

# Effect of grass species on efficiency of nitrogen utilisation in Holstein-Friesian dairy cows

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# Introduction (I)

- ❖ N use efficiency is low
- ❖ Rapid degradation of forage N
- ❖ Poor production
- ❖ Impact on environment
- ❖ Cost to farmers

# Introduction (II)

- ❖ Grass species differ
  - ❖ physical and chemical properties
- ❖ Opportunity to manipulate N use efficiency

# Objectives

To compare N utilisation efficiency by dairy cattle grazing grass species differing in chemical and morphological characteristics

# Materials and methods (I)

- ❖ Twelve multiparous Holstein-Friesian cows in mid-lactation ( $614 \pm 15.0$  kg)
- ❖ Three forage treatments: Timothy (TIM), perennial ryegrass (PRG) and tall fescue (TF)
- ❖ Replicated 3×3 Latin Square design
- ❖ Each measurement period comprised 2 weeks preceded by 3 weeks grazing a standard pasture

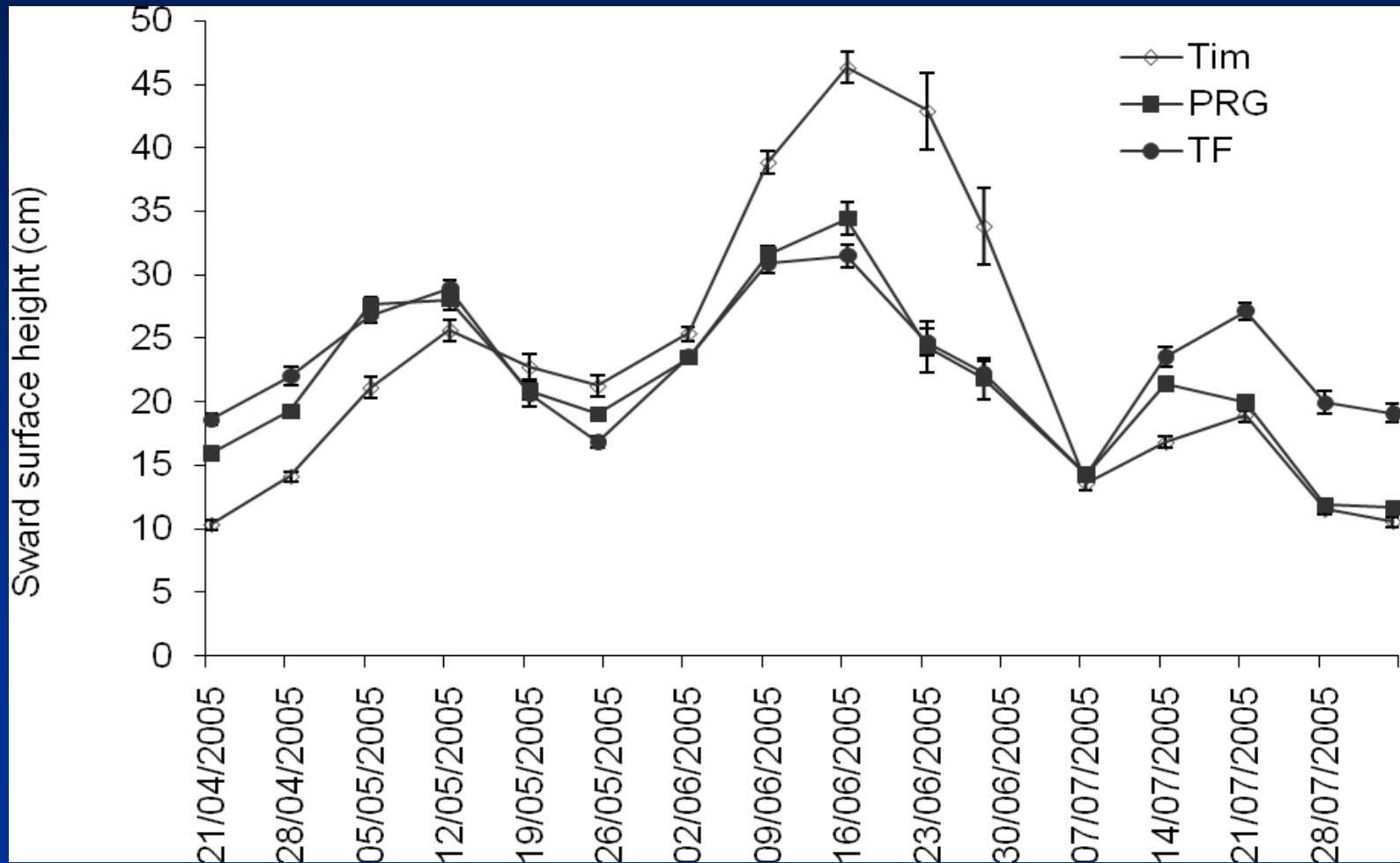
# Materials and methods (II)

- ❖ Chemical composition of the herbage assessed and herbage intake estimated using enclosure cages.
- ❖ Milk yield recorded throughout the measurement period.
- ❖ Milk samples and spot urine samples taken during each milking on the final two days.
- ❖ Effects of grass species examined by analysis of variance.

# Chemical composition of forages (g/kg DM)

	TIM	PRG	TF
Period 1			
Total-N	17.2	15.2	18.7
NDF	541	518	507
WSC	156	342	186
Period 2			
Total-N	13.4	13.1	15.9
NDF	691	569	591
WSC	65	172	138
Period 3			
Total-N	25.6	23.0	22.2
NDF	520	492	567
WSC	78	194	114

# Sward surface height (cm)



# Estimated herbage intake (kg DM/d)

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	TIM	PRG	TF
Period 1	17.7	24.5	17.3
Period 2	18.0	18.8	13.9
Period 3	19.1	16.5	13.2

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# Milk production

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	TIM	PRG	TF	SEM	<i>P</i>
Milk yield (kg/d)	22.3	23.3	20.4	0.48	0.005
Milk protein (g/d)	793	796	682	20.8	0.007
Milk fat (g/d)	892	917	883	21.2	0.528

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# Microbial protein synthesis and urinary N excretion

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	TIM	PRG	TF	SEM	<i>P</i>
Urinary PD : Creatinine*	456	439	370	18.1	0.023
Urinary N : Creatinine**	172	176	185	8.9	0.612

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\* mmol/L : mmol/L/kg  $W^{0.75}$

\*\* g/kg : mmol/L/kg  $W^{0.75}$

# Conclusions

- ❖ TF supported lower milk yield and milk protein production than PRG/TIM.
  - Lower intake
  - Lower microbial protein synthesis
  - Maybe partly linked to differences in the release of nutrients during mastication and ingestion (Summary 32)
- ❖ TF pasture showed lower efficiency of N utilisation (27-40% more urinary N per kg milk production)

# Acknowledgements

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