

Multi-species Swards Organic Seminar



Thomas Moloney DLF Seeds

What is a multi-species sward?

A white rectangular box containing the word "Grasses" in black text, positioned over a background of green grass and other plants.

Grasses

A white rectangular box containing the word "Legumes" in black text, positioned over a background of green grass and other plants.

Legumes

A white rectangular box containing the word "Herbs" in black text, positioned over a background of green grass and other plants.

Herbs

Many studies show significant production benefits associated with MSS compared to PRG swards

- **DM yield**

Annual yield, seasonal distribution, reduce N fertiliser, drought tolerance

- **Animal performance**

Milk yield, live-weight gain, reduce parasite burden

- **Environment**

C sequestration, biodiversity, water quality, N-use efficiency



Early season growth
Quality
Ground cover

Nitrogen fixing
Protein %
Summer growth

Quality
Mineral-rich
Summer growth
Drought tolerance



Seasonal production

Multi-species swards for silage production



Thomas Moloney^{1,2}

Edward O'Riordan¹ & Padraig O'Kiely¹

Helen Sheridan²

Jim Grant³

¹Teagasc Grange

²University College Dublin

³Teagasc Ashtown



Background

- Smartgrass - DAFM funded project
- Assess multi-species grassland swards
 - Grazing (UCD Lyons estate)
 - Silage (Teagasc Grange)
 - Biodiversity of plants, above- and below-ground invertebrates
 - Soil chemistry
 - GHG flux



Grass silage

- Primary form of conserved forage
- Made on ~82% of farms
- Produced by the fermentation of a high moisture crop
 - Anaerobic
 - Lactic acid dominant
 - Reduce pH
- Maintain crop quality
- Typically grass - WSC, BC, DM



Multi-species swards for silage production

- Yield
- Nutritive value
- Persistence
- Growth stage
- Ensilability
- Ensiling efficiency



Grass monoculture vs. red clover?

Annual yield
(tonnes DM/ha)

Species	+ 360 kg N/ha/yr	+ Red clover
Per.ryegrass	11,736	
It.ryegrass	12,969	
Timothy	11,666	
Red clover		11,846

- Replace N with red clover??

Grass + N vs. + red clover?

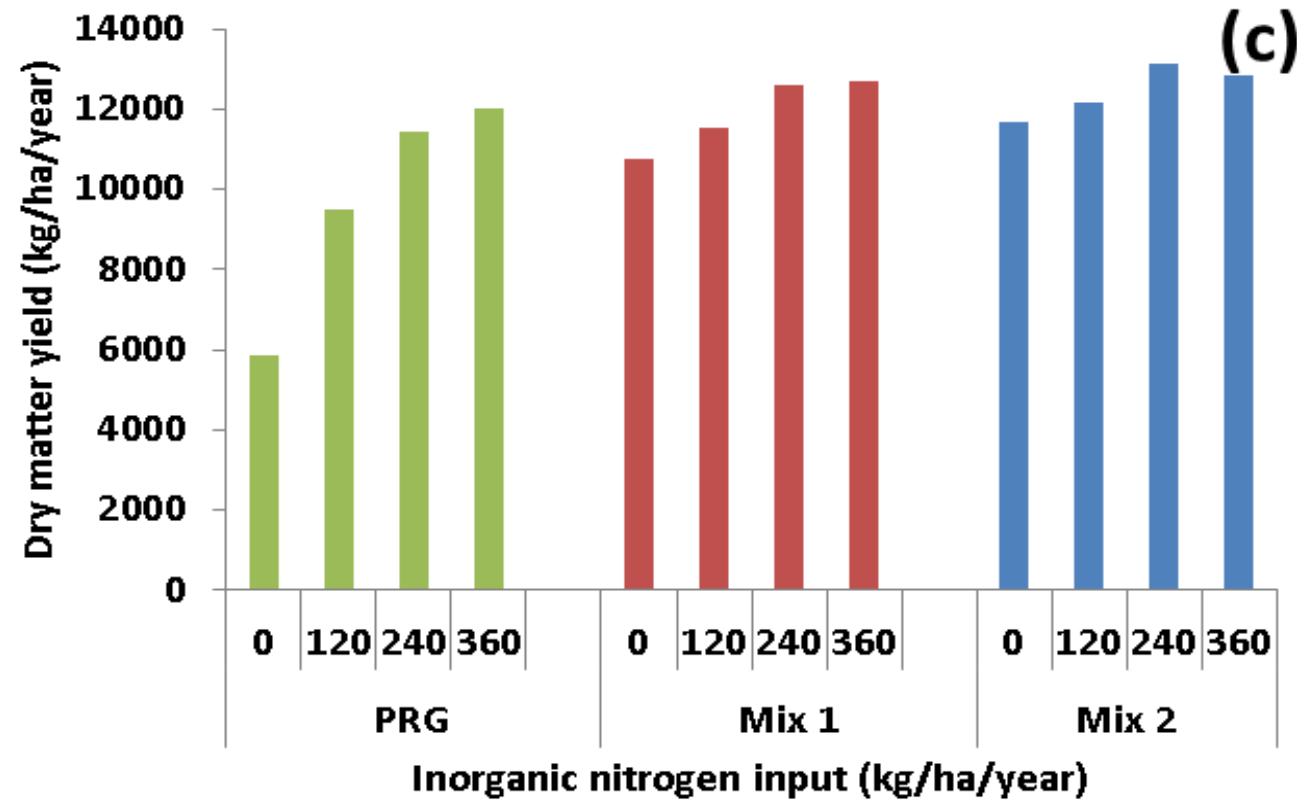
Annual yield
(tonnes DM/ha)

