

Influence of perennial ryegrass cultivar, ploidy and the incorporation of white clover to increase performance from grazed pasture

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Outline of presentation

- Introduction
- Background on effect of cultivar and ploidy
- Clonakilty experiment
- Moorepark experiment
- Summary

Introduction

- ❑ Milk production in Ireland will increase_(Dillon, 2011)
 - New entrants
 - Increasing production per cow
 - Increasing stocking rate
- ❑ Must be achieved by growing and utilising more grass
- ❑ Perennial ryegrass dominant grass type
- ❑ Focus on perennial ryegrass cultivar, ploidy and incorporation of white clover to increase performance

Background: Diploid vs. Tetraploid

Diploid

- Prostrate growth habit
- Small leaf size
- High tiller density
- High dry matter



Tetraploid

- Erect growth habit
- Larger leaf size
- Lower tiller density
- Lower dry matter



Background

- ❑ Grass breeding has led to improved perennial ryegrass cultivars
 - 4.3% increase in DM yield per decade (0.43% per year)
 - 15% to 18% increase in spring DM yield per decade
 - Improved dry matter digestibility and water soluble carbohydrates
- ❑ Perennial ryegrass cultivar can affect milk production_(Gowan et al., 2003, O'Donovan and Delaby 2005, McEvoy et al., 2012)
- ❑ Depends on heading date, ploidy and combination of sward structural characteristics
 - Generally later heading and tetraploid cultivars increase milk yield
 - More leaf and less stem in grazing horizon
 - Higher digestibility

Background

- ❑ Grass breeding has led to improved perennial ryegrass cultivars
 - 4.3% increase in DM yield per decade (0.43% per year)
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 - Improved dry matter digestibility and water soluble carbohydrates
- ❑ Perennial ryegrass cultivar can affect milk production (Gowan et al., 2003, O'Donovan and Delaby 2005, McEvoy et al., 2012)
- ❑ D 4% increase in daily milk and milk solids yield per cow and structural characteristics
 - Generally later heading and tetraploid cultivars increase milk yield
 - More leaf and less stem in grazing horizon
 - Higher digestibility

White Clover

- ❑ Forage legume
- ❑ Stoloniferous growth habit
- ❑ Fixes Nitrogen
- ❑ Seasonal pattern of growth
 - Low in spring
 - High in summer
- ❑ Potential to increase both animal production and pasture DM production





Two Experiments

□ Clonakilty Experiment

- The effect of tetraploid and diploid swards sown with and without clover on the productivity of spring milk production systems

□ Moorepark Experiment

- The influence of nitrogen fertilisation level and white clover incorporation on pasture DM production and animal performance



Clonakilty Experiment 2014

The effect of tetraploid and diploid swards sown with and without clover on the productivity of spring milk production systems

