



Mole Valley
FARMERS

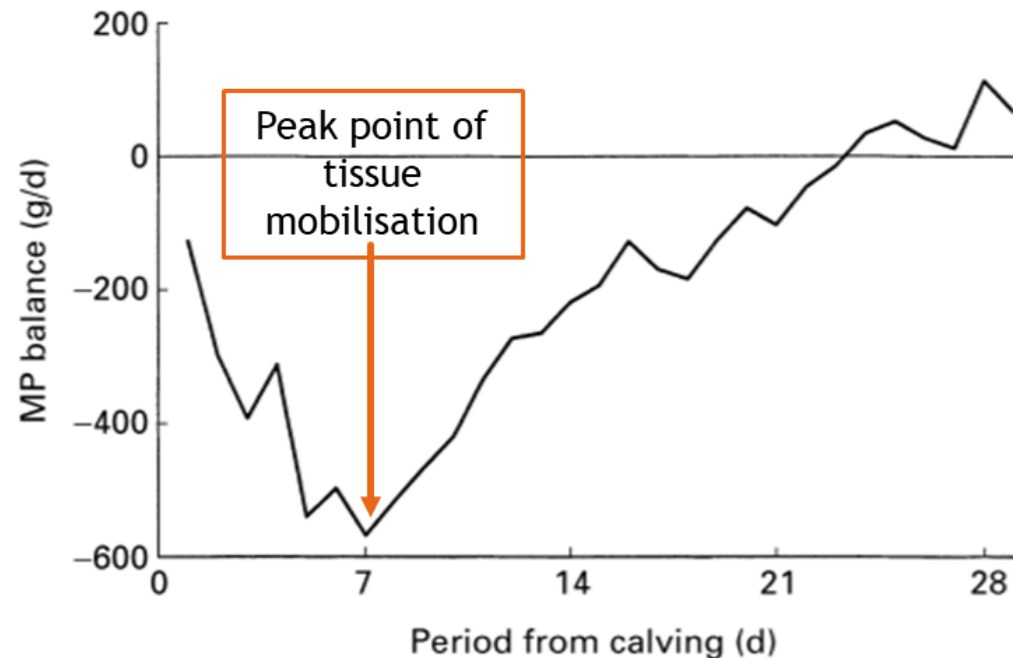


Optimising the temporal distribution of dietary protein in early lactation dairy COWS

Inga Barnett
Inga.Barnett@sruc.ac.uk

Early Lactation Challenges

- Dry matter intakes reduced
 - Negative Protein Balance
- Amino acids mobilised from skeletal muscles and uterine involution
 - Estimated that 7.6kg of body protein lost during first 4 weeks of lactation¹

