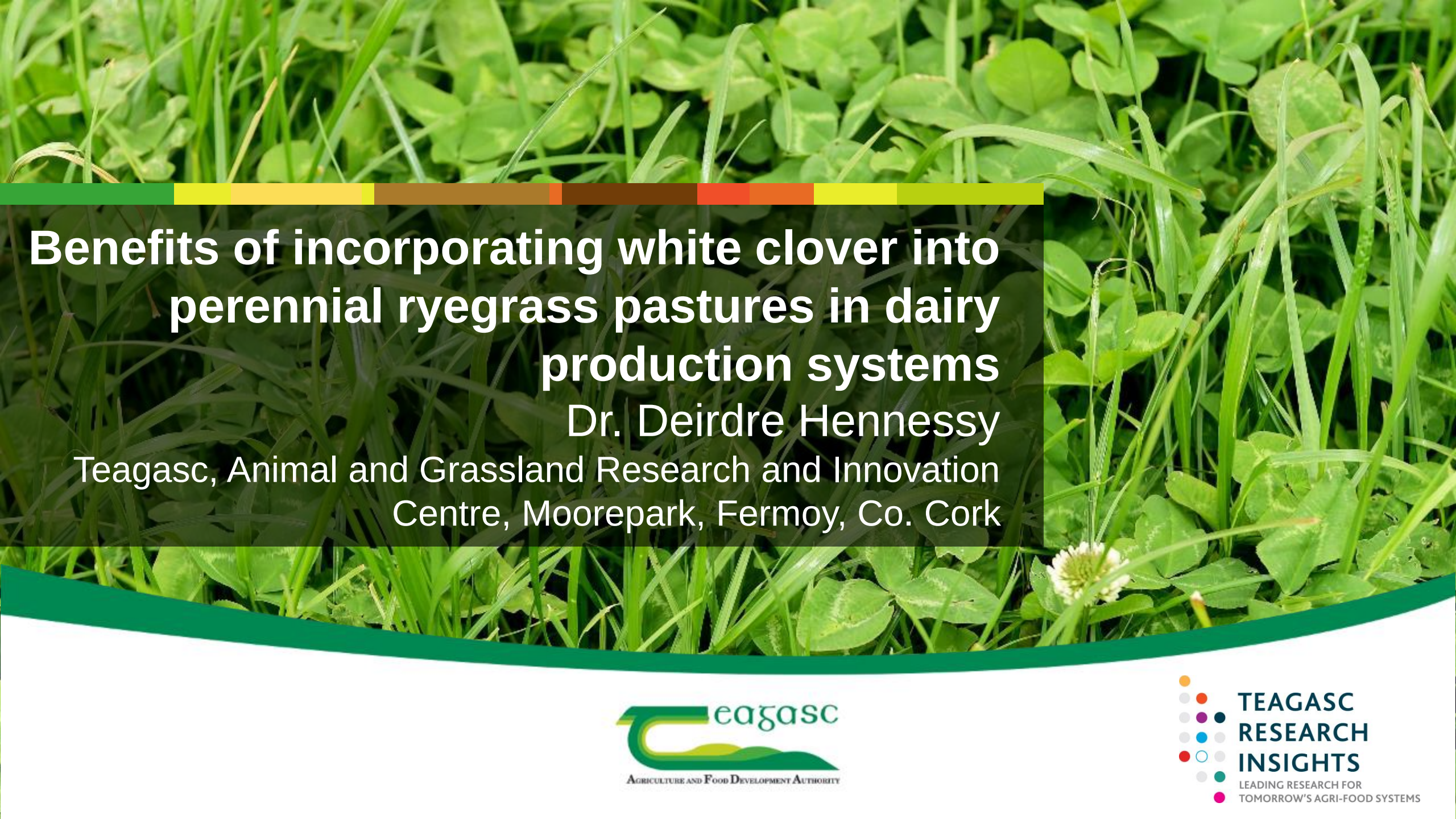

Benefits of incorporating white clover into perennial ryegrass pastures in dairy production systems

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Teagasc
Agriculture and Food Development Authority

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Introduction

- Increased interest in white clover for grass-based milk production systems
- Incorporating white clover can help address on-going and future challenges for Irish grassland farmers
  - Production
  - Sustainability
    - » Economic and environmental

What are the benefits of white clover?

