

# The role of improved pasture varieties on ruminant nutrition and productivity

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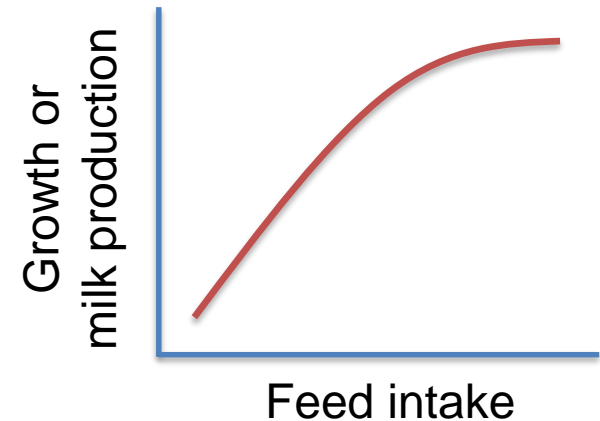
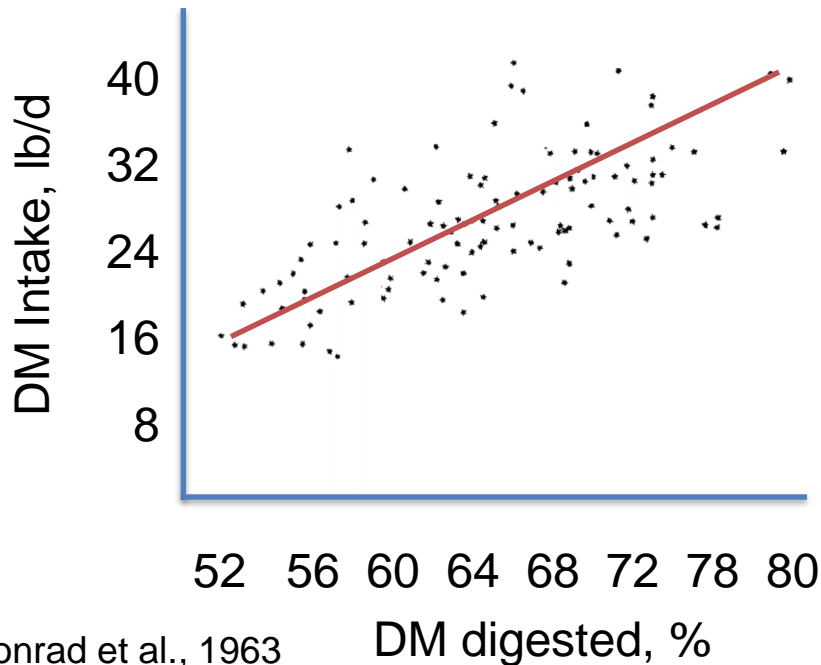
# Overview

- What affects livestock productivity
- Forage quality versus quantity
- The rumen as a control point
- Improving forages for livestock
  - Ryegrass – temperate grass
  - *Brachiaria* and other tropical grasses
- Forage conservation – hay and silage