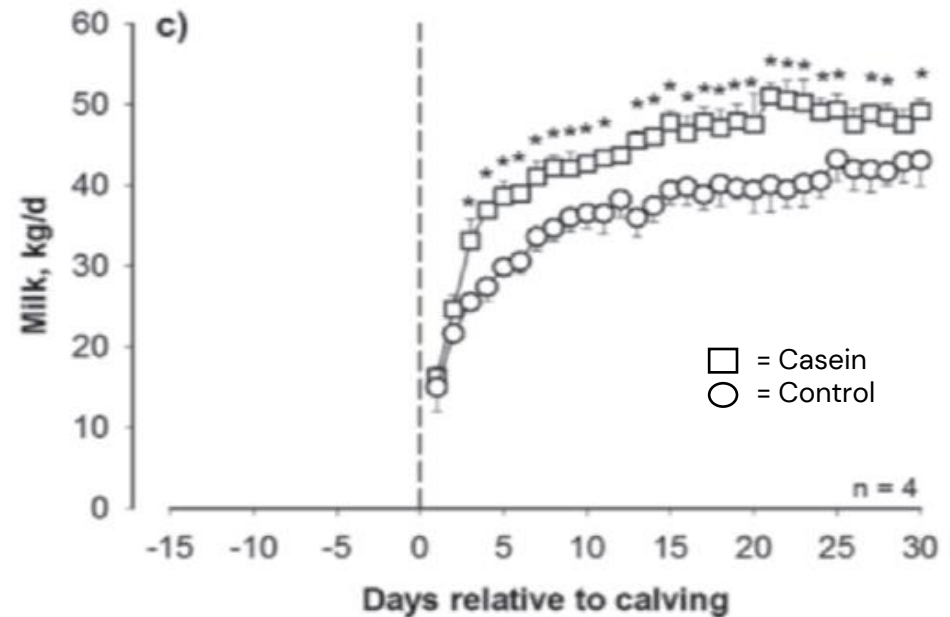
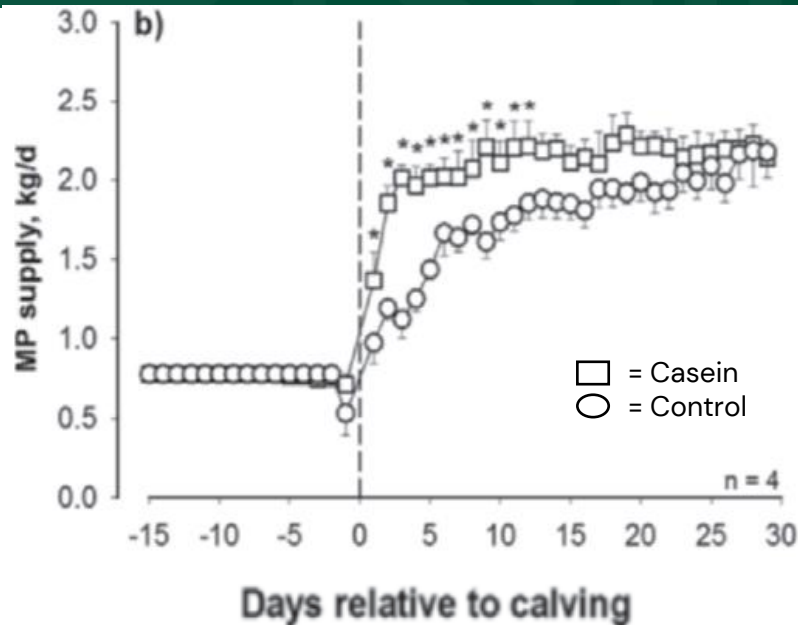


Abomasal Protein Infusion – Larsen *et al.* (2014)



- Protein deficiency limits performance – constrains milk production due to limited EAA availability
- Abomasal Infusions:
 - Water (Control)
 - Casein (Treatment)
 - Day 1 = 360 g/day
 - Day 2 = 720 g/day
 - Day 3 to 29 = Declining rate

Abomasal Protein Infusion – Larsen *et al.* (2014)



Results: As lactation progressed, Casein treated cows had a significantly higher and more constant supply of Metabolisable protein (MP; $P=0.001$; b) and greater milk yield ($P<0.01$; c) in comparison to the control.

- **'Carryover Effect'** – at 29 DIM, milk yield and lactose yields were still greater in cows treated with protein supplementation (Larsen *et al.*, 2014).



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Early Lactation Experiment

- Translating the effects of abomasal infusions into practical feeding strategies
- Commercially available feed sources and rumen protected amino acids

Hypothesis: Targeted protein supplementation in the first 14 days of lactation is more beneficial for milk protein yield and NUE compared with supplementing the same amount of protein evenly over the first 7 weeks of lactation.

Cow Management



- Acrehead farm – loose cubicle housing
- 12 'Hokofarm' feed intake bins (Insentec BV, NL)
- 2 cohorts of 18 multiparous Holstein–Friesian cows
- Cows paired according to calving date
 - Each pair occupied the facility for 7 weeks
- Normal farm practices for dry cow management