Milk production

Herbage production

Nitrogen fixation

↓

Reduce nitrogen fertiliser

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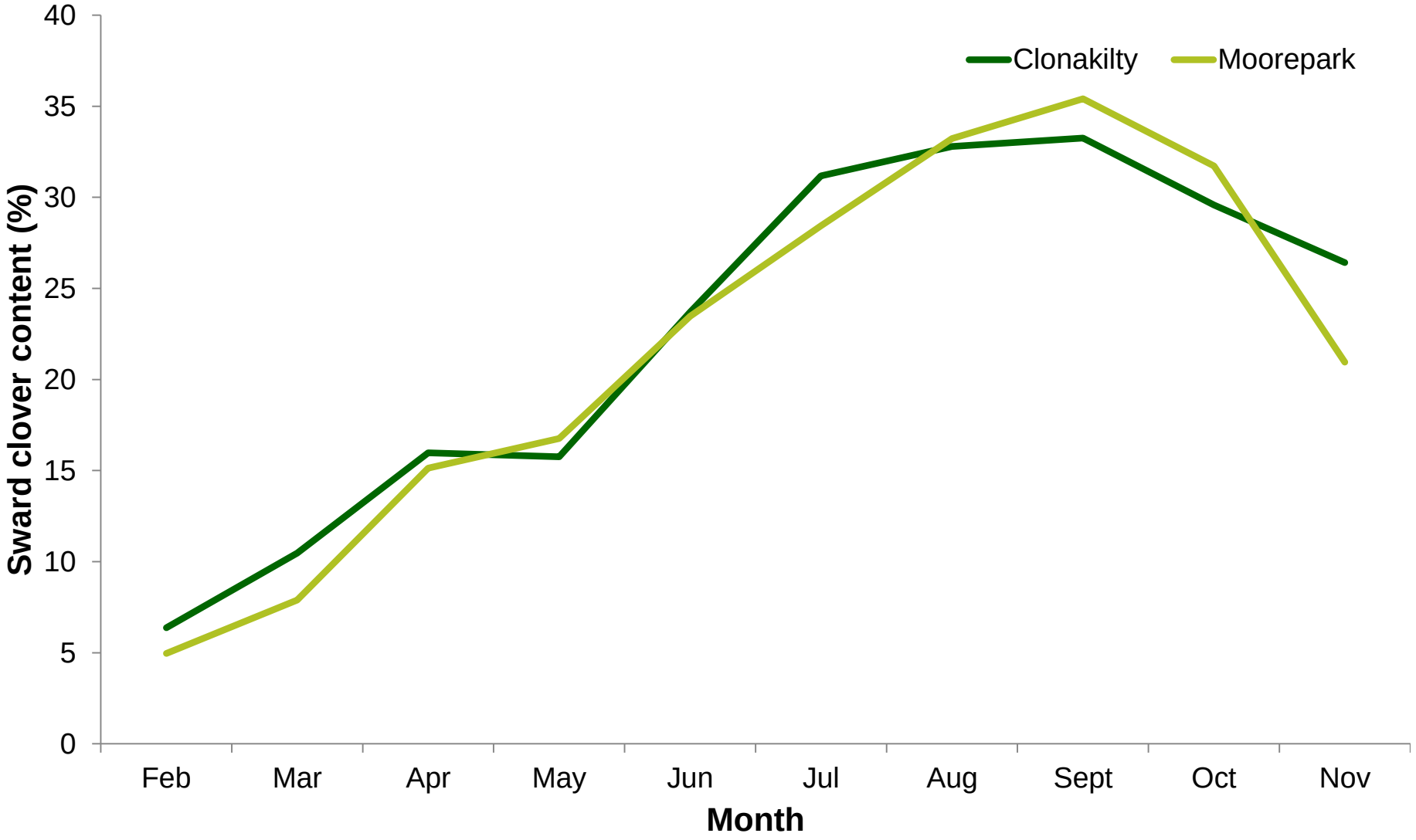
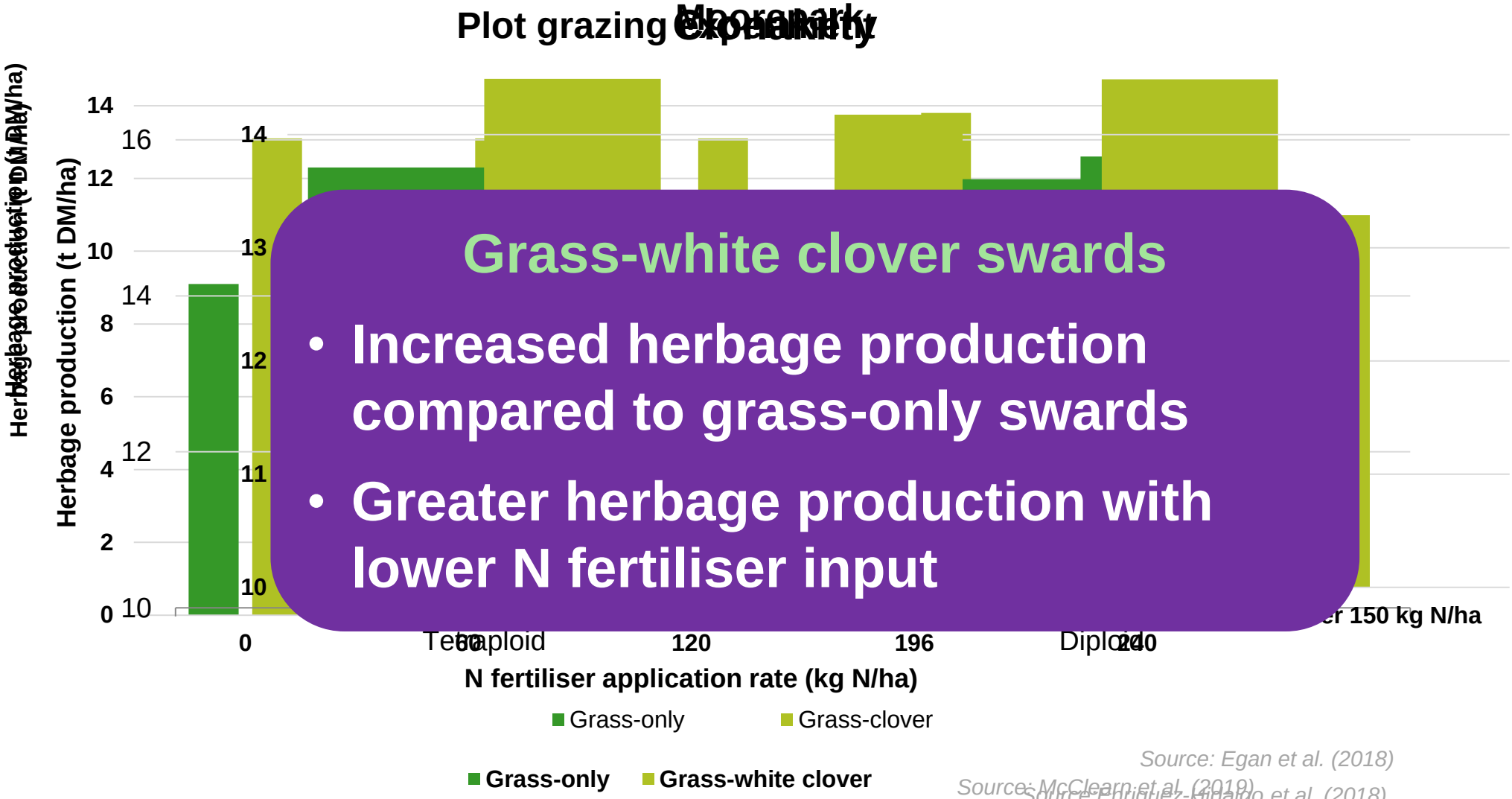
Sward white clover content



