Gay Gibson

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Sent: Monday, 9 June 2014 1:59 p.m.
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Cc: Philip Mladenov; Greg Sneath; Caroline Read
Subject: Fertiliser Association of New Zealand, submitter ID number 51972, Further Submission on Variation 1 to the Proposed Canterbury Land & Water Regional Plan
Attachments: Further Selwyn Waihora Variation One submission.pdf; APPENDIX ONE - OVERSEER Best Practice Data Input Standards.pdf; APPENDIX TWO - Issue 62 FM SPECIAL ISSUE.pdf

Categories: Purple Category

Please find attached the Fertiliser Association of New Zealand's, submitter ID number 51972, further submissions to Environment Canterbury on Variation One to the Proposed Canterbury Land and Water Regional Plan.

We attach by way of service copies of our further submissions to:

- Ballance Agri-Nutrients Ltd, submitter ID number 52309,
- Ravensdown Fertiliser Co-operative Ltd, submitter ID number 52249,
- Beef + Lamb New Zealand, submitter number ID 52292,
- Fonterra Co-Operative Group Limited, submitter ID 52333, and
- Nga Rūnanga and Te Rūnanga O Ngāi Tahu, submitter ID number 52233.

Would you please confirm receipt of this message and its three attachments by return email. The attached files are named:

- Further Selwyn Waihora Variation One submission.pdf,
- APPENDIX ONE – OVERSEER® Best Practice Data Input Standards.pdf, and
- APPENDIX TWO Issue 62 FM SPECIAL ISSUE.pdf.

Kind regards

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FURTHER SUBMISSIONS TO ENVIRONMENT CANTERBURY

on the

PROPOSED VARIATION ONE TO THE PROPOSED CANTERBURY LAND AND WATER REGIONAL PLAN

by

THE FERTILISER ASSOCIATION OF NEW ZEALAND

9 JUNE 2014

Introduction

The Fertiliser Association of New Zealand ('FANZ'), submitter ID number 51972, has an interest in the Proposed Variation One to the Proposed Canterbury Land and Water Regional Plan that is greater than the interest the general public has, for the following reasons:

I. FANZ is a trade association representing the New Zealand manufacturers of superphosphate and nitrogen fertilisers. FANZ has two member companies – Ballance Agri-Nutrients Ltd, and Ravensdown Fertiliser Co-operative Ltd. Both these companies are farmer owned co-operatives with some 45,000 farmer shareholders. FANZ member companies supply over 98% of all fertiliser used in New Zealand. This represents a $2 billion market share. There are super-phosphate manufacturing plants located in Mt Maunganui, Invercargill, Napier, Dunedin and Christchurch. New Zealand's only ammonia-urea manufacturing plant is located at Kapuni, South Taranaki. The companies each have networks of fertiliser storage, distribution and dispatch facilities across New Zealand. In total the companies employ more than 1450 staff across their organisations.

II. To promote good management practices, FANZ and its member companies develop training programmes, codes of practice and industry information fact sheets. They fund research, partner with government on research and development projects and work closely with other organisations in the agricultural sector on industry-good issues. Industry research and development spending exceeds $16 million per annum. This includes funding for OVERSEER®.

III. OVERSEER® is an agricultural management tool which assists farmers and their advisers to examine nutrient use and movements within a farm to optimise production and environmental outcomes. The computer model calculates and estimates the nutrient flows in a productive farming system and identifies risk for environmental impacts through nutrient loss, including run-off and leaching, and greenhouse gas emissions. OVERSEER® is jointly owned and funded by the Ministry for Primary Industries, AgResearch and FANZ.

IV. FANZ supports and encourages an environmentally responsible science-based approach to nutrient management and its regulation. FANZ member companies provide product that is critical to New Zealand farming systems along with research that supports both environmentally sustainable farming practices and government's export growth agenda. FANZ is influential across all agricultural sectors, including dairy, sheep, beef, arable and horticulture.

V. FANZ cannot gain an advantage in trade competition through this submission.

VI. FANZ wishes to be heard in support of its submission and would consider making a joint case with others making a similar submission.

Further Submissions on the Proposed Variation One to the Proposed Canterbury Land and Water Regional Plan

1. FANZ' member companies, Ballance Agri-Nutrients Ltd submitter ID number 52309 (Balance) and Ravensdown Fertiliser Co-operative Ltd, submitter ID number 52249 (Ravensdown) make their own submissions specific to the view of their individual operations. In developing its own submissions FANZ member companies were consulted and provided industry expertise and advice.

    a. FANZ supports submissions of Ballance and Ravensdown. The reason for FANZ support is that Ballance and Ravensdown fluently reflect an industry view and level of expertise in nutrient management that is not readily available from any other sources. FANZ submits that the submissions of Ballance and Ravensdown be given appropriate weight on that basis.

2. FANZ supports the following submissions from Ballance, Ravensdown and Beef + Lamb New Zealand, submitter number ID 52292, and requests that they be given effect on the grounds that ignoring practical implications of the proposed rules in relation to Farm Environment Plans may render the rules unworkable at implementation.

    a. At page 3, paragraph 3.38 of its submission, Beef + Lamb New Zealand, seeks to "Amend Rule 11.5.7 4 to provide for [Farm Environment Plans] to be completed in a reasonable timeframe after the results of the MGM project for Good Management Practice are known…The timeframe for completion of [Farm Environment Plans] for affected farm properties is firstly too short, and secondly premature pending the completion of the MGM project with its N loss figures under GMP, which may see Farm Environment Plans having to be redone.

    b. At page 16 of its submission, Ravensdown seeks "confirmation from Council that farmers will not be penalised if the industry cannot cope with the demand to prepare Farm Environment Plans or Council's ability to review and audit these plans."

    c. At page 3, paragraph 2(e) of its submission, Ballance states that it is "aware (from the nutrient budgeting service that it provides to its customers) of the types of expertise that are needed to effectively and appropriately prepare robust Farm Environment Plans. While its experience is that the expertise is building, it questions if sufficient capacity exists to produce Farm Environment Plans for all 'farms' and 'lifestyle' farms that are recorded on Table 1 of Lilburne's January 2014 memorandum in a short period. As with the Company's concerns relating to lack of an implementation plan guiding the development of nutrient budgets, the Company raises similar concerns relating to implementing Farm Environment Plans in the Selwyn Te Waihora catchment.

3. FANZ supports and seeks to have allowed the submissions of Fonterra Co-Operative Group Limited, submitter ID 52333 at page 4, paragraph 12 where the originating submission reads as follows:

    a. "The relief sought addresses a large number of substantive and technical issues. Amongst these there are several common matters that underpin our submission i.e.:

    b. The importance of recognising the positive aspects of catchment use for primary production and the value that people and communities gain from that use. This can largely be addressed by amending the introductory narrative within the Variation.

    c. Concern about rules that require particular nitrogen loss rates to be achieved on farm within two years from now, and then a 30% lower rate to be achieved within eight years from now, while not identifying the rates today that need to be worked towards. This approach leaves farmers in the dark as to what they need to do until the Good Management Practice Nitrogen and Phosphorous Loss Rates (GMPNPLR) are identified - we understand this is expected to be in mid-2015. It also prevents any assessment of the potential benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from the nitrogen loss rules currently proposed in the Variation (making the proposal non-compliant with section 32 of the Resource Management Act 1991). This can largely be addressed by removing reference to compliance with the GMPNLR, or reduced rates until such time as the GMPNPL rates and associated reduction strategy are introduced to the pLWRP…"

    d. "Concern about the nitrogen baseline that applies to farming activities and the way farmers must account against that baseline. There are issues that have recently come to light with the pLWRP provisions that can, and should, be remedied for Selwyn-Waihora within this Variation.

    e. The need to keep the many quality and quantity limits and outcomes under review, making adjustments where and when necessary…

    f. The importance of acknowledging the non-regulatory methods needed to ensure the catchment vision is achieved and the fact that regulation is not expected to (and almost certainly cannot) achieve the outcomes by itself. Greater confidence in the Variation could be provided to stakeholders if it were to include a methods section that explained the approach to implementation, review and deployment of non-regulatory methods."

    g. FANZ supports these submissions and seeks to have them allowed on the grounds that they reflect FANZ' overarching position that land managers require consistency, certainty and confidence in regulatory measures which must also, by necessity, be juxtaposed cohesively with non-regulatory methods if they are to achieve the catchment vision.

4. FANZ notes the submission of Nga Rūnanga and Te Rūnanga O Ngāi Tahu, submitter ID number 52233, at page 4, paragraph 5, page 7, unnumbered

paragraph, and at page 29 in relation to Schedule X, and wishes to make the following points in relation to Schedule X.

a. At page 4, paragraph 5 of its originating submission, Nga Rūnanga and Te Rūnanga O Ngāi Tahu, seeks to "Require rural activities to either prepare and implement a nutrient budget using OVERSEER® (or an alternative method) or keep sufficient records as per Schedule X to enable a nutrient budget to be prepared using OVERSEER® (or an alternative method)".

b. Correct use of OVERSEER® requires an expert level of user knowledge. On that basis FANZ, commissioned by Dairy NZ, established the Nutrient Management Adviser Certification Programme in 2013. The programme provides land managers with the assurance and certainty of having nutrient budgets carried out by certified expert users. The Programme forms part of the Ministry for Primary Industries' (MPI) Primary Growth Partnership.

c. To further promote proper use of OVERSEER®, its owners, AgResearch, FANZ and MPI launched OVERSEER® Best Practice Data Input Standards in December 2013. A copy of OVERSEER® Best Practice Data Input Standards is **attached at Appendix One** of this submission. Information about the Nutrient Management Advisor Certification Programme is **attached at Appendix Two**. Application of the Standards by expert users produces consistent and meaningful results from OVERSEER®.

d. FANZ advises against use of OVERSEER® by inexpert users who are unlikely to be able to apply the Standards and use OVERSEER® in a way that achieves consistent or meaningful results.

e. FANZ' member companies, Ballance and Ravensdown train staff that are expert certified users of OVERSEER® and can assist in providing nutrient budgets to land managers using OVERSEER®.

ENDS

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OVERSEER®

BEST PRACTICE DATA INPUT STANDARDS

OVERSEER VERSION 6.1

August 2013

Acknowledgements

The OVERSEER® Best Practice Data Input Standards (the Standards) were developed by a group of seven technical expert users, who drew on their personal knowledge plus that contained in the DairyNZ Input Protocol, the AgResearch Expert User Group Guidelines and the Waikato Regional Council's Protocol for Variation 5 (West Taupo catchment). The Standards are a consensus of the views of the seven technical expert users.

A wider stakeholder advisory group consisting of agricultural industry representatives, regional councils, the Ministry for Primary Industries, the Ministry for the Environment and Irrigation New Zealand have also critiqued and endorsed the Standards.

AgResearch Limited, the Fertiliser Association of New Zealand and the Ministry for Primary Industries who, together, are the owners of OVERSEER® (*Overseer*) wish to thank all those involved for their time in developing the Standards.

Published in November 2013 by Overseer Management Services Limited on behalf of the owners of Overseer. PO Box 11519, Manners Street, Wellington 6142, New Zealand. www.overseer.org.nz

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Preface

Overseer is an agricultural management tool which models the cycling of nutrients within a farming operation; it estimates the inputs, outputs and nutrient flows of various farm management scenarios to assist users to optimise production and environmental outcomes. It estimates nitrogen and phosphorus loss and greenhouse gas emissions allowing the risk of environmental impacts of farm management options to be taken into consideration.

The Standards are a set of guidelines to assist expert users to define data inputs into *Overseer* that consistently achieve the most accurate nutrient budget of a farm for nutrient management purposes. They have not been developed to teach users how to operate *Overseer*, nor have they been designed to be an auditing system.

User selection of the input parameters can have a major effect on the estimates of nutrient cycling for the described farm systems and hence the ultimate budget reports. The purpose of providing a 'best practice' Standard is to reduce inconsistencies between different users when operating *Overseer* to model individual farm systems.

NAVIGATING THE STANDARDS

- The content of the Standards – and the order in which it appears – corresponds to the data entry page in *Overseer*.
- Most sections contain impact statements, and some sections contain additional information such as notes, guidance, warnings or a justification.
- Where there is more than one recommendation given, the preferred option is listed as 1.

IMPORTANT INFORMATION ABOUT OVERSEER

- By default, *Overseer* estimates an annual average nutrient budget based on the long-term average rainfall, monthly rainfall distribution, and other climate data and assumes that the farm maintains the long-term production system entered.
- When considering the use of *Overseer* for forward predictions (e.g. consent applications, fertiliser maintenance requirements) it is recommended that the data that describes the typical management system to be adopted is used with long-term average climate data (rainfall, temperature).
- For monitoring purposes, it is recommended annual management data is used with long-term rainfall until this issue is more fully resolved (refer to Appendix 9). If annual data inputs are used, it is also recommended that a rolling average or trend analysis of outputs is used to reduce the impact of year-to-year variability when monitoring the degree of compliance with any target or critical value. In addition, the uncertainty of *Overseer* predictions can be reduced if the focus is on a percentage change over time (rather than an absolute change).

Note

The Standards will be updated and amended as often as necessary to ensure that they comply with the requirements of new versions of *Overseer*.

If you have a comment about the Standards, or you have identified an issue with *Overseer*, please contact overseer@agresearch.co.nz

Known problems in *Overseer* are listed on the website at
www.overseer.org.nz/OVERSEERModel/Troubleshooting

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1 Farm Scenario

1. Farm Scenario

1.1 GENERAL

This section is used for identification of the property, owner/client and consultant details.