Dietary Treatments



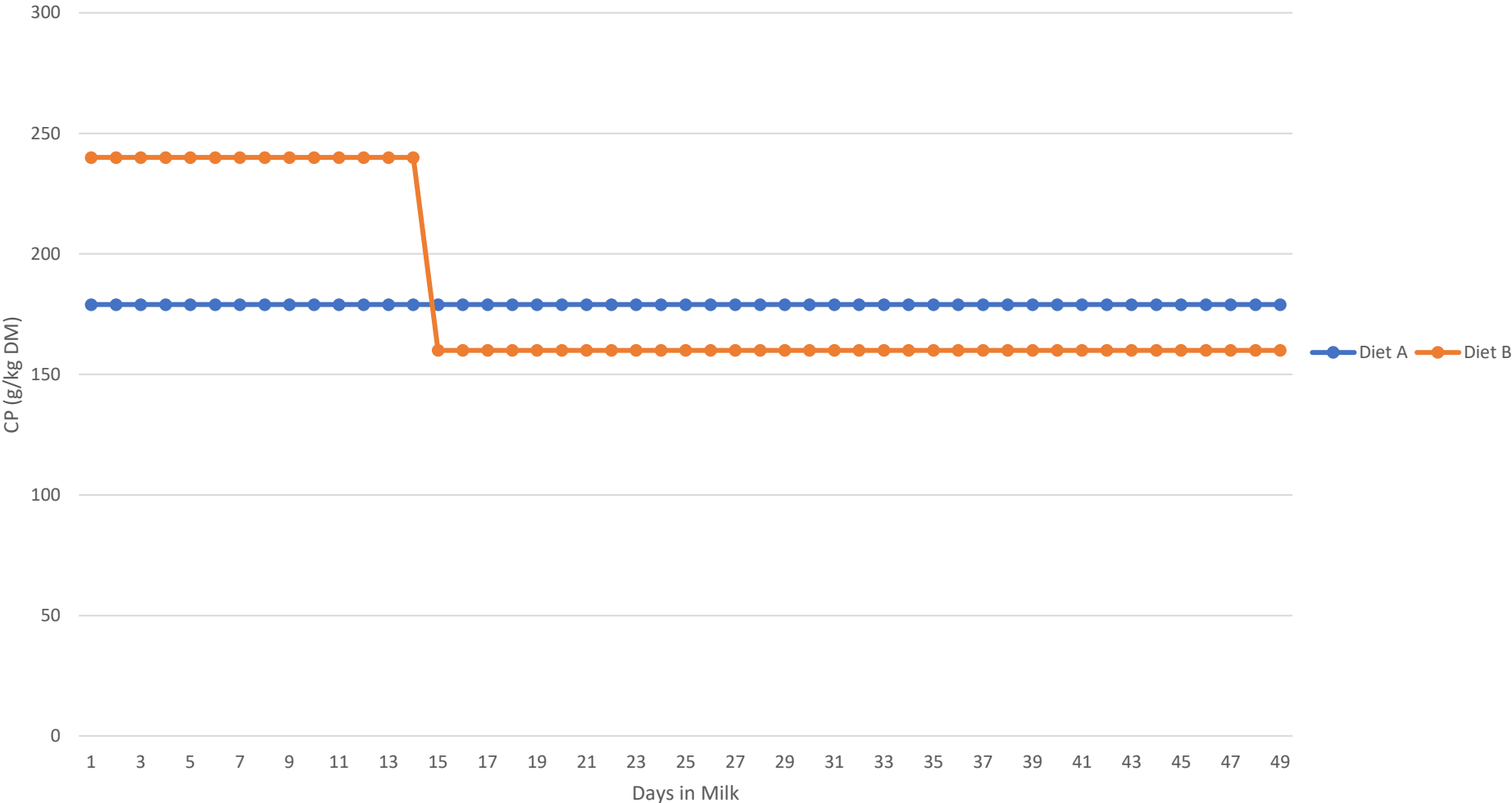
A. Medium dietary crude protein (g CP/kg DM) for 49 days of lactation.