Species	+ 360 kg N/ha/yr	+ Red clover
Per.ryegrass*	11,736	10,289
It.ryegrass	12,969	9,794
Timothy	11,666	11,477
Red clover		11,846

*'Reference' species

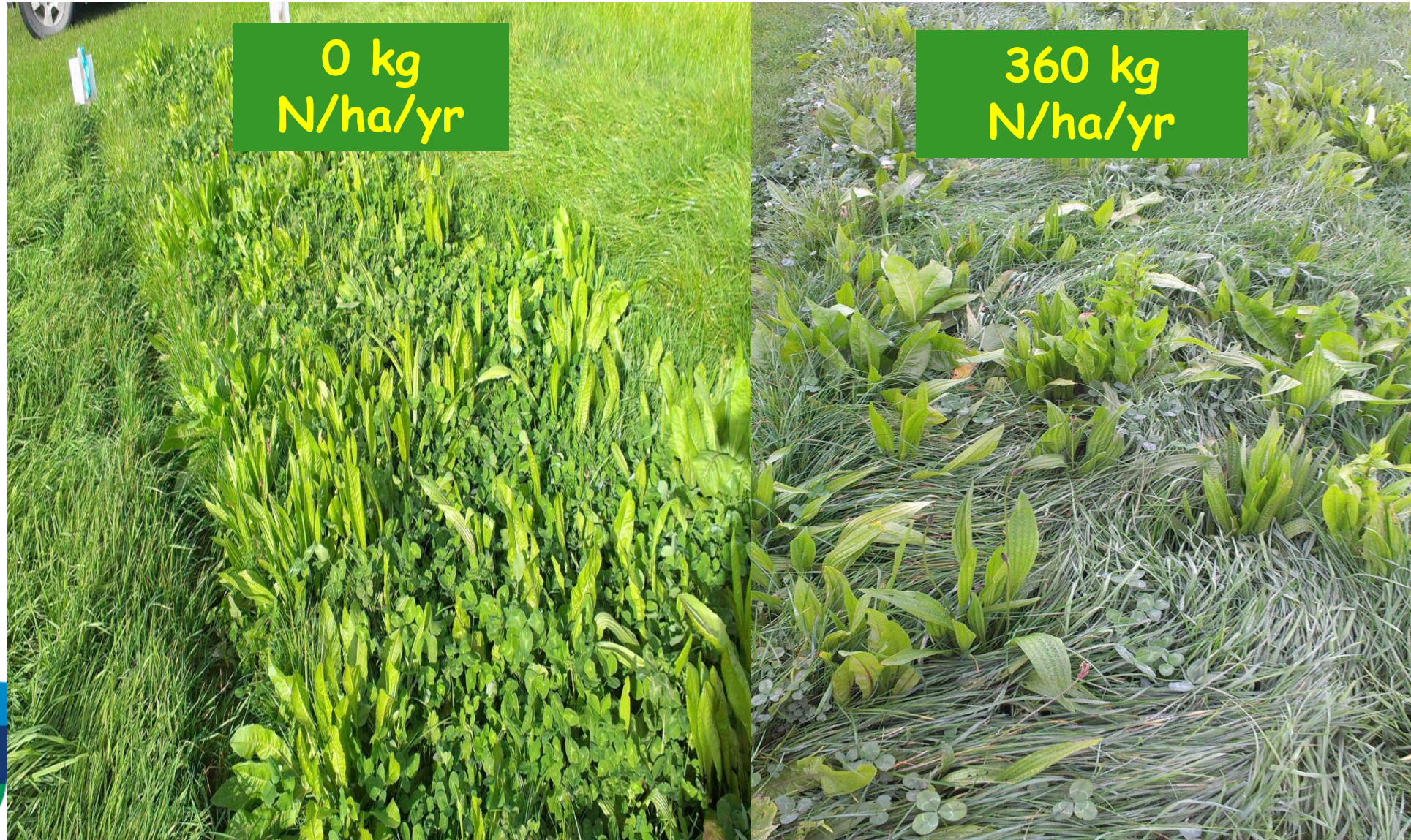