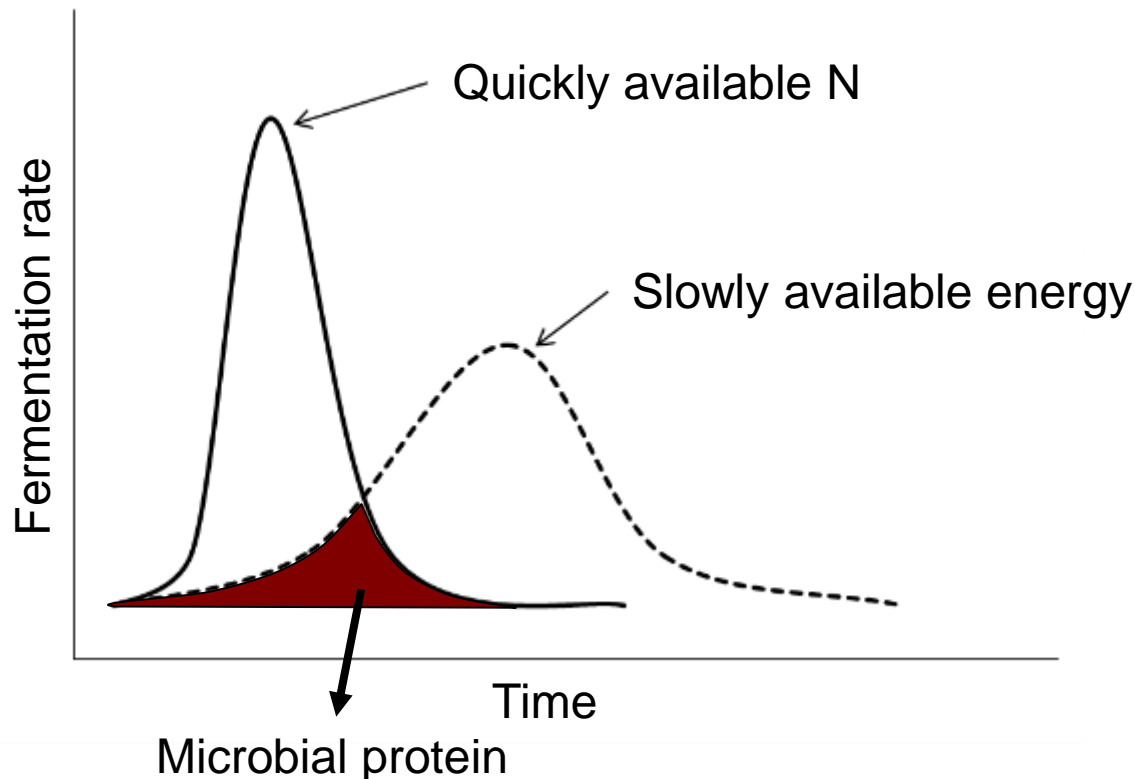
# Livestock productivity

- Dry matter intake
  - Feed digestibility
- Digestible DM intake

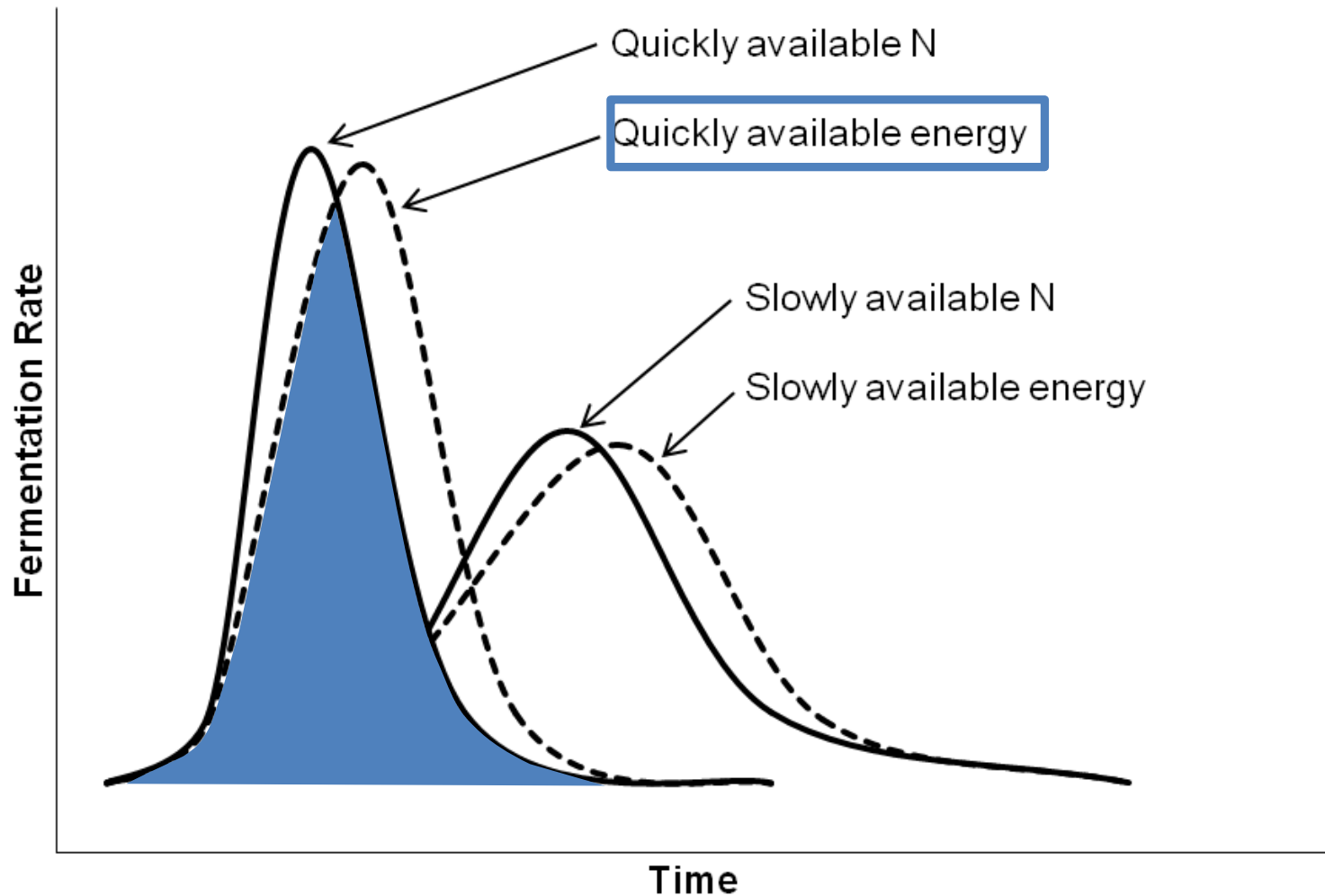


# Forage quality – rumen function

- Digestible DM intake is key
- Balance of protein and energy



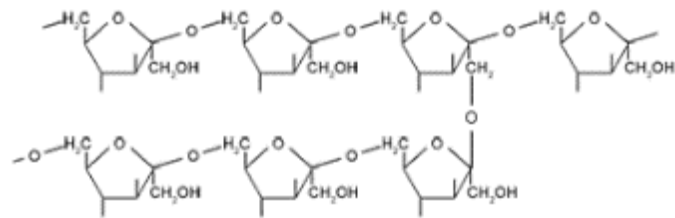
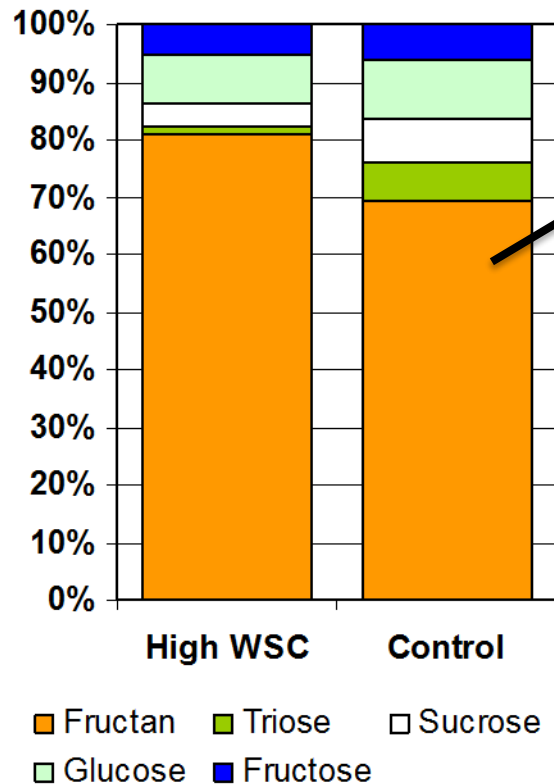
# Improved diet energy balance



