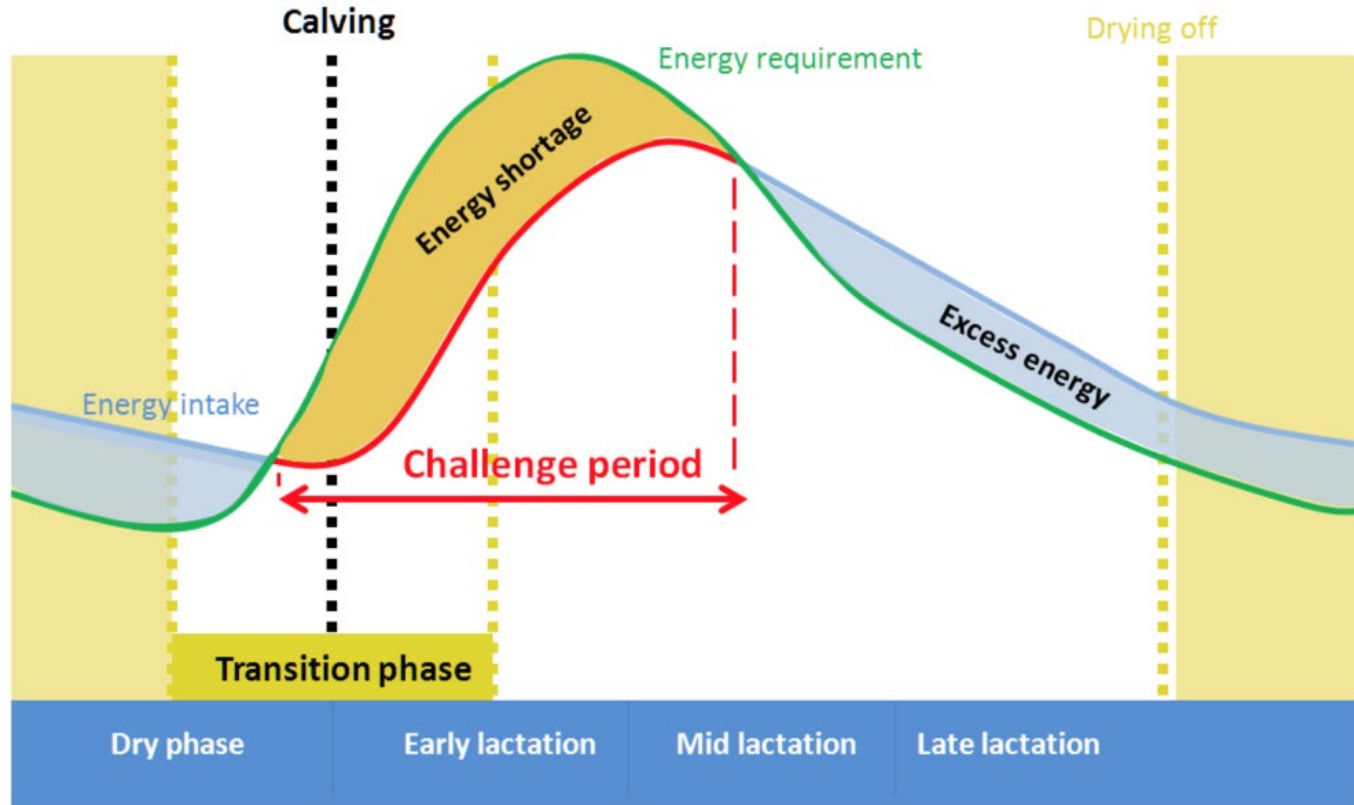


Predicting impaired postpartum health of dairy cows with dry cow blood serum profiles

