14375
Total						**11500**	**14375**

Crops Table for Ryecorn

Ohau (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Rye corn 2	200.0	01 Jul 06	18 Nov 06	141	Rye corn	100	1.5	300	tDM		[a]
Wheat 2	200.0	01 Jul 06	31 Dec 06	184	Wheat 2	85	1.3	260	tonnes		[a]
Big Bales	240.0	10 Nov 06	31 Dec 06	52	Big Bales	85	3.0	720	tDM	32400	
Rye corn	200.0	10 Feb 07	30 Jun 07	141	Rye corn	100	3.0	600	tDM	80000	
Wheat	200.0	20 Apr 07	30 Jun 07	72	Wheat 2	85	0.2	40	tonnes	120000	
Total										**232400**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for Permanent Pasture

Ohau (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Big Bales	50.0	10 Nov 06	31 Dec 06	52	Big Bales	85	3.0	150	tDM	6750	
Total										**6750**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Supplements Amounts for Ohau

Jul 06 - Jun 07

Month	Rye corn tDM	Big Bales tDM
On-Hand at Start	400.0	870.0
Bought	100.0	
Produced	900.0	870.0
Jul 06	100.0	50.0
Aug 06	100.0	200.0
Sep 06	200.0	250.0
Oct 06	200.0	200.0
Nov 06	100.0	170.0
Dec 06		
Jan 07		
Feb 07		
Mar 07		
Apr 07		
May 07	100.0	
Jun 07	100.0	
Total Fed	900.0	870.0
Sold		
On-Hand at End	500.0	870.0

Stock Reconciliation for Ohau

Jul 06 - Jun 07

Stock Class	Open	Aged		Wean	Die	Buy	Sell	Transfer		Close
		Out	In					In	Out	
Ewe Lamb				2884	14		456			2414
Ewe Hogget	2414				129		1127		1158	
Ewe	6350				256		902	2158	1000	6350
Ram	80									80
Mixed Lamb				2883	10		1460			1413
Mixed Hogget	1413						1413			
Total Sheep	**10257**			**5767**	**409**		**5358**	**2158**	**2158**	**10257**
Heifer Calf						40	40			
Bull Calf						100	100			
Total Beef						**140**	**140**			

Numbers by Month for Ohau

Jul 06 - Jun 07

	31 Jul	31 Aug	30 Sep	31 Oct	30 Nov	31 Dec	31 Jan	28 Feb	31 Mar	30 Apr	31 May	30 Jun
Ewe Lamb								460	2424	2420	2417	2414
Ewe Hogget	2397	1250	1230	1212	1200	1188	1179	1170	1165	3		
Ewe	6304	6268	6245	6229	6215	6201	6181	6161	5247	6386	6368	6350
Ram	80	80	80	80	80	80	80	80	80	80	80	80
Mixed Lamb								460	2423	2419	1416	1413
Mixed Hogget	1413	1413	1413									
Total Sheep	**10194**	**9011**	**8968**	**7521**	**7495**	**7469**	**7440**	**8331**	**11339**	**11308**	**10281**	**10257**
Heifer Calf			40	40	40	40	40	40	40	40		
Bull Calf			100	100	100	100	100	100	100	100		
Total Beef			**140**	**140**	**140**	**140**	**140**	**140**	**140**	**140**		

Nutrient assessment

Kees Zeestraten
Ohau Downs
027 433 8486
Lake Ohau rd

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ohau downs current.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		10
Fertiliser N	kg N/ha/yr		2
Other N	kg N/ha/yr		0
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	4
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.3
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	9
N conversion efficiency	%	**15-25**	20
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	2

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:08 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

Kees Zeestraten
Ohau Downs
027 433 8486
Lake Ohau rd

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ohau downs current.ovp

Nutrient Budget

Block Budget for: Current Block: Arable pasture

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	12	0	14	28	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	23	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	3	0	0	0	1	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	7	41	24	7	19	0.0
Immobilisation/absorption	3	14	0	-25	0	0	0	0.0
Change in inorganic soil pool	0	0	17	0	6	-1	-10	0.0

* Acidity - kg H+/ha

Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:08 p.m.

