Relationships between cow performance with milk urea yield and efficiency of protein utilization

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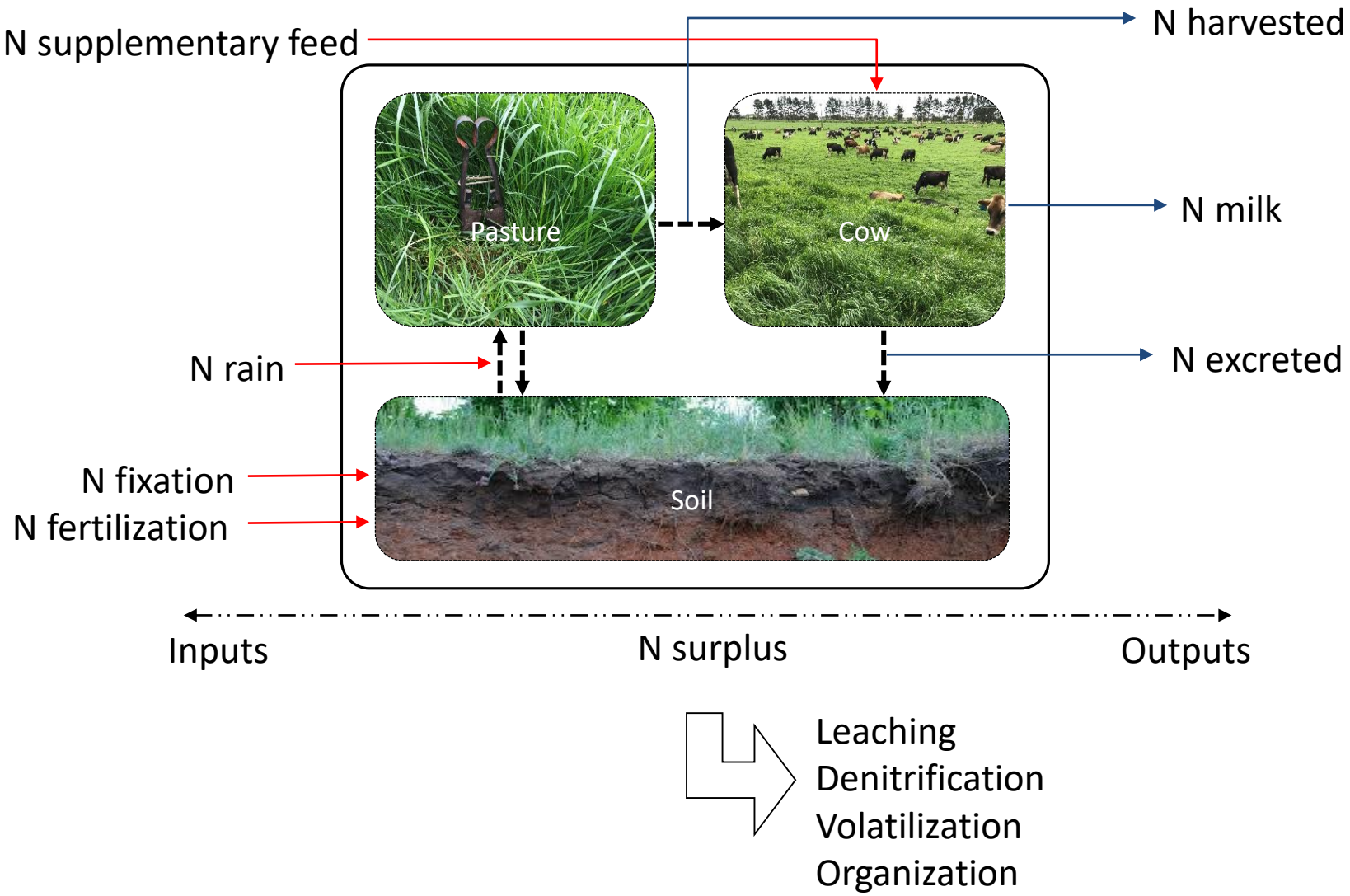
N cycle on dairy systems



(Peyraud & Delaby 2006)

Objective

Investigate relationships of cow performance with milk urea (MU) and efficiency of crude protein utilization (ECPU) in two contrasting grazing herds in New Zealand

Materials and methods

– Dairy systems

– Animal performance

– Feed quality records

Massey University Dairy 1 – Low supplement

- OAD full season
- DairyNZ System 1: 93% pasture fed
- 120 ha; 100 RG-WC pasture, 10 lucerne, 10 mixed-herb