Clonakilty Experiment 2014

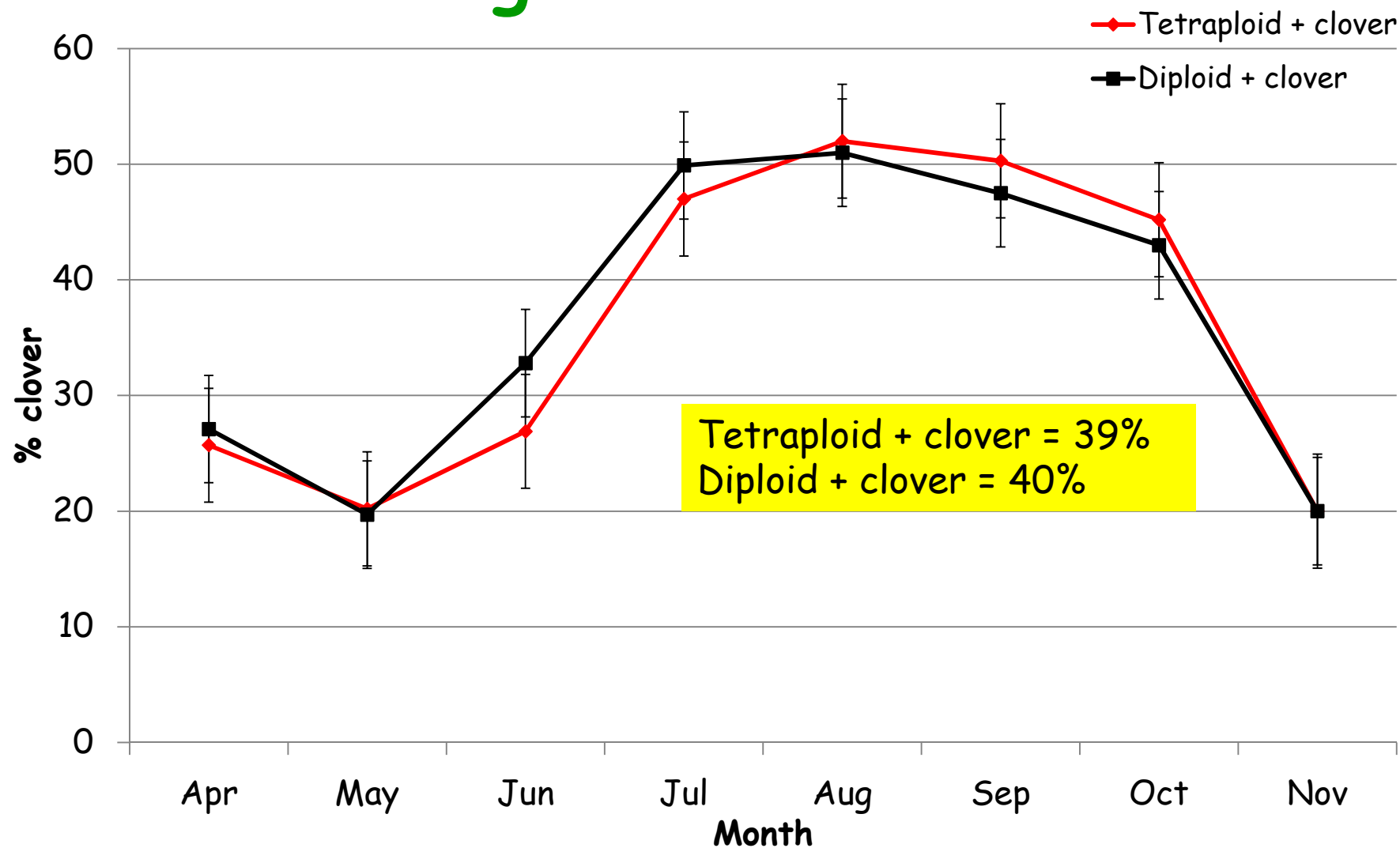
- 4 treatments
 - Tetraploid (Astonenergy, Kintyre, Dunluce, Twymax) - TO
 - Diploid sward (Drumbo, Tyrella, Aberchoice, Glenveagh) - DO
 - Tetraploid + clover sward - TC
 - Diploid + clover sward - DC
- 30 cows per treatment with each treatment stocked at 2.75 cows/ha
- Separate farmlet of 20 paddocks for each treatment