Kees Zeestraten
Ohau Downs
027 433 8486
Lake Ohau rd

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ohau downs current.ovp

Nutrient Budget

Block Budget for: Current Block: Permenant pasture

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	12	0	14	28	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	24	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	2	0	0	0	1	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	7	41	24	7	19	0.0
Immobilisation/absorption	4	15	0	-25	0	0	0	0.0
Change in inorganic soil pool	0	0	18	0	6	-1	-10	0.0

* Acidity - kg H+/ha

Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Disclaimer

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:08 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

Kees Zeestraten
Ohau Downs
027 433 8486
Lake Ohau rd

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ohau downs current.ovp

Nutrient Budget

Block Budget for: Current Block: QEII

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	0	0	0	0	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	21	0	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	1	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	0	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	10	18	26	6	22	0.0
Immobilisation/absorption	6	12	0	-16	0	0	0	0.0
Change in inorganic soil pool	0	-10	12	0	-21	1	-11	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -2, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Soil Na status is slowly declining. Check pasture Na status,especially on pumice soil, to ascertain need for Na supplementation.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:09 p.m.

Kees Zeestraten
Ohau Downs
027 433 8486
Lake Ohau rd

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ohau downs current.ovp

Nutrient Budget

Block Budget for: Current Block: Ryecorn

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	46	24	0	29	55	0	0	0.0
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release/mineralisation	54	0	23	8	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	22	3	1	3	6	0	0	-0.4
Transfer	2	0	2	0	0	0	0	0.0
Fodder crop sold	0	0	0	0	0	0	0	0.0
Atmospheric	32	0	0	0	0	0	0	-0.1
Leaching/runoff	54	1	7	34	59	4	11	-3.8
Immobilisation/absorption	0	21	0	0	0	0	0	0.0
Change in inorganic soil pool	0	0	14	0	-6	3	-3	4.3

* Acidity - kg H+/ha

Disclaimer

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:09 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

Kees Zeestraten
Ohau Downs
027 433 8486
Lake Ohau rd

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Ohau downs current.ovp

Nutrient Budget

Block Budget for: Current Block: undeveloped

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	0	0	0	0	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	23	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	0	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	0	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	6	18	13	1	7	0.0
Immobilisation/absorption	7	10	0	-16	0	0	0	0.0
Change in inorganic soil pool	0	-7	18	0	-9	5	2	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Simon's Pass Station

Farm system information

Simons Pass Station is mostly flat to rolling. Large areas of the flats are mostly unproductive. The farm has 70 ha of border dyke irrigation which operates between 1 and 5 months of the year depending on the flow rate of the contributing Maryburn Stream. The farm has about 3500 ha of variously developed pasture and 2900 ha of much less productive land. The farm stocking rate is 1.2 su /ha comprising 7000 su of Merino sheep and 600 su of 2 and 3 year steers. The farm is located at the south end of Lake Pukaki.

Block name	Area (ha)	Total growth	Rel growth %
Old B/Dyke	70	4000	280%
Deep Soils	665	2571	180%
Med soils	2715	2113	148%
Light soils	2900	460	32%
Whole farm	**6350**	**1427**	**100%**

Soil test results		pH	P	K	S	Mg	Na
Aug-07	Lower lake	5.4	15	7	7	26	1
	North Pete	6.8	24	15	5	40	4
	East hayshed	5.8	27	10	12	42	6
	Pump House	5.5	13	16	3	49	1
	Rough Irrigation	5.3	18	10	2	32	1
	Herman	6.4	44	28	10	17	3

Fertiliser

Lucerne 71ha	250	kg/ha	Lucerne fert
Paddocks 238ha	250	kg/ha	Super 10
Border Dyke 70ha	250	kg/ha	15% potash
Tussock 708ha	200	kg/ha	Sulphur gain 20S
Pump house 80ha	250	kg/ha	Super 10

Nitrogen for OldBorderDyke

SimonsPass (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	01 Nov 06	50	18	42	70	3500	7000
Nitrogen 2	10 Jan 07	50	11	42	70	3500	7000
Total						**7000**	**14000**

Nitrogen for Deep soils

SimonsPass (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	15 Feb 06	40	7	42	100	4000	8000
Crop 20	15 Feb 07	20	7	40	100	2000	4000
Nitrogen 2	15 Mar 07	40	6	40	100	4000	8000
Nitrogen 3	15 Apr 07	40	5	40	100	4000	8000
Total						**14000**	**28000**

Nitrogen for Medium soils

SimonsPass (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Crop 20	15 Feb 07	20	7	40	50	1000	2000
Nitrogen 2	15 Mar 07	40	6	40	50	2000	4000
Nitrogen 3	15 Apr 07	40	5	40	50	2000	4000
Total						**5000**	**10000**

Crops Table for OldBorderDyke

SimonsPass (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Silage	70.0	01 Nov 06	31 Dec 06	61	Silage	33	4.0	280	tDM	12600	
Total										**12600**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for Deep soils

