Release notes – Overseer version 6.5.9

Contents

1. Introduction

OverseerFM Model Release 6.5.9 introduces a new calculation for determining the amount of grass fed to dairy enterprise animals. In the absence of an agreed national standard for the definition of grass fed, Overseer uses the terms of the draft AsureQuality Grass-Fed Standard. This addition allows users to assess whether their farming system aligns with the draft Standard. While this new calculation does not impact model results, the release also includes minor defect fixes identified through user feedback and internal reviews at Overseer Ltd, which may have an impact on results.
These release notes outline the changes made and their impact on nitrogen (N), phosphorus (P), and greenhouse gas (GHG) emissions estimates at the farm level.

Prior to release, each model update is independently assessed, with all changes reviewed and approved by subject matter experts. The impact of each change on modelled results is evaluated both individually and collectively, using the latest year-end analyses from each farm account in OverseerFM. The resulting impacts, individually and collectively, are summarized in these release notes.

2. Overall Impact on Modelled Results

The updates introduced in version 6.5.9 of Overseer have had a moderate impact on modelled results. However, farms with "cut and carry" blocks or those that rely heavily on farm-grown supplements in animal feed may see a greater impact. The following graphs illustrate the impact of release 6.5.9 on N, P, and GHG results at the farm analysis level. For this comparison, we utilized the complete OverseerFM database, encompassing nearly 160,000 analyses, of which almost 140,000 included results. This dataset also covers predictive and scenario analyses, which may not always represent realistic farm systems.

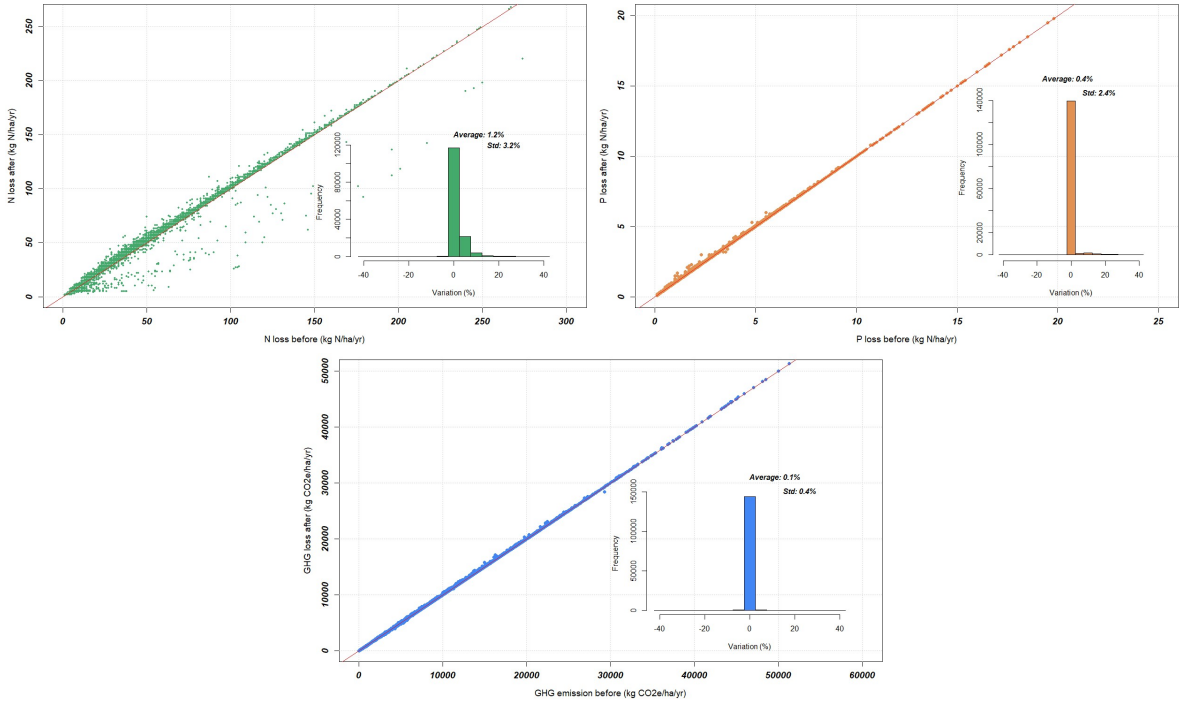


Figure 1: Comparison of N loss (kg N/ha), P loss (Kg P/ha) and GHG emissions (kg CO2e/ha) before and after version 6.5.9 update. The main graph shows the absolute values under both conditions, while the inset histogram shows the percentage

