Performance of dairy cows offered silages produced from grass swards or red clover/grass swards

D. J Johnston[1,2], A.J Dale[1] N. E O'Connell[2], C. P Ferris[1]

[1:] Agri-Food and Biosciences Institute, Hillsborough

[2:] Queen's University Belfast

Introduction (i)

- There is considerable interest in reducing reliance on imported protein feeds in livestock diets in the UK
    - Volatility of supply
    - Price fluctuations
    - GM issues
    - Carbon footprint?
- A number of forage protein crops can be successfully grown in the UK, yet only some are suited to the Northern Ireland climate

Introduction (ii)

- Red Clover has been identified as a forage crop that *can* be grown successfully under Northern Ireland conditions

  - 14.6t DM/ Ha over 4 year period (No added Nitrogen)
  - 18% crude protein (Dry matter basis)
  - Can be grown in a pure sward, or in mixed swards with perennial ryegrass
  - Potential to reduce Nitrogen fertiliser inputs?
  - Potential to improve cow performance?

Objective of study

To examine the impact of offering silages (Harvests 1,2 &3) produced from perennial ryegrass based swards (PRG) or mixed perennial ryegrass/ red clover swards (PRG/RedC) on cow performance and nutrient utilisation

Methodology

afbi Agri-Food and Biosciences Institute

Forage Production- Sowing

- Crops established autumn 2013
  - 4 strips of each crop sown, (3ha of each crop)
  - Pure PRG Sward (*Var. Navan: 32.1kg seed/ha*)
  - Mixed PRG/Red clover sward (*Var. Navan: 22.2 kg seed/ha and Merviot: 9.9 kg seed/ha*)

- Grass swards received 248kg N/ha in total across the season

Perennial Ryegrass

Perennial ryegrass/ Red Clover

Forage production (Harvesting)

- 3 Harvests taken during 2014
  - Harvest 1: 10th June
  - Harvest 2: 4th August
  - Harvest 3: 29th September
- Target DM at ensiling: 30%
- Ensiled in big bales

	Yield (t DM per Ha)	
	PRG	PRG/RedC
Harvest 1	5.2	4.4
Harvest 2	3.4	4.0
Harvest 3	1.8	1.6
Total Yield	10.4	9.9

Feeding study

- 28 Crossbred dairy cows
- Silages from Harvests 1-3 fed consecutively in a 13 week study;
  - H1= 5 weeks
  - H2= 5 weeks
  - H3= 3 weeks

- Common concentrate (21% CP, DM basis) offered within both treatments (8.0 kg/ cow/ day) split between 2 daily feeds in parlour

Measurements

- DM intakes and milk yield (daily)
- Milk composition (weekly)
- Liveweight and BCS (start of study and end of study)
- Ration digestibility (4 cows per treatment at the end of each harvest)
- Data analysed using ANOVA using GenStat (16th Edition)