Grazing Management Rules

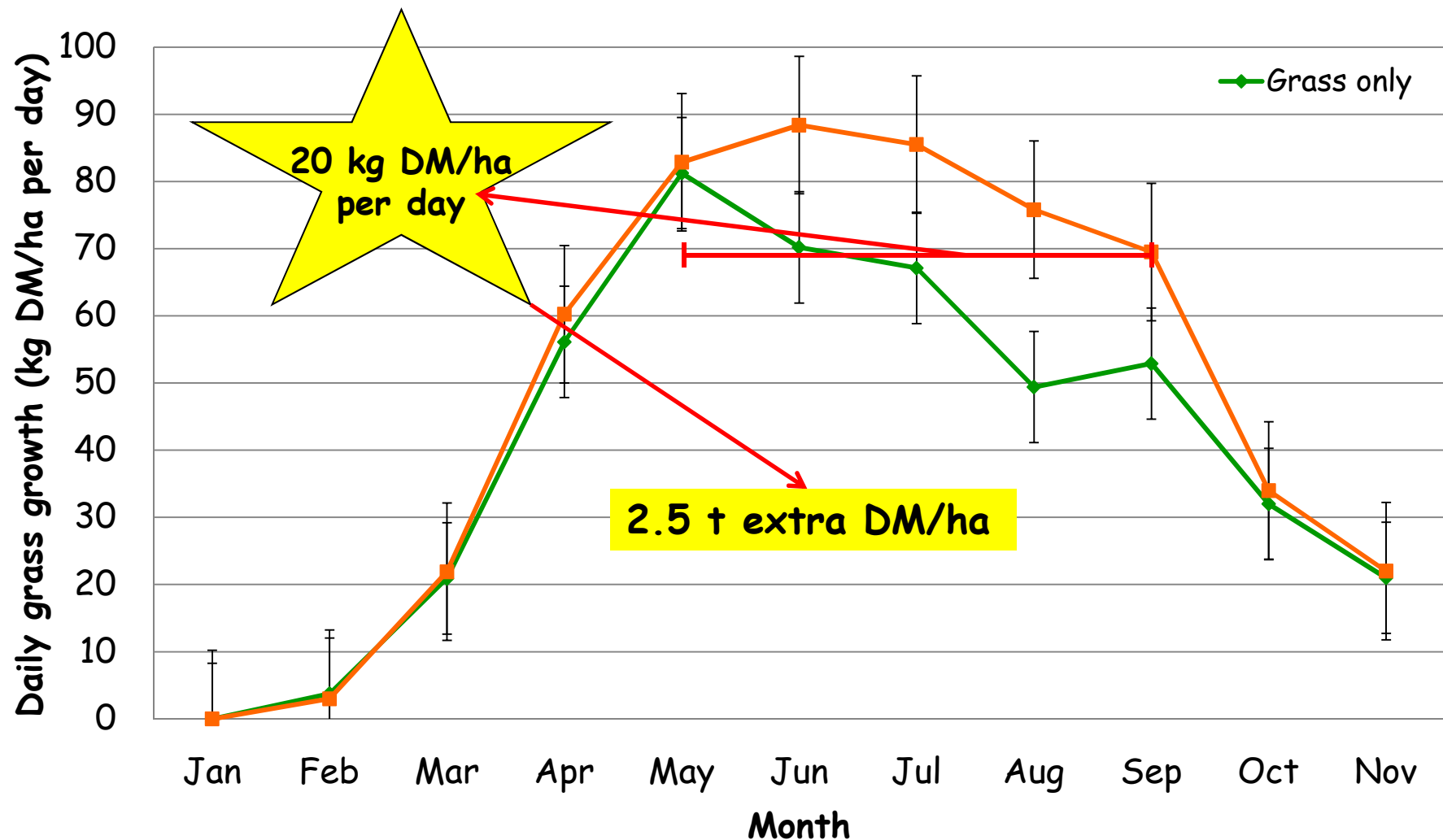
	Tetraploid	Diploid	Tetraploid + clover	Diploid + Clover
No. cows	30	30	30	30
Stocking rate (LU/ha)	2.75	2.75	2.75	2.75
Fertiliser (kg/ha)	250	250	250	250
Post grazing sward height (cm)	4.0	4.0	4.0	4.0
Target pre-graze HM (kg DM/ha)	1300-1500	1300-1500	1300-1500	1300-1500
Concentrate (kg/cow)	~300	~300	~300	~300

- ❑ Farm walk every week (PastureBaseIreland)
- ❑ Surpluses removed as bales
- ❑ Surplus bales fed as supplement if deficit in individual treatment