Farm Scenario/Client/Property/Consultant details

Recommendation: Fill in as required. We recommend all boxes are filled in i.e. client name, address of property, legal description of property, valuation number and consultant details.

- For assessment year enter as year dates e.g. 2011/2012.

1.2 LOCATION

Impact: The location sets variable climate defaults and some animal characteristics e.g. calving date.

Recommendation:

1. Select location by region.
2. If your site has similar climatic conditions (i.e. temperature or rainfall) to the nearest town, choose that option.

NOTE: Different temperatures between nearest towns and regions will affect the amount of N leaching; the use of Virtual Climate Station data (VCS) will override climatic data selected through the choice of either region or nearest town.

1.3 BLOCKS

Impact: It is critical to get the farm area and block areas within the farm defined as accurately as possible to truly represent the farm being modelled.

Recommendation: The total farmed area including relevant tree blocks and non–productive areas must be entered. The total farm area does not have to be contiguous, blocks may be geographically separated but included in the same nutrient budget, however, if blocks are in separate catchments they should be treated as separate nutrient budgets.

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

- If total area is entered, the difference between total area and sum of effective area is deemed non-productive area. While not recommended, if total area is not entered, *Overseer* will assume a certain percentage of the effective block is lanes, raceways and yards, and this area is added to the effective area entered to give total farm area used in the calculations.

Pastoral

- Support blocks;
  1. If interested in whole system output, include support block.
  2. Where a support block/runoff is contiguous with the milking platform, the support block should be entered as a block within the whole farm.
  3. Where the support block/runoff is non-contiguous and in a different catchment it should be treated as a separate farm.

NOTE: If you are interested in Life Cycle Assessment (LCA) you must also include other properties that are involved in the farming operation i.e. farms where cows are wintered off.

Fodder crop

- Fodder crop blocks are assumed to rotate through one or more pastoral blocks.
- Semi-permanent fodder crops should be entered as crop blocks when:
  - » >25% of the pastoral area is in fodder crop or,
  - » If the fodder crop cycle is greater than 12 months or,
  - » If the same area of the farm is used continuously for fodder cropping, or,
  - » A fodder crop can be grown as part of a crop rotation and it therefore must be entered on the crop rotation page of the appropriate crop block.

Crop

In situations of multiple crop rotations it may be necessary to treat each paddock as an individual block.

- To minimise the number of blocks, guideline's to consider when amalgamating paddocks/crops into blocks may be found in Appendix 1 and 2.

House blocks

- House blocks should be entered on small properties (< 10 ha). House blocks are important on lifestyle properties in sensitive catchments.

Effective area

For all blocks except fodder crop blocks, enter the effective area of the block.

- For pastoral blocks this includes area grazed, but excludes raceways and lanes.
- Fenced off areas of trees within another block (e.g. trees, scrub with a pastoral block) should be amalgamated up and entered as tree blocks.
- Fenced off areas of wetlands should be separated out and entered as wetland block.
- For crop blocks, the effective area of a crop block should include headlands, tracks within the block, or other areas defined as not cultivated but plants growing, e.g. pasture around fence lines. These can be further redefined under the crop input options. However, farm tracks should be part of the non-productive area.

Justification: All of the factors mentioned above are critical to determining the way *Overseer* treats how nutrients cycle between blocks and into and out of the farm.

1.4 ENTERPRISES (STOCK)

Impact: Farm animals are a major source of nutrient loss from the whole farm system.

Recommendation: Check the boxes which represent the enterprises on the farm.

1.5 STRUCTURES

Impact: Structures influence the time animals spend on paddocks and how excreta is distributed between paddocks and other surfaces.

Recommendation: Check the boxes which represent the structures present on the farm.

- A feed pad is a hard surface area (usually concrete) normally sited adjacent to the farm dairy where stock can be held for some time (1–2 hours), either prior to or after milking, and provided with supplementary feed.

  NOTE: feed pads can only be used by dairy cows during the milking season. If also used in winter, consider using the concrete apron under wintering pad during the summer as well.

- A winter stand off or loafing pad is a specially built area where stock can be withheld from grazing during wet periods to minimise damage to pasture. There is no provision for stock feeding while the animals are on the pad. If stock are held for extended periods on the raceways, treat this as a stand-off area.

  NOTE: A feed pad and winter standoff or loafing pad can only be selected if dairy cows are present on the property.

- A wintering pad, animal shelter, barn or housing are specially built areas constructed where animals are withheld from pasture for extended periods (weeks or months) and supplementary feeds can be brought to them. A wintering pad consists of a bedding area, with or without a concrete feeding apron.

1.6 ANIMAL DISTRIBUTION

Impact: Differences in productivity and livestock type between blocks will influence the distribution of animal intake and excreta deposition between blocks and hence nutrient cycling and transfers between blocks. If characteristics such as soil, climate or irrigation differ between blocks, then this can result in different farm N leaching losses.

Recommendation:

1. Where differences in block productivity are unknown use the default no differences between blocks.
2. Where relative pasture productivity is likely to be different e.g. irrigated vs. dryland, flat country vs. hill country, relative productivity differences should be entered based on credible information (e.g. measured or farmer knowledge of pasture yield assessment, grazing days and/or stocking rate).
    - When using animal assessment, actual stocking rate differences can be used e.g. flats 14 su/ha and hills 7 su/ha.

Justification: Where there are obvious differences between block productivity it is important to try and represent that in the best way possible, otherwise nutrient uptake and deposition by grazing animals will not be properly represented.

1.7 DAIRY EFFLUENT SYSTEM

Impact: Only displayed if dairy or dairy goat enterprise has been selected. Entering the correct management system is critical to determine the fate of effluent nutrients.

Management System

Recommendation: Select the most appropriate management system from the drop down box.

- If spray from sump is selected or all exported, nothing further is required on this page.
- If 2 pond + discharge is selected further information is required on pond solid disposal i.e. either spread on selected blocks or exported.
- If spread on selected blocks is selected, then enter the frequency in years that ponds are emptied.
- If holding pond is selected further information is required.
    - » If solids are separated out before entering the holding pond, check the appropriate box, information on disposal method and storage method of the solids will be required.
    - » If pond solids are spread on selected blocks enter frequency in years that ponds are emptied. Pond solids can be exported.
    - » For liquid disposal select the appropriate method from the drop down box.

Justification: Effluent management systems and fate of solids and liquid effluent should be easily identified on farm and from farm records.

1.8 SUPPLEMENTS IMPORTED

Impact: Supplements are an important source of nutrients coming into a farm system and an accurate description of the type and amount of supplements brought in is critical to nutrient cycling assessments on farm.

Supplement description and source

Recommendation:

1. Records (purchased or freight) of the types and quantities of the purchased feeds must be used to populate the fields required. Supplement source can be purchased or from storage.
    - Where the nutrient budget is based on a one year assessment – feeds that were purchased or imported in the year of assessment but put in storage at the end of the year must NOT be included.
    - If your supplement is not available from the drop down lists, select the supplement with the closest characteristics.
2. When no records exist, farmer estimates will suffice, although it is unsatisfactory.

Weight

Recommendation: Enter actual weight (in tonnes) of supplement where known.

- Take care to check the box weight on dry weight basis if the weight is recorded on this basis.
- For bale feeds where actual weights are not known click use bale size. Where no information is given enter 12 for the number of standard bale equivalents/bale.

Storage

Recommendation: Leave as average, unless there is good evidence to alter this.

Destination

Recommendation: Select most appropriate destination where the supplement is fed, from the choices in the drop down list.

Recommendation:

- Select appropriate utilisation, or if unknown, use average, unless on a pad where the default is very good. Refer to Overseer HELP file for additional information.

NOTE: Select specify timing of feeding if timing is concentrated around certain times of the year e.g. maize silage in autumn. This should be based on farm records. Note that the feed balance needs to be more precise when timing is selected. If an error occurs around too much or too little feed, sometimes unchecking specify timing of feeding will resolve this.

NOTE: Where the destination of the supplement is in shed feeding, this option will only become available after filling out the milking shed feeding section under the dairy enterprise feeding. The dairy enterprise inputs must be entered prior to entering supplement input page.

Justification: Because this is such a potentially important source of nutrients, farmers will need to be educated into obtaining and retaining accurate records of all supplementary feed purchased and fed.

- Utilisation and storage – inappropriate values entered are one reason why messages on insufficient or too much feed are generated.

1.9 DCD (NITRIFICATION INHIBITORS)

Impact: DCD can be used to mitigate some of the impacts of nitrogen losses.

Recommendation: Do not fill in this section at all as DCD is not currently available on the market.

1.10 WETLANDS

Impact: Wetlands can operate as denitrification zones and can act as mitigation for off-farm N losses.

Recommendation:

1. Wetlands that are completely fenced off from grazing should be added as a separate wetland block. Similarly, artificial wetlands should be added as a separate block unless they are used to treat outlets from mole/tile drainage systems in which case these must be added using the specific block's Drainage/Runoff page.
    - For wetland descriptions enter area, condition and type. Refer to the *Overseer* HELP file for definitions of options for condition and type.
    - For catchment descriptions enter catchment area, convergence and aquitard depth. Refer to the *Overseer* HELP file for definitions of convergence and aquitard depth.
    - Wetlands with the same characteristics should be grouped together.
    - Check the box specify how wetland catchment area(s) are distributed across the farm to represent where the areas of wetlands lie relative to the different farm blocks.
2. Ignore wetlands if not a significant feature of the farm.

Justification: Farmers should be given the mitigation 'credit' for purposefully having and maintaining functioning wetlands within their farm systems.

1.11 GREENHOUSE GAS FOOTPRINT

Recommendation: Ignore this section unless interested in 'cradle-to-farm gate' inputs for LCA analysis, or altering greenhouse gas emission factors.

1.12 REPORT SETTINGS

Impact: This allows the user to customise some of the reports out of Overseer with respect to benchmarking data, regional council permitted activity rules requirements/thresholds and fertiliser nutrient costs. You can alter report setting for all your subsequent farm reports by going to the Options>Report tab. Or customise for a particular farm using the Farm Scenario>Report setting drop down menu list.

Recommendation:

1. Enter the most appropriate data to customise output reports.
    a. Select from drop down list of farm type for benchmarking data.
    b. Enter the appropriate regional council permitted activity or consented N application rate as effluent.
    c. Enter the applied fertiliser nutrient costs per ha into the appropriate boxes.
2. If unknown, use *Overseer* defaults.

2 Enterprises

2. Enterprises

Impact: The type and amount of animals on farm, their weight and the associated maintenance, growth, gestation, lactation and production has a direct influence on metabolisable energy requirements, which is used to determine pasture dry matter intake, which in turn directly influences nutrient cycling between animals and pasture. For additional guidance around entry of inputs to the enterprise panes refer to Appendix 3.

2.1 NUMBERS

2.1.1 Dairy, Dairy Grazing, Drystock, Dairy Goats

Breeding Stock Numbers

Impact: The entry of monthly stock numbers must be as accurate as possible to ensure that a relevant nutrient budget is produced.

The numbers of animals entered per stock type and class has a direct effect on metabolisable energy and dry matter uptake, nutrient cycling, and ultimately nutrient losses.

NOTE: Section 2.1.3 below provides more detail on entering mob parameters.

How would you like to enter your stock numbers?

Recommendation:

1. Where monthly stock numbers are known choose specify based on specific stock numbers.
2. If monthly stock numbers are not known use generate milking mob for dairy and replacements, or generate breeding mob for dry-stock classes and dairy goats. This will make assumptions about stock numbers and management on farm throughout the year. The user will need to modify monthly numbers to accurately reflect actual on-farm animal numbers.
3. Use specify using peak cow numbers – for dairy farming only.

☑ NOTE: Check breeding numbers are constant only if all culling occurs at the time replacements are brought on.

NOTE:

- A default replacement rate for breeding cows and goats is provided, adjust if differs from actual replacement rate.
  - » Annual Replacement rate percentage is calculated by: number of cull breeding animals sold per year/number of breeding animals present at 30th June (including dry animals).
- If calves are fed milk powder check box, otherwise *Overseer* assumes fed on whole milk to weaning.
- Enter the most appropriate descriptor for class and breed.
- Enter calving date, drying off/lactation length and weight if known, or leave as *Overseer* defaults (see section 3.3).

NOTE:

- *Overseer* defaults are provided for mean lambing, calving, fawning and weaning dates; these can be adjusted if there is good information to justify the changes.
- Actual breeding rates and replacement rates for ewes, cows and hinds must be entered.
  - » Breeding rate is calculated by: weaned animals/number of breeding animals present in at 30 June (including dry animals).
  - » Replacement rate focusses on the breeding mob and refers to: number of cull breeding animals sold per year/number of breeding animals present at 30th June (including dry animals).
  - » Enter average weaning weight for the stock class.
  - » If the weaning weight is not known leave the pane blank – this will assign a national average weaning weight based on stock type and breed.
- Check replacements are mated if they are mated within the 12 month (July–June) stock entry.
  - » If there is a hogget or heifer mating mob, this must be entered as a breeding replacement mob to allow for them to be mated within the 12 month (period above), and are therefore differentiated from the lamb mob.

NOTE: For all stock types, where there are regular stock movements or strict compliance requirements, the best approach is to enter monthly numbers on a grazing day's basis. The following formula must be used to calculate numbers per month:
Number of animals ÷ days in the month x number of days present on farm for that month

The above calculation applies to any animals on farm for part of the month.