Materials and methods

- **Dairy systems**
- Animal performance
- Feed quality records

Massey University Dairy 4 – High supplement

- TAD full season
- DairyNZ System 4: 55% pasture fed
- 250 ha; 100% RG-WC pasture with summer crop
- Maize and pasture silage, concentrate

Materials and methods

- Dairy systems
- **Animal performance**
- Feed quality records

Animal measurements

- Live weight

Tru-Test 2018®

Herd test records and milk sampling

- Milk production
- Milk solids composition
- Milk urea
- Somatic Cell Count

Tru-Test 2018®

Materials and methods

- Dairy systems
- Animal performance
- **Feed quality records**

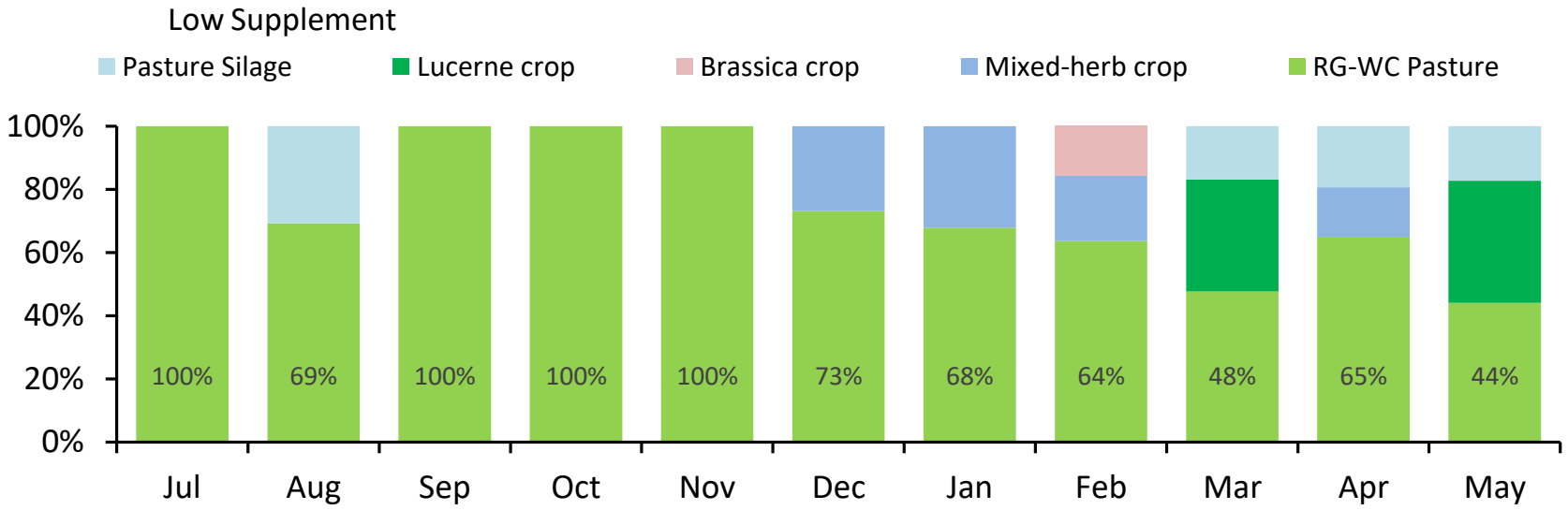
Pre- and Post-grazing for DM intake allocation