Average Clover % 2014



Daily grass growth 2014



Pasture Results 2014

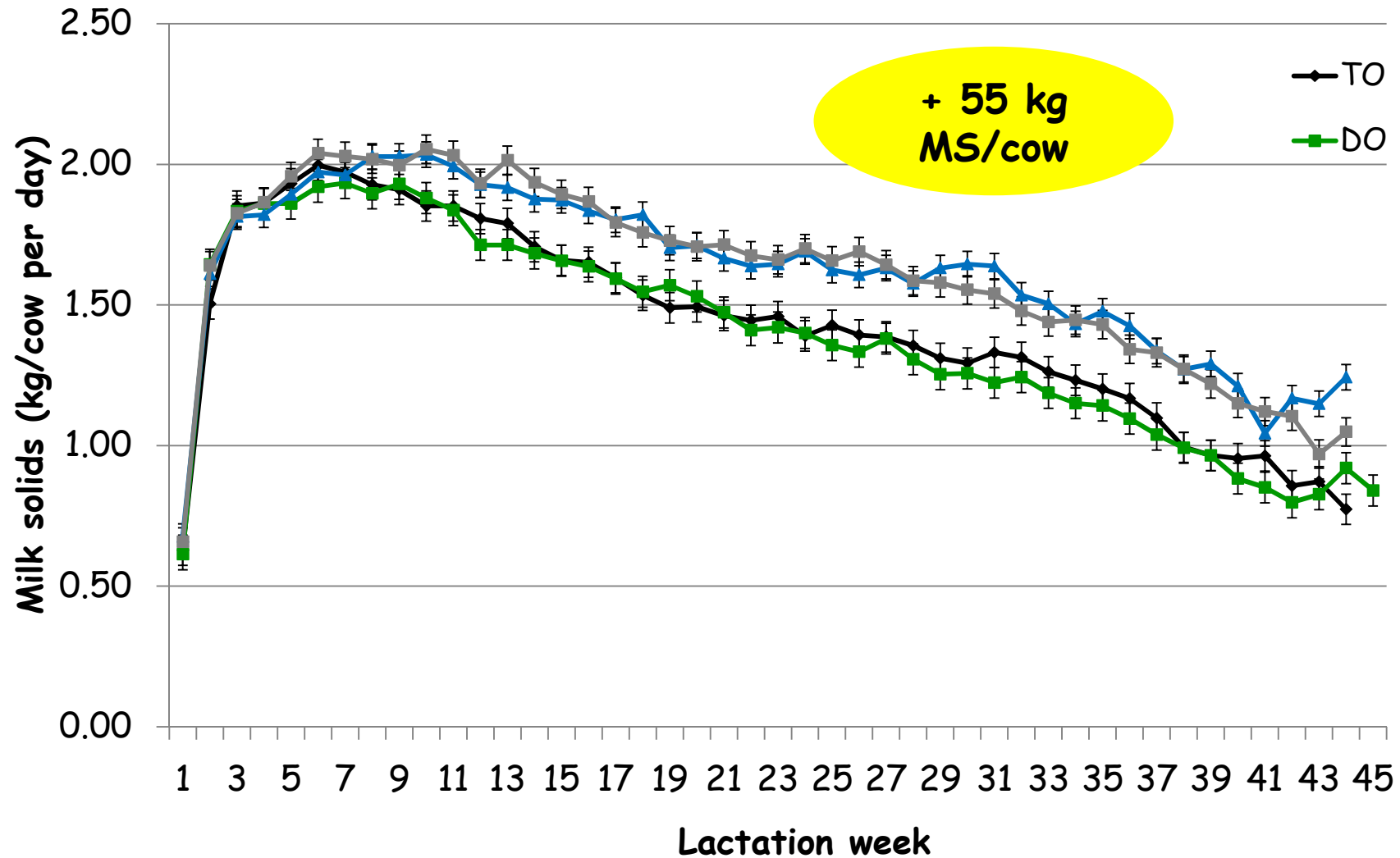
	TO ¹	DO	TC	DC
Dry Matter (%)	19.8	21.3	16.7	17.0
Pre-grazing height (cm)	8.85	9.03	9.19	9.13
Pre-grazing yield ³ (kg DM/ha)	1720	1831	1683	1752
Post-grazing height (cm)	4.24	4.51	3.92	4.01
Herbage allowance (kg DM/cow)	15.2	16.9	15.1	15.6
Herbage removed (kg DM/cow)	14.4	15.1	15.4	15.7
Pasture DM production (t DM/ha)	14.9	14.8	17.5	17.2
Winter feed (t DM/cow)	1.18	1.27	1.70	1.63

¹TO = tetraploid only; DO = diploid only; TC = tetraploid + clover; DC = diploid + clover