Justification: The most accurate representation is using actual monthly stock figures, otherwise, *Overseer* will make assumptions around mating, culling, calving/lambing/fawning/kidding, which may or may not reflect on farm practice.

For dairy, calving date, lactation length and drying off can be an important factor in N leaching loss.

OTHER (e.g. Goats, Horses, Alpacas, Llamas)

Recommendation:

1. To enter in other animals, such as goats, horses, alpacas or llamas, select the correct stock class under each tab and enter the number of stock present on farm.
   - This is an annual stock number entry. If stock are present for only a portion of the year then calculate an annual average figure using the following formula:
     Number of stock ÷ 52 weeks x number of weeks on farm
2. If the stock type is not listed the operator will need to identify an appropriate RSU. These animals are treated similarly to sheep.

2.1.2 Drystock Farming (Sheep Beef Deer)

Trading Stock Numbers

Impact: The entry of monthly stock numbers must be as accurate as possible to ensure that a relevant nutrient budget is produced.

The numbers of animals entered per stock type and class has a direct effect on metabolisable energy and dry matter uptake, nutrient cycling, and ultimately nutrient losses.

NOTE: Section 2.1.3 below provides more detail on entering mob parameters.

How would you like to enter your stock numbers?

Recommendation: All monthly stock numbers should be entered using the selection specify based on specific stock numbers.

NOTE: For all stock types, where there are regular stock movements or strict compliance requirements, the best approach is to enter monthly numbers on a grazing days basis. The following formula must be used to calculate numbers per month:
Number of animals ÷ days in the month x number of days present on farm for that month

The above calculation applies to any animals on farm for part of the month.

2.1.3 Mob Detail Entry Parameters

These data entry standards apply to all stock classes being entered into *Overseer* – including breeding, trading and milking animals.

Notes Regarding Class

Breeding Stock

- All mixed age breeding stock and dairy cows only have a selection for maximum weight. If this weight is unknown leave blank and a national average default weight will be assigned based on breed and class.
- Breeding replacements are assumed to enter the breeding mob, although some may be sold (indicated by a decrease in numbers). For sheep or beef, if hoggets or heifers are mated ensure the replacements are mated tick box is checked.

Trading Stock

- Trading stock should be entered as lambs, calves, fawns, hogget's, heifers, hinds, wethers, bulls, steers, stags with an appropriate start and end weight if there are records, or use age at start.
  - » Lambs, calves, fawns: source = weaned imply (weaners have been weaned directly from the breeding stock on farm). They are treated as trading stock (sold for store or to the works).
- Weaners (lambs, calves, and fawns) are to be entered starting (the first monthly entry) from their weaning date (entered above).
- The correct type of dairy grazing stock must be entered (dairy grazing milking cows are pregnant; dairy grazing replacements are dry yearlings or autumn born heifers).

- Dairy grazers – this animal class can be specifically selected under Beef animals to cover dairy cows wintered on or dairy replacements grazed off farm. The model assumes that the energy intake required for pregnancy is included, but that any lactation occurs on the main (parent) farm.
- Cryptorchid lambs are entered as Ram Lambs (Lincoln University Farm Technical Manual states that they grow almost as fast as entire Rams).

Notes Regarding Entering Animal Weights

Introduction: The entry of animal weights and weight gain is preferred as it will more accurately reflect what is happening on farm in terms of maintenance and production requirements from pasture metabolisable energy, and any associated nutrient losses.

Recommendation:

1. If maximum weight or weight gain (start and end weights) are known, enter these weights in preference to age at start.
2. If only the maximum weight is known enter this with age at start (this will provide you with a more accurate growth curve compared with age at start only).
3. If maximum weight is not known enter age at start only.

2.1.3.1 MAXIMUM WEIGHT

Impact: This will affect the nutrient budget.

- For breeding animals, the maximum weight is the maximum weight of the mob throughout the year (excluding conceptus). Maximum weight will differ between breeds and classes during different times of the year. If weight is entered it must be fairly accurate and auditable to ensure that the resultant nutrient budget is accurate.
- For trading animals the maximum weight is the weight when fully grown, or weight at sale or slaughter.

Recommendation:

1. Enter the maximum weight if known.
2. If the maximum weight is not known leave the data entry pane blank – this will assign a national average weight based on the breed and class.

2.1.3.2 START AND END LIVE WEIGHT

Impact: This setting determines live weight gain that in turn affects the flow of nutrients. Greater weight gain will require more metabolisable energy uptake and result in greater N cycling. This will impact on N leaching. If weights are entered they have to correct to ensure that the resultant nutrient budget is accurate.

Recommendation:

1. Enter live weight at the start (for the month when the mob first appears on the stock reconciliation), and end live weight (for the month when the mob ends on the stock reconciliation (are sold) or at the end of the year in June).
    - End live weights (or carcase weight) for mobs sold to the works are usually available on the sales docket (kill sheet).
2. If end live-weight is known but not the start weight, then enter both age at start and live-weight at end.

3. If the weights are unknown or unreliable enter age at start only (see below).

NOTE: When using start and end weights in the situation where mobs of animals are being sold in groups throughout the year, or when they reach a certain weight (e.g. lambs), different entries or lines to sale must be entered to accurately depict weight gain for each drafted mob. The worked example in the Appendix 3 sets out the method to be followed.

2.1.3.3 CARCASS WEIGHT

Recommendation: If the end weight is not known, carcass weight may be entered (only for some stock classes).

NOTE: This is not relevant to breeding mobs and replacements. It is only relevant to trading stock. This is only visible when Fate = sold to works.

2.1.3.4 SOURCE

Impact: Source describes the origin of the mob – Brought, Weaned, or On Farm (i.e. already present from last year). If on farm or bought is selected a live weight or age at start must be entered.

Because of the possible impacts and variables of setting weight or age, this input may change predicted N leaching. The accurate setting of source is useful when reviewing the nutrient budget inputs or parameter report with the farmer.

NOTE: Source does not directly affect N leaching. It is directly concerned with Greenhouse Gas emissions. However, it is important because it indicates the type of information that should be used when determining the weight or age of the mob, both of which are critical to accurate estimation of nutrient losses.

Recommendation:

1. Enter source and enter weights or age as required.
2. For lambs, fawns, calves, if the animals originate from the breeding stock, enter weaned.
    - If weaned is selected only weight settings are available. Follow the weight entry protocols above.

2.1.3.5 AGE AT START

Impact: Where accurate or reliable weights are not available the age at start data entry must be used. This will assign stock in the mob being entered to national average weights and weight gain rates based on their age, class and breed.

Recommendation: Enter in the age at start for the month when the mob first appears on the monthly stock reconciliation.

- Age at start is usually calculated from the date entered in Mean Lambing, Calving, and Fawning date.
- The age entered is the age at their next monthly birthday i.e. 0–30 days old = 1 month, 30–60 days old = 2 months etc.
- See the age at start table in Appendix 3 for further guidance.

2.1.3.6 SEX

Impact: This setting applies to weaners (lambs, calves and fawns).

Recommendation:

1. Select mixed sex for weaners born on-farm.
    - In most cases in an on-farm breeding situation, mixed sex is selected. Here *Overseer* assumes equal numbers of male and female present in the monthly stock reconciliation. If the weaners are still on farm after the end of June they should be entered as their stock class – i.e. hogget, heifer, steer, hind etc.
2. Select male or female if weaner animals of a particular sex are bought onto the farm for breeding or finishing.
    - Only enter as weaners if under 1 year old – i.e. before the end of June. After this they will be entered as hogget's, wethers, heifers, steers, hinds, stags etc.

2.1.3.7 FATE

Impact: This setting is available for finishing mobs (trading animals) only. The accurate setting of fate is useful when reviewing the nutrient budget inputs or parameter report with the farmer.

Recommendation: Select the most appropriate option for the mob being entered.

- Remain on farm: for mobs that will remain on farm after the end of the year (stock reconciliation).
- Sold to works: for mobs being sold for slaughter at the point of their last entry on the monthly stock reconciliation.
- Sold to store: for mobs being sold to store or leaving the farm to be grazed on another property owned by the same landowner.

2.1.3.8 REPLACEMENTS ARE MATED

Impact: This setting affects predicted N leaching. When selected the model assumes increased metabolisable energy and dry-matter uptake for gestation resulting in increased nutrient cycling and possibly N leaching.

Recommendation: ☑ This check box is only available for replacement sheep or beef animals:

- For sheep, only select for hogget mobs that will be mated or tupped before the last entry in the stock reconciliation (typically June).
- For beef, only select for replacement mobs that are calved as R2 heifers. The animals become pregnant after 12 months of age.

2.2 PRODUCTION

Dairy

Recommendation: Depending on purpose of modelling:

- Enter current year's milk solid production data based on records.

NOTE: This is milk solids sold to the processor and does not include whole milk fed to calves on farm.

- Select appropriate option for once a day milking from the drop down list.
- *Overseer* provides defaults for lactation length, milk volume yield and fat yield, the actual values should be used if records are available.

Justification: Milk solids are a critical input to the energy calculations of the metabolic model. The energy requirements then dictate all aspects of nutrient cycling in the model.

Dry Stock

Wool

Recommendation:

1. Enter wool production (greasy weight per year) based on farm records.
2. Leave as default.

Antler and Velvet

Recommendation:

1. Enter antler and velvet annual production if based on records.
2. Leave as default.

Goats

Recommendation: Depending on purpose of modelling:

- Enter current year's milk yield production data based on farm records.
- *Overseer* provides defaults for lactation length; adjust if actual differs from these values.

Justification: Milk yield is a critical input to the energy calculations of the metabolic model. The energy requirements then dictate all aspects of nutrient cycling in the model.

2.3 HEALTH SUPPLEMENTS

All Enterprises

Magnesium, Salt and Lime Flour

Recommendation:

1. Enter the total amount of all inputs if known for:
   - Magnesium Oxide, Magnesium Sulphate, Magnesium Chloride, Salt, Lime Flour, Phosphorus.
2. Enter drenching and pasture dusting regimes for magnesium, salt and lime.
   - For salt blocks select the product from the drop down list and enter the number of blocks put out on farm per year.

2.4 MILKING SHED FEEDING

Dairy and Dairy Goats

Recommendation: Enter the percentage of animals fed in the shed by month during lactation as appropriate.

NOTE: The percentage value is actually the proportion of animal days within a month that are fed in the shed i.e. if 100% of the animals are feed for only 1/2 the month in the shed enter 50%.

2.5 LEFT-OVER FEEDING

Dairy Goats

Overseer assumes that 40% of all supplements fed is unutilised. This default value can be adjusted by the user. If other enterprises are on farm, the tab left-over feeding will become available and the user can then assign the unutilised feed to other stock classes.

3 Structures

3. Structures

3.1 FEED PADS

General

Feed pad details

Manure removal method

Recommendation: Select manure removal method from drop down list.

- If it is known that solids are separated (i.e. scraping or by a weeping wall) check the solids are separated box.
- If the solids are NOT separated, check scraped material is added to farm dairy effluent system.

Solids Management

Recommendation: **Solids disposal method**

1. Select solids disposal method from drop down list.

Storage method before solids are disposed of

1. Select the best option from the drop down list.
2. Unless good information is provided, select open to rain and set the time in storage to 3 months.

Management

Time animals are on the feed pad

Recommendation: Enter percentage of cows that are using the feed pad by month and enter hours per day on average that those cows are on the feed pad.

3.2 WINTER STAND OFF OR LOAFING PADS

General

Wintering standoff pad construction and maintenance

Recommendation:

1. Select the best option for pad surface from the drop down list.
2. The optional default is inert.

- Check lined, concrete floor or subsurface drained and effluent captured if effluent is effectively captured.
- If the surface is scraped regularly, check the relevant box.

Management of scraped surface solids

Recommendation: **Scraped surface solids disposal method**

1. Select the best option from the drop down list.

Storage method before top layer is disposed of

1. Select the best option from the drop down list.
2. Select open to rain where no other information is available with the time in storage set to 3 months.

Management

Winter standoff usage

Recommendation: Enter percentage of animals that are using the winter standoff by month and enter hours per day on average that those animals are on the standoff pad.

- Pads may only be used for short periods e.g. 1 or 2 days per month and entering hours per day overstates the pad use. If this is the case, calculate the total number of hours a pad is used per month and pro rata this across 30 days.

3.3 WINTERING PADS/ANIMAL SHELTER/BARN/HOUSING

General

Wintering pad, animal shelter or housing details

Recommendation: Select most appropriate option for pad type from the drop down list

- Covered wintering pad or animal shelter will activate options for bunker management and concrete feeding apron.
- Uncovered wintering pad will activate options for bedding pad, concrete feeding apron, and solids management.

Bunker management

Bunker is defined as a concrete pit in which effluent accumulates. Lining is the material added to the bunker to contain the effluent.

Recommendation: Select most appropriate bunker lining material from the drop down list.

- If carbon rich or soil is selected: enter in the time between first adding animals and cleaning out of bunker (months), and whether the liquid effluent is drained away (added to liquid effluent).
- If no lining material is selected then select the most appropriate concrete apron cleaning method.

Bedding pad

Recommendation:

1. Select the best option for pad surface from the drop down list.
2. The optional default is inert.

- Check lined, subsurface drained and effluent captured if applicable
- If the surface is scraped regularly check the relevant box

Concrete feeding apron

This is a separate area of concrete used for feeding animals only, similar in concept to a feed pad. Because it is used for feeding only, effluent is sometimes managed separately to the sleeping/resting area. If this is the case, check the box and enter details of how effluent/solids are dealt with.

