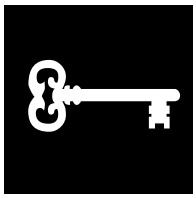
Section 8

8. Overseer

Overseer Case Studies

Introduction

In this part of the course you will be applying the information you have gained from previous sections of this study guide. You are provided with a case study farm for which you will develop fertiliser recommendations and identify the specific environmental issues and risks relating to nutrient management, as part of the contact course.



Key Learning Objectives:

A student should be able to:

1. Use Overseer to identify and understand the key farm parameters influencing nutrient cycling on farms.
2. Use Overseer to understand the principles of 'maintenance' and 'capital' nutrient requirements and how they are influenced by key farm parameters.
3. Understand how Overseer can be used to identify potential environmental risks associated with nutrient management, in particular losses of nitrogen (N) and phosphorus (P) from farms.
4. Understand the objectives of the Code of Practice for Nutrient Management.

Farm parameters

LEARNING OBJECTIVES:

Through using a case study farm, you will learn how to use Overseer to examine the influence of the following factors on nutrient transfer and losses:

- fertiliser use and effluent management
- supplementary feeding
- winter management of pastures, and
- seasonal stock management.

Principles of 'maintenance' and 'capital' nutrient requirements

LEARNING OBJECTIVES:

Through using a case study farm, you will be made aware of the influence of:

- the size of the 'pool' of cycling nutrients on nutrient loss and, therefore, the maintenance nutrient requirements.
- soil type, soil tests and landscape on 'maintenance' and 'capital' nutrient requirements.

Potential environmental risks

LEARNING OBJECTIVES:

Through using Overseer and a case study farm, you will be made aware of:

- the potential environmental risks associated with farming systems.
- how to identify the causes of N and P losses from the farm to the environment.
- how changes in nutrient management can be used to help minimise environmental risks.
- the importance of making realistic and reasonable changes to farm systems when proposing mitigation scenarios.

8.1 Dairying (Waikato)

Background
The Waikato regional council has proposed a plan change (Plan Change 1) to give effect to Government legislation on the management of fresh water. This plan change includes a requirement for farms to provide a Nitrogen Reference Point. This requires farmers to have an analysis completed for their farm using Overseer. For this course you will need to use the Education version of Overseer (edu.overseer.org.nz).

(Note: This case study farm information has been developed and adapted for teaching purposes and is not necessarily descriptive of any particular farm.)

Location
This case study is a seasonal supply dairy farm located at 356 Mangateparu Loop Rd, Mangateparu 3375, which is about 30 km north-east of Hamilton, Waikato. The west coast is approximately 70 km away, which is the direction of the prevailing wind.

Overseer instructions: Start by selecting 'Create New Farm' and then enter the location as 'Farm Address' and 'Region' (Waikato/Coromandel) (Note: please do not enter location based on 'Nearest Town'). More detailed guidance on using Overseer can be found in the Overseer 'User Guide', which can be accessed by selecting 'Support' from the Overseer top menu bar.

Figure 8.1.1 Case study farm entrance (Image source: Google Maps).

Farm blocks (area, soils and topography)
The total farm area is 116 ha, which is divided into 6 grazing blocks (total combined effective area of blocks is 114 ha, Table 8.1.1, Figure 8.1.2) and areas that are not declared as blocks (2 ha).

Table 8.1.1. Block effective area, SMap soil reference and topography

Block	Effective Area (ha)	SMap Soil Reference	Topography
Main (West)	46.5	Morr_4a.1 (100%)*	Rolling
Main (East)	28	Morr_4a.1 (100%)	Rolling
Silage (West)	14	Otor_1d.1 (100%)	Rolling
Silage (East)	5	Otor_1d.1 (70%)/Morr_4a.1(30%)	Rolling
Top	11.5	Otor_1d.1 (60%)/Tait_17a.1(40%)	Rolling
Effluent	9	Otor_1d.1 (80%)/Tait_17a.1(20%)	Rolling

** The percentage refers to the proportion of the block comprised of each soil (adjust this value manually after drawing the block).*

***Overseer instructions**: 'Create New Analysis' as a 'Scenario' analysis. Then select 'Create Block' and 'Add Block Detail'. All 'Block Types' are 'Pasture'. Draw the area of each individual block using Figure 8.1.2 for guidance (Note: it is not necessary to get the outline exactly the same because the actual area and the percentage of each soil in in block will be added manually. The percentage soil can be adjusted by moving the blue circle along the red line, as seen in Figure 8.1.3). Select 'Add Block' to create additional blocks. Once all blocks have been entered, then select 'I have completed all my blocks' at the bottom of the page.*

Figure 8.1.2 Location of farm blocks (Image source: Overseer).