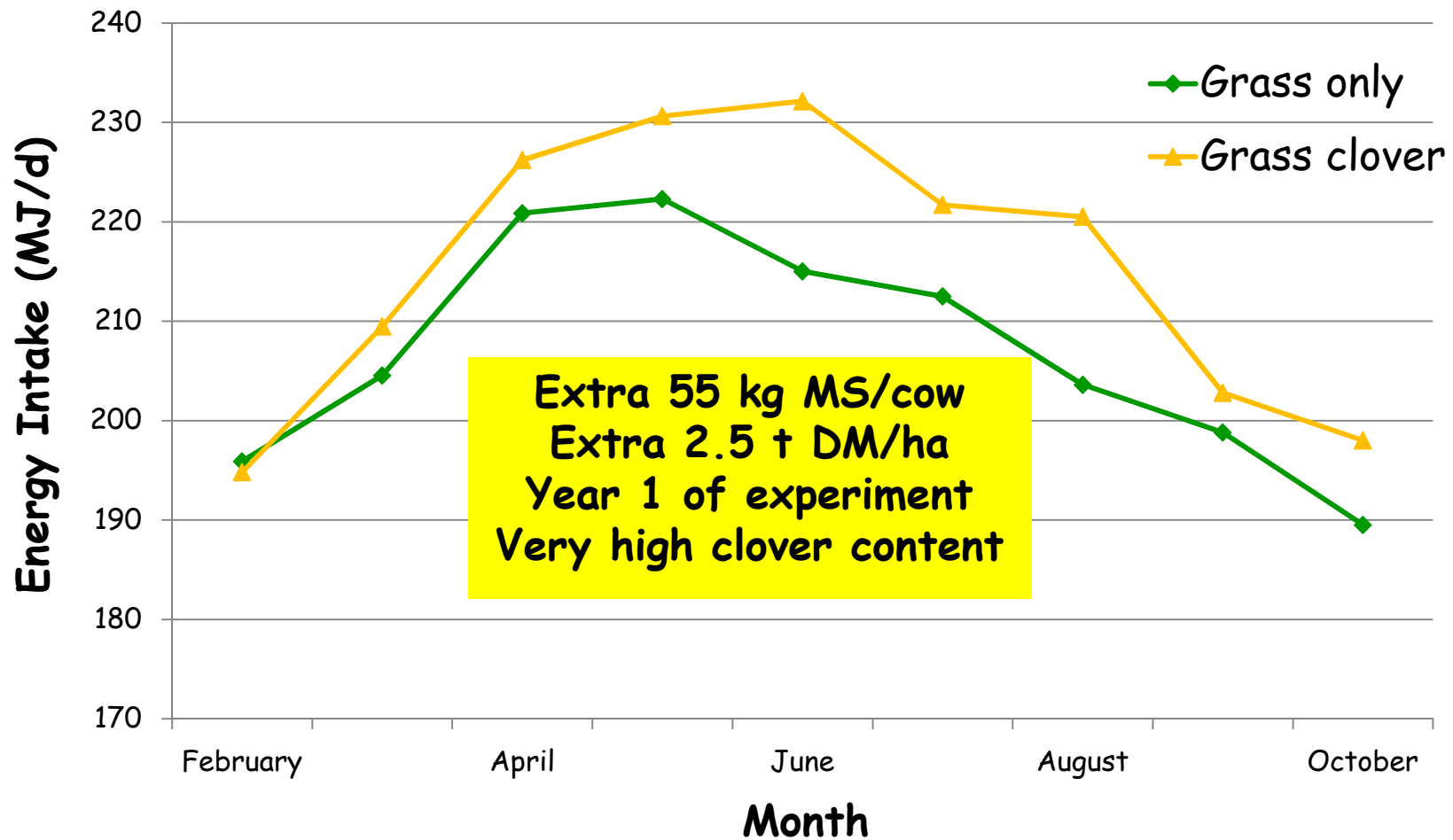
²Significance; *** = P<0.001; ** = P<0.01; * = P<0.05; + = P<0.1; NS = not significant; P*C = interaction between ploidy and clover