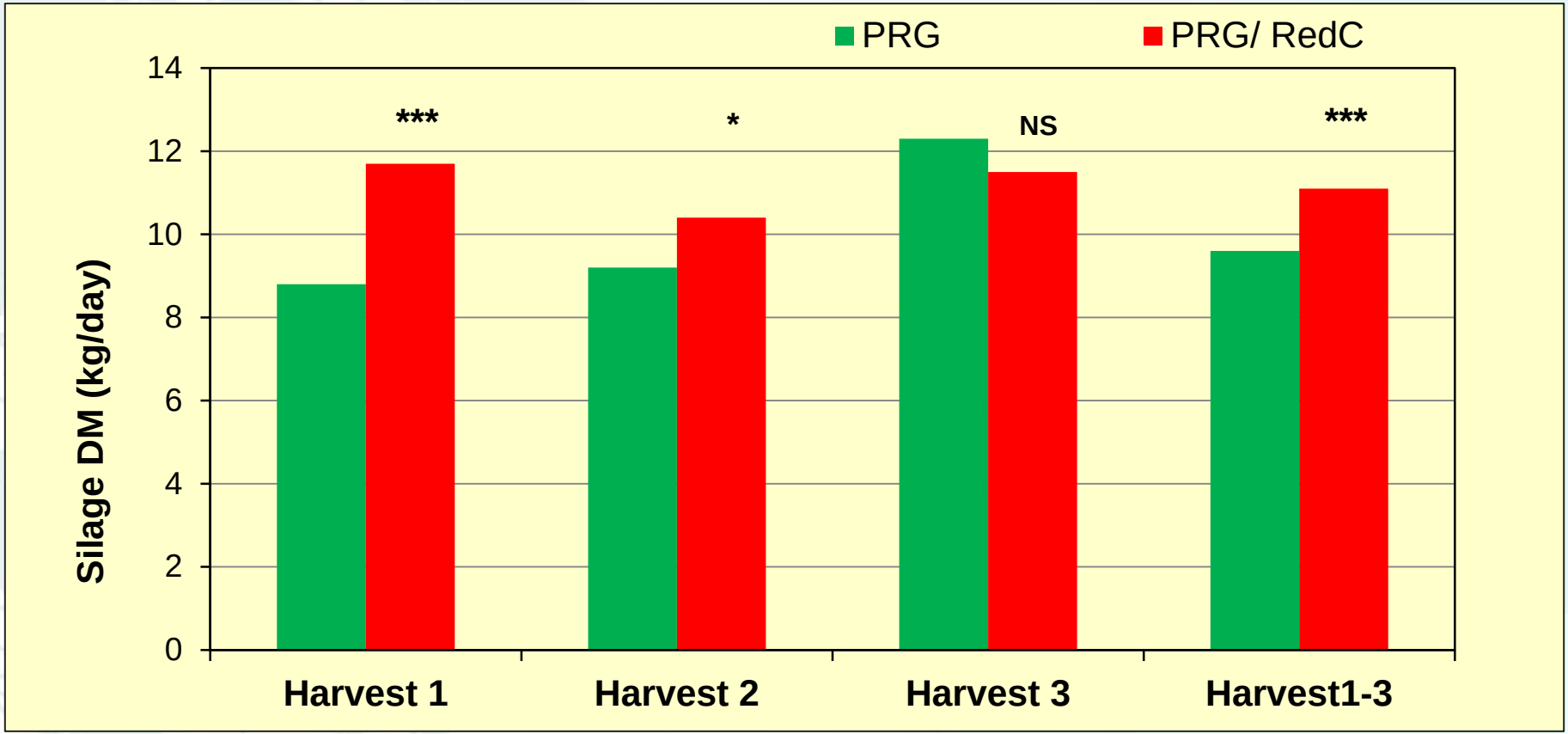
Results

afbi Agri-Food and Biosciences Institute

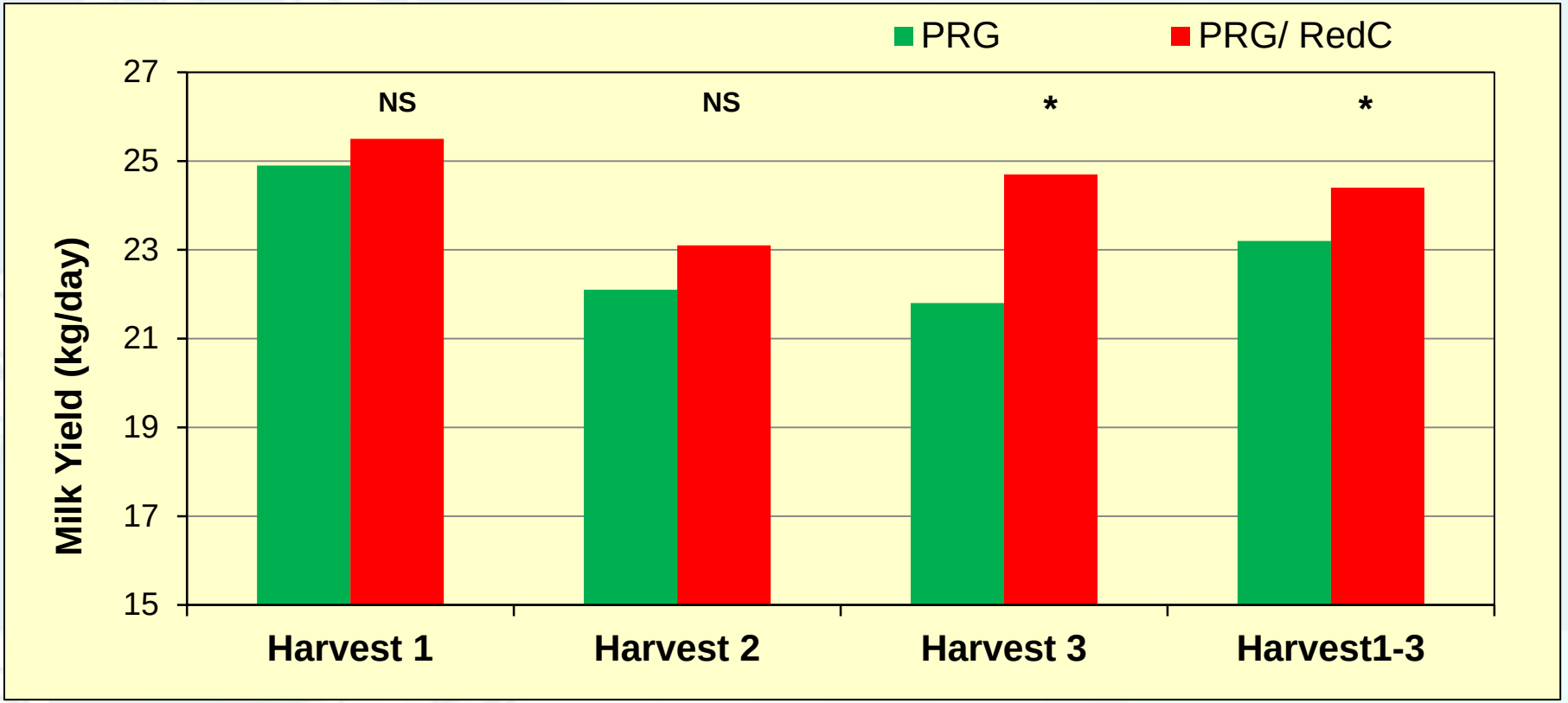
Chemical composition of silages offered

	PRG silage	PRG/ RC silage
Harvest 1		
Dry matter (g/kg)	228	330
Crude Protein (g/kg DM)	121	103
pH	4.4	4.2
Harvest 2		
Dry matter (g/kg)	172	178
Crude Protein (g/kg DM)	143	176
pH	4.2	4.7
Harvest 3		
Dry matter (g/kg)	269	199
Crude Protein (g/kg DM)	146	230
pH	4.5	4.6

