

Dry matter production of grazed multispecies swards over three grazing seasons

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Summary

- The inclusion of white clover in grazed multispecies swards was crucial to increased dry matter production.
- Seasonal sward dry matter production was not altered by the inclusion of herb species.
- Trial will continue until December 2024 to assess persistency of herb species under grazing.

Introduction

Currently, there is spotlight on the use of legumes, specifically red clover (RC) and white clover (WC), in Irish grassland systems. A large amount of research has been carried out in this area, particularly with regard to WC in combination with perennial ryegrass (PRG) for grazing systems. Such work has shown that nitrogen (N) fertiliser input can be reduced, and sward dry matter (DM) production maintained, where sufficient WC is present in the sward. Further to this, international research has shown that the inclusion of herb species in grass and clover swards can have benefits in terms of wider ecosystem services, seasonal DM production and nutrient cycling. In contrast to the grass clover research undertaken to date the MS research work is in its infancy and there is very little research completed under intensive grazing. Productive herb species, such as chicory (CH) and plantain (PL), are often sown in complex multispecies (MS) mixtures with several other forage species and it can be difficult to measure species specific contributions to sward DM production. A deficit in knowledge exists regarding the DM production of MS swards in grazing systems and the actual contribution of the individual species to overall MS sward performance. Teagasc, Moorepark has undertaken a number of MS studies under grazing; the current work was set out to assess the DM production potential of various MS swards within a dairy grazing scenario with varied levels of N fertiliser application.

Project work

Multispecies plots of varying species complexity were sown in June 2019 at Teagasc Moorepark; the sward sowing treatments ranged in complexity from a PRG monoculture to a five species combination of PRG, WC, RC, PL & CH (see Table 1 for all sward species mixtures); three different nitrogen (N) application rates of 100, 150 and 200 kg N/ha per year were applied. These plots were managed to mimic a conventional Irish dairy grazing scenario where the PRG only sward receiving 200 kg N/ha per year was the control treatment within the study. Plots were grazed when pre-grazing herbage mass of the control reached 1,200-1,400 kg DM/ha and cows grazed all plots until the average post-grazing sward height across the plots was 4 cm. Data was collected from 2020-2022 and included three full grazing seasons where plots were grazed on 8-9 occasions each year.

Results

There was a clear DM production advantage of swards which included WC over the three-year period of this study (Table 1) where these swards produced an average of 1,619 kg DM/ha more than those which did not include WC. This represents a substantial difference

in DM production and highlights the importance of WC in grazed MS sward mixtures. While both RC and WC fix N from the atmosphere to make it available in the soil it is clear from these results that WC was more effective for increasing sward DM production in an intensive grazing scenario over the three years of this study. This effect was clear across N fertiliser application rates; swards including WC receiving 100 kg N/ha produced comparable levels of DM to swards without WC receiving 200 kg N/ha (Table 1). No clear trends in increased seasonal DM production were observed in swards containing either CH or PL. Previous work has shown that PL is more winter active than conventional grass or clover species but no early season increase in DM production was observed in swards where PL was sown compared to PRG and WC swards. Similarly, swards including the summer active CH did not show increased summer growth compared to swards sown without CH.

Table 1. Mean dry matter production (kg DM/ha) of multispecies swards over three years for three nitrogen application rates (kg N/ha)

Species mixture	100 N	150 N	200 N
Grass	8,983	9,645	10,094
Grass & chicory	9,555	9,781	10,497
Grass & plantain	9,883	10,763	10,354
Grass, chicory & plantain	9,303	10,328	10,921
Grass & red clover	9,262	9,498	10,898
Grass & white clover	11,124	11,254	12,375
Grass, white clover & red clover	11,042	11,610	11,675
Grass, white clover & plantain	10,595	12,480	12,346
Grass, white clover, plantain & chicory	11,153	11,963	12,015
Grass, white clover, red clover, plantain & chicory	10,721	11,298	12,396

Conclusions

Sward species mixture had a significant effect on sward DM production across all rates of N application. While the inclusion of herb species did not affect sward DM production, either annual or seasonal, compared to PRG and WC swards in the current study they may provide other benefits to grassland systems including more efficient nutrient cycling and utilisation; work is currently underway to assess these aspects of MS swards. Over the course of the current trial it became apparent that PL was more persistent under grazing than both CH and RC although further measurements are required to validate this persistency. This grazed plot trial will run for a further two years to fully assess the DM production persistency and the N fertiliser response of MS swards under grazing in Irish dairy systems; other work is currently underway to investigate the impact of herb species inclusion on milk production.

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