SimonsPass (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Rye corn old	100.0	01 Jul 06	31 Oct 06	123	Rye corn	100	1.5	150	tDM	90000	[a,b]
StackSilage	100.0	01 Nov 06	31 Dec 06	61	Silage	33	3.0	300	tDM	13500	
SilageBales	50.0	01 Nov 06	31 Dec 06	61	Silage	33	3.0	150	tDM	6750	
Rye corn new	100.0	15 Nov 06	30 Jun 07	228	Rye corn	100	3.0	300	tDM	40000	
Total										**150250**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for Medium soils

SimonsPass (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Rye corn old	50.0	01 Jul 06	31 Oct 06	123	Rye corn	100	1.5	75	tDM	45000	[a,b]
SilageBales	75.0	01 Nov 06	31 Dec 06	61	Silage	33	2.0	150	tDM	6750	
StackSilage	100.0	01 Nov 06	31 Dec 06	61	Silage	33	2.0	200	tDM	9000	
Rye corn new	50.0	15 Nov 06	30 Jun 07	228	Rye corn	100	3.0	150	tDM	20000	
Total										**80750**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Supplements Amounts for SimonsPass

Jul 06 - Jun 07

Month	Silage tDM	Rye corn tDM
On-Hand at Start	1200.0	65.0
Bought		
Produced	1080.0	675.0
Jul 06	300.0	
Aug 06	300.0	50.0
Sep 06	200.0	100.0
Oct 06		140.0
Nov 06		
Dec 06		
Jan 07		
Feb 07		
Mar 07		130.0
Apr 07		130.0
May 07	100.0	75.0
Jun 07	300.0	50.0
Total Fed	1200.0	675.0
Sold		
On-Hand at End	1080.0	65.0

Stock Reconciliation for SimonsPass

Jul 06 - Jun 07

Stock Class	Open	Aged		Wean	Die	Buy	Sell	Transfer		Close
		Out	In					In	Out	
Ewe Lamb				2835	17		1532			1286
Ewe Hogget	1286				12		100		1174	
Ewe	5316				355		815	1264	90	5320
Ram	70									70
Wether Lamb				2835	19		1616			1200
Wether Hogget	1200				20		1180			
Total Sheep	**7872**			**5670**	**423**		**5243**	**1264**	**1264**	**7876**
1-Year Steer										
2-Year Steer						150				150
Steer	150						150			
Total Beef	**150**					**150**	**150**			**150**

Numbers by Month for SimonsPass

Jul 06 - Jun 07

	31 Jul	31 Aug	30 Sep	31 Oct	30 Nov	31 Dec	31 Jan	28 Feb	31 Mar	30 Apr	31 May	30 Jun
Ewe Lamb							2835	2265	1296	1293	1289	1286
Ewe Hogget	1284	1282	1280	1278	1176	1174	1174					
Ewe	5287	5258	5229	5201	5172	5143	5114	5440	5410	5380	5350	5320
Ram	70	70	70	70	70	70	70	70	70	70	70	70
Wether Lamb							2835	2122	1208	1206	1203	1200
Wether Hogget	1196	1193	1189	1186	591							
Total Sheep	**7837**	**7803**	**7768**	**7735**	**7009**	**6387**	**12028**	**9897**	**7984**	**7949**	**7912**	**7876**
1-Year Steer												
2-Year Steer										150	150	150
Steer	150	150	150	150	150							
Total Beef	**150**	**150**	**150**	**150**	**150**					**150**	**150**	**150**

Nutrient assessment

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:27 p.m.

Simons Pass Station
Manager Tony Wall
0274776469
Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Pass current.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		11
Fertiliser N	kg N/ha/yr		4
Other N	kg N/ha/yr		0
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	4
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.8
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	11
N conversion efficiency	%	**15-25**	30
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	2

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:27 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved
Simons Pass Station
Manager Tony Wall
0274776469
Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Pass current.ovp

Nutrient Budget

Block Budget for: Current Block: Old border dyke

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	100	21	19	24	48	0	0	-1.9
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	39	0	1	1	0	1	2	0.0
Irrigation	2	0	4	6	23	5	21	0.0
Slow release	0	3	23	0	1	2	2	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	13	2	1	2	5	0	0	-0.5
Transfer	2	0	2	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	35	0	0	0	0	0	0	0.0
Leaching/runoff	11	0	25	29	47	1	8	-0.6
Immobilisation/absorption	81	18	0	1	0	0	0	-0.1
Change in inorganic soil pool	0	4	18	0	20	7	17	-0.6

* Acidity - kg H+/ha

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Simons Pass Station
Manager Tony Wall
0274776469
Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Pass current.ovp

Nutrient Budget

Block Budget for: Current Block: Deep soils

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	11	0	13	24	0	0	-0.6
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	13	0	1	2	1	1	2	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	24	0	2	4	4	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	8	1	0	1	3	0	0	-0.3
Transfer	1	0	2	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	8	0	0	0	0	0	0	0.0
Leaching/runoff	4	0	24	17	42	1	6	-0.2
Immobilisation/absorption	-8	17	0	-4	0	0	0	0.0
Change in inorganic soil pool	0	-5	-1	0	-18	3	1	-0.1

