OVERSEER®

Technical Note No. 3 (June 2011)

Supplementary feeds/Fodder crops in OVERSEER®

Introduction

We've recently received a few enquiries about aspects of use of supplementary feeds in the model, and also a question around fodder crops. Here is some information to explain how *Overseer* deals with these.

Why is N discharge greater when you use N fertiliser to overcome a feed gap compared to using a supplement to supply the same amount ME?

Overseer estimates pasture production from the metabolisable energy (ME) required to obtain the level of animal production that is entered into the model, less that supplied by brought in supplements.

Table 1 looks at a range of scenarios to increase production, mainly focusing on using N fertiliser to grow more pasture or alternatively using a range of purchased supplements to replace the need to grow more pasture. When looking at the impact of using either fertiliser or supplements to overcome a feed gap, the first assumption is that animal production remains the same irrespective of the source of feed, and that animal production would be higher than if neither was used Row 1 of the Table). To achieve this, if N fertiliser is used, pasture production must be higher than if no additional feed is used. If supplements are used, pasture production is the same, with additional animal requirements met by supplements (see Table 1).

Table1: *Potential impact of using N fertiliser or supplements to overcome a feed deficit on N losses and pasture yield.*

N source	Stock numbers (cows/ha)	Milk solids production (kg/ha)	Estimated pasture yield (kg DM/ha/yr	Estimated N leaching losses (kg N/ha/yr)
No N fertiliser and no Supplements	3.0	1000	14940	28
N fertiliser (100 kg N/ha)*	3.3	1100	16433	37
Maize silage (161 t)	3.3	1100	14944	29
Pasture silage (174 t)	3.3	1100	14941	31
Lucerne silage (174 t)	3.3	1100	14941	32
Palm kernel extract (139 t)	3.3	1100	14942	31
Soya bean meal (115 t)	3.3	1100	14938	36

* no N applied in high risk period of drainage and N leaching

Note that the effect on N leaching and pasture production depends on other farm inputs, and hence will differ from farm-to-farm.

Given this, the differences in N leaching seen in Table 1 can be due to:

- Higher intake when additional feed is supplied (difference between no and plus additional fed)
- Differences in feed quality – if supplementary feed has a higher energy content (MJ ME/kg DM) than pasture, less DM intake and hence less nutrient intake is required to meet animal requirements.
- Differences in N content – N fertiliser results in small increases in pasture N content. Supplements typically have lower N content than pasture, but some supplements such as lucerne silage or soya bean meal can have high N contents.
- Differences in dietary N intake changing the proportion of excreta N than is urine. Urinary N is the primary source of N losses from grazed systems, and the higher the dietary N content, the higher the proportion that is excreted as urine.
- If fertiliser N is applied in high-risk months, direct leaching losses can occur while estimated pasture yield remains the same (Table 2).

Table 2: *Example of the potential impact of applying N fertiliser to a pastoral block on a dairy farm during a period of high risk of drainage and N leaching with no change . (100 kg N/ha as Urea to a non effluent block).*

N source	Estimated N leaching losses from non effluent block (kg N/ha/yr)	Estimated pasture yield (kg DM/ha/yr
No N fertiliser	28	14940
Plus N fertiliser None applied in high-risk period	35	14940
Plus N fertiliser 33% applied in high risk period	36	14940
Plus N fertiliser 67% applied in high-risk period	38	14940
Plus N fertiliser 100% applied in high-risk period	39	14940

If additional fertiliser or supplements are added without taking into account any effects on animal production, then erroneous results can occur. In effect, the model assumes that the added fertiliser or supplements did not result in changes in animal production. Thus, it can be seen in Table 2 that added supplements decreases pasture production as pasture is substituted for supplements. The difference between no N and plus N fertiliser is underestimated as the additional yield, and hence animal production, is underestimated.

The model was set up this way so that pasture growth did not have to be estimated, and to stabilise the model against incorrect information on fertiliser or supplement use. This works fine when entering a farm as it is currently operating. The down side is that when doing what-if scenarios care is needed to ensure that animal production changes as inputs change – the model doesn't do this automatically.

Table 3 illustrates the effect if fertiliser or supplements are added without adding in the change in production. This can lead to large differences in the estimated farm pasture production and N leaching.

Table 3: *Potential impact of using N fertiliser or supplements to overcome a feed deficit on N losses and pasture yield, with no adjustment to animal productivity or stocking rate. (N fertiliser and supplement amounts are for example purposes only and do not reflect an actual farm).*

N source	Pasture yield (kg DM/ha/yr	N leached (kg N/ha/yr)
No N fertiliser and no Supplements	15955	18
N fertiliser	15955	25
Maize silage	3660	14
Palm kernel extract (PKE)	10006	19
Pasture silage	10237	19
Lucerne silage	12295	21

Fodder crop: Why does N discharge increase when you decrease crop yield but leave all other variables the same?

N leaching from the crop model is estimated each month based on the drainage and amount of available soil N. The amount of available soil N is the sum of N inputs from fertiliser, soil organic matter mineralisation and residue decomposition, less N removal by crop uptake, denitrification, volatilisation and leaching.

Decreasing crop yield decreases N uptake, and hence increases the amount of available soil N as all other inputs remain the same. If this occurs during a period when drainage occurs, the result is an increase in N discharge.

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