Impact of +N on p.ryegrass and multi-species mixes

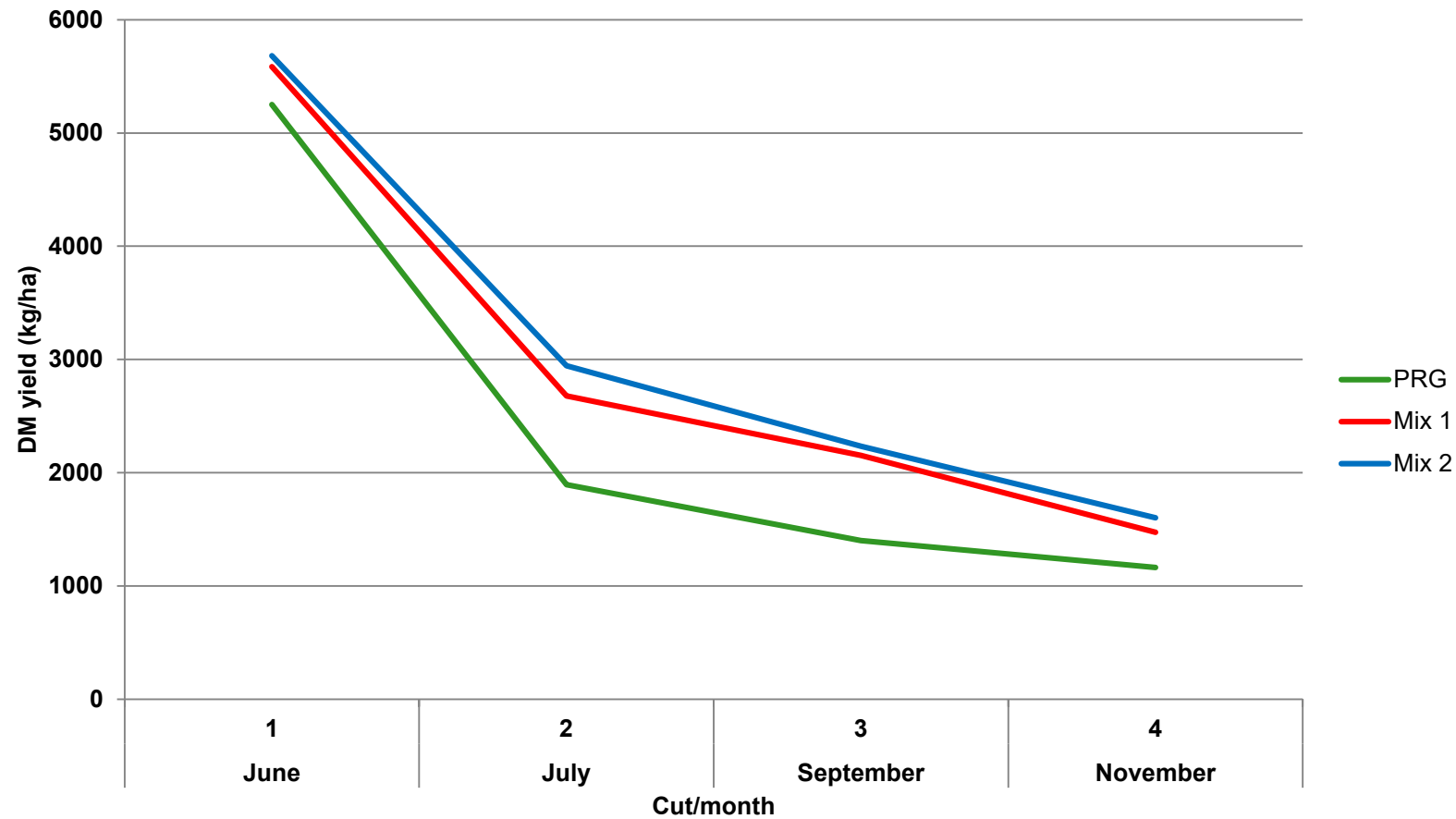


- Mix 1: PRG, timothy, red and white clover
- Mix 2: PRG, timothy, red clover, plantain and chicory