B. High dietary CP for 14 days, followed by low dietary CP for 35 days.

	Milk protein yield	NUE
Hypotheses	$B > A$	$B > A$

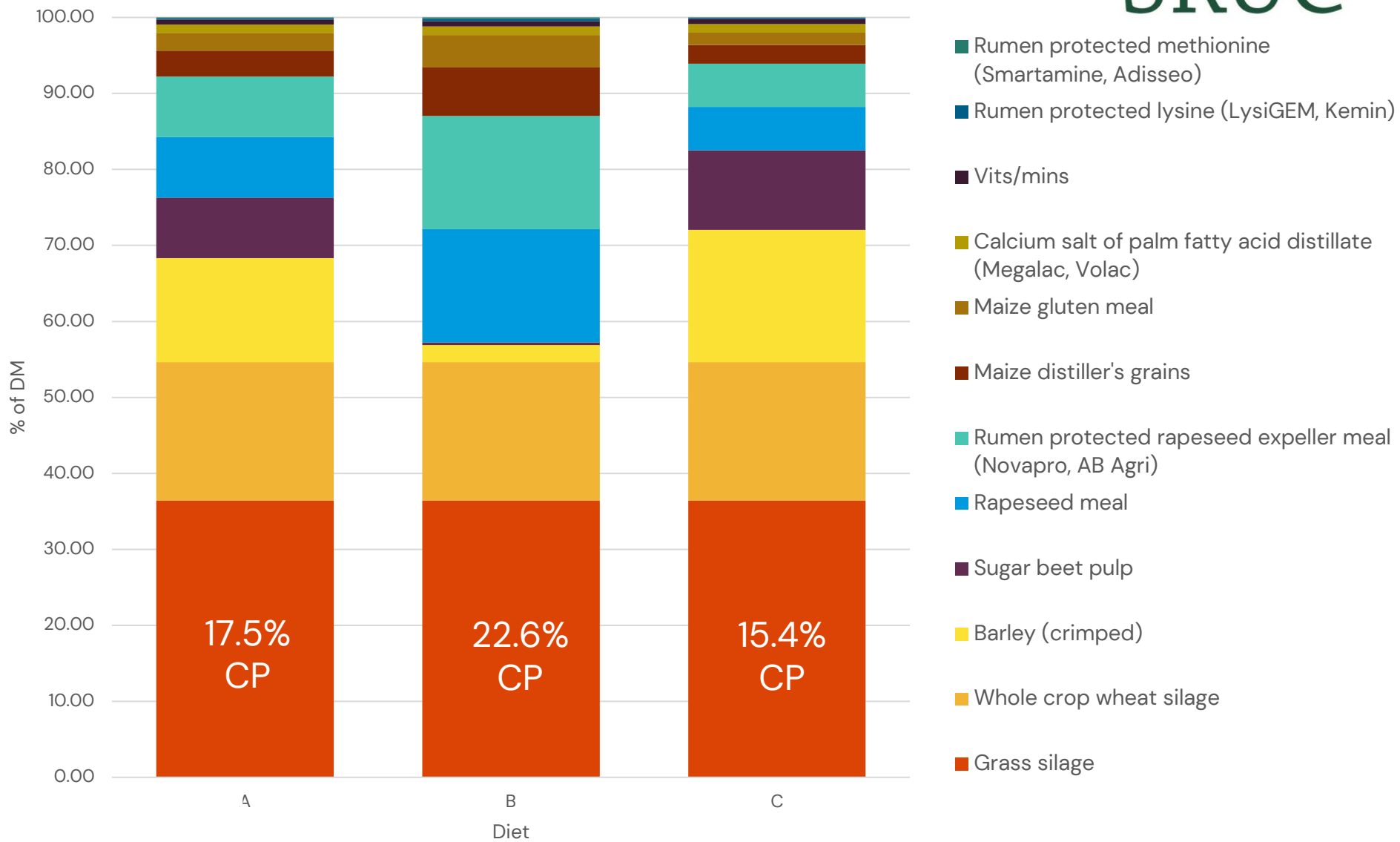
Dietary Treatments





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Ration Composition



Measurements and Sampling



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- **Body Weight** – weekdays at AM milking
- **Body Condition Score** – dry off, calving, day 14 and 49
- **Daily Feed Intake** – individually recorded via Insentec RIC equipment
- **Milk Yield** – 2x daily (farm norm)

Measurements and Sampling

- **Milk Composition**

- Lactose, fat, urea, scc, crude protein content (selected samples to analyse milk casein sub units and major whey proteins)