³Measured above 4 cm

Milk Production 2014



Predicted Energy Intake 2014





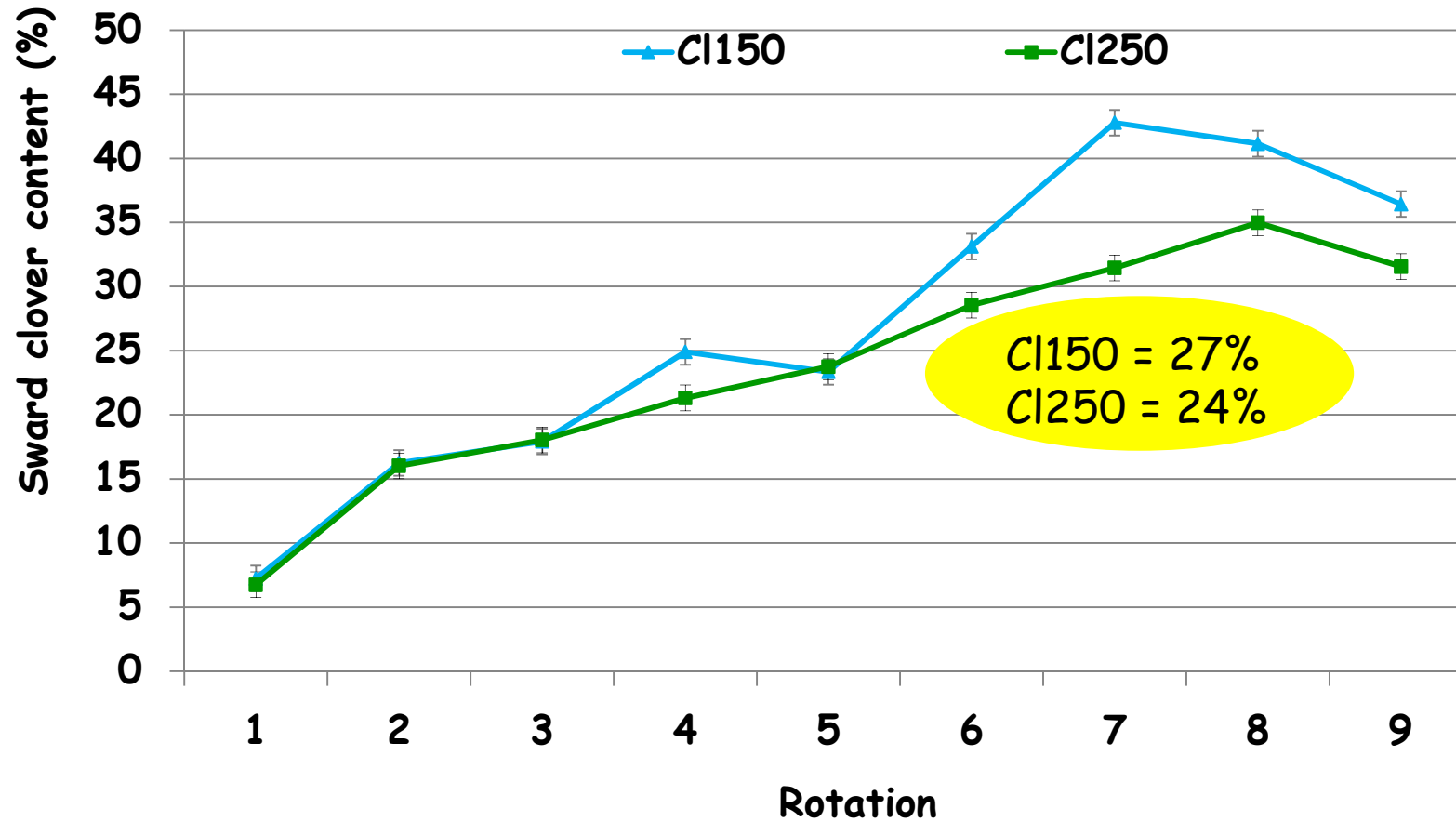
Moorepark Experiment 2013 & 2014

The influence of nitrogen fertilisation level and white clover incorporation on pasture DM production and animal performance