- Response to N:
 - **PRG** +96%
 - **Mix 1** +18%
 - **Mix 2** +10%

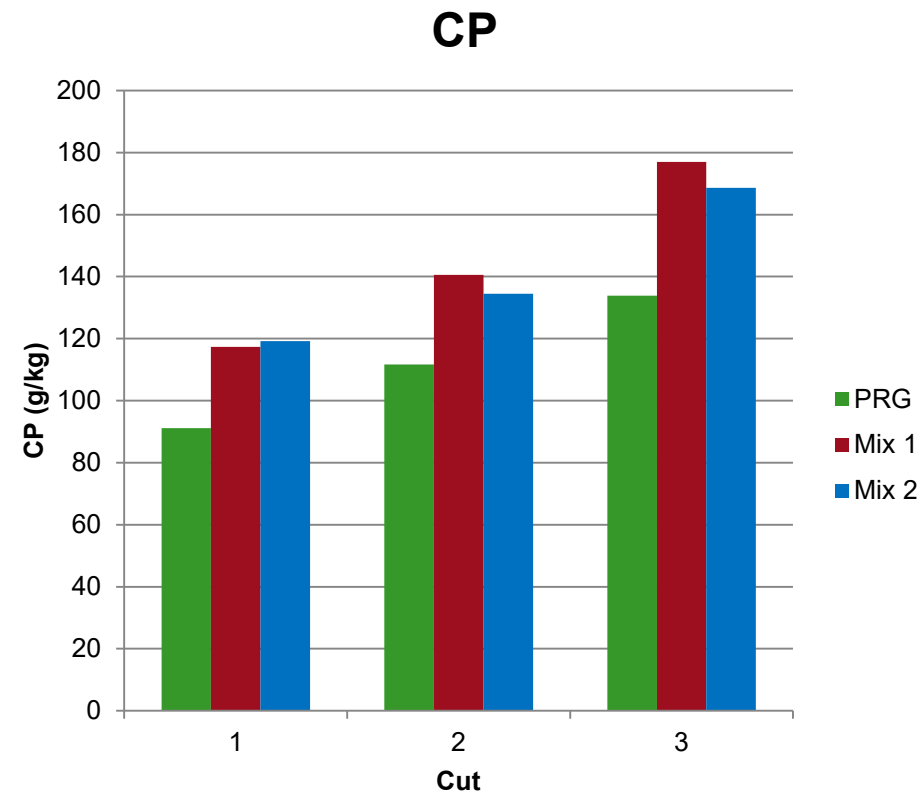
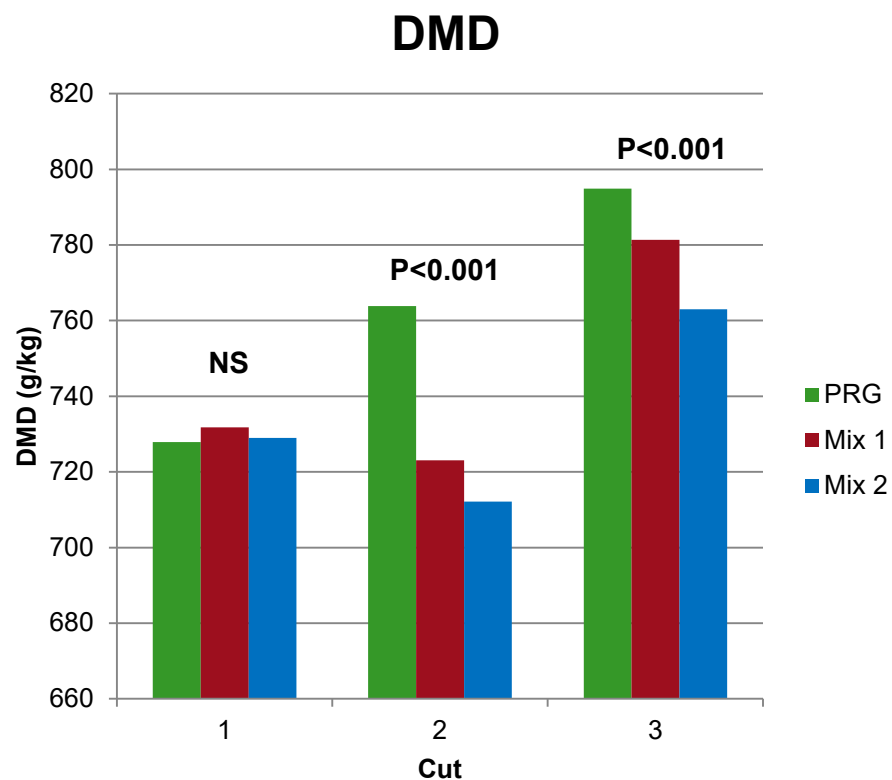
Botanical composition: **Mix 2** (5 species)