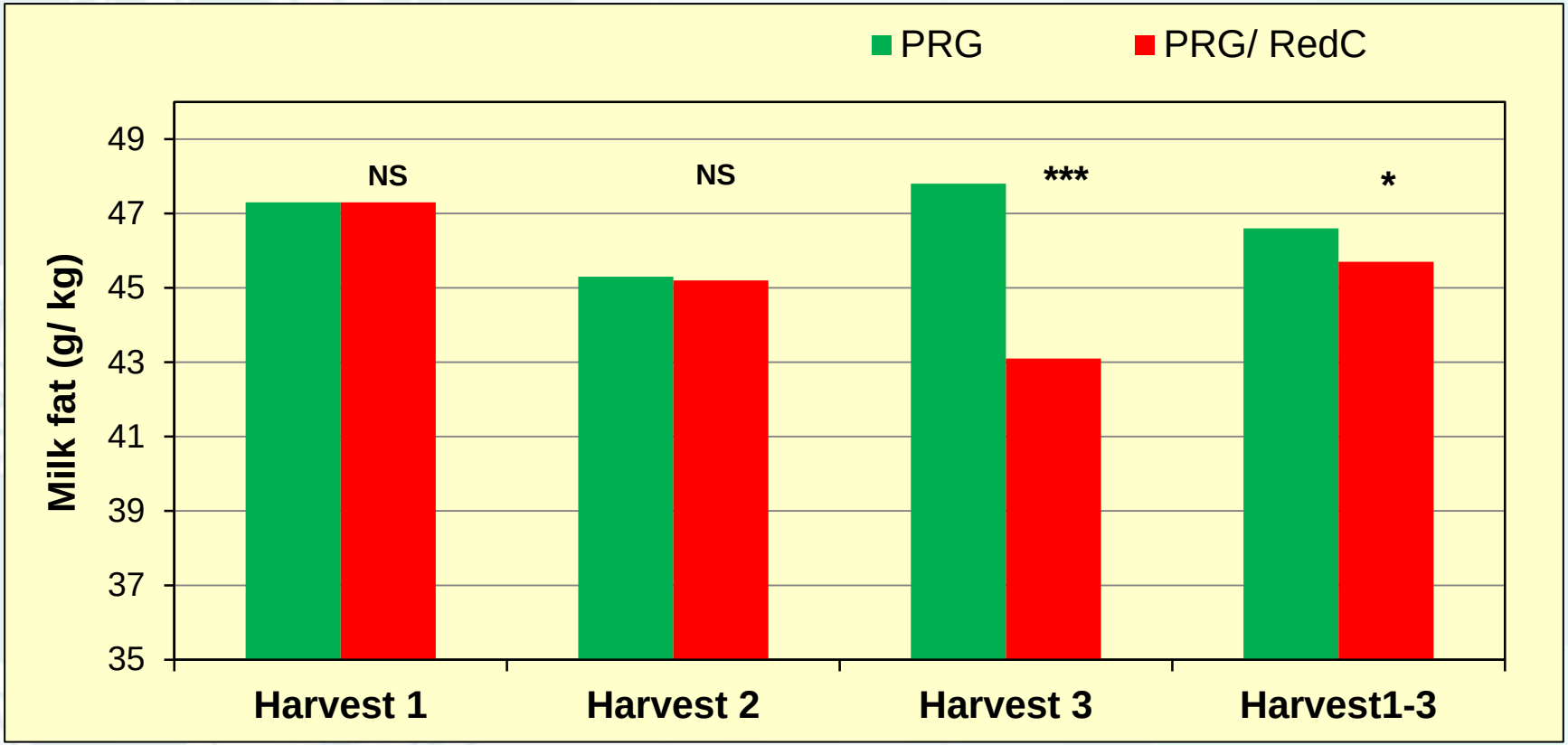
Effect of silage type on DM intakes (kg/cow/day)