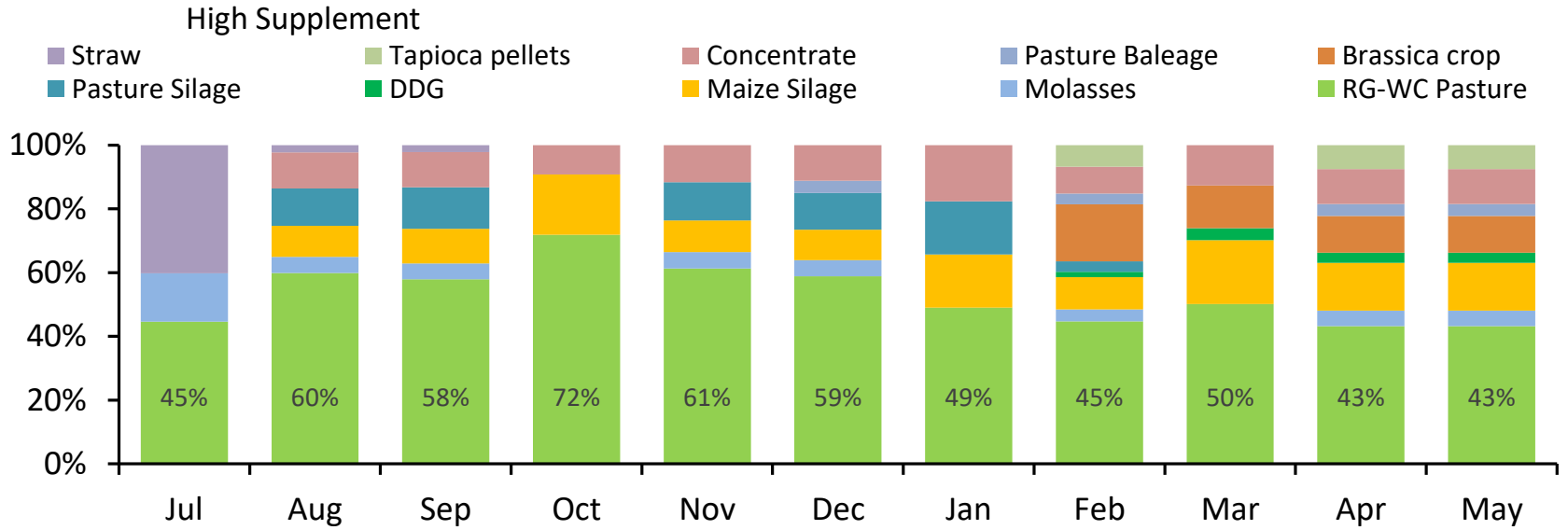
- Ryegrass – White clover pasture : Rising plate meter
- Crops: Quadrat cuts

Hand-plucking samples for feed quality

- Nutritive values
- Botanical composition
- % Dry Matter

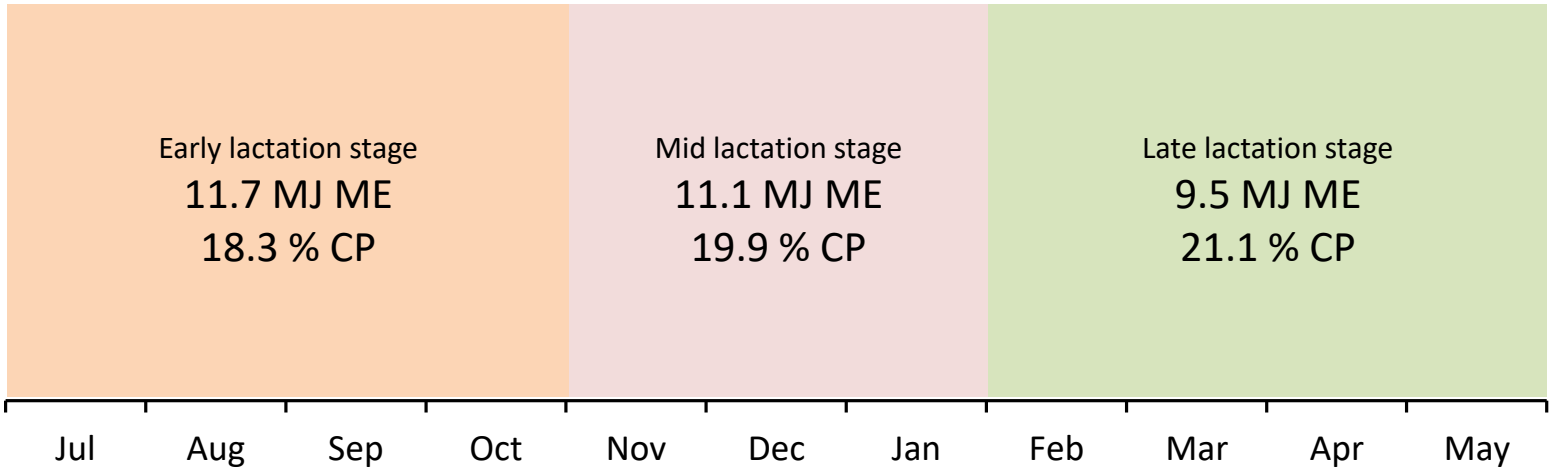
Results


Low Supplement
Pasture Silage
Lucerne crop
Brassica crop
Mixed-herb crop
RG-WC Pasture
100%
80%
60%
40%
20%
0%
100%
69%
100%
100%
100%
73%
68%
64%
48%
65%
44%
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May