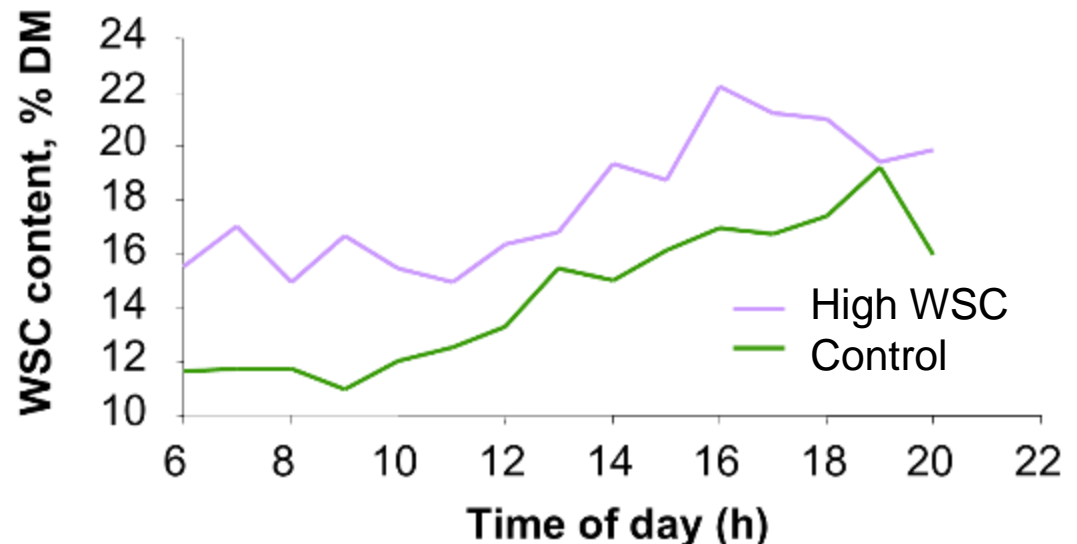
# Grass water soluble carbohydrates

## *Lolium perenne*

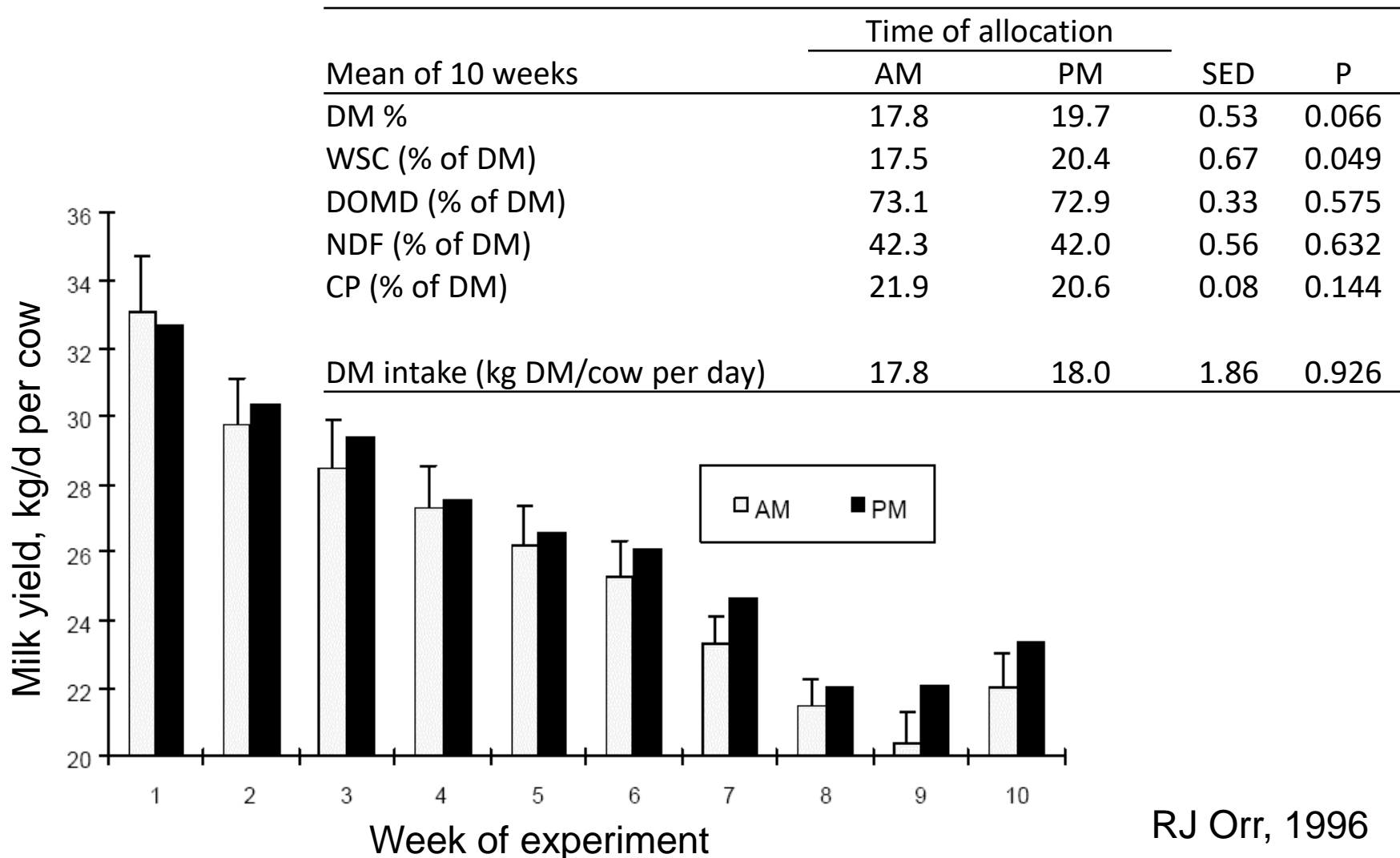
### Proportion of total WSC



Fructans – polymers of fructose



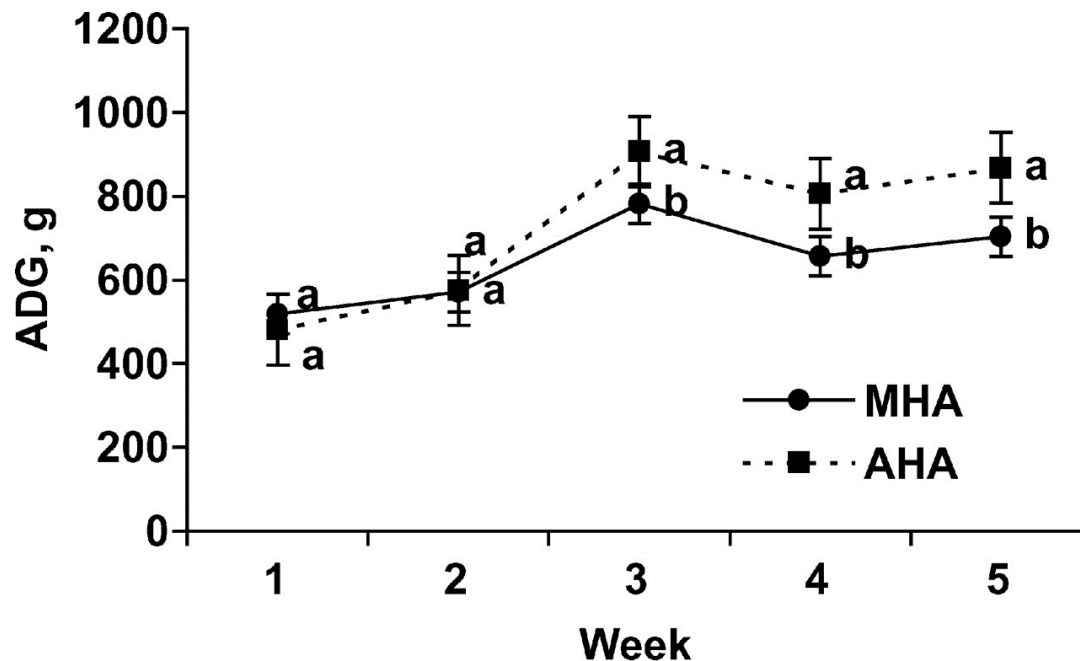
# Strip grazing afternoon ryegrass



Mean of 10 weeks	Time of allocation		SED	P