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:28 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved

Simons Pass Station
Manager Tony Wall
0274776469
Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Pass current.ovp

Nutrient Budget

Block Budget for: Current Block: Light soils

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	0	0	0	0	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	2	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	21	0	2	4	4	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	2	0	0	0	1	0	0	-0.1
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	11	13	38	2	11	0.0
Immobilisation/absorption	4	13	0	-12	0	0	0	0.0
Change in inorganic soil pool	0	-10	10	0	-35	3	-4	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -2, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:28 p.m.

Simons Pass Station	David Houlbrooke
Manager Tony Wall	Invermay Agriculture Centre
0274776469	AgResearch
Waitaki	

\\gfile\Snow\/$\UpperWaitaki\Stage3\FromDavid\Simons Pass current.ovp

Nutrient Budget

Block Budget for: Current Block: Med soils

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	5	0	11	11	0	0	-0.5
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	11	0	1	2	1	1	2	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	23	0	2	4	4	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	7	1	0	1	2	0	0	-0.2
Transfer	1	0	1	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	7	0	0	0	0	0	0	0.0
Leaching/runoff	4	0	23	17	42	1	10	-0.2
Immobilisation/absorption	-7	17	0	-6	0	0	0	0.0
Change in inorganic soil pool	0	-11	-2	0	-31	3	-3	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -2, 0.0 and 0 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:28 p.m.

Simons Pass Station	David Houlbrooke
Manager Tony Wall	Invermay Agriculture Centre
0274776469	AgResearch
Waitaki	

\\gfile\Snow\/$\UpperWaitaki\Stage3\FromDavid\Simons Pass current.ovp

Nutrient Budget

Block Budget for: Current Block: Ryecorn crop

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	127	13	0	15	29	0	0	0.0
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	2	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release/mineralisation	0	11	19	5	2	4	4	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	8	1	0	1	3	0	0	-0.3
Transfer	1	0	2	0	0	0	0	0.0
Fodder crop sold	0	0	0	0	0	0	0	0.0
Atmospheric	54	0	0	0	0	0	0	-0.5
Leaching/runoff	38	1	6	21	64	1	2	-2.9
Immobilisation/absorption	35	22	0	0	0	0	0	0.0
Change in inorganic soil pool	0	0	12	0	-35	3	5	3.7

* Acidity - kg H+/ha

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Nutrient assessment – Farm and irrigated blocks at "highly developed" status

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:32 p.m.

Simons Pass Station
Manager Tony Wall
0274776469
Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Pass current HD.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		11
Fertiliser N	kg N/ha/yr		4
Other N	kg N/ha/yr		1
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	4
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.8
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	11
N conversion efficiency	%	**15-25**	29
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	3

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:32 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved
Simons Pass Station
Manager Tony Wall
0274776469
Waitaki

David Houlbrooke
Invermay Agriculture Centre
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Pass current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Old border dyke

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	100	21	19	24	48	0	0	-1.8
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	1	0	1	2	0.0
Irrigation	2	0	4	6	23	5	21	0.0
Slow release	0	3	23	0	1	2	2	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	13	2	1	2	5	0	0	-0.5
Transfer	2	0	2	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	60	0	0	0	0	0	0	0.0
Leaching/runoff	38	0	25	29	47	1	8	-0.6
Immobilisation/absorption	0	18	0	1	0	0	0	0.0
Change in inorganic soil pool	0	4	18	0	20	7	17	-0.6

* Acidity - kg H+/ha

Nitrate-N losses from this block exceed 11.3 ppm - the drinking water standard. Consider mitigation options to reduce this loss

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Simon's Hill Station

Farm system information

Simons Hill Station is 6000 ha but only half of this is considered to be effective farm area because there are 3000 ha of unproductive flats that are currently ungrazed. Of the remaining 3000 ha there are 150 ha of irrigated by centre pivot when flow rates from the Maryburn permit, nearly 900 ha of developed flat to rolling country and 1900 ha of oversown, topdressed hills. The farm carries 3 su /ha (excluding the unproductive flats) of Merino sheep, 9600 su in total excluding the area. In the last year some cattle have been introduced to the system. The property is adjacent to the eastern side of Simons Pass and is 20km north east of Twizel.