change, calculated as (After - Before) / Before × 100%. Positive values indicate an increase, while negative values indicate a reduction.

3. Individual Fixes

To ensure that model changes function as intended and to identify any unintended impacts, we perform impact testing using a production copy of our database. This approach allows us to observe the effects of targeted model adjustments and, when multiple changes are made, to evaluate their cumulative impact on modelled results. Testing with production data, which reflects real farm data, enables a more accurate understanding of how these changes affect real-world scenarios.

The following individual fixes were tested and validated using data from all latest year-ends in our centralized database.

3.1 Grass fed percentage calculations

In the absence of an agreed national standard for the definition of grass fed, Overseer uses the terms of the draft AsureQuality Grass-Fed Standard. This provides a framework for assessing and certifying feed management practices in dairy farming. Basic information about the standard has been included in the Overseer Knowledgebase, more detailed questions should be addressed to AsureQuality. This integration enables users to understand and report the percentage of grass-fed feed in animal diets and the time spent grazing on pastoral blocks.

The draft Grass-Fed Standard defines the minimum criteria for a "grass-fed" diet, ensuring that dairy animals primarily consume pasture-based feed and spend most of their time grazing. Certification under this standard enhances credibility and traceability for farms and dairy products marketed as "grass-fed".

With this release, users can now monitor, at farm and milk-pool level:

- the monthly percentage of a livestock diet that meets the grass-fed criteria.
- the percentage of time animals spend grazing on pastoral blocks each month.

A new section, "Dairy Grass-Fed Percentage," has been added to the Animals Report. This section provides a monthly breakdown of the wet matter fed to the dairy enterprise from grass-fed standard compliant feed, expressed as a percentage of the total wet matter consumed each month. Additionally, it displays a monthly breakdown of the estimated time the dairy enterprise spent on non-milking structures, shown as a percentage of total hours in each month.
A new section has also been added to the Aggregated Reporting page within Publication / farm group reporting, enabling the same understanding at a milk pool level.

Impact of change: No impact on results.

3.2 Removal of snowfall data entry

As part of the Overseer 6.5.9 update, the snowfall data entry field has been removed from the block climate data entry to streamline input requirements and improve model accuracy.

The snowfall data entry for productive blocks was both subjective and unnecessary, adding complexity to the data entry process. Investigation has determined that the monthly-average NIWA precipitation data already

includes all forms of precipitation, making separate snowfall input redundant.

With the removal of the ability to enter snowfall data for a block, we have also updated existing analyses to exclude any previously entered snowfall data. With the snowfall removed we have upgraded analyses to reflect the updated model results.

The Climate tab in the user interface has also been removed. The climate information can be found in the block screen on the "List view" and in the "Block details" and "Compare blocks" reports.

Impact of change: Impact on N loss only with 0.4% of analyses show a reduction greater than 5%, while the absolute difference between before and after remains below 5 kg N/ha.

3.3 Automatic assignment of Nearest Coast Distance for blocks

The nearest distance to the coast for productive blocks is now automatically estimated based on geolocation, eliminating the need for manual entry. This improves efficiency and reduces subjectivity in the modelling process. While the ideal measure would be the distance to the coast in the direction of the prevailing wind, sensitivity analysis has shown that the nearest distance serves as a reliable proxy.