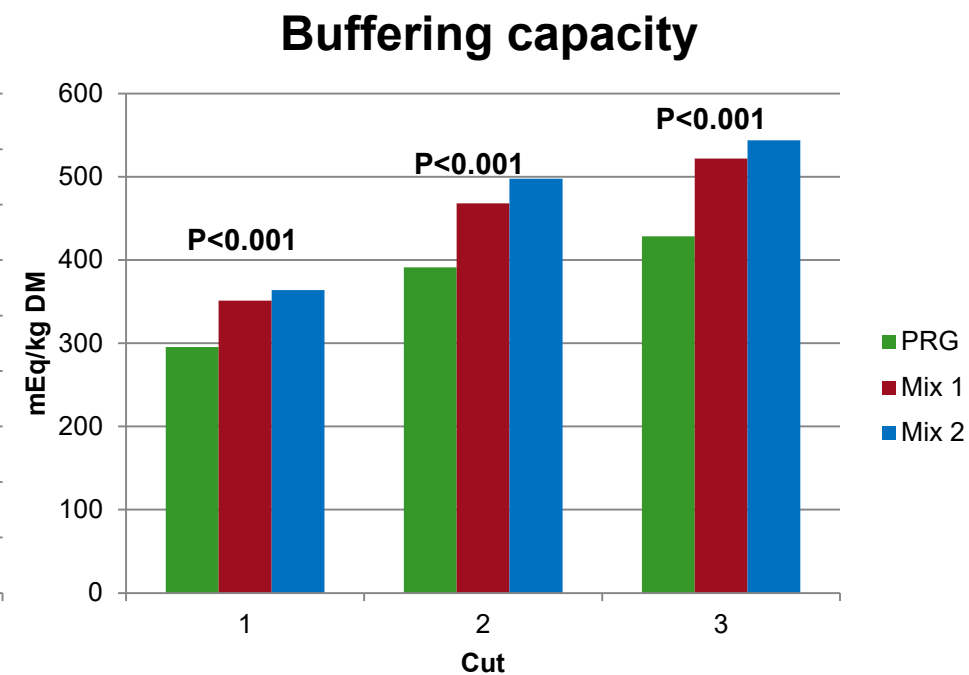
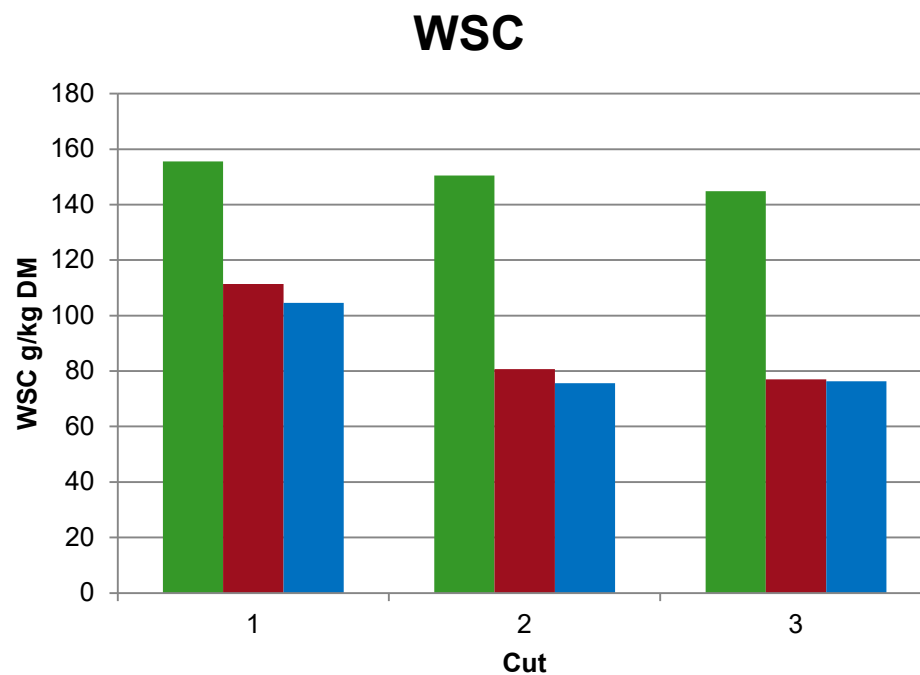
Distribution of DM yield