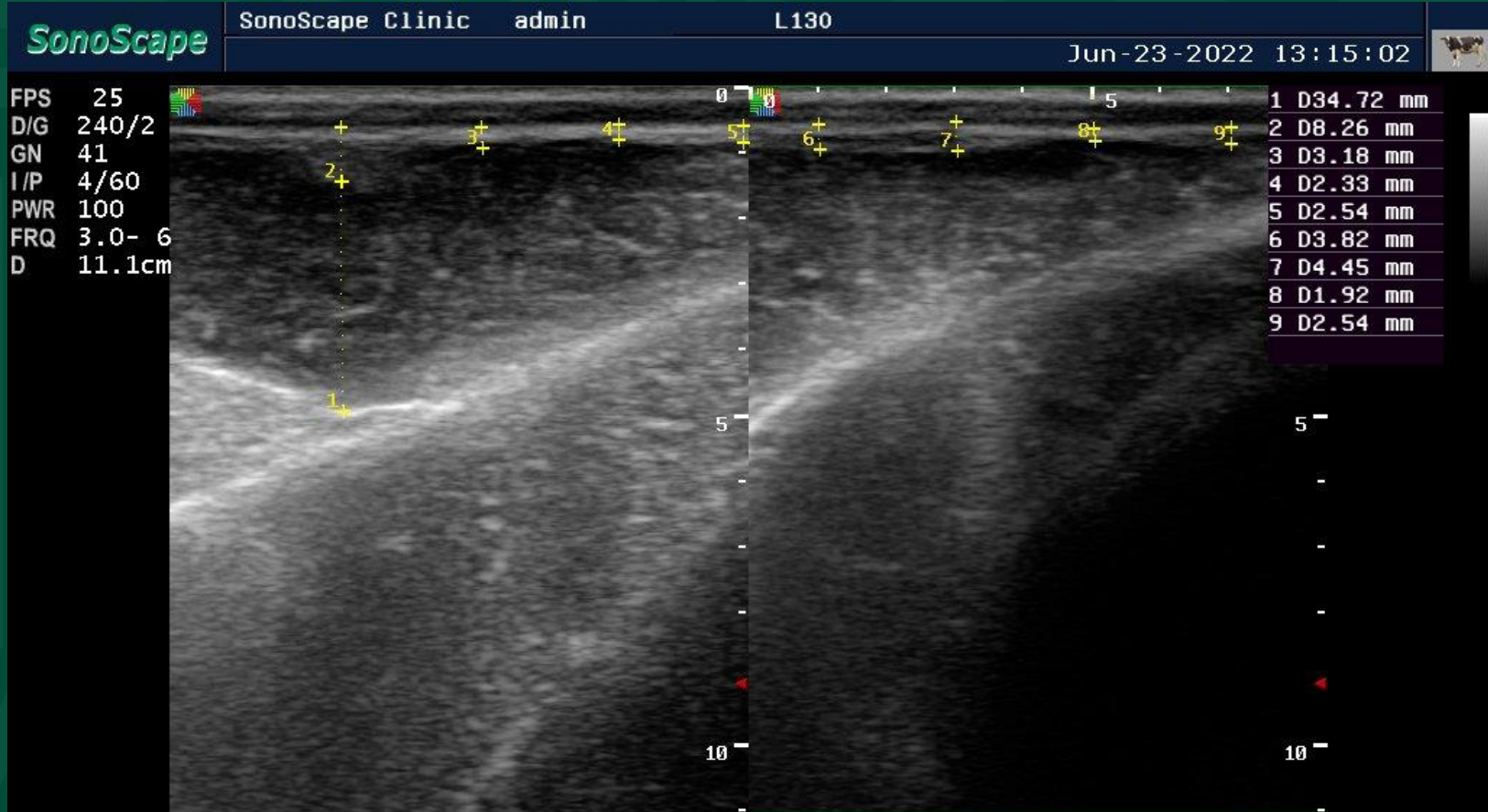
- **Blood Sampling** – at calving, day 14, 49