Impact on Modelling:

- Rainfall seasonality modelling:
    - In some regions, distance from the coast is used to define sub-regions for modelling rainfall seasonality, which affects daily rainfall distribution, and therefore soil moisture, drainage, and nutrient leaching.
    - In Otago, coastal proximity significantly influences rainfall seasonality, leading to changes in nutrient loss calculations for approximately 10% of farms in the region. Other regions remain unaffected.
- Nutrient Inputs & Fertiliser Requirements:
    - Coastal distance is also used to estimate the nutrient content of precipitation for potassium (K), sulphur (S), calcium (Ca), magnesium (Mg), and sodium (Na).
    - These changes impact maintenance fertiliser requirements for the affected nutrients.

This update enhances accuracy in OverseerFM by automating coastal distance estimation, streamlining the user experience, and improving the consistency of climate-related modelling inputs.

Impact of change:

- Maintenance fertiliser requirements may be affected for K, S, Ca, Mg, and Na.
- In Otago, rainfall seasonality varies significantly with proximity to the coast. As a result, the change in estimated coastal distance affects nutrient loss calculations for about 10% of farms in the region, due to shifts in daily rainfall patterns, but with a moderate effect.

3.4 GHG wet weight supplement distribution

The GHG calculation of wet weight should be based on the total wet weight of a supplement fed to an enterprise on pastoral blocks, without adjusting for utilisation—i.e., it should reflect what was fed, not what was consumed. Previously, when supplements were distributed to enterprises, and users specified the timing, the wet weight value was incorrectly adjusted based on what the enterprise consumed rather than what it was fed. This anomaly has now been corrected, improving the accuracy of GHG calculations.

Impact of change: Very low impact on the GHG emissions.

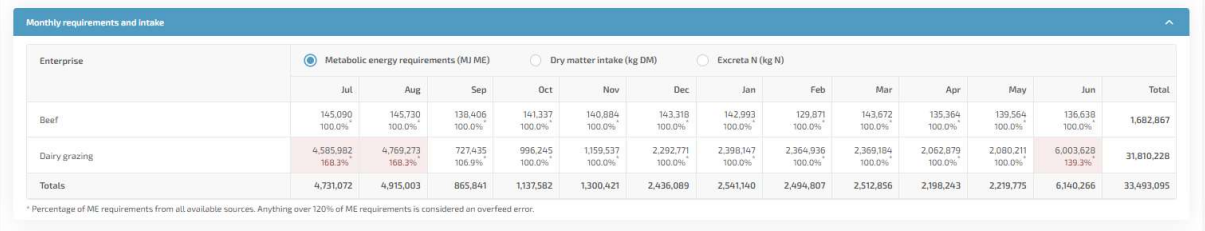
3.5 Improved feed error handling in Animal Report

In the event of a feed error, the "Monthly requirements and intake" section of the "Animal Report" will now display the initial input conditions rather than the model's last failed attempt. This update enhances transparency and prevents misinterpretation of feed distribution data, enabling users to more effectively identify and correct sources of feeding errors.

While this change does not affect overall results, it provides a clearer and more consistent representation of monthly feed distribution, particularly in cases where previous feed periods displayed confusing overfeed or underfeed values. By maintaining a more reliable reference point, users can now diagnose and resolve feed issues with a clearer understanding of the distribution.

Impact of change: No change on results.

The example below illustrates a case of overfeeding evident during the winter months. This occurs due to the distribution of imported supplements in parallel with crop defoliation, leading to an overfeeding error. The model allows for a 20% variation around its feed estimate, and in this scenario, this threshold was exceeded.



Monthly requirements and intake

Enterprise | Metabolic energy requirements (MJ ME) | Dry matter intake (kg DM) | Excreta N (kg N)

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Beef	145,090 100.0%	145,730 100.0%	138,406 100.0%	141,337 100.0%	140,884 100.0%	143,318 100.0%	142,993 100.0%	129,871 100.0%	143,672 100.0%	135,364 100.0%	139,564 100.0%	136,638 100.0%	1,682,867
Dairy grazing	4,585,982 168.3%	4,769,273 168.3%	727,435 106.9%	996,245 100.0%	1,159,537 100.0%	2,292,771 100.0%	2,398,147 100.0%	2,364,936 100.0%	2,369,184 100.0%	2,062,879 100.0%	2,080,211 100.0%	6,003,628 139.3%	31,810,228
Totals	4,731,072	4,915,003	865,841	1,137,582	1,300,421	2,436,089	2,541,140	2,494,807	2,512,856	2,198,243	2,219,775	6,140,266	33,493,095

* Percentage of ME requirements from all available sources. Anything over 120% of ME requirements is considered an overfeed error.