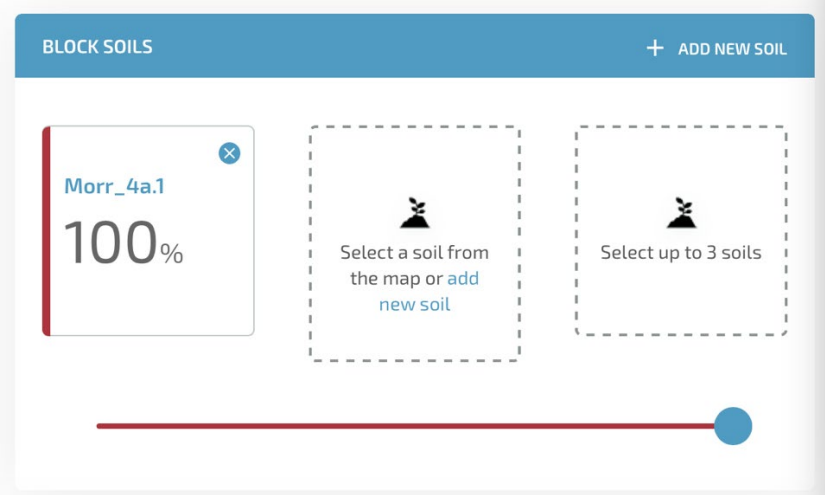


Figure 8.1.3 Overseer block soil percentages (Image source: Overseer).

The soil series on this farm are all formed from rhyolitic and andesite rock, which arrived via different processes. The dominant soil type on the farm is a Morrinsville soil followed by an Otorohanga soil, both formed from tephra (airfall ash) parent material, and a Taitapu soil formed from alluvium parent material. The surface runoff risk is a lower for the Morrinsville and Otorohanga soils, compared to the Taitapu soil.

- The Morrinsville soil (SMap sibling name: **Morr_4a.1**) is classified as a Typic Orthic Granular soil and has a medium Anion Storage Capacity (ASC; P retention). The soil is moderately well drained, has medium N leaching vulnerability and a low potential for runoff. Rooting depth is unlimited with no stones, but aeration within the root zone can be slightly limited.

- The Otorohanga soil (SMap sibling name: **Otor_1d.1**) has a high ASC and is classified as a Typic Orthic Allophanic soil. Its surface texture is a well-drained soil that provides no physical barriers to rooting, with aeration in the root zone unlimited and has no stones and no non-standard layers. Nitrate leaching vulnerability is medium, but runoff potential is low.

- The Taitapu soil (SMap sibling name: **Tait_17a.1**) is a stoneless, poorly drained soil that has very limited aeration in the root zone and a low root penetration. Both the N leaching vulnerability and the runoff potential are medium. This soil has a medium ASC and is classified as a Typic Recent Gley soil.

Overseer instructions: *Choose the Soil icon , then select 'Add Soil Tests'. Enter the soil test values from Table 8.1.2. 'Use system default' for ASC and Slow release K. For blocks that have the same soil test values, the blocks can be selected together and then the values entered will apply to all of the blocks selected.*

Table 8.1.2. Soil test results (Autumn)

Soil test	Main blocks (East & West)	Silage blocks (East & West)	Top block	Effluent block
pH	5.6	5.9	5.8	5.8
Olsen P (mg P/L)	22	20	52	47
K (Quick Test)	6	7	9	15
Ca (Quick Test)	10	8	11	10
Mg (Quick Test)	15	12	14	30
Na (Quick Test)	7	5	6	7
Sulphate S* (mg S/kg)	11	10	15	12

**QT SO4 in Overseer*

Climate

The farm's mean annual rainfall is approximately 1075 mm and its mean annual temperature is approximately 14.5 °C. Climate information is added automatically by Overseer based on the location information that was entered for the farm.

Pasture and crops

The entire farm contains perennial ryegrass/white clover pasture, with medium clover content. Only the Main (East) and Silage (East) blocks have been cultivated in the last 5 years.

***Overseer instructions**: Choose the Pasture/Crops icon , then for each block select 'Add Pasture'. Add the topography information from Table 8.1.1 and then add 'Pasture Type'. Animals are present on all blocks. Based on the recommendations of the Overseer Best Practice Data Input Standards, select 'Use default' for 'Hydrophobic condition' and 'Occasional' for 'Susceptibility to pugging' for all blocks.*

Animals

The farm's total annual milk solids production is 116,820 kg MS. This is achieved from a herd of 350 Friesian/Jersey cross cows. The breeding replacement rate is 23%. Young dairy replacement stock are grazed off the farm from weaning. The farm uses once a day milking only during the drying off period. A total of 3000 kg magnesium oxide is applied annually to the farm, as an animal health supplement.

