

White clover use in dairy systems

A four-year study by **TEAGASC** in Clonakilty Agricultural College has shown the potential production and economic benefits of incorporating white clover into perennial ryegrass swards for Irish dairy farmers.

Ireland enjoys a competitive advantage in milk production over other European countries, due to its temperate climate and ability to grow and utilise grazed herbage over a long grazing season, as grazed grass is the cheapest source of feed for animal production. Perennial ryegrass (PRG) is the predominant forage species used in grazing systems in Ireland. However, there has been increased interest in the use of forage legumes to increase forage yield and nutritive value, and substitute inorganic nitrogen (N) fertiliser inputs with symbiotic N fixation. White clover is the main forage legume used in temperate grazing systems due to its ability to withstand grazing and its complementary growth habit to PRG. White clover is nutritionally superior in comparison to PRG, can improve animal performance and facilitate a reduction in N fertiliser use, or act as an additional source of N in the sward for herbage production. Research on including white clover in intensive dairy systems was undertaken in Clonakilty Agricultural College from 2014 to 2017 and results are presented here.

Grazing experiment and results

The grazing experiment investigated four separate grazing treatments, two PRG-only treatments and two PRG-white clover treatments established in 2012 and 2013. Each grazing treatment had a separate farmlet of 20 paddocks for the four years, was stocked at 2.75 cows/hectare and received 250 kg N/ha annually. Target concentrate supplementation was 300 kg/cow per year. The physical and economic performance of the PRG-only and PRG-white clover treatments is presented in **Table 1**. On average over the four

years, sward white clover content was 23.1 %; however, there was a large variation between paddocks, seasons and years, with sward white clover content generally low in the spring and peaking in late summer/autumn (**Figure 1**). Perennial ryegrass-white clover treatments grew an extra 1.2 tonnes DM/ha herbage compared to PRG-only treatments (**Table 1**). Organic matter digestibility was greater (+ 21 g/kg) and neutral detergent fibre was lower (- 40 g/kg) for PRG-white clover treatments compared to PRG-only treatments. Cows grazing PRG-white clover treatments produced 597 kg more milk (5,818 vs 5,221 kg/cow) and 48 kg more milk solids (485 vs 437 kg/cow) than cows grazing PRG-only treatments. The increase in milk and milk solids production for cows grazing

Table 1: Physical and economic performance of PRG-only and PRG-white clover treatments in Clonakilty (2014-2017).

	PRG-only	PRG-white clover
Herbage production (t DM/ha)	15.6	16.8
Organic matter digestibility (g/kg DM)	776	797
Neutral detergent fibre (g/kg DM)	441	401
Gross output/farm ¹ (€)	255,867	273,090
Costs/farm (€)	161,555	166,702
Net profitability/farm (€)	94,774	106,964
Net profitability/hectare (€)	2,369	2,674

¹ Modelled on a 40 ha farm at a base milk price of 29 c/l using the Moorepark Dairy Systems Model.