	AM	PM		
DM %	17.8	19.7	0.53	0.066
WSC (% of DM)	17.5	20.4	0.67	0.049
DOMD (% of DM)	73.1	72.9	0.33	0.575
NDF (% of DM)	42.3	42.0	0.56	0.632
CP (% of DM)	21.9	20.6	0.08	0.144
DM intake (kg DM/cow per day)	17.8	18.0	1.86	0.926

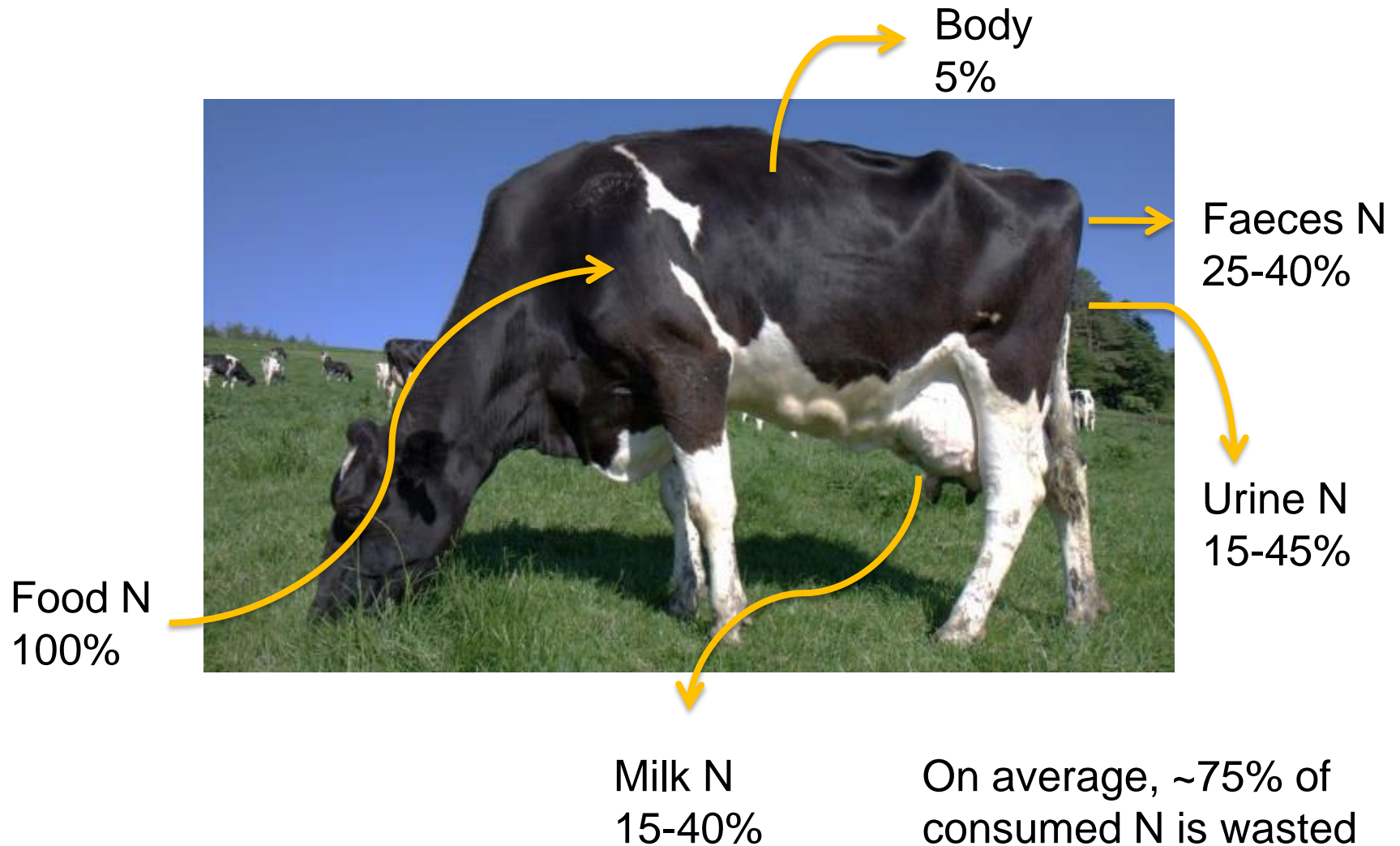
# Steer LW gains (ADG, g/d)