Herbage chemical composition



Herbage chemical composition



A diverse, complex, heterogeneous and **UNCONTROLLED** process



Quality of preservation

	Pre-ensilage	Post-ensilage	
		Good preserv.	Bad preserv.
Dry matter (DM; g/kg)	176	175	179
pH		3.9	4.7
Lactic acid (LA; g/kg DM)		86	60
Acetic acid (g/kg DM)		18	27
Propionic acid (g/kg DM)		2	8
Butyric acid (g/kg DM)		2	19
Ethanol (g/kg DM)		20	36
FP (g/kg DM)		128	150
WSC (g/kg DM)	149	16	10
LA/FP		0.67	0.39
NH ₃ -N (g/kg N)		104	191
C. protein (g/kg DM)	184	213	192
DMD (g/kg)	827	826	784

Source: Teagasc Grange

Preservation of multi-species swards

- Under favourable ensiling conditions MSS can preserve satisfactorily as silage, comparable to PRG
 - However...
 - » Low DM makes wilting important



Conclusions

- Both MSS produced greater annual DM yields than PRG
 - Particularly at zero or low N rates
 - Seasonal distribution
- Overall, herbage DMD was lower and CP greater for MSS than PRG
- Herbage quality and ensilability did not reflect the proportions of species present
 - Need for in-situ evaluation
- Can preserve satisfactorily as silage



- Partner farm programme
- LegacyNet
- Mixture formulation
 - Spring growth
 - Grazing red clover
 - Chicory and plantain varieties
 - Nitrification inhibiting plantain varieties



tmoloney@dlfseeds.ie 087 396 1265

@tom_moloney58