Block name and area		**Total growth**	**Rel growth %**
Irrigation	150ha	13437	426%
HeavyPoorDrain	242ha	4763	151%
HeavyWellDrain	266ha	5144	163%
LucShallowSoil	368ha	3284	104%
OversownTopDressedShady	1023ha	2316	74%
OversownTopDressedSunny	884ha	1278	41%
Whole farm avg 2933ha		**3151**	**100%**

Soil test results

pH	P	K	S	Mg	Na
5.6 to 6.0	15 to 20	12 to 16	1 to 2	38 to 45	1 to 2

Fertiliser

Irrigated block = Urea 326 kg/ha and Serpentine super 400 kg/ha
Shallow well drained = 75 kg/ha sulphur super 30
Rye corn= crop zeal 20 @100 kg/ha and Urea @ 100 kg/ha
Deep well and deep poor drained = same as shallow well drained
Hill country = sulphur super 30 @ 50 kg/ha

Nitrogen for Irrigation

SimonsHill Fastier (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	15 Nov 06	50	18	42	150	7500	15000
Nitrogen 2	01 Jan 07	50	11	42	150	7500	15000
Nitrogen 3	15 Feb 07	50	7	42	150	7500	15000
Total						**22500**	**45000**

Nitrogen for HeavyPoorDrain

SimonsHill Fastier (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Nitrogen	15 Feb 06	50	7	42	120	6000	12000
Crop 20	15 Feb 07	20	7	40	84	1680	3360
Nitrogen 2	15 Mar 07	23	6	40	84	1932	3864
Nitrogen 3	15 Apr 07	23	5	40	84	1932	3864
Total						**11544**	**23088**

Nitrogen for LucerneHeavyWellDrain

SimonsHill Fastier (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Crop 20	15 Feb 07	20	7	40	42	840	1680
Nitrogen 2	15 Mar 07	23	6	40	42	966	1932
Nitrogen 3	15 Apr 07	23	5	40	42	966	1932
Total						**2772**	**5544**

Nitrogen for LucerneShallowSoil

SimonsHill Fastier (Jul 06 - Jun 07)

Name	Date	Rate	Response		Area	Amount	Cost
		kgN/ha	kgDM/kgN	days	ha	kgN	$
Crop 20	15 Feb 07	20	7	40	14	280	560
Nitrogen 2	15 Mar 07	23	6	40	14	322	644
Nitrogen 3	15 Apr 07	23	5	40	14	322	644
Total						**924**	**1848**

Crops Table for Irrigation

SimonsHill Fastier (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Silage1	70.0	16 Oct 06	15 Dec 06	61	Silage	33	10.0	700	tDM	31500	
Total										**31500**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for HeavyPoorDrain

SimonsHill Fastier (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Rye corn old	84.0	01 Jul 06	31 Oct 06	123	Rye corn	100	2.0	168	tDM	75600	[a,b]
Silage2	50.0	22 Oct 06	14 Dec 06	54	Silage	33	10.0	500	tDM	22500	
Rye corn new	84.0	01 Nov 06	30 Jun 07	242	Rye corn	100	4.0	336	tDM	33600	
Total										**131700**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for LucerneHeavyWellDrain

SimonsHill Fastier (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Rye corn old	42.0	01 Jul 06	31 Oct 06	123	Rye corn	100	2.0	84	tDM	37800	[a,b]
Big Bales2	66.0	15 Sep 06	31 Dec 06	108	Big Bales	85	15.0	990	tDM	44550	
Silage1	52.0	15 Sep 06	31 Dec 06	108	Silage	33	10.0	520	tDM	23400	
Rye corn new	42.0	01 Nov 06	30 Jun 07	242	Rye corn	100	4.0	168	tDM		[a]
Total										**105750**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Crops Table for LucerneShallowSoil

SimonsHill Fastier (Jul 06 - Jun 07)

Name	Area	Out of Pasture			Crop		Utilised Yield			Total	Notes
	ha	From	To	Days	Type	DM %	Per Ha	Total	Units	Cost $	
Rye corn old	14.0	01 Jul 06	31 Oct 06	123	Rye corn	100	2.0	28	tDM	12600	[a,b]
Rye corn new	14.0	01 Nov 06	30 Jun 07	242	Rye corn	100	4.0	56	tDM	5600	
Total										**18200**	

[a] No production cost for crops which begin on start date (01 Jul 06), or which follow an exactly similar crop.
[b] Crop is followed by new pasture - regrassing cost applies.