- Metabolic Profile and glucose

- **Ultrasound Scanning** – late dry, day 14, 49

- SonoScape scanner
- 3rd Lumbar and 13th Rib

Ultrasound Scanning



3rd Lumbar

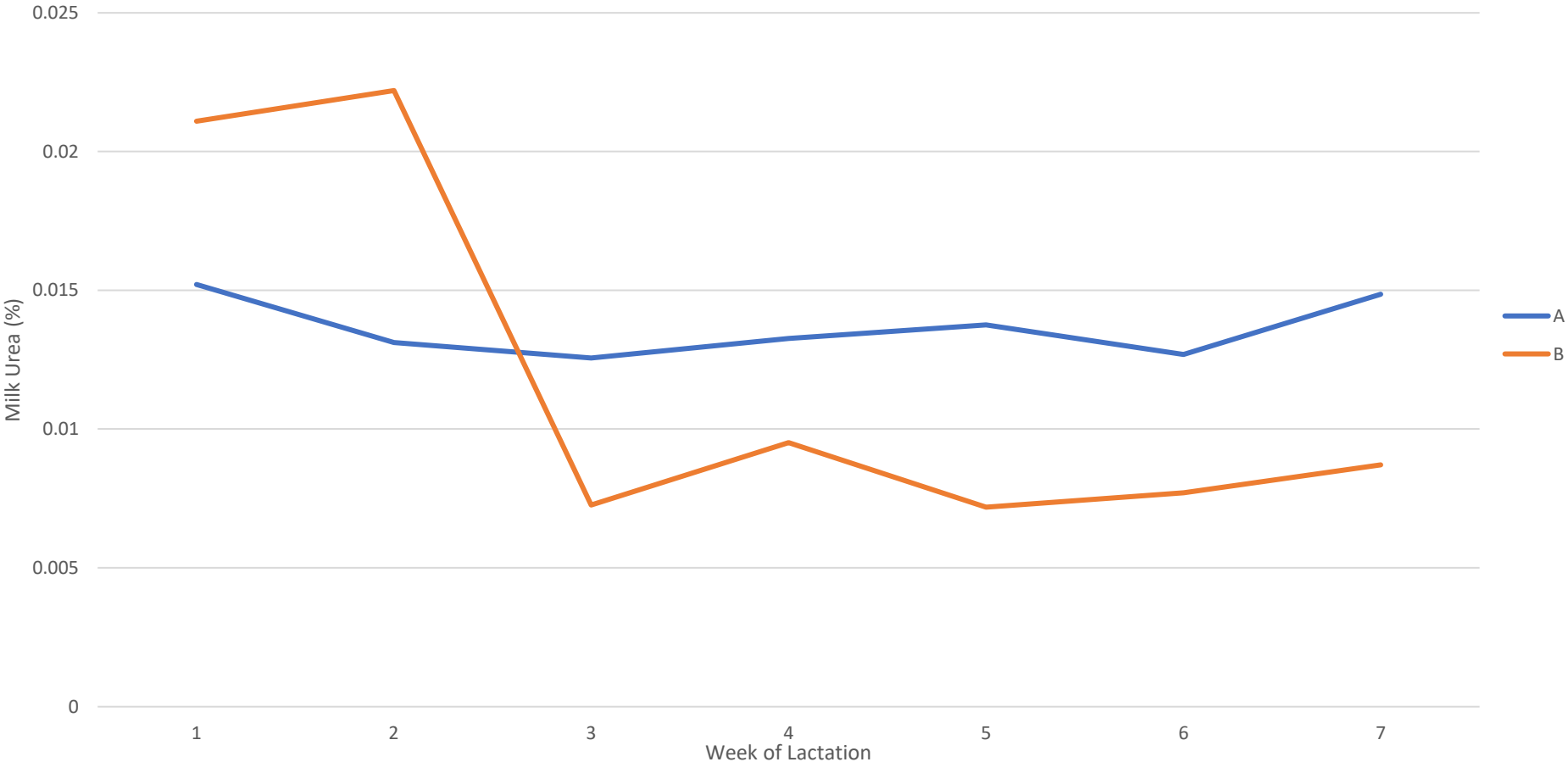
13th Rib



CINE

Average of Milk Urea (%)