- Steers strip grazed ryegrass, with:
  - morning herbage allocation (MHA), 07:00h
  - afternoon herbage allocation (AHA), 15:00h





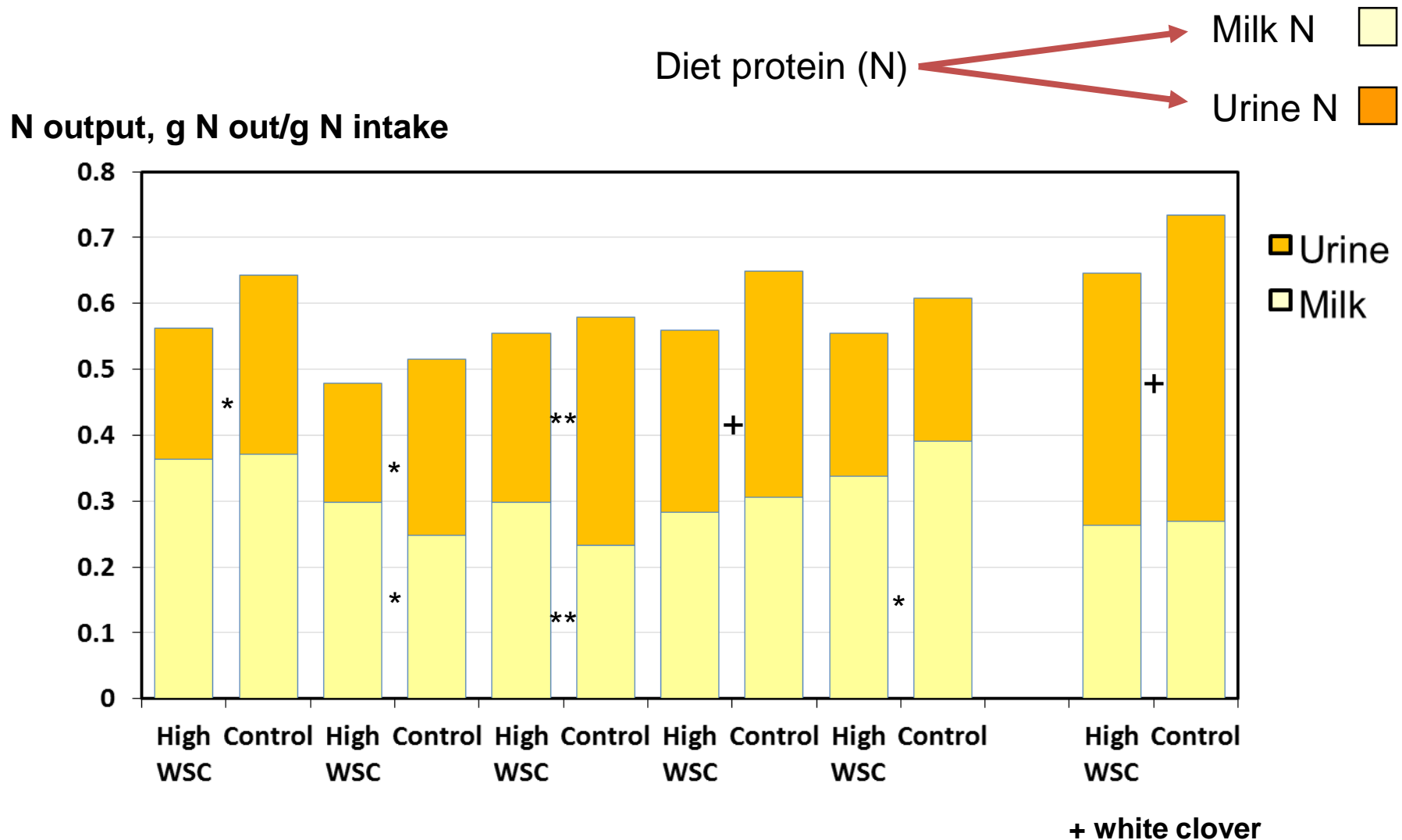
# Partitioning of N use - cow



# Whole body N partitioning

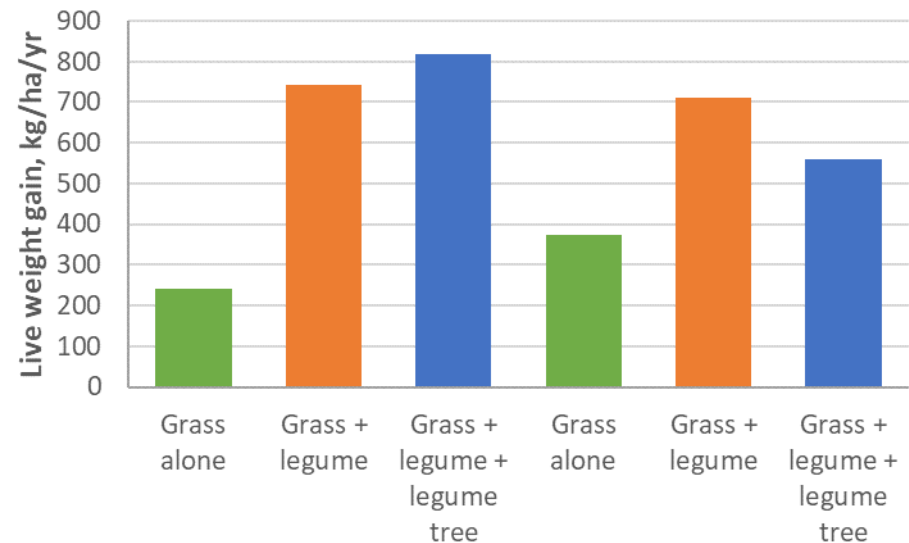


# N partitioning from high WSC grass



# Role of improved tropical forages

- Better animal performance