Recommendation: If an apron is present check the box.

- For the concrete apron cleaning method select appropriate option from the drop down list.
- If it is known that solids are separated tick the solids are separated box.
- If the solids are not separated then select scraped material is added to farm dairy effluent system.

Solids management

Recommendation:

Scraped surface solids disposal method

1. Select the best option from the drop down list.

Storage method before top layer is disposed of

1. Select the best option from the drop down list.
2. Unless good information is provided, select open to rain where no other information is available with the time in storage set to 3 months.

Liquid effluent (bunker or concrete) or Effluent from lining (liquid) or concrete

Recommendation:

1. Check the box if the effluent is treated the same as the farm dairy effluent.
2. If not, then select treatment method and pond solids disposal method.

Management

Wintering pad, animal shelter or housing usage

Recommendation: Select the appropriate feeding regime from the drop down list.

- If most of the farm is grazed out before the animals move onto the pad – check the appropriate box.

Time spent on pad

Recommendation: Enter percentage of animals that are using the pad by month and enter hours per day grazing on average if they are using both the pad and grazing pasture.

4 Block Data

4. Block Data

4.1 GENERAL

Impact: Topography affects drainage, runoff and animal transfer, which will affect nutrient cycling and losses. Distance from the coast drives nutrient inputs from rainfall, which has the biggest effect on the sulphur model.

Topography

Recommendation: Topography should be entered as the average slope for the block based on the table below:

SLOPE CLASS	SLOPE
Flat	0° – 7.9°
Rolling	8° – 15.9°
Easy Hill	16° – 25.9°
Steep Hill	> 26°

Distance from coast

Recommendation:

1. Estimate distance from the coast in the direction of the prevailing wind (use online map if necessary).
2. If prevailing wind direction is unknown assume westerly winds occur.

- ☑ If fodder crop or fallow area rotates through this block, select box.
- ☑ Only tick cultivated in the last 5 years if the whole block is cultivated.

Fodder Crop Block Specific

Rotation Area

Recommendation: Enter the area of the fodder crop grown or proposed to be grown to one decimal place (e.g. 7.5 ha).

Low Mineralisation Capacity

Impact: The capacity or potential of a soil to mineralise N will have an impact on the amount of N cycling within the farm and ultimately on N losses to water.

Recommendation: Do not check this check box.

Justification: There is little field trial data to assess which sites are likely to have low mineralisation capacity.

Month Resown in Pasture

Recommendation: Enter the month that the fodder crop is resown into pasture; this automatically becomes the final month on the rotation grid and is populated by Overseer as sown to grass and grazed.

WARNING: Changing the grid final month will irreversibly clear all crop management, irrigation and fertiliser inputs in the grid on the crop rotation data pane.

Crop Block Specific

Block land use

Recommendation:

1. Enter the percentage of cultivated area, headland and tracks and non-cultivated (other areas) in the relevant boxes.
    - All three must add up to 100%, with headlands and tracks (0–20%) and other areas (0–20%).
2. Optional default is 100% cultivated.

Crop rotation

Recommendation:

1. With multiple rotations and crops it is recommended that the same final month of May be used. This automatically becomes the final month on the rotation grid.
2. Enter the final month of the crop rotation.

WARNING: Changing the grid final month will irreversibly clear all crop management, irrigation and fertiliser inputs in the grid on the 'Crop rotation' data pane.

Justification: Recommendation 1 ensures that all land uses are accounted for and increases the ease of use of the crop rotation page.

Wetland Block Specific

Fenced wetland block

Effective wetland area

Recommendation: Fill in the effective wetland area (hectares).

Wetland condition and type

Recommendation: Select the appropriate wetland condition and type from the drop down list (definitions are found in the *Overseer* HELP).

Catchment area

Catchment area

Recommendation: Fill in the catchment area (hectares).

- Include areas of the wetland catchment beyond the farm boundary if applicable.

Catchment convergence and aquitard depth

Recommendation: Select the appropriate catchment convergence and aquitard depth from the drop down list (definitions are found in the *Overseer* HELP).

- Check the box specify distribution of catchment area between blocks on the farm if you want to represent where the areas of wetlands lie relative to the different farm blocks.

Cut and Carry Block Specific

Perennial crop

Recommendation: Select appropriate crop from the drop down list.

Fruit Crops Specific

Crop details

Recommendation: Select appropriate crop type and pruning disposal method from the drop down list and enter the appropriate product yield and age of current trees.

- If your crop type is not represented choose the most similar crop type.

Foliar sprays

Recommendation: If known, enter the number of times the specified foliar sprays are applied.

Sward management

Recommendation: Select the appropriate sward type from the drop down list.

- If full pasture or herbicide strip are selected further information is required about animal source and type.
- Most fruit crop blocks are likely to be grazed by non-farm animals.

Trees and Scrub Specific

Bush Type

Recommendation: Select appropriate bush type from the drop down list.

Riparian Specific

Recommendation: Do not select specify riparian strip P model input unless you are an expert in riparian systems. However, retain the riparian block, as this allows you to account for the riparian area.

Justification: Much of the data required is very complex and difficult to determine to make the strip P model accurate enough to be worthwhile.

House Block Specific

Recommendation: Enter the average number of people on the property, sewage disposal method and the percentage of block area in flower and vegetable gardens.

4.2 CLIMATE

Impact: Climatic variables such as rainfall and evaporation are critical inputs, which affect drainage and therefore nutrient losses.

Rainfall Seasonal Variation

Recommendation:

1. Select appropriate rainfall seasonal variation from the map provided and users/farmers knowledge of rainfall seasonal variation.
2. Use the *Overseer* default. This is displayed on saving the Climate page or transferring information from the Climate Station Tool.

Climate Data

Precipitation (Mean Annual Rainfall)

Recommendation:

1. Climate station tool.
2. Farmer records (long-term data 30 years+).
3. Off the map supplied in *Overseer*.

Temperature (Mean Annual Temperature)

Recommendation:

1. Climate station tool.
2. Farmer records (long-term data 30 years+).
3. Estimate using latitude and altitude.
4. Use default – estimate base on nearest town or region.

PET (Potential Evapotranspiration (Annual PET)

Recommendation:

1. Climate station tool.
2. Off the map supplied in *Overseer*.
3. Use default.

PET seasonal variation

Recommendation:

1. Use the map to determine seasonal variation e.g. low, moderate or high.
2. Use default.

Justification: The best data source is the NIWA climate station data.

Climate Station

Recommendation: Select climate station tool and enter latitude and longitude values from the property.

- GPS or Google maps can be used to determine latitude and longitude if not known.
- Select retrieve climate data and use these values. This will automatically populate your climate data fields.

NOTE: The user must be on the Internet to be able to use the climate station tool.

4.3 SOIL DESCRIPTION

Impact: The soil description is a key driver of soil nutrient losses, particularly nutrient leaching due to the impact of the Available Water Capacity (AWC).

Soil type, order or group

Recommendation:

1. Use farm specific soil map (to the level of Soil Order), produced by a trained soil pedologist.
2. Soil Order data – sourced from S-map Online (smap.landcareresearch.co.nz).
3. Soil Series (type) – sourced from fundamental soil layers or legacy maps and accompanying bulletins.

   NOTE: Only data shown is used, with remaining data based on soil order.
4. Soil Order – sourced from national scale soil map (Fundamental Soil Layer).
5. Soil Group – choose from drop down list.

- Additional information can be sourced from the *Overseer* HELP files, the Landcare Research website (landcareresearch.co.nz) and Appendix 4.

Justification:

- A detailed soil map of the property (i.e. 1:10,000 scale or better) will provide the best description of soils possible, but for most farms there is unlikely to be a map.
- S-map, where available, will be the next most accurate source of soil survey data. Use the predominant sibling in a map unit (unless a soil expert believes a sub-dominant sibling is more representative). However, S-map is not available for all areas.
- In which case the next step in the hierarchy is to choose the soil series name (type) from either fundamental soil layer or legacy maps and accompanying bulletins. If the series name is listed in S-map Online – then use the associated S-map sibling and its data, otherwise use the series name itself.
- Alternatively use New Zealand Soil Classification (NZSC) soil order (can be obtained online at landcareresearch.co.nz).
- Lastly soil group can be used.

4.4 SOIL PROFILE

Impact: Soil moisture and other properties are defined by soil profile characteristics entered below.

Top soil (0–10 cm)

Impact: Top soil texture, stony and compacted soils affect runoff, infiltration rate and water holding capacity (refer to Appendix 5 for additional information).

Top soil texture

Recommendation:

1. Use farm specific soil map, produced by a trained soil pedologist to determine top soil texture.
2. Obtain topsoil texture from S-map Online.
3. Topsoil texture information may be available from legacy maps and accompanying bulletins.
4. Default texture unknown can be selected.

Justification: Generally lowest importance of soil profile inputs.

☑ Is stony

Recommendation:

1. Use farm specific soil map, produced by a trained soil pedologist to determine if top soil is stony (if the stone content in 0–10cm layer is >35% stones).
2. Obtain this information from S-map Online.
3. Obtain from legacy maps and accompanying bulletins ("very stony soil").
4. Obtain from the Fundamental Soil Layers.

Justification:

- User discretion is required because even 35% stones will affect AWC.
- 35% stones accords with soils identified as very stony soils on soil maps.

☑ Is compacted

Recommendation: Leave unchecked.

Justification: The major effect of compaction is usually a temporary within year phenomenon, and will not be equal over entire blocks.

Lower profile (10–60 cm pasture and 10–150 cm for cropping)

Impact: Choices will critically affect AWC and therefore drainage, and hence nutrient losses (refer to Appendix 5 for additional information).

Soil texture group

Refers to the fine material (including between the stones) down to 60 cm for pasture or 150 cm for cropping or until a non-standard layer, if present. Only available for Brown, Gley, Melanic, Pallic, Recent, Semiarid and Ultic soil orders and Sedimentary/Recent soil groups.

The definitions are:

- Light = predominantly sand or loamy sand,
- Heavy = predominantly clay (clay content >35%),
- Medium = everything else.

Recommendation:

1. Use farm specific soil map, produced by a trained soil pedologist to determine soil texture group of the lower profile.
2. Obtain this information from S-map Online.
3. Obtain from legacy maps and accompanying bulletins.
4. Obtain from farmer knowledge.

Justification:

- The intent of light, medium and heavy is to differentiate between the subsoil's ability to hold soil moisture.
- This information is not currently available from the Fundamental Soil Layers.

Non-standard layer

Non-standard layer is entered when there is a texture group in the lower profile that affects the water holding capacity of the soil. If multiple non-standard layers occur choose the dominant non-standard layer. The definitions are:

- Select stony – where subsoil profile contains ≥50% stones and the fine material is sandy.
- Select stony matrix – where subsoil profile contains ≥50% stones and the fine material is loamy or clayey.
- Select sandy – where subsoil profile is sandy e.g. sand dunes and plains. Note that this option does NOT apply to Pumice soils.
- Where none of the above apply leave blank.

Recommendation:

1. Use farm specific soil map, produced by a trained soil pedologist to determine if a non-standard layer is present.
2. Obtain from S-map Online.
3. Obtain from legacy maps and accompanying bulletins.
4. Obtain from farmer knowledge.

Justification:

- Details for selection obtained from *Overseer* HELP file.
- This information is not currently available from the Fundamental Soil Layers

Depth to non-standard layer

Recommendation:

1. Use farm specific soil map, produced by a trained soil pedologist to determine depth to non-standard layer.
2. Obtain this information from S-map Online.
3. Obtain from farmer knowledge.

Justification: This information is not currently available from the Fundamental Soil Layers.

4.5 DRAINAGE/RUNOFF

Natural soil drainage and run-off characteristics

Impact: This affects water movement through the soil, which both hydrophobicity and pugging will reduce, leading to ponding and affecting nutrient loss processes.

Profile drainage class

Profile drainage class in its natural state i.e. without artificial drainage.

Recommendation:

1. Use farm specific soil map, produced by a trained soil pedologist to determine profile drainage class.
2. Obtain this information from S-map Online.
3. Obtain from the Fundamental Soil Layers.
4. Obtain from farmer knowledge.
5. Overseer default (this will be determined from soil information).

Justification:

- Where farm specific data is not available, the next best data set will be in resources such as S-map.
- However, *Overseer* will select a suitable default value based on the user defined soil description.

NOTE: There is considerable variability of drainage class within most Soil Orders).

Hydrophobic conditions

Recommendation: Use default.

Justification: It will be practically impossible to determine in the field, and is mostly a within paddock rather than whole block phenomenon.

Susceptibility to pugging or treading damage

Recommendation:

1. Use rare for well-drained soils, and occasional on heavier soils (this is assuming drains are working very well), winter if heavy soils and drains are suspect and winter or rain on soils where pugging can occur after periods of prolonged rainfall throughout the year.
2. User or farmer knowledge of the susceptibility of pugging soils.

Justification: Pugging tends to be a within year paddock phenomenon rather than whole block or farm occurrence.

Artificial drainage system

Impact: Will improve the drainage characteristics of poorly drained soils and therefore affects nutrient losses.

Drainage method

Recommendation: Select from drop down list the most relevant option.

Percentage of block drained

Recommendation: The area drained is usually the paddock and should be calculated as a percentage of the block area.

NOTE: This is usually less than 100%, unless the whole block is drained.