Herbage production



Grass-white clover swards

- **Increased herbage production compared to grass-only swards**
- **Greater herbage production with lower N fertiliser input**

Source: Egan et al. (2018)

Source: McClearn et al. (2019)

Source:Enriquez-Hidalgo et al. (2018)

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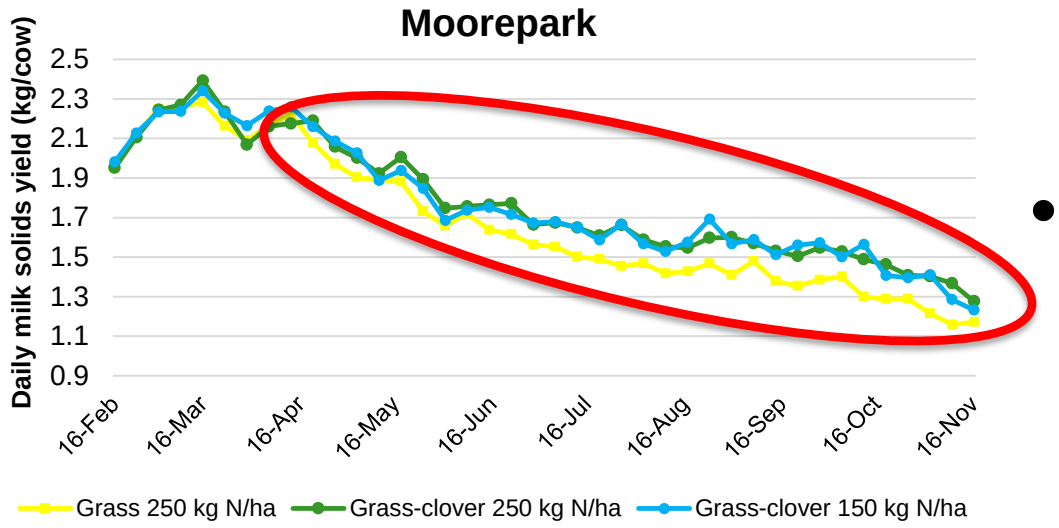
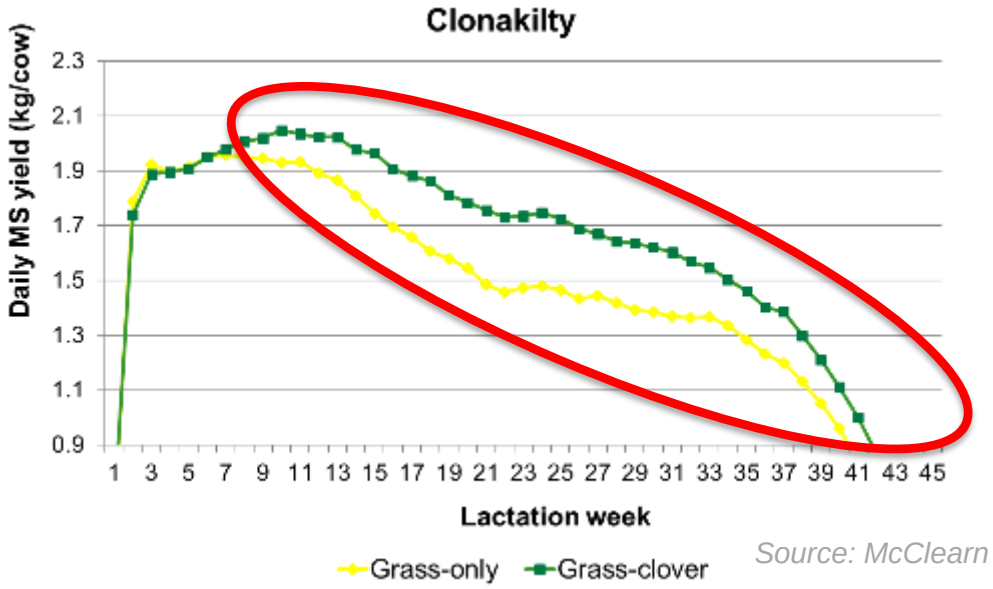
Milk production