- Potential to reduce GHG emissions
  - $\text{N}_2\text{O}$  by BNI of *Brachiaria*
- Reduced emissions intensity
- Increased land carrying capacity



*Brachiaria*:

Cayman

Toledo



*Canavalia*

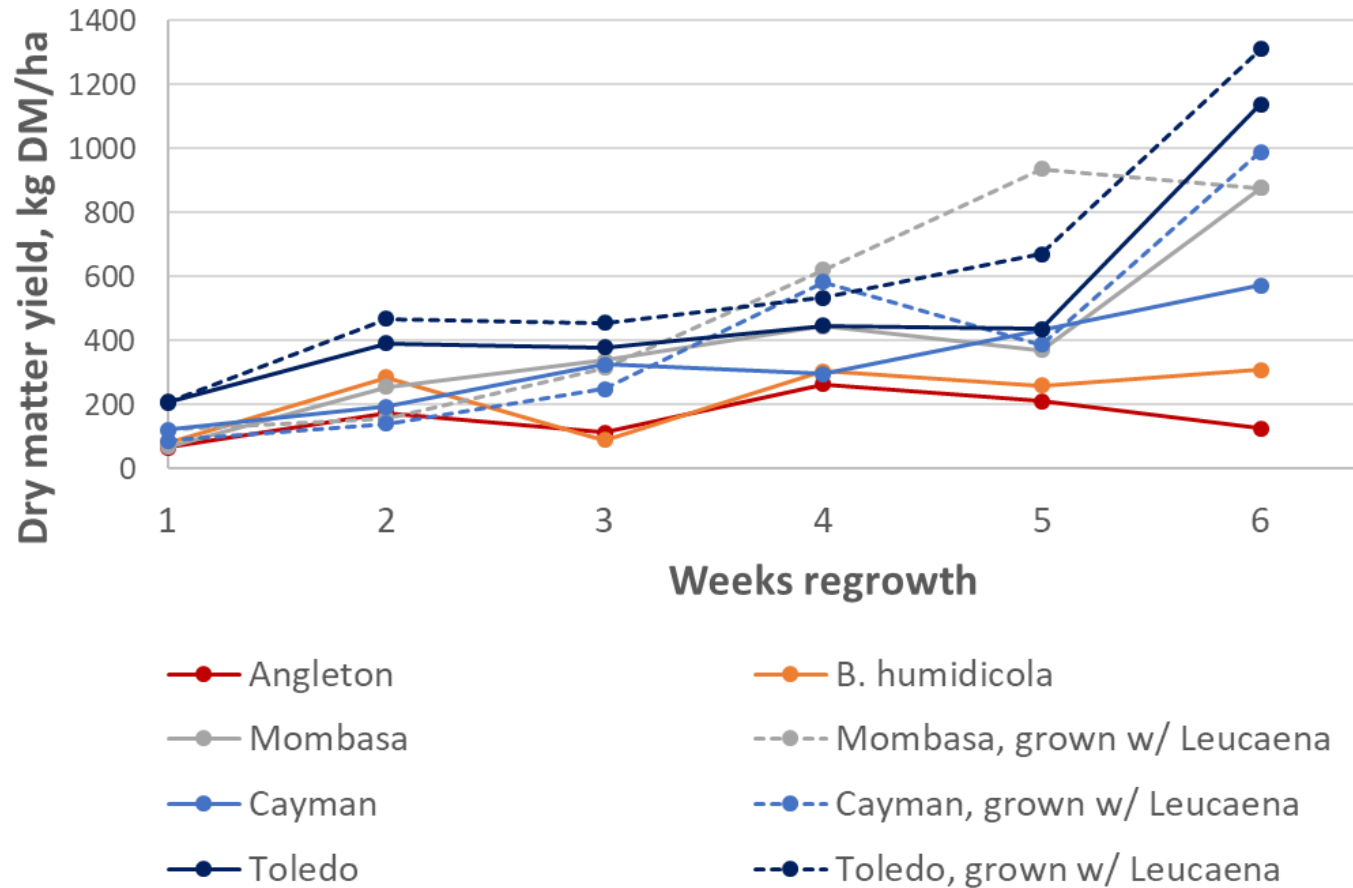


*Leuceana*



Gutierrez et al, unpublished data

# Improved DM yield



Work carried out at CIAT, Colombia (Moorby, Arango, et al, unpublished data)