- If other is selected the user can provide specific drainage placements – depth to drains and spacing between drains if known, otherwise leave box unselected.
- If all drainage from a block is captured by a wetland, check box and provide wetland area and condition. Refer to *Overseer* help file from description of condition.

4.6 SOIL TESTS

Impact: Soil test data is required to generate a nutrient budget and to determine maintenance nutrient requirements. Individual soil test data, such as Olsen P, Slow release K and ASC affect recommendations and losses.

Soil tests

Recommendation: Depending on use:

1. Use the most recent soil test results.
2. Where available, enter long-term average (e.g. rolling 3-year average) soil test data.
3. Default soil test values should ONLY be used if the interest is solely on N or greenhouse gas emissions.

Justification:

- Every farmer should have a recent soil test (within 1–2 years).
- Using a 3-year rolling average deals with year-to-year variability and possibly reflects the 'true' fertility status better.

Anion storage capacity (ASC) or phosphate retention (PR)

Recommendation:

1. Automatically populated through the choice of soil description.
2. Change only when you have a measured ASC for the soils on that property or can obtain a value from S-map.

Slow release K

Recommendation:

1. Automatically populated through the choice of soil description.
2. Change only when you have a measured TBK for the soils on that property.

- Do not use specify K reserve status.

4.7 SOIL PROPERTIES

K leaching potential

Recommendation: Do not change (leave as default).

Do you want to enter more detail about soil properties?

Recommendation: Ensure all boxes are unchecked.

Justification:

- Changing these values will overwrite data that has been determined from more readily available data, such as soil texture and non-standard layers and will have a large impact on leaching losses.
- Currently there is no reliable method to determine sites with low or high N immobilisation and K leaching potential is based on soil description and rainfall information previously entered.

4.8 PASTURE

Impact: The pasture type affects both energy (metabolisable energy) and the nitrogen concentration, which will impact on nutrient losses.

Pasture type

Recommendation: Select the dominant pasture type in the block from the drop down list.

- For example, well developed downland pastures will predominantly be ryegrass/white clover, except in Northland, where it could be C4 Kikuyu pastures and hill country sheep and beef farms will predominantly be browntop, except possibly for the re-grassed flats.

Other pasture inputs

Recommendation: Leave as *Overseer* default values.

Justification: There needs to be very good long term average evidence of clover content, pasture utilisation, pasture N content and pasture quality to justify changes from the default *Overseer* values. This level of information would be rare.

4.9 SUPPLEMENTS MADE

Impact: Supplements made on the farm will move nutrients between blocks or off-farm if sold.

Recommendation: User and farmer knowledge of category, weight (WW or DM), cutting method (silage) and destination will be required to populate the data for this page.

- Additional information e.g. supplement is wrapped, can be provided if known.
- Select appropriate utilisation (see supplements imported for comments on timing, storage and utilisation).

NOTE: Select specify timing of feeding if timing is concentrated around certain times of the year e.g. maize silage in autumn. This should be based on farm records. Note that the feed balance needs to be more precise when timing is selected. If an error occurs around too much or too little feed, sometimes unchecking specify timing of feeding will resolve this.

Justification: Much of this information should be based on good records but in many cases it will be estimated and is difficult to specify. In the future, better record keeping will be required to track supplement production.

4.10 FERTILISER

Impact: Fertiliser nutrients are one of the major sources of nutrients coming into farm systems and consequently have a large impact on nutrient cycling and losses.

Recommendation: Fertiliser and lime information must be entered based on the month(s) of application. Overseer provides fertiliser and lime product lists from drop down menus.

1. Enter the most recent fertiliser nutrient and lime data.
2. Enter long-term average (e.g. rolling 3-year average) fertiliser nutrient and lime data.

NOTE: The 3 methods of entering fertiliser (soluble fertiliser, fertiliser product or fertiliser form) are equivalent – select the one that is most appropriate for your data. Take care to ensure that there is no double counting. This section covers inorganic fertiliser of all types, lime and organic materials, such as imported industrial effluent e.g. dairy factory waste and any fertiliser applied through fertigation.

Justification: There are a range of sources of information from fertiliser and lime purchase orders, transport and spreading invoices to proof of placement information, so this section can be filled out accurately.

4.11 IRRIGATION

Impact: Irrigation in addition to rainfall drives soil drainage and thus has a critically important influence on drainage and hence nutrient leaching losses.

Irrigation

Recommendation:

1. Enter method and months that irrigation is applied and actual monthly depth, based on at least 5-year average data.

   NOTE: This needs to be commensurate with the rainfall data entered for the block i.e. 5-year average rainfall.

2. Enter method and months only (leave rate blank).

   NOTE: DO NOT use actively managed at this time.

Justification:

- The three methods of data entry representing irrigation, potentially give widely different results, particularly with respect to N leaching.
- Actual data could be sourced from Irrigation Company Invoices, farmer records etc.
- Using method only, *Overseer* calculates the amount of irrigation water applied based on daily water balances and replacing the estimated soil water deficit. The calculated amounts are usually considerably less than actual rates applied on a long-term basis.
- Actively managed is there for demonstration purposes to show the effect of eliminating all system losses, and accurately predicating weather 5–6 days in advance.

Nutrient concentrations in irrigation water

Recommendation:

1. Use *Overseer* default values.
2. Only enter block specific data when you have accurate nutrient concentrations for irrigation water.

   NOTE: Fertigation nutrients should be entered under the fertiliser section.

Justification: The *Overseer* default settings should be used as most people will not have accurate long-term average nutrient concentration data.

4.12 ANIMALS

Grazing Management

Impact: Entering data here allows you to specify the months particular groups of animals are on specific blocks and the proportion of pasture eaten by each animal type. This allows for areas that are not grazed for a period of greater than 3 months e.g. summer or winter grazing blocks or cut and carry.

Recommendation: Leave grazing management unchanged as predominantly stock graze all blocks all year round.

- Where this does not apply e.g. summer or winter grazing blocks or cut and carry select appropriate enterprise, pasture eaten and grazing months.

Other information

Impact: If cattle have access to streams they will excrete nutrients into the waterways and this is taken into account in the nutrient budget. On blocks grazing deer the user is required to indicate whether deer pace the fence line and whether wallows are visible. On those blocks grazing beef, dairy grazers or deer the user can select "finishing", which results in higher beef/deer product removal from the block, more typical of finishing units.

Recommendation: Select the relevant boxes that apply to the enterprise on farm.

4.13 DCD (NITRIFICATION INHIBITOR)

Impact: DCD can be used to mitigate some of the impacts of nitrogen losses.

Recommendation: Do not fill in this section at all as DCD is not currently available on the market.

4.14 EFFLUENT

Impact: Effluents (liquids and solids) generated by enterprises on farm represent a major recycling or export of nutrients within or off farm. The treatment, storage, application and timing of effluent all impact on nutrient management.

Liquid effluent applications

Source

Recommendation: If any liquid effluent is applied generated by the farm dairy, select the liquid effluent from farm dairy option. This may include effluent from structures such as feed pads, and wintering pads/animal shelters when treated the same as farm dairy.

- If any liquid effluent from wintering pads/animal shelters is generated and managed separately from the farm dairy, check the liquid effluent from wintering pad option.
- Both options above can be checked.

Method

Recommendation:

1. Actual measured application rates must be used where known.
2. If unavailable choose application depth based on information in the table below.

EFFLUENT TREATMENT METHOD	APPLICATION DEPTH
Low rate type systems (pods)	Low application method
Metered pivot application systems	<12 mm
Travelling irrigators	12–24 mm
Stationary irrigators, canons or contractor pumping	>24 mm

NOTE: DO NOT check the actively managed box (unless there is NO risk of effluent losses through runoff or by-pass flow), and there is no system losses due to ponding, overlap, or faulty equipment.

NOTE: On pastoral blocks, if spraying infrequently from a holding pond is specified, then the month effluent is applied can be specified (deferred irrigation method). The model assumes that the pond storage capacity is adequate.

Justification:

- Ideally it is important to get the application depth as accurate as possible and this may require on farm measurement.
- The table provided is a generalised indication only, for example it is possible to change the speed of a travelling irrigator to deliver a lower application depth.

Percentage of block areas receiving effluent

Recommendation: Leave as 100%, unless effluent is not applied to the whole block.

Solid effluent applications

Recommendation: Select source of solid material applied and month applied.

4.15 CROP HISTORY

Long-term paddock history

Years in pasture

Recommendation: Enter the number of years in pasture from 3–12 years prior to the reporting year.

- Several paddocks with different years in pasture may be blocked together when other management factors are similar, Paddocks can be grouped when years in pasture is consistent with these groupings: 0–2, 3–5, 6–8, 9, 10 years in pasture.

Justification: The years in pasture is used to modify the N mineralisation rate, which has significant consequences for N cycling.

Land use prior to crop rotation

Recommendation: Select the appropriate prior land use from the drop down list. This is the land use two years before the reporting year.

- If the prior land use is not shown in the drop down list, refer to Appendix 6 for alternative options.

Animals grazing pasture

If pasture is selected additional information will be required about the source, if the crops are grazed within the reporting year. When deciding which to use it is important to know how grazing animals interact with the rest of the farm. A large number of assumptions are made when entering stock as non-farm animals.

Recommendation:

1. Select farm stock as animal source and select animal class pasture consumption equals ratio of intake on farm if any of the following criteria are true:
   - Farm includes a pastoral block
   - Livestock move between this block and the rest of the farm
   - Livestock are on farm all year
   - Dairy-grazers over winter on this block
   - Supplements are fed to livestock on this block
2. For crop systems that use imported animals to 'clean up' then non-farm animals option can be used. These non-farm animals are assumed to be separate from those entered on the stock number data sheet and:
   - Animal intake is estimated and cannot be changed
   - Non-farm animals cannot be fed supplement

Justification:

- Given that many arable properties also have livestock the preferred option is to select farm stock as a large number of assumptions are made when selecting non-farm animals.

☑

- If lime has been applied 2–5 years ago check box specify lime application in previous years and select type of lime material applied from the drop down list and enter the amount applied.

4.16 FODDER CROP ROTATION AND CROP ROTATION

Impact: It is important to capture the sequence of events e.g. cultivation, sowing, harvesting, fertiliser applications and irrigation, as this will have an impact on nutrient cycling.

All management activities and events occurring during the reporting year and the year before are recorded month by month using the crop rotation table. The table uses icons to depict the sequence of events and the inferred crop status. Fodder crop rotations are less complex than arable crop sequences and require information over a one year period only. For additional information on data entry into the crop rotation page refer to Appendix 7.

Specify crop type

Recommendation: All crops sown must be entered, by selecting category, crop type, product yield and month and year sown.

- Additional information may be required around cultivation practice at sowing and residual disposal method depending on the crop.
- ONLY check modify growth curve and harvesting box if you have expert knowledge on crop physiology.
- Enter specify soil test values if known, otherwise leave box unchecked.

Cultivate

Recommendation: Only specify a cultivation event if cultivation occurs in any month other than the month of sowing.

Justification: *Overseer* assumes that when you sow a crop, cultivation occurs in the same month.

Fertilise

Recommendation: Enter fertiliser and lime product description, application rate and method applied on a monthly basis.

- Click on the symbol beside fertilise to create multiple fertiliser activities. Check the desired year(s), months required and add one or more applications as required.

Irrigate

Recommendation:

1. Enter method and months that irrigation is applied and actual monthly depth, based on 5-year data.

   NOTE: This needs to be commensurate with the rainfall data selected earlier.

2. Enter method only (leave rate blank). This assumes good management deficit irrigation.
   - DO NOT use actively managed at this time.
   - If irrigation method used is not in *Overseer* choose the method which most resembles it.
   - Click on the symbol beside irrigate to create multiple irrigation activities. Check the desired year(s), months required and add one or more applications as required.

Justification:

- The three methods of data entry representing irrigation (actual or method only), potentially give widely different results, particularly with respect to N leaching.
- Actual data could be sourced from Irrigation Company Invoices, farmer records etc.
- Using method only, *Overseer* calculates the amount of irrigation water applied based on daily water balances and replacing the estimated soil water deficit. The calculated amounts are usually considerably less than actual rates applied on a long-term basis.

Cut/Graze

Recommendation: Enter method of defoliation for each month it occurs.

- If method is cut and carry, destination of the crop must be specified and enter percentage of the crop eaten by each animal type.
  - » Cut and carry crop can only be sent to one destination each month, if more than one destination choose the dominant destination.
- If method is grazed in situ, source farm stock should be selected and enter the percentage of the crop eaten by each animal type.
  - » If restricted grazing occurs enter the hours/day the crop is grazed for.

NOTE: Ensure final harvest is selected for the month of the last defoliation of the crop.

Appendices

Appendix 1:
Factors to take into account when combining areas into blocks for arable farms

INPUTS	RECOMMENDATION
Soil description	Where multiple soils exist within a block, use the dominant soil type unless the soils differ markedly in drainage characteristics, in which case do not block the soils together.
Irrigation	Determine block according to method of irrigation – e.g. none vs. centre pivot vs. big gun.
Years in pasture	Areas can be grouped according to their long term history (0–2, 3–5, 6–8, 9, 10 years in pasture). For long term pasture (> 6 years), intensive cultivation will result in more mineralisation than minimum tillage and this should be taken into account when blocking.
Prior land use	Use the options listed in the drop down box to block. Where the block's land use is not listed in the drop down box, see Appendix 2 for suitable options and groupings of crops with similar N status.
Crop rotation	This is the main factor determining blocking on a cropping farm. Crops of similar N status can be grouped together as per Appendix 2. It is also important to consider canopy duration as the effects of canopy duration on the water balance are just as important as N status.
Animals grazing pasture	If animals graze pasture during the year immediately before the reporting year, this must be used as a blocking factor to divide an area into separate blocks. This is because the urine deposited by those animals is taken into account by the model.