Source: Egan et al. (2018)



Source: McClearn et al. (2019)

- Incorporating white clover in grassland swards ➡ +20 – 50 kg MS/cow
- Increase from mid-April on-wards
- Mostly driven by increase in milk yield rather than composition

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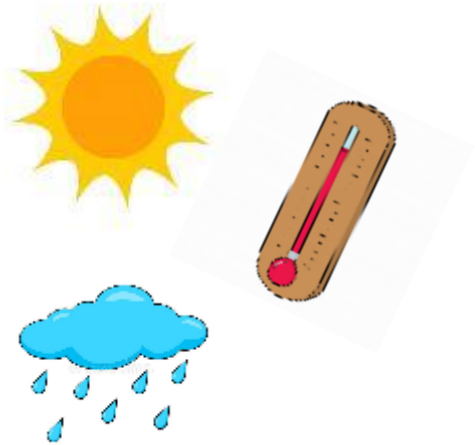
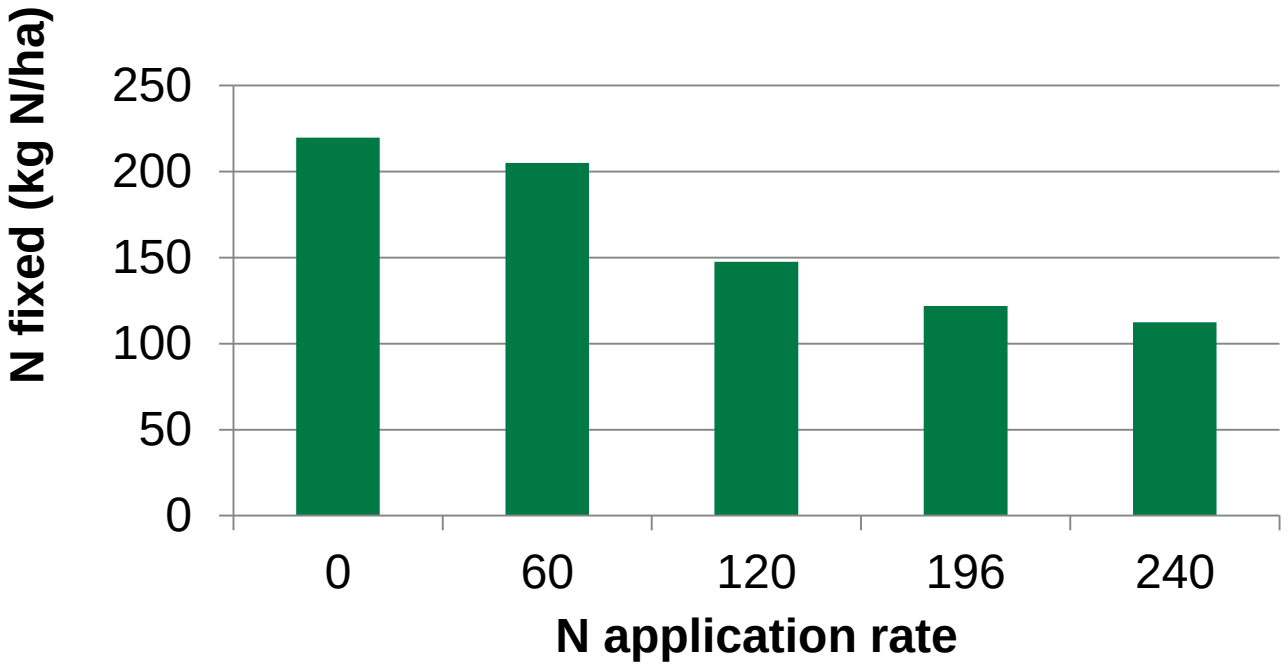
Nitrogen fixation

What is N fixation?

