Clonakilty Update: The effect of perennial ryegrass ploidy and white clover inclusion on animal, sward and farm economic performance

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Summary

- The inclusion of white clover in perennial ryegrass swards increased milk and milk solids yield and grass dry matter (DM) production compared perennial ryegrass to grass-only swards.
- As sward white clover content decreased over time, the beneficial effects of white clover on milk and grass DM production were reduced.
- Perennial ryegrass ploidy did not affect milk or grass DM production.
- Including white clover in a sward increased net profit/ha by €305.

Introduction

Perennial ryegrass (*Lolium perenne* L.) ploidy and white clover (*Trifolium repens* L.) can affect both grass DM production and milk production in grazing systems. There has been renewed interest in the use of white clover in grazing systems due to its ability to biologically fix nitrogen (N), increase herbage nutritive value and improve animal performance.

Clonakilty experiment 2014–2017

The experiment was established in Clonakilty Agricultural College in 2012 and 2013 and ran from 2014 to 2017. Four separate grazing treatments were sown on the experimental area; a tetraploid only sward (**TO**), a diploid only sward (**DO**), a tetraploid plus clover sward (**TC**) and a diploid plus clover sward (**DC**). Four diploid (Tyrella, Aberchoice, Glenveagh and Drumbo) and four tetraploid (Aston Energy, Kintyre, Twymax and Dunluce) perennial ryegrass cultivars were sown as monocultures with and without white clover around the farm, thus creating a separate farmlet of 20 paddocks for each grazing treatment. In the clover paddocks, a 50:50 mix of chieftain and crusader white clover were sown at a rate of 5 kg/ha. There were 30 cows in each treatment group and treatments were stocked at 2.75 cows/ha, received 250 kg of nitrogen (N) fertiliser/ha and target concentrate supplementation was 300 kg/cow for each treatment.

Results 2014–2017

On average over the four years, perennial ryegrass ploidy did not affect grass DM production or milk production per cow, therefore the results will focus on the differences observed between grass-only (TO and DO) and grass-clover (TC and DC) treatments. Sward white clover content was similar for TC and DC (23.1%; Table 1) and white clover content varied both within year and over time. In 2014, sward white clover content was high (37%) however, white clover content declined each year (2015 = 25%, 2016 = 18% and 2017 = 15%). On average, grass DM production was 15.6 t DM/ha on grass-only swards and 16.8 t DM/ha on grass-clover swards over the four years. However, as sward white clover content declined over time the difference in DM production also declined and ranged from 2.5 t DM/ha in 2014 to 0.4 t DM/ha in 2017. Average concentrate supplementation

across all treatments was 344 kg DM/cow per year during the experiment. Average silage supplementation during lactation to the grass-clover cows was significantly greater (450 kg DM/cow per year) compared with the grass-only cows (350 kg DM/cow per year).

White clover inclusion increased milk and milk solids yield per cow. Cows grazing grass-clover swards produced 597 kg more milk and 48 kg more milk solids per year than cows grazing grass-only swards. However, the difference in milk production per cow between grass-only and grass-clover declined as sward white clover content declined. The economic performance of grass-only vs. grass-clover swards was modelled, based on a 40 ha farm, using the biological performance from this experiment with the Moorepark Dairy Systems Model. Net profit/ha was €305 higher for grass-clover swards compared to grass-only swards.

Table 1. The effect of grazing treatment[1] on grass and milk production and economic performance over four years (2014–2017)

	TO	DO	TC	DC
Grass growth (t DM/ha)	15.6	15.5	16.8	16.8
Sward white clover content (%)	-	-	22.6	23.6
Milk yield (kg/cow)	5,235	5,208	5,854	5,782
Milk solids yield (kg/cow)	439	434	487	482
	Grass-only		Grass-clover	
Net Profit (€/40 ha farm)	94,774		106,964	
Net Profit per ha (€)	2,369		2,674	

[1]*TO = tetraploid only; DO = diploid only; TC = tetraploid + clover; DC = diploid + clover.*

Clonakilty experiment 2019–2021

The new grazing experiment in Clonakilty will investigate the effect of sward type (grass-only vs. grass-clover) and N fertiliser level (150 vs. 250 kg N/ha) on the productivity of spring milk production systems and will examine how reducing N fertiliser levels on grass-only and grass-clover swards will affect grass and milk production. In this experiment a concerted effort will be made to increase and maintain sward white clover content at optimum levels (approx. 20%–25%) through a systematic programme of over-sowing and reseeding.

Conclusions

Perennial ryegrass ploidy did not affect milk or pasture DM production. White clover inclusion in perennial ryegrass swards significantly increased both milk and grass DM production. The increased net profit/ha observed highlights the potential of white clover to increase the profitability of pasture-based systems.