Appendix 2:

Grouping options for crops of similar N status and canopy duration for specifying the previous crop

CROP	GROUPING CATEGORY	COMMENTS
Fodder		
Kale	Winter fodder	If appropriate yields and sowing times are provided kale, swedes and turnips could be grouped.
Swedes	Winter fodder	
Turnip bulbs	Winter fodder	
Rape	Summer fodder	If appropriate yields and sowing times are provided, leafy turnips and rape can be grouped.
Turnip leafy	Summer fodder	
Fodder beet	Don't group	It is best to leave fodder beet on its own due to it having a lower N content that the brassica crops.
Forages		
Annual ryegrass	Grass forage	
Forage barley (spring)	Spring cereal forage	The cereal forages can be grouped on Spring and Autumn sown types.
Forage oats (spring)	Spring cereal forage	
Rye corn (spring)	Spring cereal forage	
Triticale (spring)	Spring cereal forage	
Rye corn (autumn)	Autumn cereal forage	
Forage oats (autumn)	Autumn cereal forage	
Triticale (autumn)	Autumn cereal forage	
Maize silage	Maize	If appropriate harvest time is given maize silage is no different to grain maize.

CROP	GROUPING CATEGORY	COMMENTS
Grains		
Barley (spring)	Spring cereal	
Oats (spring)	Spring cereal	
Wheat (spring)	Spring cereal	
Wheat (autumn)	Autumn cereal	
Oats (autumn)	Autumn cereal	
Maize (short, medium and long)	Maize	The only difference between these maize's is the duration of their growth differs by about 2 months from short to long. If this loss of precision can be tolerated then a medium maize could be used to represent them all.
Green Manure		
Brassica	Green manure	
Mustard	Green manure	
Phacelia	Green manure	
Oats and rye	Autumn Cereal	
Lupins	Legume green manure	
Seed		
Clover seed	Don't group	
Ryegrass seed	Don't group	

Appendix 3:

Additional information around entering information to the enterprises

Entering Monthly Stock Numbers

In this example lambs are being finished and drafted and sold at 46 kg. The *Overseer* weight entry is the 25 kg weaning weight, and the end live weight of 46kg:

- 1200 lambs weaned 1 January
- 400 sold at 1 March
- 350 1 April
- 250 sold at 1 June
- 200 kept as replacements

In Table 1 below the mob is entered on one line. Using this data entry methodology *Overseer* will assume that the 1200 in January are 25 kg and the remaining 200 in June are 46 kg. The model will assume a weight gain of 3.5 kg per month in this case (21 kg gain over 6 months = 3.5 kg/month).

Overseer will assume that the 400 sold on 1 March are only 32 kg when sold, the 350 sold at 1 April are 35.5 kg, and the 250 sold at 1 June are 42.5 kg.

TABLE 1

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Lambs	1200	1200	800	450	450	200

AGE AT START

Select the month the animals are born from the row across the top →

Select the current month from the columns below – also using the animals R1, R2, or R3 year ↓

	JULY	AUG	SEPT	OCT	NOV	DEC	Approximate "R" Age
July	1						
August	2	1					
September	3	2	1				
October	4	3	2	1			
November	5	4	3	2	1		
December	6	5	4	3	2	1	R1
January	7	6	5	4	3	2	
February	8	7	6	5	4	3	
March	9	8	7	6	5	4	
April	10	9	8	7	6	5	
May	11	10	9	8	7	6	
June	12	11	10	9	8	7	

	JULY	AUG	SEPT	OCT	NOV	DEC	Approximate "R" Age
July	13	12	11	10	9	8	
August	14	13	12	11	10	9	
September	15	14	13	12	11	10	
October	16	15	14	13	12	11	
November	17	16	15	14	13	12	
December	18	17	16	15	14	13	R2
January	19	18	17	16	15	14	
February	20	19	18	17	16	15	
March	21	20	19	18	17	16	
April	22	21	20	19	18	17	
May	23	22	21	20	19	18	
June	24	23	22	21	20	19	
	JULY	**AUG**	**SEPT**	**OCT**	**NOV**	**DEC**	**Approximate "R" Age**
July	25	24	23	22	21	20	
August	26	25	24	23	22	21	
September	27	26	25	24	23	22	
October	28	27	26	25	24	23	
November	29	28	27	26	25	24	
December	30	29	28	27	26	25	R3
January	31	30	29	28	27	26	
February	32	31	30	29	28	27	
March	33	32	31	30	29	28	
April	34	33	32	31	30	29	
May	35	34	33	32	31	30	
June	36	35	34	33	32	31	

Appendix 4:
Description of New Zealand Soil Orders* in Overseer

*Descriptions adapted from Landcare Research website (landcareresearch.co.nz)

SOIL ORDER	KEY ATTRIBUTES	OTHER ATTRIBUTES
1. Allophanic • 5% NZ land area • Major: North Island – volcanic ash • Minor: South Island – high country	» Phosphorus retention high or very high » Greasy feel between fingers (dry or wet) » Dark brown/black topsoil	» Porous, low density, good rooting » Easy to dig, crumbles easily when crushed » Stable topsoil, low pugging/ machinery damage » Well drained » Moist climate
2. Brown • 43% NZ land area • Most common soil	» Phosphorus retention moderate to high » Good agricultural soil » Brown topsoil, yellow brown subsoil	» Rarely droughty in summer or waterlogged in winter » Stable topsoil, good structure » Well drained » Moist climate
3. Gley • 3% NZ land area • Wetlands, unless artificially drained for agriculture	» Winter and spring water-logging » Light grey subsoil colour commonly with red mottles	» Drainage required for intensive agriculture » High organic matter » Sustain production into summer In dry areas
4. Granular • 1% NZ land area • Northern North Island	» Highly productive long-term horticulture soils » Clayey (sticky when wet)	» Highly weathered/old volcanic soils » Good structure » Limited workability and sticky when wet » Slow permeability in subsoil
5. Melanic • 1% NZ land area, scattered throughout • Formed from Basalt or Limestone rocks	» Black to dark brown topsoil » Highly fertile	» Good soil structure » High magnesium or calcium » Swell when wet, shrink when dry » Biologically-active » Well drained
6. Organic • 1% NZ land area • Wetland and peat	» Wetlands, peat, forest litter » High water-holding capacity	» High organic matter, slow turnover » Acidic » Low bulk density » High water table » Low bearing strength
7. Oxidic • < 1% NZ land area • Auckland and Northland	» Phosphorus retention high » Very clayey soil, but good structure » Crushed easily, not very sticky when wet	» Low fertility » Highly weathered and leached volcanic soil » Good structure overlies dense subsoils that limit root depth » Well drained

SOIL ORDER	KEY ATTRIBUTES	OTHER ATTRIBUTES
8. Pallic • 12% NZ land area • North and South Islands (seasonally dry, east)	» Pale colour » Dense, weak structure, low rooting » Also called yellow-grey earth » Phosphorus retention low to moderate	» Dry in summer, wet in winter » Older soils have high bulk density, low rooting depth » Low organic matter but good nutrient status » Prone to erosion » Pan or very frim horizons may be formed in subsoil » Variable drainage class
9. Podzol • 13% NZ land area • Forests, high country	» High rainfall, usually ex-forest areas » Acidic with low fertility	» Marked horizons e.g. bleached layer beneath topsoil over black or reddish horizon » Forest litter accumulation » Older soils have pans with limited rooting depth » Variable drainage class
10. Pumice • 7% NZ land area • Central North Island	» Sandy (pumice), high porosity	» Free drainage » Clay and trace elements low » Deep rooting » Disturbed by traffic but low treading damage » Easily eroded on hills
11. Recent • 6% NZ land area • Alluvial flood plains, steep slopes, young ash	» On floodplains, have high spatial variability » Phosphorus retention low	» Variable depth and texture with variable water holding capacity » Thin profile development » Good fertility » Well drained
12. Semiarid • 1% NZ land area • Otago and southern Canterbury inland	» Very low rainfall (< 500 mm), dry soils » Phosphorus retention low	» Nutrient levels high, but irrigation usually required » Low leaching » Some lime and salt accumulation » Low organic matter » Prone to wind erosion » Subsoil clay pans common
13. Ultic • 3% NZ land area • Northern North Island, Wellington, northern South Island	» Low permeability » Low fertility » Acidic	» Strongly weathered, topsoil prone to pugging » Clay subsoil below leached horizon » Impeded drainage » Old soils – long-term leaching » Wet in winter
14. Anthropic • < 1% NZ land area	» Not included in *Overseer* (no agriculture)	» Intensively mined areas e.g. Central Otago, Westland, crowded urban areas
15. Raw • 3% NZ land area	» Not included in *Overseer* (no agriculture)	» Rivers, beaches, tidal, alpine areas

Appendix 5:
Definition of soil profile inputs, soil water parameters and Overseer texture

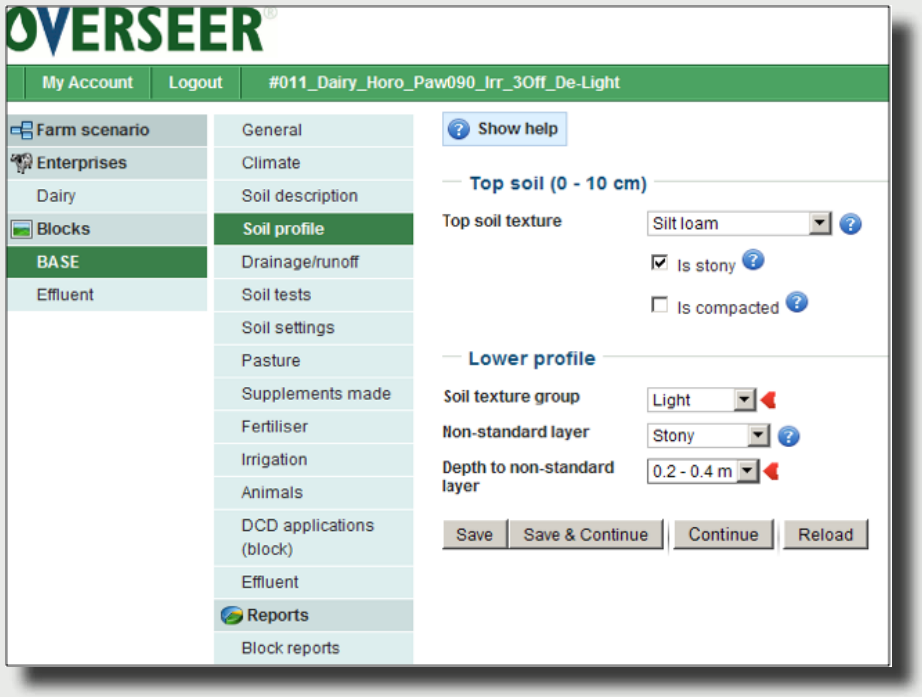
Background

This technical note provides guidance for users of OVERSEER® Nutrient Budgets (*Overseer*) to interpret soil classes used to modify soil water input values. *Overseer* uses inputs on the soil profile page to set soil moisture contents at wilting point (WP), field capacity (FC) and saturation (Sat). These, in turn, drive the drainage model and hence N leaching.

Nitrogen leaching is sensitive to these input variables and hence consistency in use is important.

Landcare Research has undertaken an analysis of the data used in *Overseer* and made recommendations on how to define the terms on the soil profile page. These recommendations have been adopted and are included in "*Overseer* Best Practice Data Input Standards" and *Overseer* HELP files.

This technical note provides definition for the inputs on the soil profile web page for top soil stoniness, and subsoil soil texture group and non-standard layer.



Topsoil stoniness

Under top soil texture, there is an option to check 'Is stony'. This should be checked when there are greater than 35% stones in the top soil (0–10 cm layer). This aligns with 'very stony' in soil descriptions.

Soil texture group

For some soil orders or soil groups, subsoil texture groups of light, medium or heavy must be selected.

The soil moisture contents used in the *Overseer* model were compared with those of soils in the New Zealand Soils Database (NSD).

Soils with similar soil moisture properties as used for *Overseer* soil texture groups typically aligned with texture classes such that:

- 'light' aligned with sand to loamy sand texture
- 'heavy' aligned with clayey texture
- 'medium' aligned with loamy textures

Table 1 presents soil moisture data for *Overseer* soil texture groups and the averaged data for NSD texture classes were the soil moisture data aligned with the soil moisture data for the *Overseer* soil texture group. The following data outliers were removed from the analysis – all Pumice soils, pumice horizons and horizons with total available water > 24% were removed from the sandy texture class, and all horizons with > 78% clay and/or < 18% wilting point were removed from clayey texture.

Based on this analysis, *Overseer* soil texture group classes are defined as:

- 'Light' = upper 60 cm predominantly sand or loamy sand (except Pumice soils)
- 'Heavy' = upper 60 cm predominantly clay (clay content > 35%)
- 'Medium' = everything else

Table 1 also presents the Pumice data. Sandy Pumice data has a closer association with 'medium' texture than with 'light' texture, especially for total soil available water (TAW).

TABLE 1. Soil moisture contents (mm/100mm soil horizon to 60 cm) at wilting point (WP), field capacity (FC), and saturation (Sat TP, TP total porosity) and total available soil water (TAW) data for *Overseer* texture classes and for averaged data for NSD texture classes (standard deviation in parenthesis. No. = number of samples).