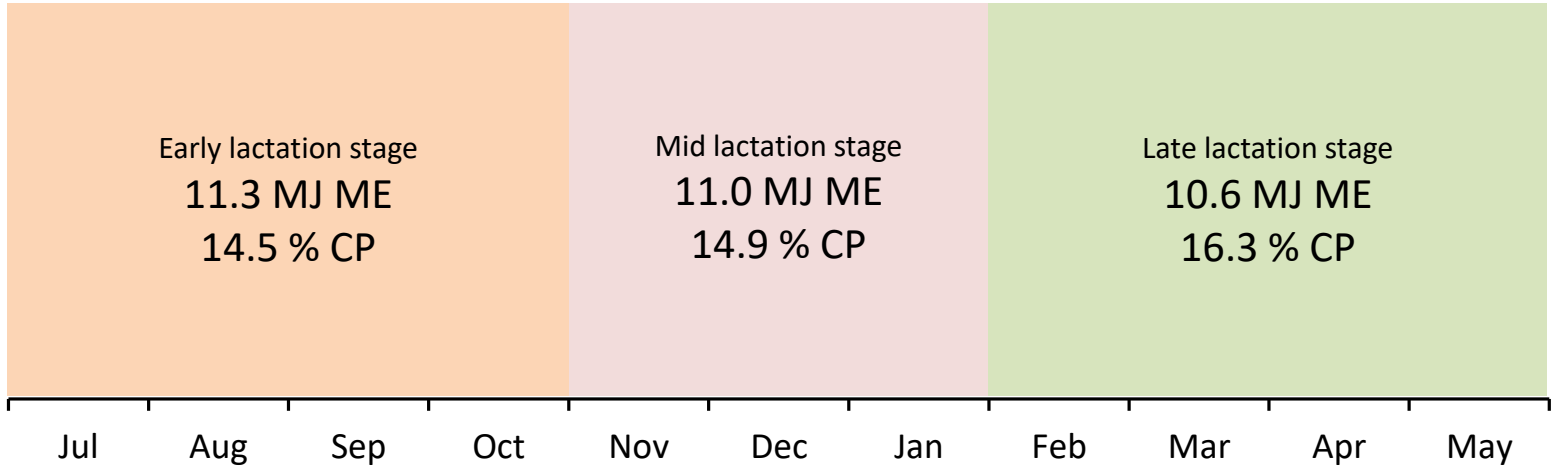

High Supplement
Straw
Tapioca pellets
Concentrate
Pasture Baleage
Brassica crop
Pasture Silage
DDG
Maize Silage
Molasses
RG-WC Pasture
100%
80%
60%
40%
20%
0%
45%
60%
58%
72%
61%
59%
49%
45%
50%
43%
43%
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May