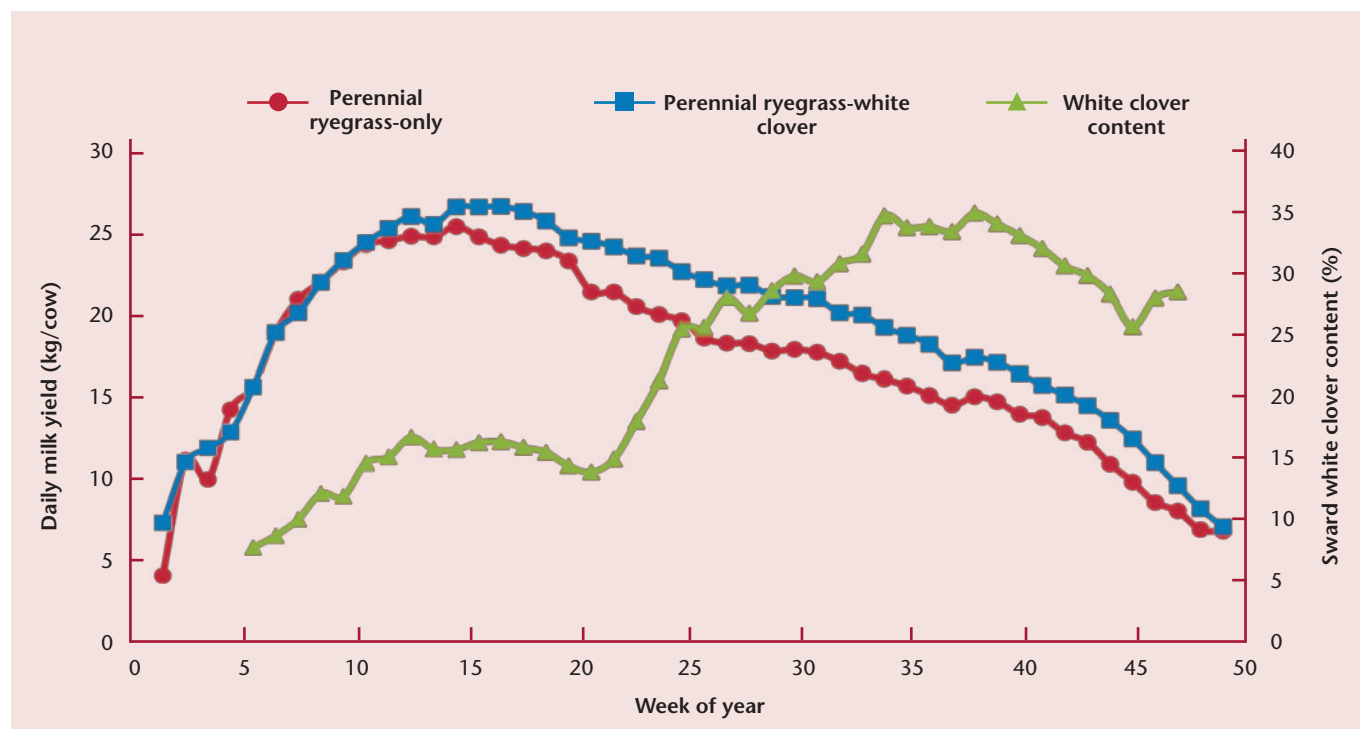


FIGURE 1: Daily milk yield for perennial ryegrass-only and perennial ryegrass-white clover treatments and average sward white clover content by week of year.

PRG-white clover swards generally took place from mid-April onwards, as sward white clover content increased (Figure 1). The economic performance of the PRG-only and PRG-white clover treatments was modelled (based on a 40 ha farm and a base milk price of 29 c/l) using the Moorepark Dairy Systems Model (Shalloo *et al.*, 2004) and the biological performance of the treatments as described above. Gross output was greater on the PRG-white clover swards due to the higher milk production from these treatments (Table 1). Costs were higher on PRG-white clover swards, due to higher silage supplementation requirements in spring (due to lower over-winter growth), higher labour and housing requirements, and the requirement to include bloat oil for the prevention of bloat. However, profitability was greater on a whole-farm basis (+ €12,190) and on a per hectare basis (+ €305) with PRG-white clover treatments, compared to PRG-only treatments.

Implications

The results of this experiment have shown the benefits of white clover inclusion in PRG swards in terms of herbage production, herbage nutritive value, and animal and economic performance. Future work will continue to investigate the use of white clover in conjunction with reduced N fertiliser usage.

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Reference

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Authors

Brian McCarthy

Research Officer, Grassland Science Department, Teagasc Animal & Grassland Research and Innovation Programme, Moorepark, Fermoy, Co. Cork

Correspondence: brian.mccarthy@teagasc.ie

Brid McClearn

PhD student, Grassland Science Department, Teagasc Animal & Grassland Research and Innovation Programme, Moorepark, Fermoy, Co. Cork

Fergal Coughlan

Farm manager, Clonakilty Agricultural College, Darrara, Clonakilty, Co. Cork