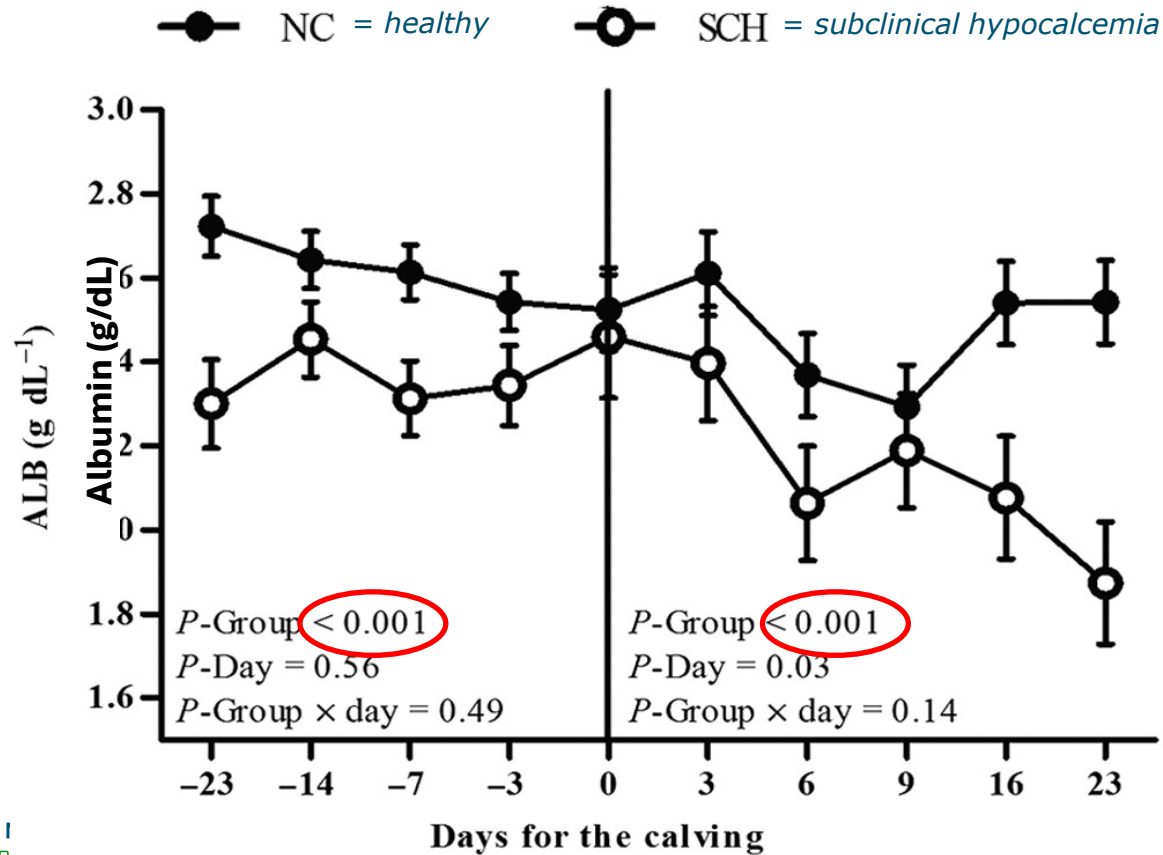
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The calving period