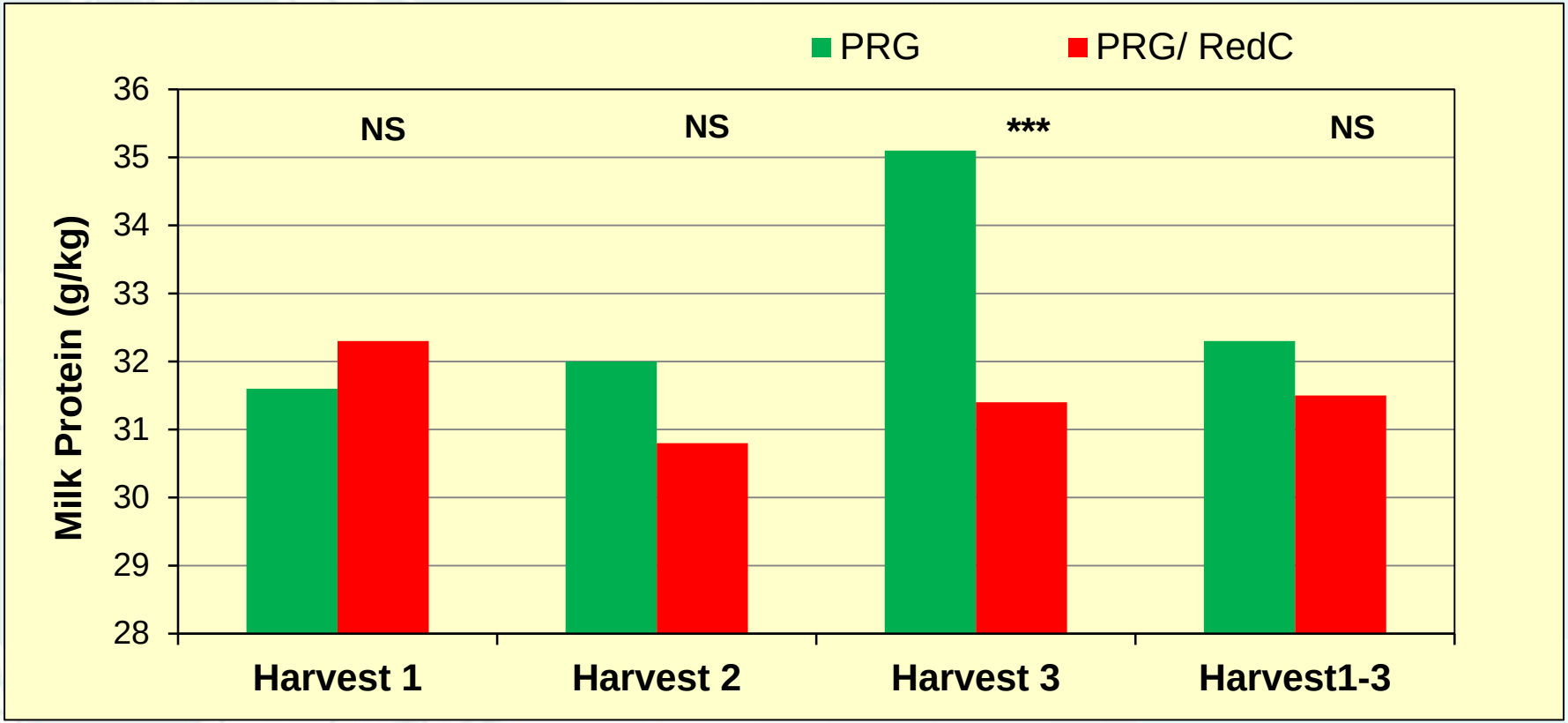
Effect of silage type on Milk yield (kg/day)