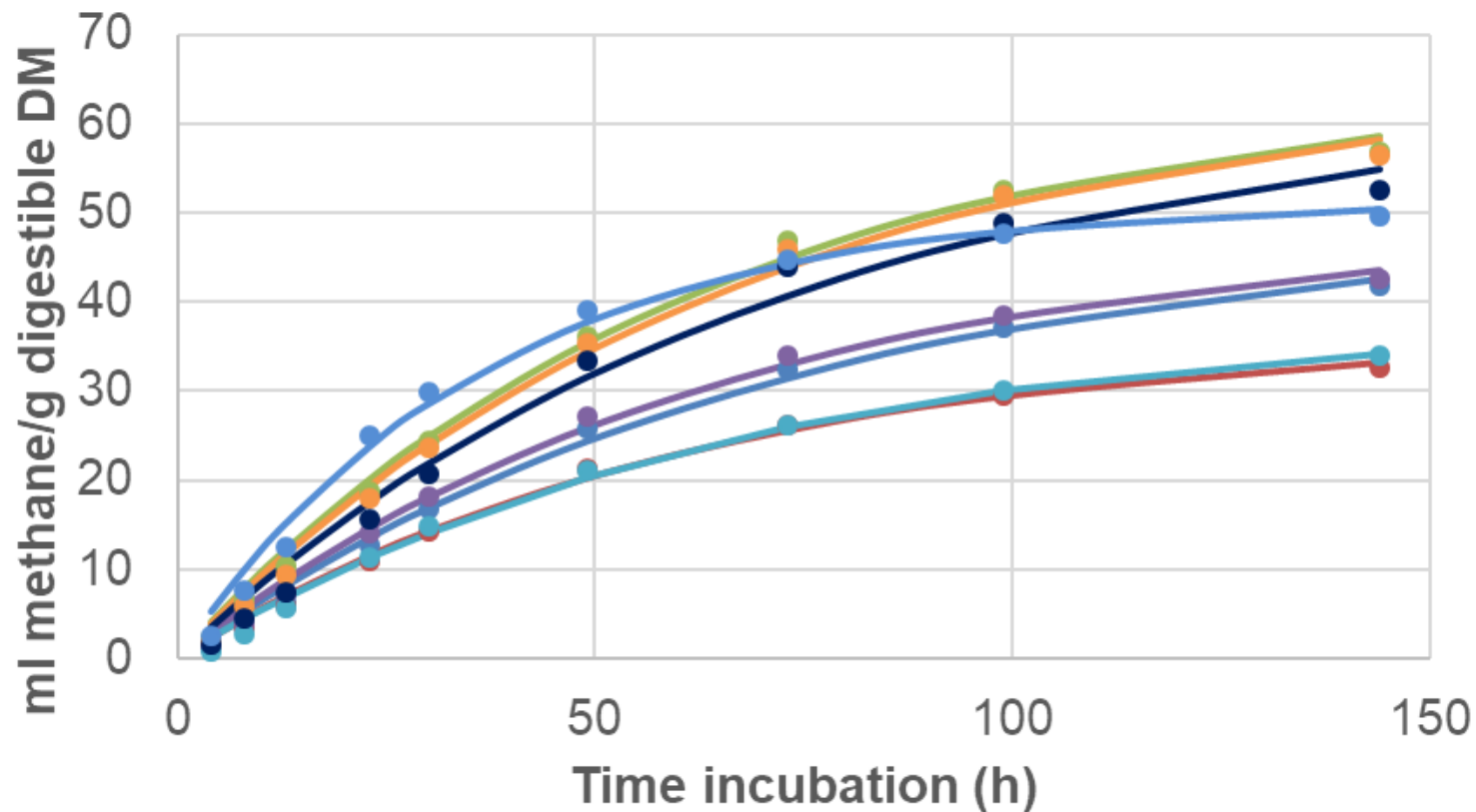


# GHG emissions

- Enteric methane emissions from ruminant are a major contributor to global methane
- Urine patches contribute to nitrous oxide emissions
- Both equate to nutrient losses