Supplements Amounts for SimonsHill Fastier

Jul 06 - Jun 07

Month	Silage tDM	Big Bales tDM	Rye corn tDM
On-Hand at Start	1200.0		70.0
Bought		690.0	
Produced	1720.0	990.0	840.0
Jul 06	400.0	300.0	
Aug 06	400.0	300.0	50.0
Sep 06	400.0	90.0	150.0
Oct 06			140.0
Nov 06			
Dec 06			
Jan 07			
Feb 07			
Mar 07			150.0
Apr 07			150.0
May 07	120.0		150.0
Jun 07	400.0	300.0	50.0
Total Fed	1720.0	990.0	840.0
Sold		690.0	
On-Hand at End	1200.0		70.0

Stock Reconciliation for SimonsHill Fastier

Jul 06 - Jun 07

Stock Class	Open	Aged		Wean	Die	Buy	Sell	Transfer		Close
		Out	In					In	Out	
Ewe Lamb				3522	21				2169	1332
Ewe Hogget	1332				12		20		1300	
Ewe	6500				325		975	1300		6500
Wether Lamb				3523					3523	
Mixed Lamb								5692		5692
Mixed Hogget	5692						5692			
Total Sheep	**13524**			**7045**	**358**		**6687**	**6992**	**6992**	**13524**

Numbers by Month for SimonsHill Fastier

Jul 06 - Jun 07

	31 Jul	31 Aug	30 Sep	31 Oct	30 Nov	31 Dec	31 Jan	28 Feb	31 Mar	30 Apr	31 May	30 Jun
Ewe Lamb							3519	1346	1342	1338	1335	1332
Ewe Hogget	1330	1328	1326	1324	1302	1300	1300					
Ewe	6474	6448	6396	6370	6357	6344	6313	6607	6581	6554	6527	6500
Wether Lamb							3523					
Mixed Lamb								5692	5692	5692	5692	5692
Mixed Hogget	5692	5692	5692	5123	1691							
Total Sheep	**13496**	**13468**	**13414**	**12817**	**9350**	**7644**	**14655**	**13645**	**13615**	**13584**	**13554**	**13524**

Nutrient assessment

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:19 p.m.

Dennis Fastier
Simons Hill
Mary Burn
Mackenzie

David Houlbrooke
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Hill current.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		10
Fertiliser N	kg N/ha/yr		11
Other N	kg N/ha/yr		0
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	5
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.5
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	17
N conversion efficiency	%	**15-25**	19
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	na

na : N in drainage not calculated for farms with easy and steep blocks.

Disclaimer

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:20 p.m.
Copyright © 2006 AgResearch Ltd. All rights Reserved
Dennis Fastier
Simons Hill
Mary Burn
Mackenzie

David Houlbrooke
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Hill current.ovp

Nutrient Budget

Block Budget for: Current Block: Deep poor drained

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	5	0	22	14	0	0	-0.2
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	21	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	6	1	0	1	1	0	0	-0.1
Transfer	0	0	1	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	3	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	13	26	31	1	2	0.0
Immobilisation/absorption	-1	15	0	-3	0	0	0	0.0
Change in inorganic soil pool	0	-7	8	0	-15	5	7	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Dennis Fastier David Houlbrooke
Simons Hill AgResearch
Mary Burn
Mackenzie

\\gfile\Snow\/$\UpperWaitaki\Stage3\FromDavid\Simons Hill current.ovp

Nutrient Budget

Block Budget for: Current Block: Deep well drained

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	5	0	22	14	0	0	-0.2
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	21	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	6	1	0	1	1	0	0	-0.1
Transfer	1	0	1	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	3	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	13	26	31	1	2	-0.1
Immobilisation/absorption	-2	15	0	-3	0	0	0	0.0
Change in inorganic soil pool	0	-7	8	0	-15	5	7	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Dennis Fastier David Houlbrooke
Simons Hill AgResearch
Mary Burn
Mackenzie

\\gfile\Snow\/$\UpperWaitaki\Stage3\FromDavid\Simons Hill current.ovp

Nutrient Budget

Block Budget for: Current Block: Hill country

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	4	0	15	9	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	19	0	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	2	0	0	0	0	0	0	0.0
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	1	0	0	0	0	0	0	0.0
Leaching/runoff	3	0	13	22	31	1	2	0.0
Immobilisation/absorption	5	13	0	-6	0	0	0	0.0
Change in inorganic soil pool	0	-7	7	0	-18	7	8	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:19 p.m.

Dennis Fastier
Simons Hill
Mary Burn
Mackenzie

David Houlbrooke
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Hill current.ovp

Nutrient Budget

Block Budget for: Current Block: Irrigated

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	150	27	0	34	68	20	0	-0.8
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	8	0	1	2	1	1	3	0.0
Irrigation	3	1	4	7	26	6	24	0.0
Slow release	0	3	22	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	16	2	1	3	4	0	0	-0.3
Transfer	1	0	2	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	38	0	0	0	0	0	0	0.0
Leaching/runoff	12	0	15	44	38	1	2	-0.4
Immobilisation/absorption	94	18	0	-3	0	0	0	0.0
Change in inorganic soil pool	0	10	10	0	56	31	30	-0.1

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is 2, 0.0 and 3 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:20 p.m.