Metabolic changes around calving



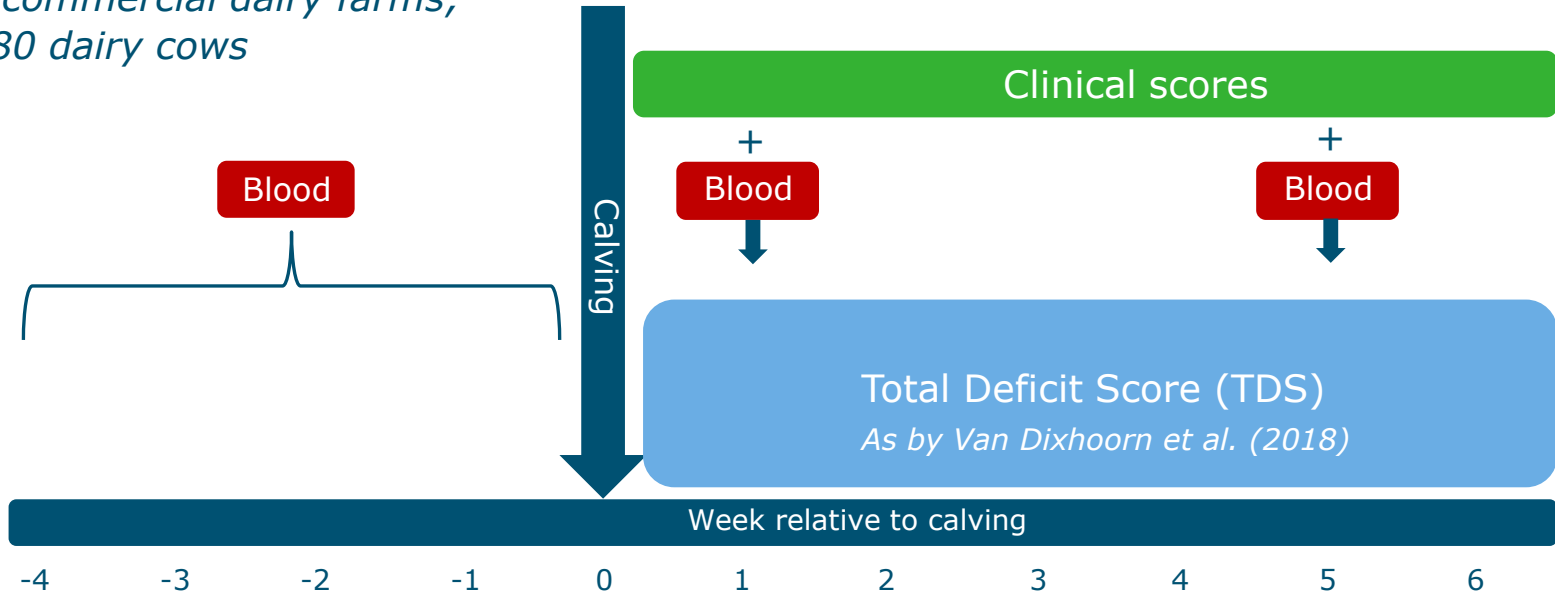
Study objective

To evaluate the predictive value of prepartum blood serum indicators for identification of dairy cows at an increased risk for impaired health after parturition.



Experimental set-up

4 commercial dairy farms;
180 dairy cows



TDS per farm and per parity group

Note: The lower the TDS, the healthier the cow!

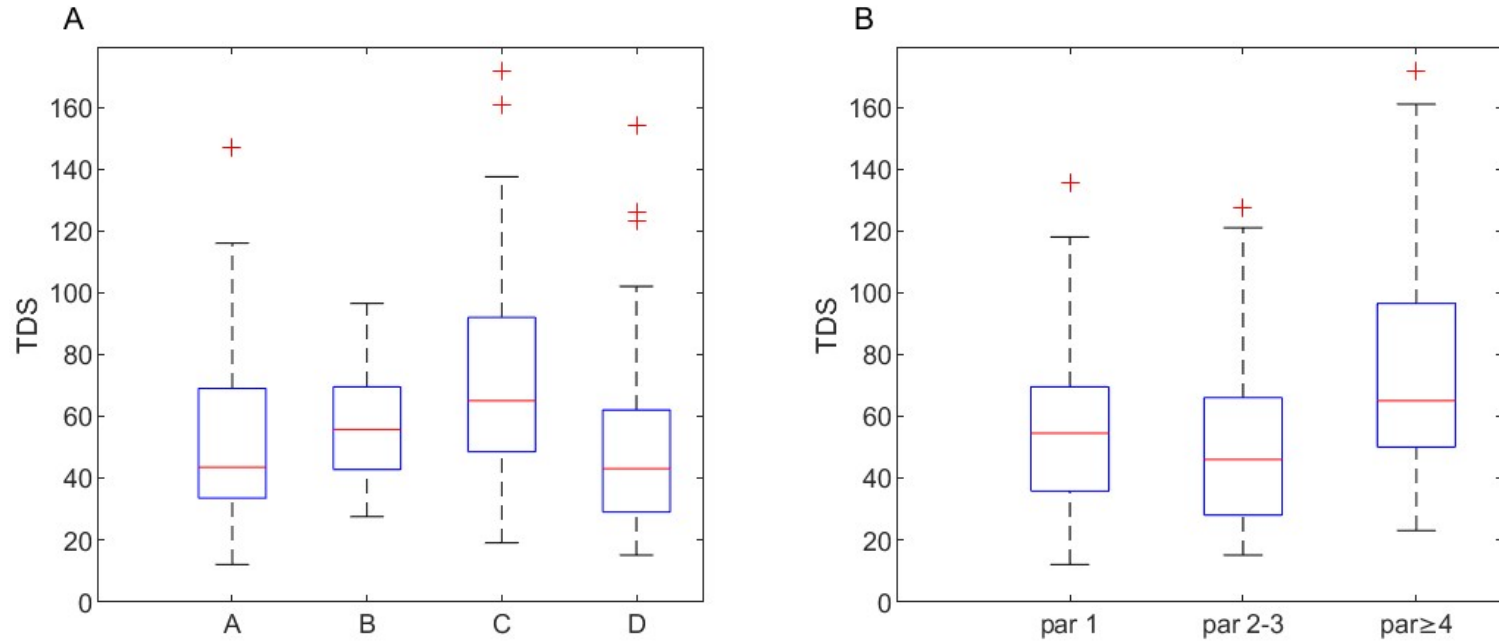


Fig 1. Total Deficit Score (TDS) per **(A)** farm, and **(B)** parity group

Categorisation of blood serum values

Table 1. Number of cows with a prepartum serum value within or outside the desired range