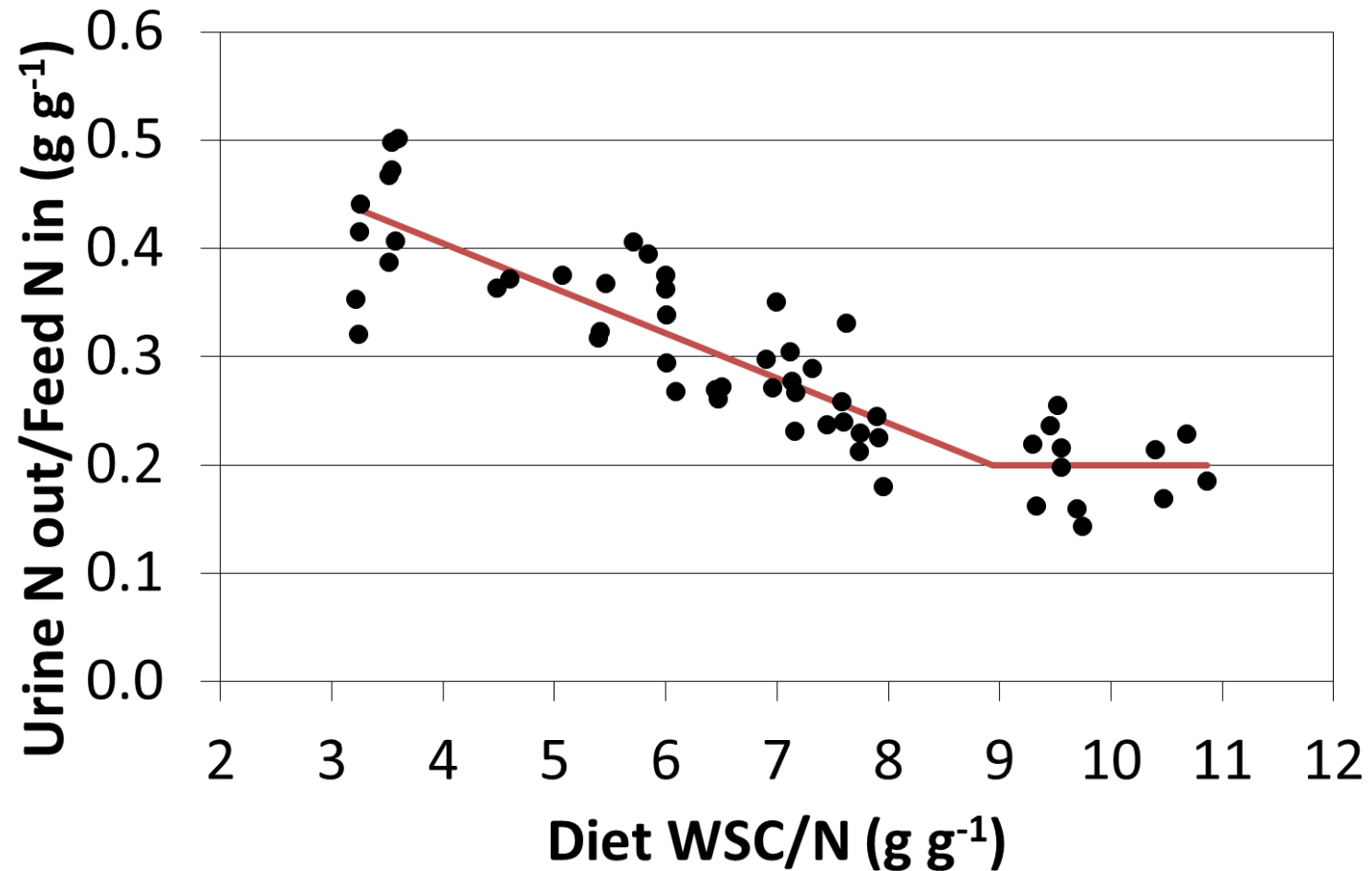


# *In vitro* methane production



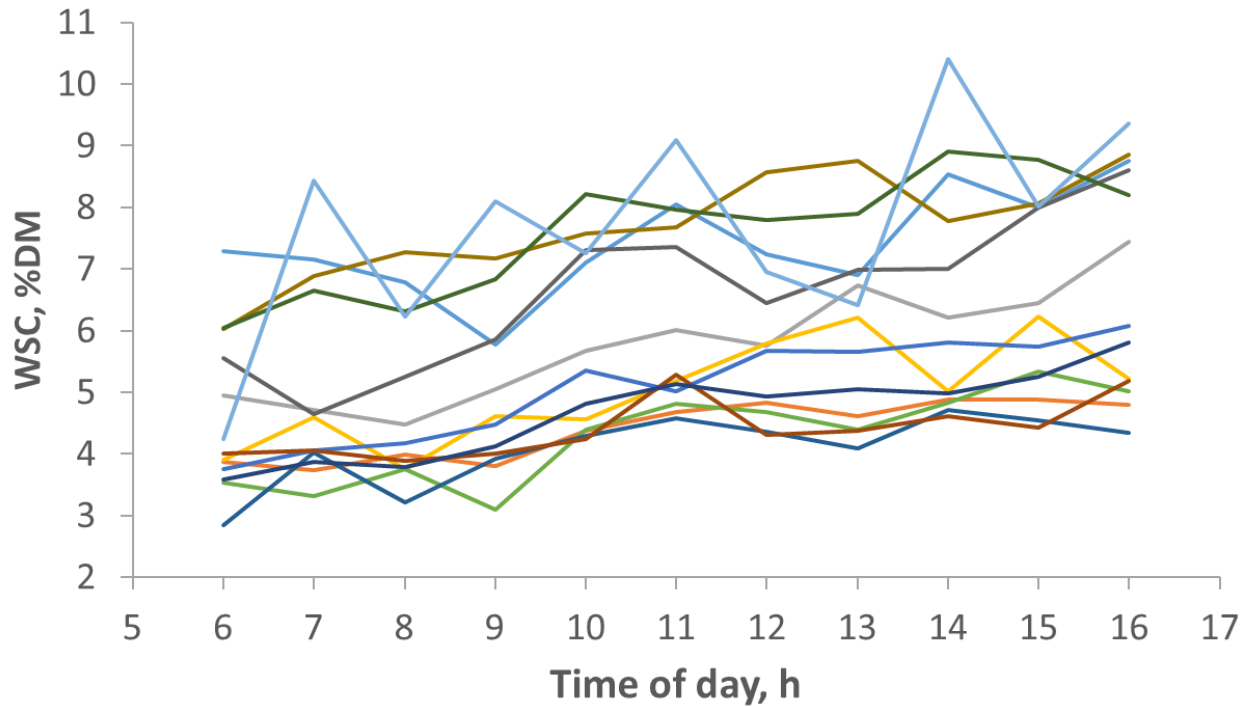
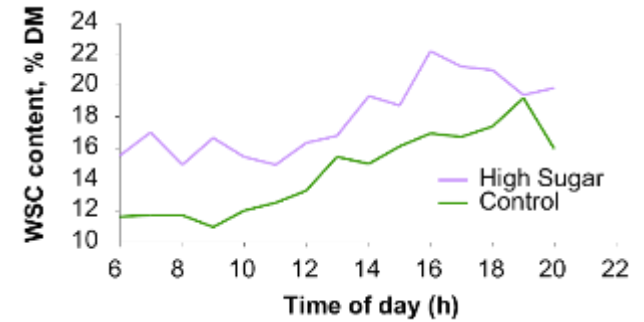
● Toledo ● Cayman ● Mombasa ● Tully  
● Toledo+L ● Cayman+L ● Mombasa+L ● Angleton

# Effects of WSC/N on urine N output





# Tropical grass WSC



# Forage conservation

- Conserve feeds when plentiful for times when not





# Silage and hay



# Summary

- Improved forages will increase livestock productivity
- Increased DM yield and improved nutritional composition are critically important
- Conserve forages when plentiful, timing is important
- Feed appropriately!



# Acknowledgements

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