3.6 Maturity Factor Inconsistency in Farm-Grown Supplement Calculations

Farm-grown supplements such as hay, baleage, silage and direct feed are derived from pasture, with their dry matter (DM), digestibility, and metabolisable energy (ME) content estimated based on standard values for average-quality hay and silage. As pasture grows taller, its nutrient content changes—mature grass has a

higher stem-to-leaf ratio, leading to lower digestibility and energy content. To reflect this, a maturity factor is applied to adjust the nutrient composition of harvested supplements accordingly.

An inconsistency was identified between the code implementation and the supplements technical manual chapter (TMC) regarding the maturity factor applied to farm-grown supplements. Specifically, the maturity factor for N was incorrectly implemented as 0.46 in the code, whereas the TMC specified 0.86. Similar discrepancies were found for other nutrients. This issue has now been resolved, with maturity factor values updated in coordination with domain experts to ensure alignment with scientific standards.

Impact of change: This update directly affects the total nutrient uptake of farm-grown supplements, particularly increasing N uptake. This results in a higher N content in these supplements compared to previous calculations. When these supplements are used as animal feed, the increased N intake leads to greater N excreta, which can contribute to higher N leaching. However, since the total N uptake by the farm-grown supplement has increased, the amount of N available for leaching in the block where they were grown is reduced.

For farms where the diet relies heavily on harvested farm-grown supplements, N-loss may increase in proportion to supplement use. This is particularly relevant during the drainage season (winter) when higher N excretion can lead to greater N accumulation in the soil, increasing the risk of leaching. Conversely, for farms where these supplements are exported or stored, there could be a decrease in N-loss.

3.7 Wet weight management for crop supplements on structures

An anomaly was identified where defoliated crop supplements (Cut & Carry) were not correctly managing wet weight when distributed to milking sheds, feed pads, and wintering pads. This led to an incorrect allocation of wet weight (kg WW), potentially impacting GHG calculations.

The wet weight calculation has now been corrected, ensuring accurate GHG modelling and the proper allocation of crop supplements. This fix was implemented as part of the Grass-Fed Standard work, enhancing the accuracy of GHG calculations within OverseerFM.

Impact of change: Very low impact on the GHG emissions.

3.8 Dairy goat leftover distribution

An anomaly was identified in OverseerFM where the percentage of dairy goat leftovers was incorrectly interpreted as a whole number instead of a decimal in certain scenarios. For example, a value of 25 was treated as 25% instead of 0.25, leading to supplement allocations being overestimated by a factor of 100 in some cases. The proportion is now correctly applied, ensuring accurate distribution of leftovers. This prevents the overestimation of supplement usage, resulting in more reliable feeding calculations for dairy goat systems.

Impact of change: No change for all analyses that do not model dairy goats. Those modelling dairy goats: minimal impact.

3.9 Correction of Stock Class Assignment in Outdoor Pigs Calculation

In the Technical Manual Chapter - Outdoor Pigs (Section 4.8), the estimated number of growers (weaners, growers, or finishers) passing through the growing unit and sold each year was incorrectly assigned. The system assigned the number sold to "weaners" instead of "growers."

The calculation has been updated to correctly assign the number of pigs sold each year to "growers" instead of "weaners," ensuring consistency with block assignments.

This correction ensures that stock class assignment aligns accurately with expected values and maintains the integrity of the Outdoor Pigs model.

Impact of change: No overall impact on key indicators such as N loss, P loss, and GHG emissions. However, minor changes were observed in N surplus and nutrient budgets, as expected for some pig farms.