TEXTURE	WP	FC	SAT (TP)	TAW	NO.
Overseer light	5	11	43	6	
NSD Sand, loamy sand	6 (5)	18 (8)	49 (7)	12 (5)	67
Overseer medium	15	31	50	16	
NSD silt loam, sandy loam, clay loam	18 (9)	41 (12)	56 (12)	23 (10)	1019
Overseer heavy	25	39	58	14	
NSD silty clay loam, silty clay, clay	30 (6)	47 (8)	59 (9)	17 (8)	292
Overseer medium	15	31	50	16	
NSD Sandy Pumice	8 (5)	26 (6)	57 (9)	18 (4)	25
NSD Loamy Pumice	15 (8)	42 (9)	65 (8)	26 (9)	196

Non-standard layers

The soil moisture contents for a stony non-standard layer align with a soil with high stone content (> 50%) and the dominant texture of the fine material in the very stony horizon is sandy. The stony matrix is similar, except the dominant texture of the fine material in the very stony horizon is loamy or clayey.

Field procedure for determining input values for shallow and stony soils

The recommended field procedure to determine soil input values for *Overseer* is:

- Dig a hole to 60 cm.
- Does the topsoil have > 35% stones? = stony topsoil.
- Is the texture in the top 60 cm dominantly sandy? (= Light), loamy? (= Medium) or clayey? (= Heavy).
- Is there a horizon with > 50 % stones?
    - » Is the predominant texture of the fine material in the very stony horizon sandy? Then non-standard layer = **stony**
    - » Is the predominant texture of the fine material in the very stony horizon loamy or clayey? Then non-standard layer = **stony matrix**
    - » Measure the depth to the top of the non-standard layer?

Examples for Canterbury

Feedback from users and Landcare Research has indicated that there has been varying interpretations of shallow stony soil classes in Canterbury. As a general guide for shallow and stony soils in Canterbury:

Glacial outwash (e.g. Lismore soils) have **Medium** texture group and **stony matrix** at 0.2–0.4 m. The very stony soils have stony topsoils and **stony matrix** at 0–0.2 m.

Younger alluvium (e.g. Eyre, Rakaia, Rangitata soils) have **Light** texture group and **stony** non-standard layers at 0.2–0.4 m. The very stony soils have stony topsoil's and **stony matrix or stony** horizons at 0–0.2 m.

Appendix 6:

Default entry inputs of crops and management options not supported by the Overseer Crop rotation page

CROP	RECOMMENDATION
Lucerne (Grazing)	Pasture – grazed
Lucerne (hay or seed)	Pasture – cut and carry
Barley (autumn)	Wheat (autumn)
Rape and kale seed	Fodder Rape or Kale
Oil seed rape	Fodder Rape or Wheat
Seed crops	Ryegrass seed
MANAGEMENT OPTION	**RECOMMENDATION**
Undersown crops	
Lucerne under barley	Select Barley and sow pasture when barley harvested
Clover under barley	Select Barley and sow Clover when barley harvested
Residue removal	
Bale then burn	Select bale
Graze then burn	Select graze
Bale then graze	Select bale

Appendix 7:
Additional information around data entry into the crop rotation page

The crop rotation table is a timeline with the following headings:

- **Month and Year:** displayed beneath the table these cannot be edited directly. The starting month of the grid will be based on the selected final month of the grid, set on the **Crop block/General** page.
- **Crop:** this cannot be edited directly. It depicts crops grown in terms of a generic crop profile. The profile is responsive to crop information supplied and associated management activities recorded in the following rows.
- **Cultivate:** depicts the timing of cultivation and crop sowing events.
- **Fertilise:** depicts the timing of fertiliser (including urea), lime, manures and organic material.
- **Irrigate:** depicts the timing of irrigation events.
- **Cut/Graze:** depicts the timing of defoliation events (grazed in situ, cut and carry for use on-farm or elsewhere).
- Information describing a management activity or event is not entered directly into the table. Instead, each icon has an associated dialog into which information describing that event can be entered. Click on an existing icon to open the dialog and view or edit underlying information. A new crop can be specified by clicking on the add crop button. Other events can be added by clicking on the blank cell corresponding to the month the event occurs and the relevant row listed above. A dialog will open into which required additional information must be entered and saved. A crop or any management activity can be deleted using the delete button within the dialog. For more information including a description of icons used refer to *Overseer* HELP.

Specifying a crop

The presence of a crop is depicted in the crop row of the crop rotation table using an icon that illustrates its growth profile  , the bar indicates the proportion of growth that has been obtained. Sowing is depicted using the icon  in the cultivate row. To add a new crop, click the add crop button. To edit an existing crop, click on either one of its two icons. A dialog will open into which information can be entered and saved, such as the type of crop, yield, cultivation method, residue disposal. Information entered into this dialog and elsewhere in *Overseer* is used to estimate the crop's growth curve. This curve can be modified either by specifying the time at which the crop is harvested and/or when the crop reaches maturity at which time nutrient uptake ceases. This is illustrated by Figure 1.

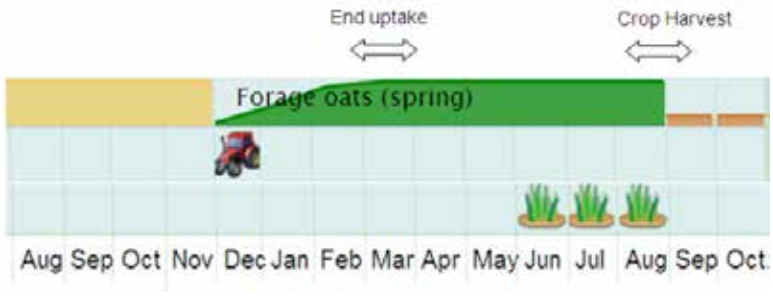
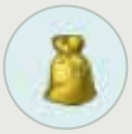


FIGURE 1: The crop growth curve and how it might be changed if the timing of end uptake and/or crop harvest is specified.

Further information describing how to specify crop details is outlined in the table over (page 52).

Cultivate

Cultivation events may occur at the time of sowing and at other times. The Cultivate symbol; denotes a cultivation event which is additional to the cultivation that occurs when sowing the crop. The Crop sown event includes the cultivation event which occurs at sowing. If a cultivation event occurs that is additional to the event at sowing then a cultivation event should be added providing it occurs during a month other than the month during which the crop is sown.



Fertiliser

Fertiliser nutrients are one of the major sources of nutrients coming into farm systems and consequently have a large impact on nutrient cycling and losses. Fertiliser includes inorganic fertiliser, lime, and organic manures such as imported industrial effluent and farm dairy effluent (FDE).

Fertiliser is entered based on the month of application. One or more applications can be added by clicking on a cell in the Fertilise row corresponding to the month and year during which the application(s) occurred. Applications saved earlier can be added to or edited by clicking on their specific icon.  refers to a single application,  to more than one. A dialog will open, into which details describing the application of fertiliser, lime and organic material can be entered or updated before saving and closing the dialog.

Fertiliser applications may often be applied over several months. These can be entered by using the  button to open the "create multiple fertilise" activities dialog. Check the desired year(s), months required, and add one or more applications as required. Pre-existing fertiliser applications will not be changed or removed.

Where a special mix (custom fertiliser) or product not included in the *Overseer* fertiliser database has been applied, this can be entered by specifying the product's name, nutrient composition and the amount applied. This is a two stage process. First the product must be entered into your personal fertiliser database accessible from the Options tab. Go to **Options | Databases | Fertilisers** to add, edit, or delete fertilisers in your user database. Once a fertiliser has been recorded in your fertiliser database it can be accessed as a user-defined fertiliser product.

NOTE: The model does not assume that fertiliser applied to the pastoral block that a fodder crop rotates through is also applied to the fodder crop block.

Therefore any fertilisers that are applied to the pastoral block that the crop rotates through and to the fodder crop block while it was still in pasture must be applied to both the pastoral block and the fodder crop block.

Irrigate

Irrigation in addition to rainfall drives soil drainage and thus has a critically important influence on drainage and hence nutrient leaching.

Irrigation can be entered by clicking on the cell in the Irrigate row corresponding to the month and year during which the irrigation event occurred. Existing irrigation events can be edited by clicking on the icon  . A dialog will open into which details such as irrigation method and rate can be entered or updated.

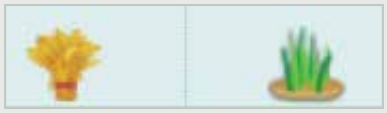
Irrigation events spread over several months may often have the same **Method of irrigation and Irrigation rate**. These can be entered by using the  button to open the Create multiple irrigate activities dialog. Check the desired year(s), months required, and then select **Method of irrigation** and enter **Irrigation rate** if required. On saving the dialog, these entries will be replicated over the months and years you selected overwriting any previous entries.

Actively managed

Actively managed should not be selected at this time.

When actively managed is selected, the model assumes that irrigation is applied using good management practices. It also assumes that when the irrigation is applied;

- the soil moisture deficit is monitored daily
- that irrigation is up to 90% of the available water capacity
- it is not applied within 5 days of predicted rain
- there is no overlapping of irrigation
- there is no ponding occurring
- it is applied evenly over the whole block
- there is no over or under application
- no runoff occurs



Specifying defoliation Cut/Graze

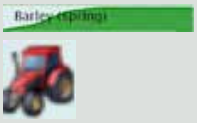
Timing and intensity of grazing can influence dung and urine return and hence nutrient leaching. Harvesting of crops will remove nutrient from the block and reduce the amount available for leaching and runoff.

Defoliation is depicted using one of two icons.  indicates the crop was grazed in situ by livestock,  indicates that the crop was cut and then fed out elsewhere on the farm during the year or exported from the farm. To record a defoliation, click the cell on the Cut/Graze row corresponding to the month the defoliation occurred. A dialog will open into which information can be entered specifying whether or not the crop was grazed in situ or cut and carried. Depending on your selection you will be required to specify information such as, livestock to which the crop was fed, restricted grazing policies in place, whether or not any crop cut was stored, or if it was exported before you save the dialog. Defoliations may be spread over several months. The last defoliation of the crop must be specified by checking Final harvest. Information describing the crop is outlined below and in the *Overseer* HELP section.

Specifying defoliation

PRIMARY INPUT	DESCRIPTION
Defoliation 	The standing crop is removed but crop re-growth occurs. This option is limited to crops such as winter oats and wheat, seed crops, cut and carry of permanent pasture, forages, and fodder crops. For fodder crops, subsequent months can be selected to represent grazing over extended periods. Using the dialog box Method of defoliation, i.e. either cut and carried or grazed in situ, can be selected and Final harvest checked to indicate the last defoliation event of the crop at which time regrowth ceases.

Specifying crop details

PRIMARY INPUT	SECONDARY INPUT[1]	DEFINITION
Crop sow 		This initiates cultivation and sowing and starts the crop's growth. Entering this event when a previous crop exists, i.e. if harvest, cultivation or final defoliation has not occurred earlier, will stop the previous crop's growth. Harvest of the previous crop is assumed if appropriate, and residues removed as specified in its dialog. Consequently non-harvested tops and roots become residues in the month the new crop is sown. A crop grows according to a typical relationship between stage of growth and accumulated thermal degree days, with the growth period extended if the month the crop ends or is harvested is two months following crop maturity. Exceptions to this rule are pasture, seed crops after the first harvest and annual ryegrass forages, where the growth rate is based on estimated monthly growth rates.
	Category and Crop type	Selecting a crop category from the drop down list determines the list of crop options available in the drop down list under crop type. For crops not covered see Appendix 2 for alternative options.
	Product yield	Enter the crop yield as at DM/ha. For most crops a 'typical' yield is provided below the data entry box for guidance.
	Cultivation practice at sowing	From the drop down list box select the best option out of minimum till, direct drilled or conventional.
	Method of residue disposal	This dialogue box appears only for crop options that are likely to leave a residue in the paddock. From the drop down list box select an option: • Retained – incorporated into the soil with next cultivation. • Grazed • Burnt • Removed – baled and removed from farm. Note that multiple options such as baling then burning or grazing then burning are not supported. It is recommended that the option which removed the greatest amount of the residue be selected (Appendix 6).
	Modify growth curve and harvesting	Check this box to modify the default growth curve and the timing of harvest estimated by *Overseer*. The crop growth profile can be modified by specifying the month the crop reaches maturity and nutrient uptake stops, the month of harvest, or both. Three options are presented for crops other than fodder, forage, green manure crops or pasture: 1. No end date – Assume the crop is harvested at a time estimated by *Overseer*. 2. Select harvest date – The crop is harvested at the end of the specified month. 3. Select the month crop ends – The crop is pulled or sprayed out at the end of the month.

PRIMARY INPUT	SECONDARY INPUT[1]	DEFINITION
	• **End uptake on**	Use to specify the month the crop reaches maturity after which no nutrient uptake occurs. This is an optional input. Unless there is good reason, leave blank to use the *Overseer* default value. The time a crop reaches maturity can be ascertained using the crop growth profile this being the time at which the standing crop reaches its maximum. To change this, check the box **Modify growth curve and harvesting** and select the year and month. One example where End uptake might be specified is when the harvest of a mature vegetable crop such as potatoes or carrots is delayed a month to meet market demands.
	• **No end date**	This is the default option. Select this to specify that the crop be harvested at a time estimated by *Overseer*.
	• **Select harvest date**	Use this option to specify the year and the month the crop is harvested. The existing crop growth is stopped at the end of the month. Product is exported from the farm.
	• **Select month crop ends**	Use this option to specify the year and the month the crop ends. The growth of the existing crop is stopped at the end of the month and non-harvested tops and roots become residues but no product is removed. This option represents management options such as spraying or crop pulling. Using this option may also extend the crop growth period if specified within two months following crop maturity, a period during which there is no nutrient uptake. Use this option with caution as no checks are made on the validity of the resultant crop growth curves.
	Soil tests	Completing this part of the data entry is optional. Check the box **Specify soil tests** and enter the soil test data. If no soil data is entered i.e. the field is blank or zero, the model will use default values.