- Conversion of atmospheric N into a plant usable form
- Symbiotic relationship between soil rhizobia and clover

What influences it?





Source:Enriquez-Hidalgo et al. (2018)

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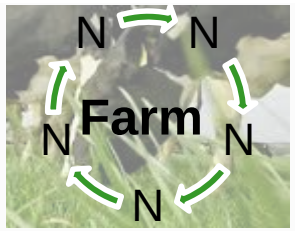
Farm gate nitrogen use efficiency

N entering the farm






N leaving the farm

	National average 2019 (NFS data)
Stocking rate (LU/ha)	2.11
Concentrate (kg/cow)	1144
N fertiliser applied (kg/ha)	177
Herbage production (t DM/ha)	10.5
Milk solids yield (kg/ha)	901
N surplus (kg N/ha)	176
N use efficiency (%)	24

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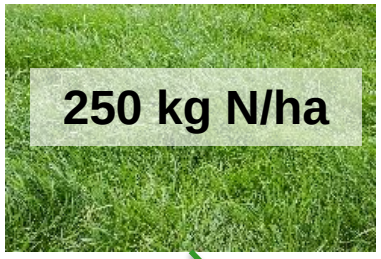
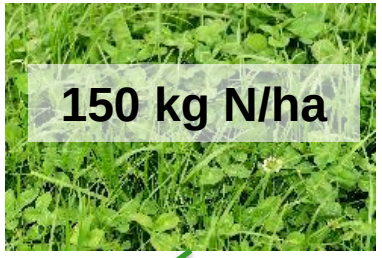
Long term research

Farms system experiment

2013-2020





2.74 cows/ha

	Grass 250	Grass Clover 150
Rotation length	Common	Common
Target farm cover (kg DM/cow)	170	170
Target pre-graze herbage mass (kg DM/ha)	1300-1500	1300-1500
Mid-season post-grazing sward height (cm)	4	4
First cut silage – planned area closed	25%	25%
Concentrate (kg/cow)	~400	~400