Results

Low Supplement



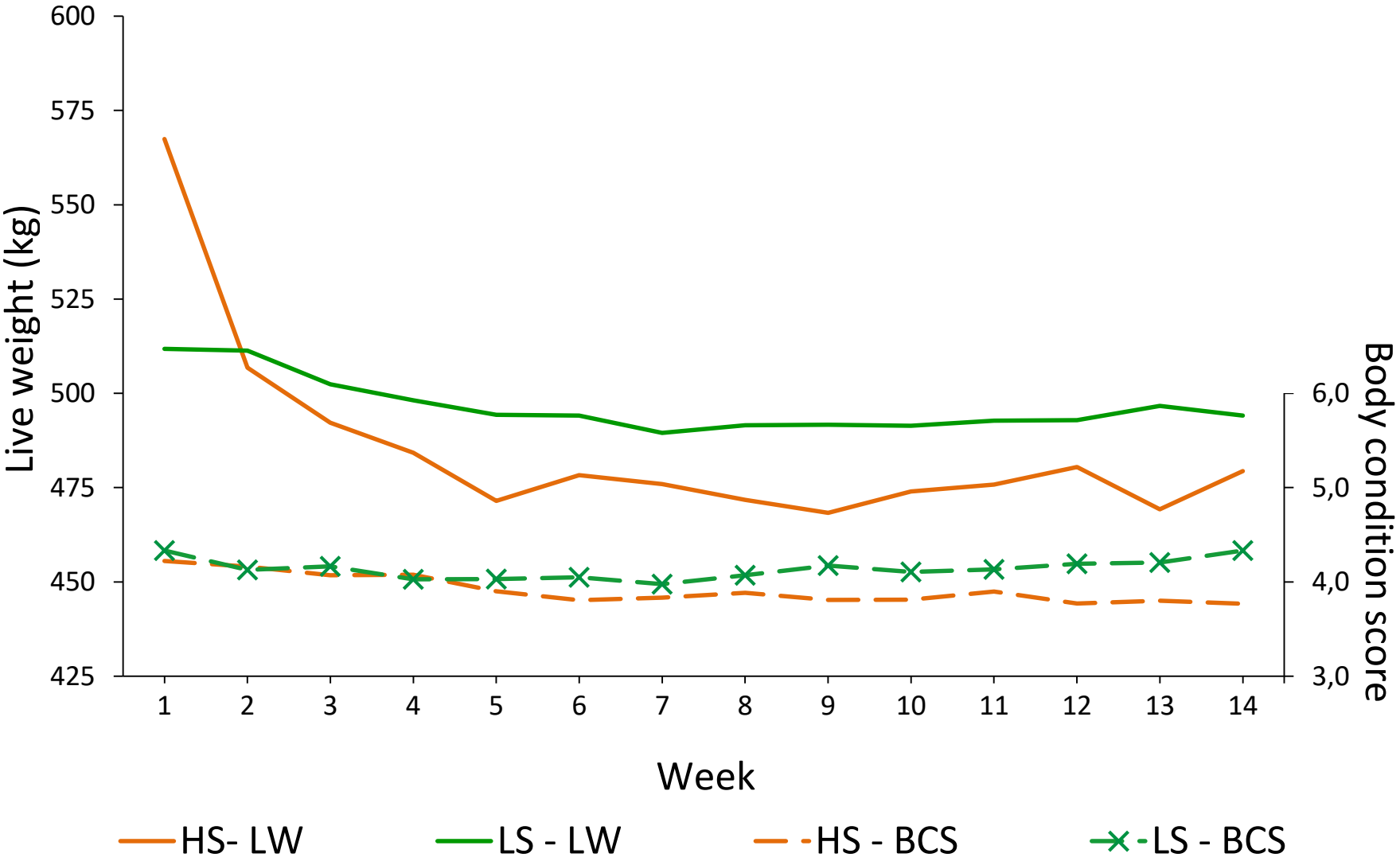
High Supplement



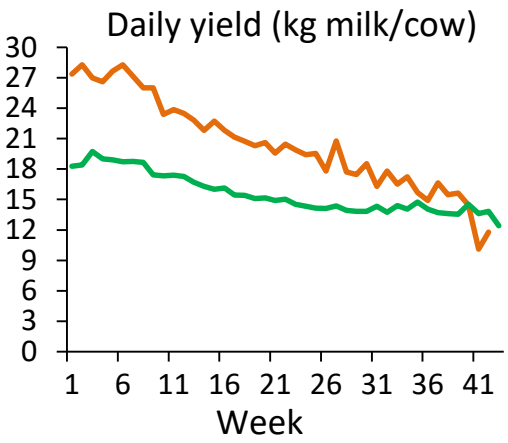
Results: cow performance (I)

	Low supplement	High supplement	*P*-value
N	258	210	
Days in milk	270	272	0.636
Live weight, kg	487	502	<0.001
BCS	4.6	4.2	<0.001
Milk yield, kg	4,206	5,387	<0.001
Milksolids yield, kg	385	448	<0.001
Fat yield, kg	216	247	<0.001
Protein yield, kg	170	202	<0.001
Lactose yield, kg	211	300	<0.001
CP intake, kg/cow/season	703	617	<0.001
Efficiency of CP utilization, %	25.3	33.6	<0.001
Milk urea, mg/dL	28.3	21.4	<0.001
Milk urea yield, g	1208	1269	0.111

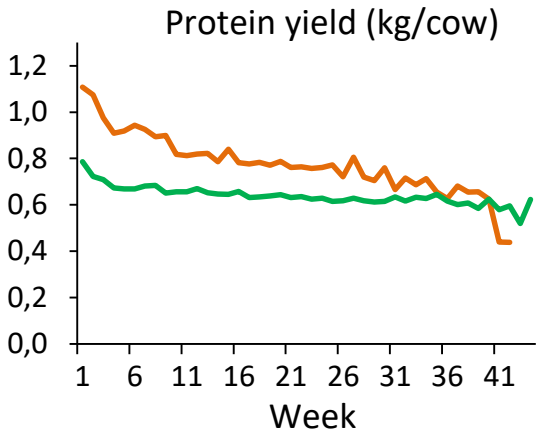
Results: cow performance (II)