[1] Fields preceded by a bullet are located in the Modify growth curve and harvesting drop down panel.

Appendix 8:
Terminology used in the nutrient budget scenario reports

TERM	DEFINITION
Net transfer by animals	Transfer by animals represents the movement of nutrients through animals. It occurs when feed is eaten (nutrients ingested) in one place on the farm, and excreta is deposited in another place on the farm. For blocks, transfer out of a block (nutrients removed from the block) is positive, and into a block (nutrients added to the block) is negative. Net transfer is the sum of all the removals and additions, and hence can be negative. Four transfers are reported: • From block to effluent, lane – this is where nutrients are ingested on the paddock from pasture or supplements fed on blocks, and excreta deposited on lanes and in the farm dairy. • To block – this is where nutrients are ingested from supplements fed on the feed pad, and excreta deposited on the block. This is a negative transfer. • Wintering pad pasture eaten – this is where nutrients are ingested on the paddock from pasture or supplements fed on blocks, and excreta deposited on the wintering pad. This is a positive transfer (nutrients leave the block). • Wintering pad excreta return – this is where nutrients are ingested on the wintering pad as supplements, and excreta deposited on the block when animals are grazing. This is a negative transfer (nutrients are added to the block). The last two options have values when the **wintering pad plus grazing** option is selected. They describe the transfer of nutrients by animals on farm moving between blocks, structures (e.g. wintering pads) and laneways.
To atmosphere	
Volatilisation – fertiliser	The loss of ammonia to the atmosphere as a consequence of the application of nitrogen based fertilisers.
Volatilisation – other	The loss of ammonia to the atmosphere as a consequence of nitrogen sources other than fertiliser or urine applied/deposited on the soil.
Volatilisation – from urine	The loss of ammonia to the atmosphere as a consequence of urine deposited on the soil.
Denitrification – background	The loss of dinitrogen gas to the atmosphere as a consequence of nitrogen sources other than urine deposited on the soil.
Denitrification – from urine	The loss of dinitrogen gas to the atmosphere as a consequence of urine deposited on the soil.

TERM	DEFINITION
To water	
Leaching – urine patches	The leaching of nutrients from animals' urine patches.
Leaching – other	The leaching of nutrients from inter-urine areas (incorporates the effects of soil fertiliser, effluent and other nutrient input sources). For P this includes the P loss from farm structures e.g. feed pads.
Runoff	The removal of nutrients from the land via overland flow.
Direct (animals, drains)	Nutrients deposited directly by animals into streams and/or drains i.e. when stock are not excluded from waterways and discharge from mole tile drainage systems.
Direct pond discharge	Nutrients discharged directly from effluent ponds into waterways.
Border dyke outwash	Nutrients discharged from the border dyke outwash.
Septic tank outflow	Nutrients discharged from the septic tank outflow.
Changes in farm pools	
Standing plant material	The net change during the year of nutrients in the live crop, including both tops and roots.
Root and stover residues	The net change of nutrients during the year in crop residues not removed from the block.
Organic pool	The net transfer of nutrients in soil organic matter. *A positive number refers to net transfer of nutrients from plant available pool to organic pool i.e. N immobilisation.* *A negative number refers to net transfer of nutrients from organic pool to plant available pool i.e. N mineralisation.*
Inorganic mineral	The net transfer of soil inorganic nutrients not accessible by plants. Associated with processes such as the weathering of clays and fixing of phosphate. A *positive number refers to net transfer of minerals out of the inorganic mineral pool e.g. fixing of phosphate (becoming unavailable)* *A negative number refers to net transfer of minerals into the inorganic mineral pool e.g. from weathering of clays*
Inorganic plant pool (aka inorganic soil pool)	The net change of labile soil inorganic nutrients accessible by plants. Changes in this pool are reflected in changing soil test values. *A positive number refers to nutrients being added to the soil pool.* *A negative number refers to nutrients being removed from the soil pool.*

Appendix 9:
Technical Note: Using annual or average climate and production data

Background

OVERSEER® Nutrient budgets (*Overseer*) is being used in two distinct modes:

1. Predictive mode, where the user is trying to predict annual average losses based on a predicted farm management system. This mode should typically be used when *Overseer* is used in conjunction with catchment and groundwater models to estimate the effect of land use on catchment nutrient loads.
2. Annual mode, where the user is basing the model on current year's management activities. This is typically being used to monitor farms over time, which forms part of the dairy industry's audited self-management programme.

This duality of use then raises the question of whether annual or average climate and production data should be entered.

N leaching sub-model

The N leaching model was validated using average rainfall and N leaching from a range of trials using the following process:

- Setting up farms so that the validation trial was represented appropriately in a block.
- Adjusting rainfall and soil properties inputs so that drainage was similar to measured drainage.
- Comparing modelled and measured average N leaching for the validation block(s).

Thus, *Overseer* is validated against field trials where the management practices are reasonably constant. This and the quasi-equilibrium assumption mean that we are predicting N leaching losses as if management was relatively constant.

The pattern of rainfall, temperature, and PET use 30-year norms. These are clearly long-term averages. These patterns are also used in the validation process.

Annual rainfall (mm/yr) is a compulsory input. In the validation process, rainfall and soil properties are adjusted within bounds so that a similar drainage to that measured is obtained. This in effect means that a 1–3 year average rainfall input has been used, the typical duration of most field trials.

The default temperature and PET is also based on 30-year climate norms. Temperature does have an effect via N removal mechanisms, as noticed by some users when switching location inputs between Region (Canterbury) and Town (Christchurch) which gave different results.

Overseer is calibrated against average outputs over the trial duration, typically 1–3 years. Thus, *Overseer* does not attempt to model the year-to-year variations caused largely by climate. As inputs (rainfall and soil properties) are adjusted so that measured and modelled drainage are similar, the validation process indicates that if drainage is modelled well, N leaching is also modelled well.

When using the model in a predictive mode, using long-term climate data and climate data patterns, and long–term average production is the logical approach. When used in annual mode, production is annual. However, should annual or long-term climate data be used, particularly given that currently the long-term climate pattern cannot be varied?

A comparison was made between modelled and measured N leaching from dairy farmlet trials centred around Ruakura, Hamilton, using an early version of *Overseer* (unpublished data). The results indicated that using annual rainfall and production gave a similar validation line to the line for all trials used to calibrate the model, where annual average rainfall and production data was

used. Both methods used the long-term climate pattern, and the management and production data between years was not large. The increased variation was partly due to a 1-in-7 year event when N leaching was high following certain conditions in autumn. The management was relatively constant over this period and hence production was relatively constant.

Work is required to understand the relationships between using *Overseer* in predictive mode or annual mode. Thus, we are not sure that the resultant outputs of using long-term climate and annual production is the same as using long-term climate and long-term average production. Work is also required to understand the effects of real practice, whereby management is changed annually due to climate variation and economic conditions. In addition, these relationships need to be understood when site-specific monthly climate, annual or average patterns are used, and when improved soil data is included.

A full recalibration of the model for the two modes of operation is required, and the relationships between annual and predictive modes of use determined before definitive recommendations are made. Based on the limited data available, when using the model in an annual mode (annual management and production data), we are currently recommending using long-term climate data and patterns. In addition, we recommend that the interpretation of the output should apply to multiple years, for example, using a rolling average, trend analysis, and not be based on a single years output.

David Wheeler
AgResearch

Fertiliser Matters

FERTILISER ASSOCIATION OF NEW ZEALAND NEWSLETTER

NUTRIENT MANAGEMENT ADVISER CERTIFICATION PROGRAMME
SPECIAL ISSUE
DECEMBER 2013

Nutrient Management Adviser Certification Programme launched

Nutrient Management Adviser Certification Programme Ltd

The Nutrient Management Adviser Certification Programme – a sector-wide national standard for the training, certification and continuing professional development of farm nutrient management advisers – was launched in November. It is open to all nutrient management advisers who have the appropriate qualifications and experience.

The programme defines the standards for people to meet to provide certified and nationally consistent nutrient management advice of the highest quality to farmers, and brings the qualification and continuing professional development requirements into a uniform framework.

A pan-sector Stakeholder Advisory Group provided independent governance and oversight for the development of the programme. A Standard Setting Group set the standards, assessment processes and continuing professional development requirements for the programme. The Standard Setting Group will manage the on-going certification process and will oversee a formal complaint resolution process, if required.

The programme is directed mainly at advisers working within the dairy, sheep and beef and cropping sectors. In time, the certification framework will be extended to include advisers working in the horticultural sector.

The Nutrient Management Adviser Certification Programme will ensure New Zealand nutrient management advisory standards are maintained to the highest level. It will also give assurance to central and regional government regulators, local and international markets and the public at large that well-trained and qualified people are involved in providing nutrient management advice to New Zealand's farmers. This will produce local, national and international benefits through providing greater quality assurance. It will also give added confidence and credibility to the increasingly important role of managing nutrient cycling and nutrient loss within environmental limits on farms.

Once certified, an adviser is listed on the programme's website and farmers and the public are able to view the list of certified advisers.

It is anticipated that approximately 50 per cent of fertiliser company nutrient management advisers will have completed their comprehensive certification competency assessment by 31 May 2014.

For information on the Nutrient Management Adviser Certification Programme, or to apply, go to www.nmacertification.org.nz

About certified nutrient management advisers

A certified nutrient management adviser will have completed specialised training in nutrient management and on the job or external training in the OVERSEER® nutrient management planning tool. They will have an expert understanding of the following areas as they relate to nutrient management:

- OVERSEER®'s practical use covering production and environmental considerations for land management
- Use of the Best Practice Data Input Standards for OVERSEER® and the compiling of nutrient budgets
- The Code of Practice for Nutrient Management
- Fertiliser products and their quality control and storage
- Soil science
- Environmental perspectives on water quality issues and contaminants
- Pasture and cropping management
- Farming practices and economics

To retain certification advisers will need to undertake continuing professional development on an annual basis, pay an annual registration fee and complete a re-certification assessment every three years.

Certification is open for all nutrient management advisers who have the required pre-requisites and meet the standards set for New Zealand. This includes farm advisers whose scope of work goes beyond nutrient management advice because it is recognised that sound nutrient management advice underpins any plan for farm related operations.

Fertiliser Association
Shaping profitable and sustainable farming

A programme run by the experts

DairyNZ, the industry good organisation representing New Zealand's dairy farmers, commissioned the Fertiliser Association of New Zealand to develop the Nutrient Management Adviser Certification Programme as part of its Primary Growth Partnership, jointly funded through DairyNZ levy money and investment from the Ministry for Primary Industries.

Seventeen primary sector organisations have committed to the programme and make up the pan-sector Stakeholder Advisory Group. The 17 organisations are:

- AgResearch
- Agri One
- Ballance Agri-Nutrients
- Ravensdown Fertiliser Co-operative
- Beef and Lamb New Zealand
- DairyNZ
- Deer Industry New Zealand
- Federated Farmers of New Zealand
- Fertiliser Association of New Zealand
- Fish and Game New Zealand (acting on behalf of environmental non-government organisations)
- Foundation for Arable Research
- Horticulture New Zealand
- Lincoln University
- Massey University
- Ministry for Primary Industries
- New Zealand Institute of Primary Industry Management
- Waikato Regional Council (representing the local government sector)

Massey University courses

MASSEY UNIVERSITY TE KUNENGA KI PŪREHUROA

FERTILIZER & LIME RESEARCH CENTRE

The Nutrient Management Adviser Certification Programme defines the standards for people to meet to provide certified nutrient management advice.

As part of the programme, advisers are required to have successfully completed the Massey University Intermediate and Advanced courses in Sustainable Nutrient Management in New Zealand Agriculture.

Each course includes as part of the programme the use of OVERSEER® as a tool to determine the effect of farm practices on the nutrient requirements for sustainable production.

For more information on the Massey University courses in Sustainable Nutrient Management in New Zealand Agriculture go to www.massey.ac.nz/~flrc/

NEWSFLASH

Until 31 March 2014, and at the discretion of the Standard Setting Group, nutrient management advisers who have more than five years of experience and have achieved a professional standard in New Zealand may be permitted to complete the certification process without holding the Massey University Sustainable Nutrient Management Intermediate and Advanced papers.

However, these advisers must meet the following criteria:

- Have published academic papers
- Have spoken at an international conference on a topic related to nutrient management advice
- Have been published in industry publications
- Be recognised as an expert in New Zealand competent to deliver both Massey University Sustainable Nutrient Management Intermediate and Advanced courses

After 31 March 2014 all advisers will be required to have passed both Massey University courses.

Find us on the web

The Nutrient Management Adviser Certification Programme website contains a range of information, including details about the programme and those people who are either certified nutrient management advisers or working towards their certification, as well as details on how to apply to become a certified nutrient management adviser.

For more information on the Nutrient Management Adviser Certification Programme, to find a certified adviser, or to apply to become a nutrient management adviser go to www.nmacertification.org.nz

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