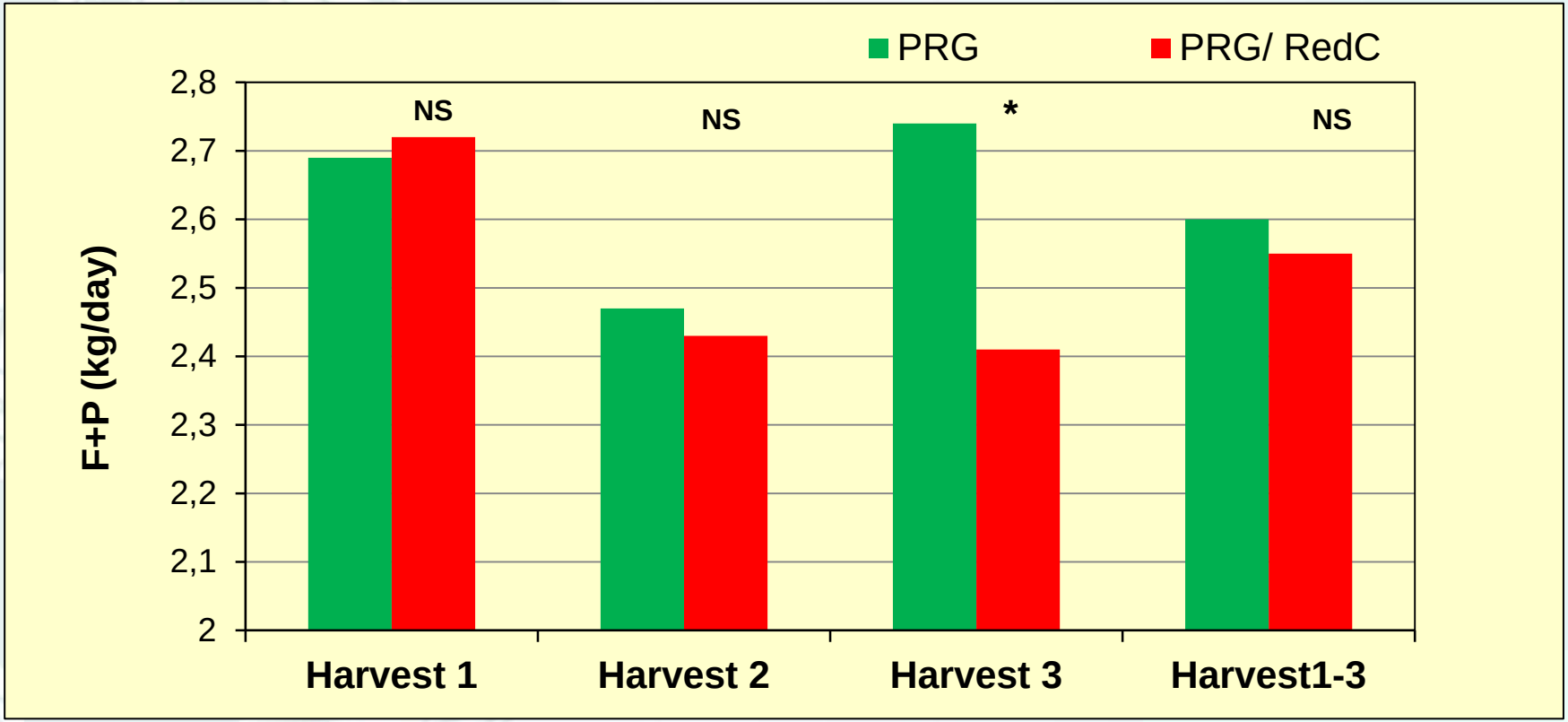
Effect of silage type on Milk Fat (g/kg)



Effect of silage type on Milk Protein (g/kg)



Effect of silage type on milk fat + protein yield (kg/day)



Effect of silage type on end of study live weight and body condition score

Treatment	PRG	PRG/ RedC	S.E.M	P- Value
End of study live weight (kg)	569	559	5.8	NS
End of study body condition score	2.52	2.56	0.050	NS

Ration digestibility

Treatment	PRG	PRG/Red C	S.E.M	P_Value
Harvest 1				
Organic matter digestibility	0.73	0.65	0.011	0.001
Harvest 2				
Organic matter digestibility	0.77	0.73	0.007	0.004
Harvest 3				
Organic matter digestibility	0.78	0.74	0.026	0.007
Harvests 1-3				
Organic matter digestibility	0.76	0.70	0.005	<0.001

Whole system effects

- There was a saving in fertiliser costs of £253/ha (248kg N/ha) with the PRG/RedC treatment.
- Using actual herbage yields and actual milk production data, and assuming equal in-silo losses of 15%, Milk solids output/ha was numerically lower with PRG/RedC calculated at:
- PRG silage = 2396 kg/ha
- PRG/RedC silage = 1940 kg/ha

Conclusion

- Intakes and milk yields were higher with PRG/RedC silage than the PRG silage
- Milk composition and end of study live weight and body condition score were unaffected by treatment
- PRG silages had a higher organic matter digestibility than PRG/RedC
- Higher milk solids/ha with PRG treatments
- Savings in N fertiliser £253/ha

Acknowledgements

- Staff from the Dairy Unit and Energy Metabolism Unit at Hillsborough

- Staff from the Laboratory at Hillsborough

- Department of Agriculture , Environment and Rural Development, Northern Ireland (DAERA NI) and AgriSearch (NI) for funding

Thank you!

Any Questions please?

afbi Agri-Food and Biosciences Institute