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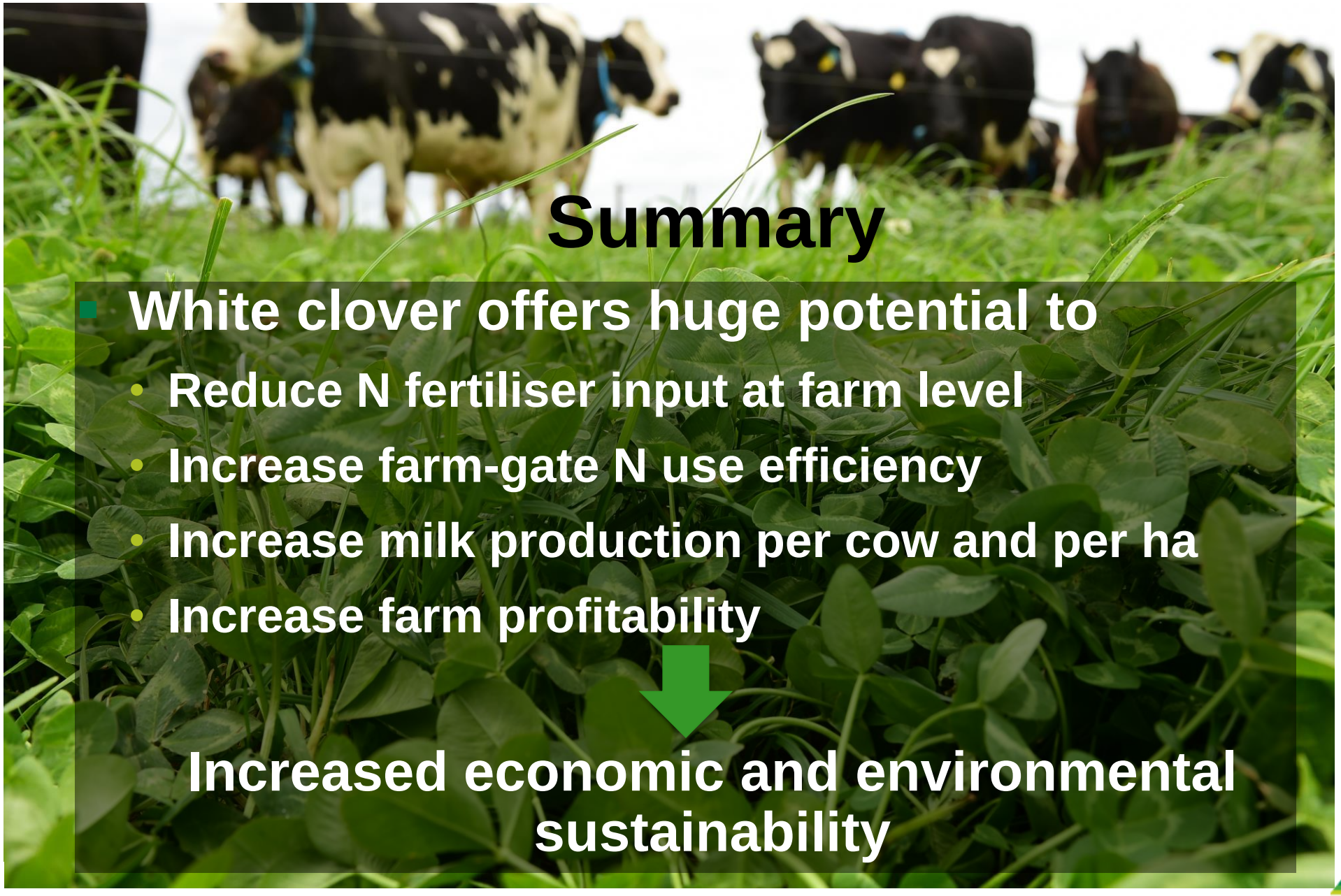
N fertiliser application strategy

Date (Rotation)	Grass 250 (kg N/ha)	Grass Clover 150 (kg N/ha)
Mid-late January	28	28
Mid March	28	28
April (2nd rotation)	33	33
May (3rd rotation)	30	9
May (4th rotation)	30	9
June (5th rotation)	17	
July (6th rotation)	17	
July (7th rotation)	17	
August (8th rotation)	17	9
Mid September	33	12

100 kg N/ha reduction

Moorepark Grass250 *v* Clover150 (2013-2020)

	Grass-only 250 kg N	Grass-white clover 150 kg N	Difference
Stocking rate (cows/ha)	2.74	2.74	-
Annual herbage production (t DM/ha)	13.5	13.4	-0.1
Silage conserved (t DM/cow)	1.00	0.98	-0.02
Silage fed during lactation (kg DM/cow)	259	333	+74
Concentrate fed (kg/cow)	438	438	-
Average sward clover content (%)	-	22.0	-
Milk yield per cow (kg)	6,068	6,331	+243
Milk solids yield per cow (kg)	490	510	+20
N use efficiency (2013-2016) (%)	40	58	+18
Net margin (€/ha)	1,974	2,082	+108



Summary

- White clover offers huge potential to
  - Reduce N fertiliser input at farm level
  - Increase farm-gate N use efficiency
  - Increase milk production per cow and per ha
  - Increase farm profitability

Increased economic and environmental sustainability

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