Dennis Fastier
Simons Hill
Mary Burn
Mackenzie

David Houlbrooke
AgResearch

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Hill current.ovp

Nutrient Budget

Block Budget for: Current Block: Ryecorn

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	66	10	0	12	0	0	0	0.0
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release/mineralisation	21	12	20	8	4	6	7	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	19	2	1	3	5	0	0	-0.4
Transfer	1	0	2	0	0	0	0	0.0
Fodder crop sold	0	0	0	0	0	0	0	0.0
Atmospheric	32	0	0	0	0	0	0	-0.2
Leaching/runoff	45	1	3	18	62	1	0	-3.3
Immobilisation/absorption	0	19	0	0	0	0	0	0.0
Change in inorganic soil pool	0	0	15	0	-62	6	10	3.9

* Acidity - kg H+/ha

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:20 p.m.

Dennis Fastier
Simons Hill
Mary Burn
Mackenzie

David Houlbrooke
AgResearch

\\gfile\Snow\$\UpperWaitaki\Stage3\FromDavid\Simons Hill current.ovp

Nutrient Budget

Block Budget for: Current Block: shallow well drained

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	0	5	0	22	14	0	0	-0.1
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	0	0	0	0	0	0	0	0.0
Slow release	0	3	22	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	4	0	0	1	1	0	0	-0.1
Transfer	0	0	0	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	2	0	0	0	0	0	0	0.0
Leaching/runoff	2	0	12	27	31	1	8	0.0
Immobilisation/absorption	2	15	0	-4	0	0	0	0.0
Change in inorganic soil pool	0	-7	9	0	-15	5	1	0.0

* Acidity - kg H+/ha

Estimated change in soil P, K and Mg test is -1, 0.0 and 1 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).

By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.

For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Nutrient assessment – Farm and irrigated blocks at "highly developed" status

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:25 p.m.

Dennis Fastier David Houlbrooke
Simons Hill AgResearch
Mary Burn
Mackenzie

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Hill current HD.ovp

Nitrogen report

Whole farm report

	Units	Average NZ farm	Current farm
Inputs (farm average)			
Clover N	kg N/ha/yr		10
Fertiliser N	kg N/ha/yr		11
Other N	kg N/ha/yr		0
Environmental losses			
Leaching loss	kg N/ha/yr	**5-20**	7
Direct winter N loss	kg N/ha/yr		0
N loss from effluent pond to water	kg N/ha/yr		0
N_2O emissions	kg N/ha/yr		0.5
Indices			
Farm N surplus	kg N/ha/yr	**30-80**	17
N conversion efficiency	%	**15-25**	19
Average nitrate conc. in drainage (+/- about 30%)	mg N/ml	**2-7**	na

na : N in drainage not calculated for farms with easy and steep blocks.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

Report from OVERSEER nutrient budgets 2, version 5.2.6.0 on 27/07/2008 07:26 p.m.

Dennis Fastier David Houlbrooke
Simons Hill AgResearch
Mary Burn
Mackenzie

\\gfile\SnowV$\UpperWaitaki\Stage3\FromDavid\Simons Hill current HD.ovp

Nutrient Budget

Block Budget for: Current Block: Irrigated

	N	P	K	S	Ca	Mg	Na	H+
	(kg/ha/yr)							
Inputs								
Fertiliser	150	27	0	34	68	20	0	-0.8
Effluent added	0	0	0	0	0	0	0	0.0
Atmospheric/Clover N	10	0	1	2	1	1	3	0.0
Irrigation	3	1	4	7	26	6	24	0.0
Slow release	0	3	22	0	3	5	6	0.0
Supplements	0	0	0	0	0	0	0	0.0
Outputs								
Product	16	2	1	3	4	0	0	-0.3
Transfer	1	0	2	0	0	0	0	0.0
Supplements sold	0	0	0	0	0	0	0	0.0
Atmospheric	87	0	0	0	0	0	0	0.0
Leaching/runoff	58	0	15	44	38	1	2	-0.4
Immobilisation/absorption	0	18	0	-3	0	0	0	0.0
Change in inorganic soil pool	0	10	10	0	56	31	30	-0.1

* Acidity - kg H+/ha

Nitrate-N losses from this block exceed 11.3 ppm - the drinking water standard. Consider mitigation options to reduce this loss

Estimated change in soil P, K and Mg test is 2, 0.0 and 3 respectively. Negative value = depletion and need for additional inputs. Positive value = surplus and potential for reducing inputs if soil test is at or above optimum.