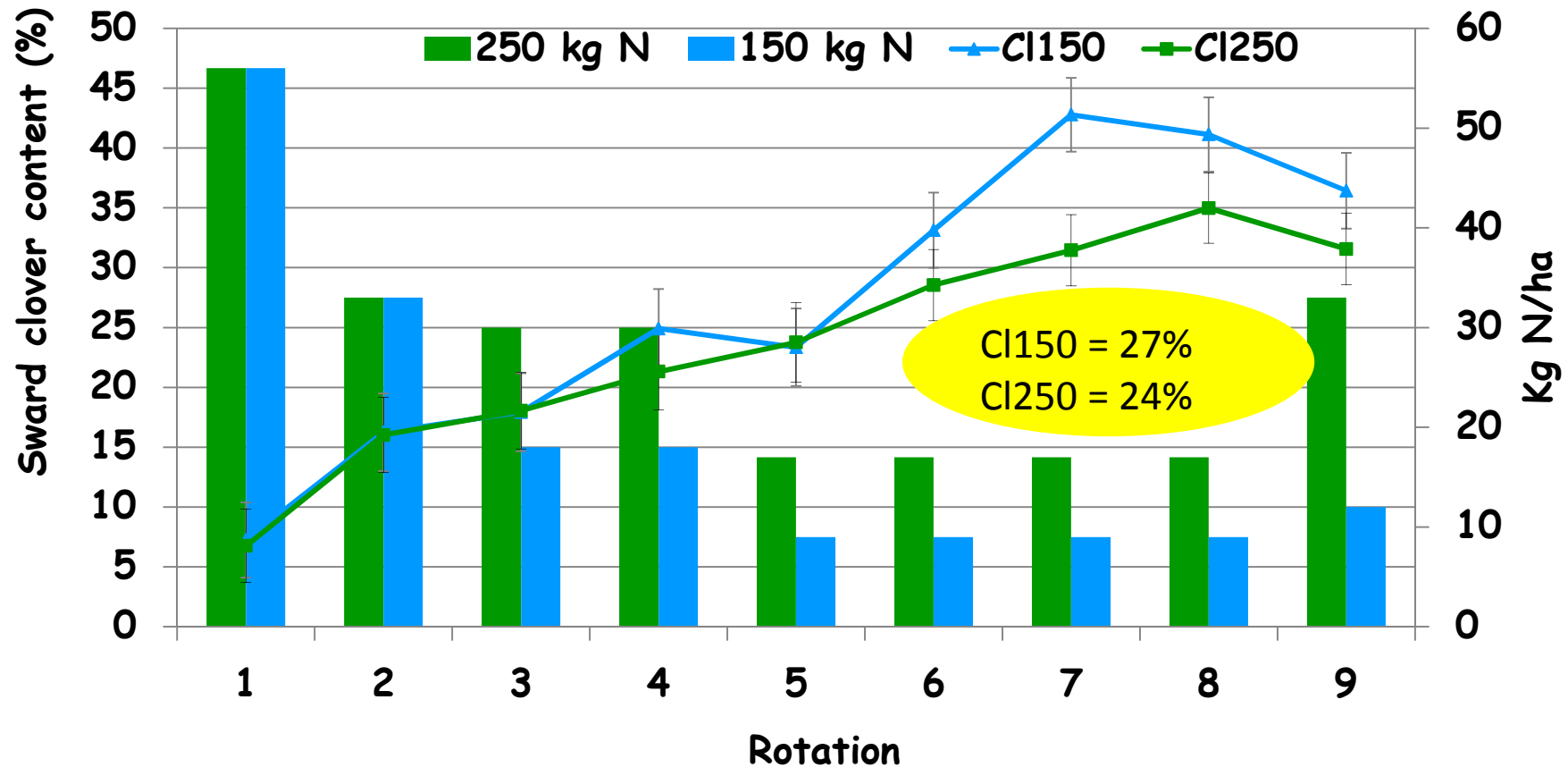
Moorepark Experiment 2013 & 2014

- ❑ Three treatments
 - Grass only 250 kg N/ha/year
 - Grass + white clover 250 kg N/ha/year
 - Grass + white clover 150 kg N/ha/year
- ❑ 20 cows per treatment
- ❑ 2.74 LU/ha
- ❑ Results are average of 2013 & 2014
- ❑ Management rules same as Clonakilty

Sward clover content (2013 & 2014)



Sward clover content (2013 & 2014)



Pasture Results 2013 & 2014

	CI150 ¹	CI250	Gr250
Dry Matter (%)	16.0	16.2	17.5
Pre-grazing height (cm)	9.8	9.9	9.9
Pre-grazing yield ³ (kg DM/ha)	1507	1500	1555
Post-grazing height (cm)	3.96	3.95	4.04
Pasture DM production (t DM/ha)	14.4	14.3	14.2
Winter feed conserved (t DM/cow)	1.02	1.08	0.98