***Overseer instructions**: Choose the Animals icon , then select 'Add Enterprise'. Add 'Dairy' as the 'Type' of livestock enterprise. The method for entering stock numbers is 'Dairy peak cow numbers'. Calves are not fed milk powder. Use 'F x J cross' as the breed. Breeding numbers are not constant. Leave Overseer to provide default values for 'Average Mob Weight', 'Lactation Length', 'Milk Volume Yield', 'Fat Yield' and 'Dairy Calving Times'. Enter the 'Health Supplement' information. Add 'Dairy Replacements' as a second livestock enterprise.*

Effluent system and standoff facilities (structures)
The liquid farm dairy effluent management system involves storage in a holding pond (solids not separated) and sprayed regularly (when soil moisture conditions allow) to pasture in the Effluent block (9 ha). Liquid effluent is applied at high application depths of >24 mm (applications are not 'actively managed'). Effluent pond solids are emptied every 3 years (application in March) and spread onto the Effluent block.

Overseer assumes that best practice is being used for effluent management. Best practice principles for effluent management include:

- Applying effluent within Waikato Regional Council regulations of no more than 150 kg of effluent N/ha/year.
- Having effluent storage facilities, with adequate storage capacity, that do not leak into groundwater and which are empty prior to winter.
- Having an effluent irrigation system and management that ensures each season's effluent is applied relatively uniformly to the entire effluent block and at application depths that are appropriate for the soil type and soil moisture conditions.

Overseer instructions: *Choose the Structures/Effluent icon*  , *then select 'Add Effluent System' and enter the required details from the information provided above.*

In winter, the dairy herd (100 % of cows) stand off from pasture on an 'Uncovered Wintering Pad'. The wintering pad has a wood chip pad surface and is lined with subsurface drainage, which allows the liquid effluent to be collected (pad surface is not scraped regularly). This liquid wintering pad effluent is stored and managed with the liquid farm dairy effluent. The feeding regime of the wintering pad involves all cows being on the structure for 20 hours per day and grazing the remaining 4 hours per day, over a period of 1 month in June. The farm is not grazed out prior to moving the animals on to the pad. Wintering pad effluent solids are stored open to the rain for six months and then are spread onto the Effluent block in December.

Overseer instructions: *Choose the Structures/Effluent icon*  , *then select 'Add Uncovered Wintering Pad' and enter the required details from the information provided above. The 'Management System' for the effluent is 'Use farm system'.*

Supplementary feed
The farm purchases 330 tonnes (dry weight) of imported maize silage each year. This imported supplementary feed is distributed as 75 tonnes fed to wintering pad (very good utilisation) and 255 tonnes fed evenly across paddocks (average utilisation). The storage condition of the maize silage is average.

Overseer instructions: *Choose the Supplements icon*  , *then select 'Add Imported Supplement' and enter the required details from the information provided above.*

Good quality pasture silage (3.5 t DM/ha) is harvested every year in November from the Silage (West) and Silage (East) blocks (multiply the per hectare average silage yield by the area of each block to obtain the per block total yield on a dry weight basis). The storage condition for the silage is average and utilisation is also average. The silage is distributed to the dairy cows, but not to the dairy replacements.

***Overseer instructions**: Choose the Supplements icon  , then select 'Add Harvested Supplement' and enter the required details from the information provided above.*

Fertiliser and lime

The fertiliser product 20% Potassic superphosphate (i.e. 20% Potash Super) is applied at a rate of 500 kg/ha to all pasture blocks in a single application in September. Urea fertiliser is applied in 6 applications (April, Jul, Aug, Sept, Oct, Nov) of 70 kg/ha per application (i.e. 420 kg fertiliser/ha/year) to all pasture blocks.

***Overseer instructions**: Choose the Fertiliser/Lime icon  , then select 'Create Product Applications' and then 'Select from a manufacturer' and fill in details for 'Manufacturer' and 'Product'. Then select 'Add Pasture or Fruit Application'. Choose all of the blocks that the application is for (multiple blocks can be selected for the same application) and then enter application details.*

Overseer reports

Once all of the farm information has been entered into Overseer, the reports can be found by selecting the 'Overview' icon  . If there is still essential farm information required still to go into Overseer, then the reports may not be available. Sometimes Overseer indicates in which category of inputs that information is still required by use of an exclamation mark inside a red circle (e.g. ).

The 'Overview' report page provides a summary of N and P losses to water for the farm in total and for individual blocks. This page also provides the farm average 'Nutrient Budget' and 'Effluent Report' near the bottom of the page.

The 'Block details' report page provides more comprehensive information for one block at a time. This includes estimates of pasture grown, utilisation and intakes. The block 'N Pool Graphs' and 'Nutrient Budget' reports are also provided near the bottom of this page.