Variable	Type	# within range	# outside range	% outside range
Calcium (mmol/L)	Micro-mineral	179	1	1%
Phosphorus (mmol/L)	Micro-mineral	177	3	2%
Magnesium (mmol/L)	Micro-mineral	157	23	15%
β-hydroxybutyrate (mmol/L)	Energy balance	180	0	0%
Non-esterified fatty acids (mmol/L)	Energy balance	161	25	16%
Total protein > 85 (g/L)	Protein metabolism	166	14	8%
Urea (mmol/L)	Protein metabolism	147	39	27%
Albumin (g/L)	Protein metabolism	174	6	3%
Haptoglobin (g/L)	Inflammatory status	176	4	2%
Interleukin-6 (ng/mL)	Inflammatory status	152	25	16%
Albumin-globulin ratio	Inflammatory status	162	18	11%
Gamma-glutamyl transferase (IU/L)	Liver function	179	1	1%
Bilirubin (μmol/L)	Liver function	160	1	1%
Aspartate aminotransferase (IU/L)	Liver function	179	1	1%

Statistical methods



1) Univariate analysis:

- Single prepartum serum variables $\sim$ postpartum TDS + farm
- Categorical TDS: low TDS (n=138), high TDS (n=33), culled (n=9)

2) Multivariate analysis:

- postpartum TDS (continuous) $\sim$ subset of prepartum serum variables + parity group + farm
- $P < 0.20$ univariate analysis

Univariate analysis

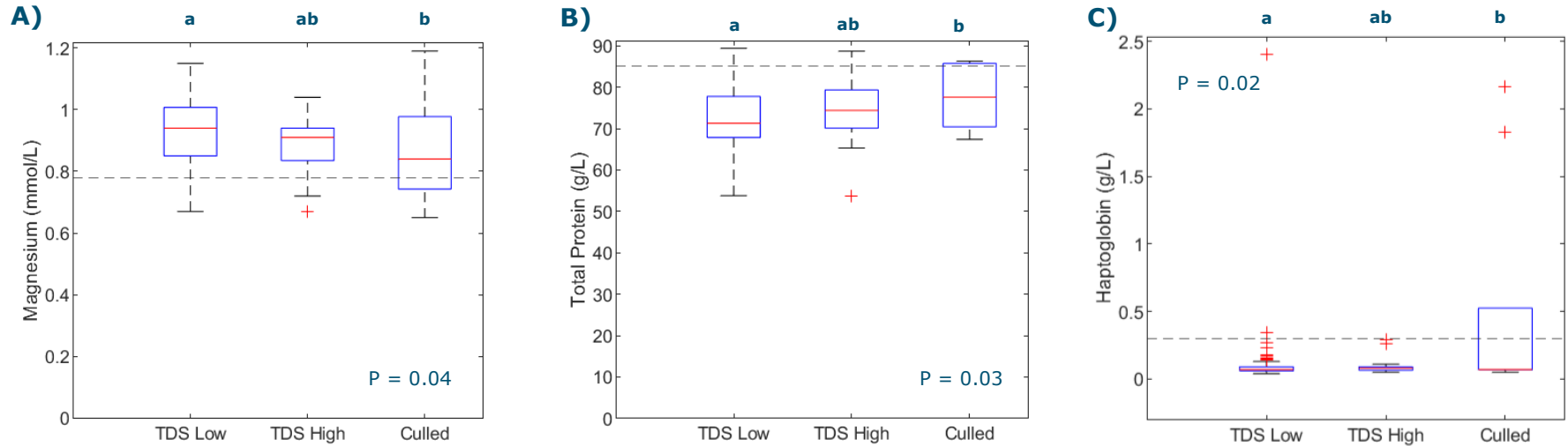


Fig 3. (A) Magnesium, **(B)** total protein, **(C)** haptoglobin concentrations per Total Deficit Score (TDS) group.

*Cows that were culled after calving had increased odds for prepartum **magnesium** values under the threshold, and **total protein** and **haptoglobin** values above the threshold than healthy cows.*

Multivariate analysis

Table 2. Final multivariate model for prediction of postpartum Total Deficit Score (TDS)

Predictor	Category	LSM (SEM) or β (SE)	P-value
Parity Group	1	1.84 ^b (0.07)	< 0.01
	2 - 3	1.79 ^b (0.07)	
	≥ 4	1.97 ^a (0.07)	
Albumin (g/L)		-0.30 (0.09)	0.01
Total protein (g/L)		0.28 (0.13)	0.03
Magnesium (mmol/L)		-0.13 (0.04)	0.01

Model performance:

Area under the curve = 68%

Model sensitivity = 15%

Model specificity = 97%

Take home message

- Cows that were culled after parturition had most distinctive prepartum blood serum profiles
- A multivariable predictive model could be useful on herd level, but not on individual cow level.



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