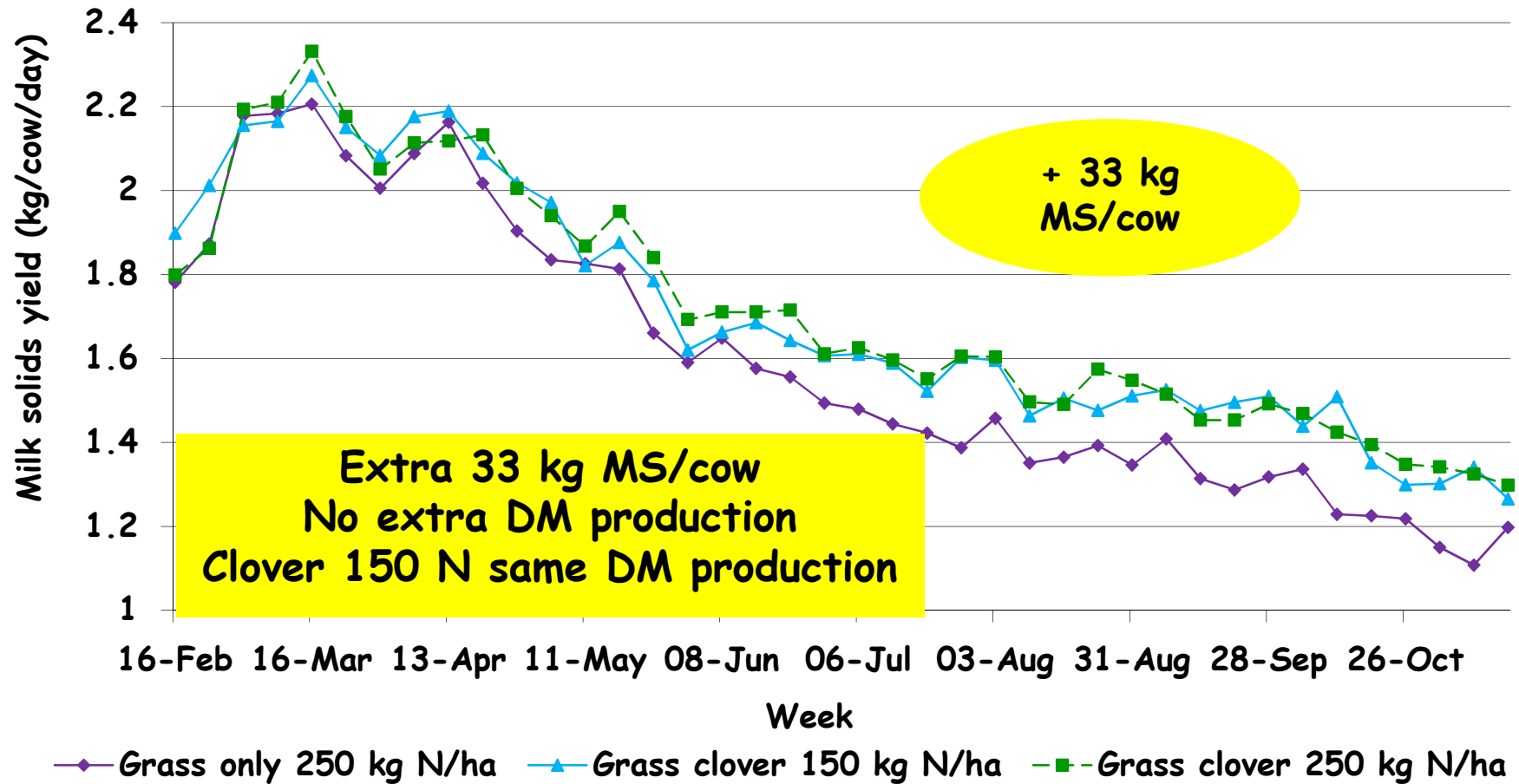
¹CI150 = Grass + clover 150 kg N/ha per year; CI250 = Grass + clover 250 kg N/ha per year;

Gr250 = Grass only 250 kg N/ha per year

²SE = standard error

³Treatment * = P<0.05; NS = not significant

Milk production results 2013 & 2014



Summary

- ❑ Cultivar and ploidy affect milk production
 - Relatively small effect - 2 - 4%
- ❑ Clover has potential to offer large increases in milk and pasture DM production
 - Dependant on clover content
- ❑ Early stages of research
 - Have had two relatively clover "friendly" years in 2013 and 2014
 - Need more data to evaluate results fully

Thank you!

Questions?