Results

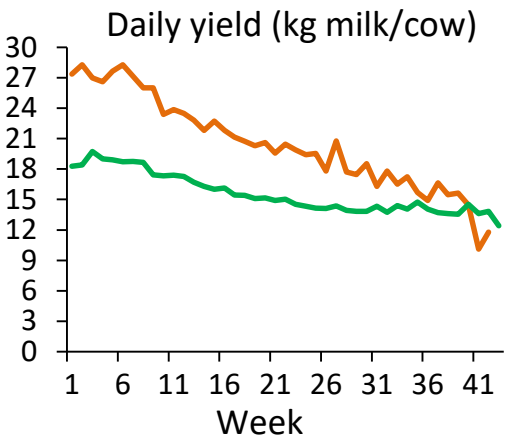


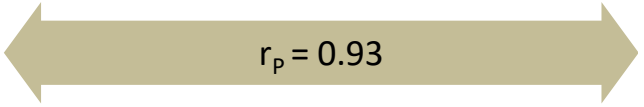
$r_P = 0.93$

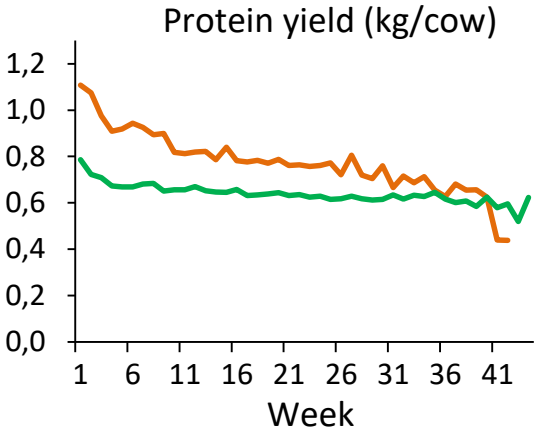


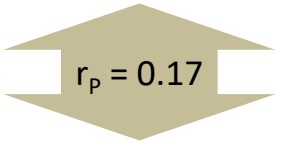
Low supplement
High supplement

Results


Daily yield (kg milk/cow)
30
27
24
21
18
15
12
9
6
3
0
1 6 11 16 21 26 31 36 41
Week


r_P = 0.93


Protein yield (kg/cow)
1,2
1,0
0,8
0,6
0,4
0,2
0,0
1 6 11 16 21 26 31 36 41
Week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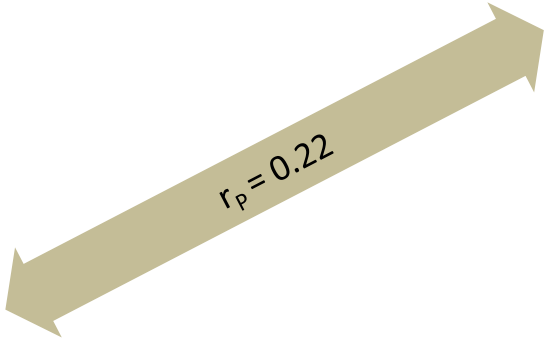
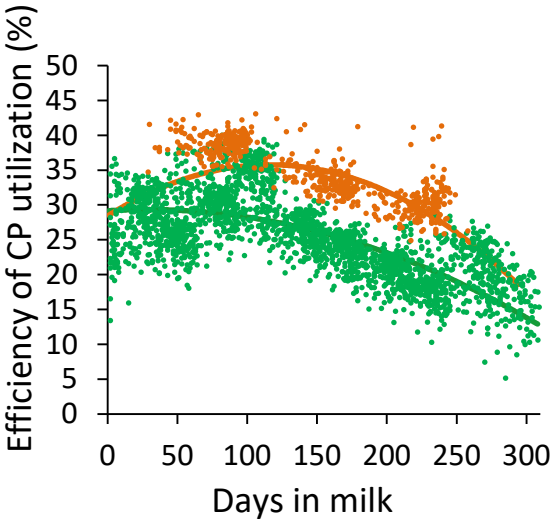
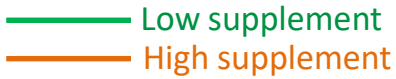
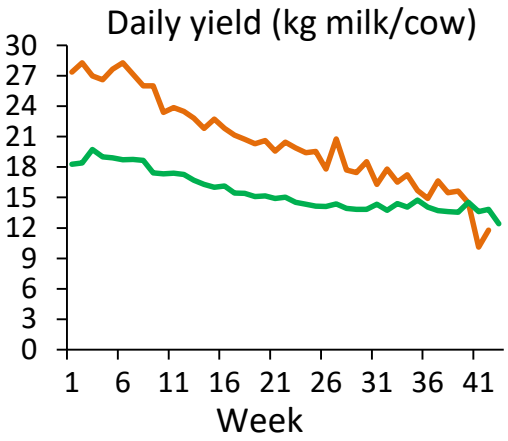
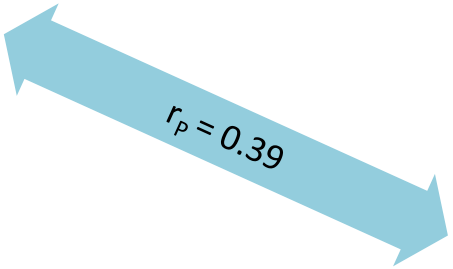

r_P = 0.22


Efficiency of CP utilization (%)
50
45
40
35
30
25
20
15
10
5
0
0 50 100 150 200 250 300
Days in milk