Disclaimer

The contents of the software and the accompanying files ("Overseer") are provided "AS IS" and without warranties of any kind either express or implied. To the fullest extent permissible and subject and pursuant to applicable law, the owners of verseer disclaim all warranties representations or guarantees, express or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, non infringement, quality or performance. In addition, while the owners of Overseer have used reasonable efforts to ensure that Overseer is free from bugs, errors or viruses, any warranty relating to Overseer being free from bugs, errors, or viruses is disclaimed. The owners of Overseer do not warrant or make any representations regarding the correctness, accuracy, reliability, or otherwise of the contents of Overseer outputs, any third party information supplied, or the results of Overseer's, or Overseer's outputs', use (including reliance on those outputs).
By using Overseer, you agree that you are using Overseer, and its outputs, at your sole risk and that it is not a substitute for specialised advice or testing. To the fullest extent permissible by law, the owners of Overseer are not responsible, or liable, in any way in relation to your use of Overseer or any use of Overseer's outputs.
For the avoidance of doubt, this disclaimer continues to apply where data from any part of Overseer or a report produced by it are exported to other media and altered in any way.

GlenEyrie Downs Station

Gleneyrie Downs Station has a rolling to flat contour and until very recently, had a major wilding pine population. Pastures where present have been very unproductive and undeveloped. It is presently un-grazed. The wilding pines (some many years old) have in the last few months been knocked down and burnt and the areas cultivated and re-grassed. It is located approximately 10km north of Omarama

```
-----Original Message-----
From: Hamish Brown [mailto:BrownH@crop.cri.nz]
Sent: Wednesday, 23 July 2008 11:09 a.m.
To: Snow, Val
Subject: Re: Canola information

Hi Val

I have discussed potential yields with John de Ruiter.  For the given time we would expect a potential biomass
yield of 10 t DM/ha for the rape and 11 t DM/ha for the barley.  As this is a dryland situation the yields will
be lower than this and more variable, 6-9 t/ha for the rape and 5-8 t/ha for the barley.

Assuming the rape is 30% leaf (5%N content) and 70% stem (2% N content), the barley is 50% grain (2.5% N), 50%
straw (1.5% N) then the rape crop will remove 174 - 261 kg N/ha and the barley will remove 100-160 kg N/ha
giving a total N removal of 274 - 421.

Mineralisation of Nitrogen from the soil organic matter will vary depending on soil moisture conditions but
likely decrease from 100 - 200 kg N/ha in the first year following pasture, decreasing to 80 - 170 kg
N/ha in the second year and 60 - 140 kg N/ha in the final year.

Nitrosol is 8% N so 40 kg/ha applications will provide 3.2 kg N/ha (an annual total of 6.4 kg N/ha)

Crop N demand will be in substantial excess to what is supplied by soil mineralization and fertiliser.  Thus,
the mineral N content of the soil profile will be very low throughout the duration of this crop rotation and any
drainage events will result in only very small amounts of leaching.  The likelihood of drainage events will
depend on the water holding capacity of the soil (which will also influence the yield
obtained) but under dryland conditions with a crop growing through the autumn and winter the risk of drainage is
low.

For the specified rotation I would expect zero N leaching under most circumstances with the possibility of up to
30 kg of N leaching if a large rainfall event causes substantial drainage within three months of the initial
cultivation from pasture.
```

I would also expect that all crops (excluding the first rape crop) will be extremely nitrogen deficient and yields to be below the range quoted above.

Hamish

Hamish E. Brown
Crop Physiologist
Crop & Food Research
Private Bag 4704
Christchurch
+64 3 325 9394

>>> "Snow, Val" <Val.Snow@agresearch.co.nz> 22/07/2008 5:23 p.m. >>>
Hi Hamish,

As discuss, this is the farmer's plan for his canola-barley rotation.
The farm is in the Upper Waitaki region. Can you provide an expert opinion on both the feasibilty (is there enough fertiliser for this planned rotation) and the likely N leaching.

This would be dryland production only.

Year 1 plan
1 March - cultivation of existing 'pasture', plant canola + 40 kg Nitrosol Oceanic
1 September - + 40 kg Nitrosol Oceanic
1 October - harvest canola for dry matter (biofuel) and direct drill barley
1 December - + 40 kg Nitrosol Oceanic

Plan for years 2, 3, 4
1 March - harvest barley for grain, plant canola + 40 kg Nitrosol Oceanic
1 September - + 40 kg Nitrosol Oceanic
1 October - harvest canola for dry matter (biofuel) and direct drill barley
1 December - + 40 kg Nitrosol Oceanic

Please contact me if there is more information that you want or if something does not make sense.

Thanks, Val