	Treatment		SEM	P-value
	A	B		Treatment
Urea (%)	0.014	0.014	0.0005	0.35



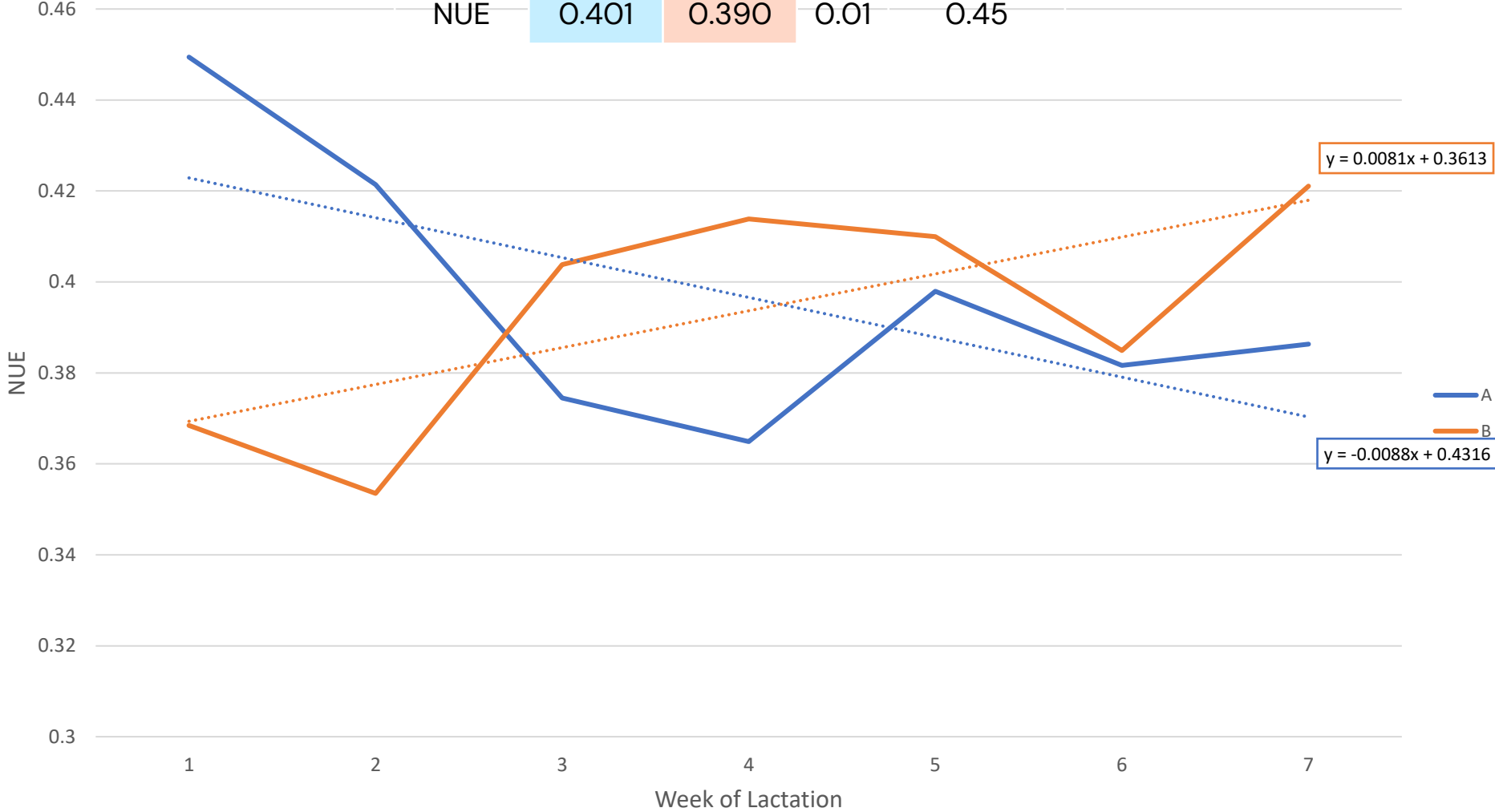
Results: Day 1 to 49 of Lactation



	Treatment			P-value
	A	B	SEM	Treatment
Intake				
DM (kg/d)	19.8	19.3	0.10	0.43
Daily intake CP (g)	3332	3249	17.9	0.53
Milk Yield (kg/day)	38.7	37.7	0.21	0.47
Milk Fat				
%	4.42	4.48	0.08	0.85
Yield (kg/d)	1.65	1.57	0.03	0.28
Milk Crude Protein				
%	3.70	3.51	0.06	0.09
Yield (kg/d)	1.26	1.20	0.01	0.19

Average of NUE

	Treatment		SEM	P-value
	A	B		Treatment
NUE	0.401	0.390	0.01	0.45



Conclusions

Cows experience negative protein balance in early lactation



Redistributing dietary protein in the first seven weeks of lactation, to provide more in the first two weeks, did not improve milk protein yield or NUE



Why did we not observe difference?

Too conservative in terms of protein provision?

Timing of protein input around calving?

AA supply e.g. histidine?

Acknowledgements



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