Low supplement
High supplement

Results


Daily yield (kg milk/cow)
30
27
24
21
18
15
12
9
6
3
0
1 6 11 16 21 26 31 36 41
Week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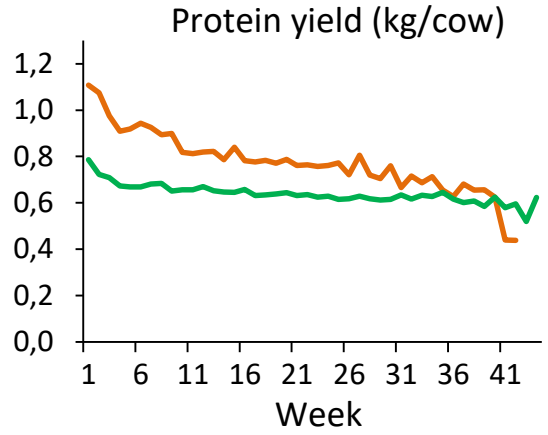
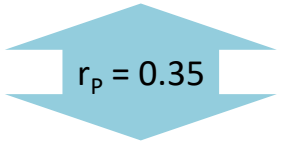
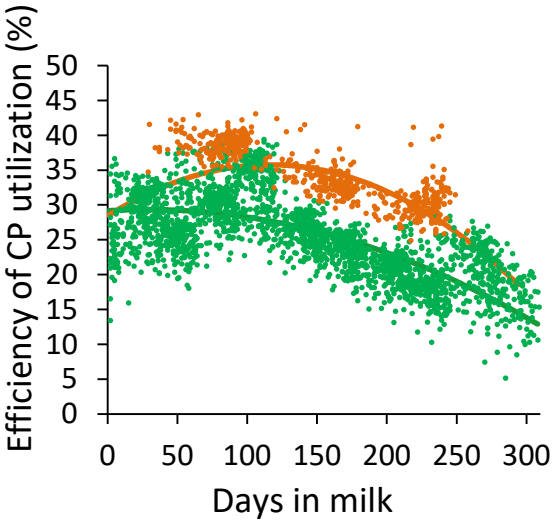
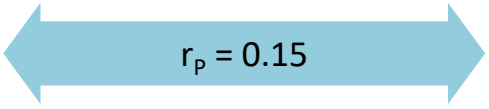
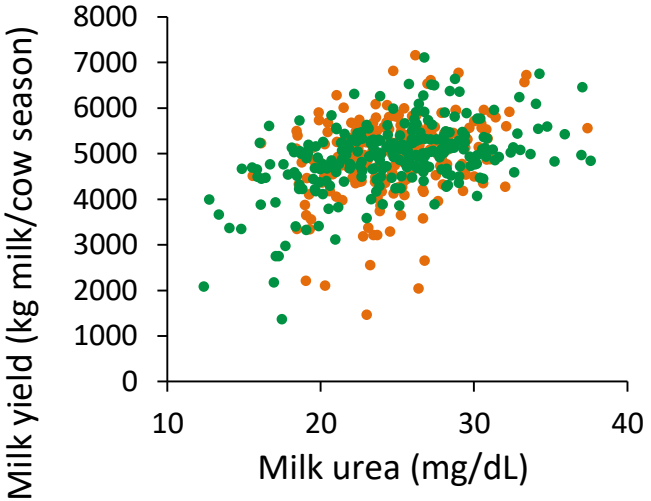
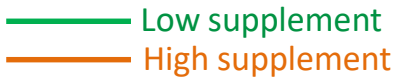

Protein yield (kg/cow)
1,2
1,0
0,8
0,6
0,4
0,2
0,0
1 6 11 16 21 26 31 36 41
Week


r_P = 0.35

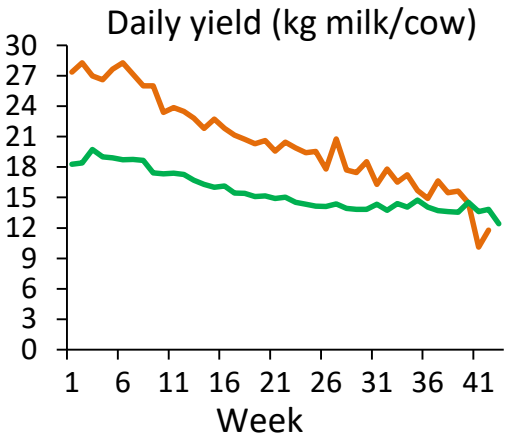

Efficiency of CP utilization (%)
50
45
40
35
30
25
20
15
10
5
0
0 50 100 150 200 250 300
Days in milk

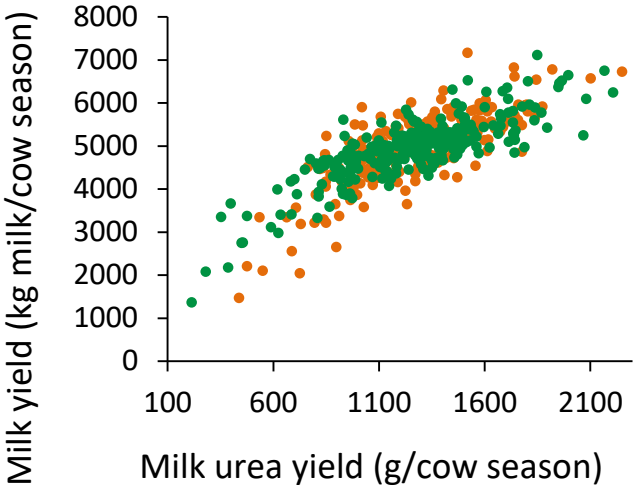

r_P = 0.15


Milk yield (kg milk/cow season)
8000
7000
6000
5000
4000
3000
2000
1000
0
10 20 30 40
Milk urea (mg/dL)


Low supplement
High supplement

Results

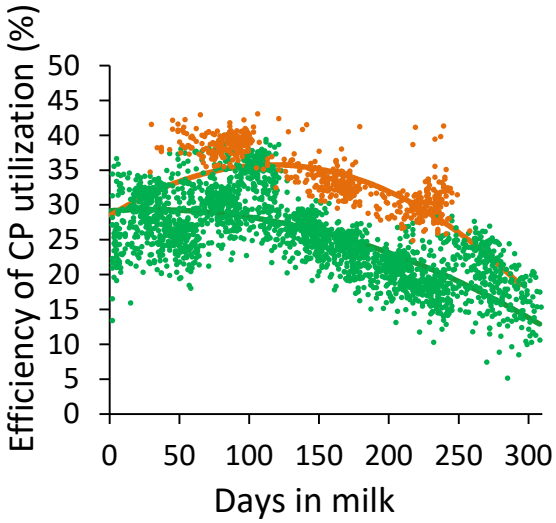


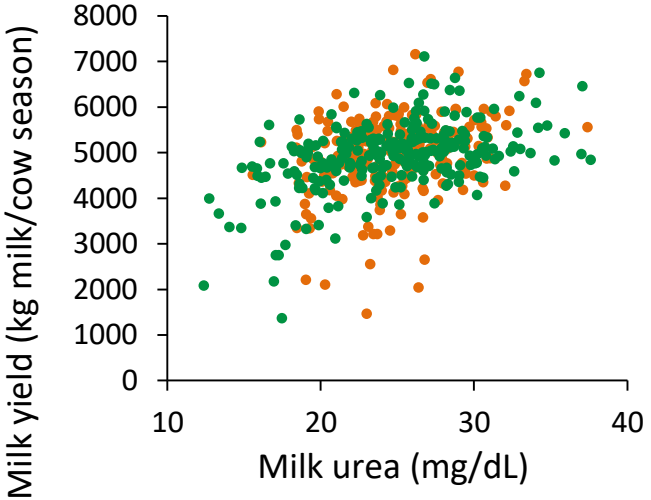


$r_P = 0.18$

$r_P = 0.80$

$r_P = 0.15$





Low supplement

High supplement

Conclusions

- Efficiency of CP utilization of low supplement herd was reduced due to lower milk yield and higher CP% in diet
- No clear linear association between the efficiency of CP utilization and MU
- Body reserves mobilization may contribute to N requirements
- Our definition of efficiency of CP utilization does not describe in full N use efficiency and N losses of grazing systems. Part of N not seen in milk may be stored in body reserves

Acknowledgements

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School of Veterinary Science

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