Subclinical ketosis in post-partum dairy cows fed a predominantly pasture-based diet: defining cut-points for diagnosis using concentrations of beta-hydroxybutyrate in blood and determining prevalence

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Supplementary Table 1. Optimal cut-point of concentration of beta-hydroxybutyrate (mmol/L of BHBA) in blood at different times post-calving for prediction of clinical disease from receiver operating characteristic (ROC) ^a analysis and univariable associations between categorical factors and incidence of clinical disease within 5 weeks post-calving.

Week post-calving	Optimal cut-point	ROC		Factor	Univariable
		AUC ^b	95% CI		p-value
0	1.05	0.49	(0.40, 0.59)		
1	0.70	0.56	(0.42, 0.70)		
2	4.10	0.52	(0.44, 0.61)		
3	0.40	0.33	(0.06, 0.60)		
4	NA	NA			
5	NA	NA			
Max BHBA ^c	NT				
				Age	0.29
				Breed	0.08
				BCS at calving	0.41
				Herd	0.03
				Region	0.00

^a Confidence intervals ≤ 0.5 were not considered associated with the outcome measure

^b Area under curve

^c Maximum concentration of BHBA in blood within 5 weeks post-calving

The content of this supplementary information has not been edited. All risk and liability rest with the authors.

Supplementary Table 2. Optimal cut-point of concentration of beta-hydroxybutyrate (mmol/L of BHBA) in blood at different times post-calving for prediction of purulent vaginal discharge from receiver operating characteristic (ROC) analysis ^a and univariable and multivariable associations between categorical factors and prevalence of purulent vaginal discharge at 5 weeks post-calving.

Week post-calving	ROC			Factor	Univariable	Multivariable
	Optimal cut-point	AUC ^b	95% CI		p-value	p-value
0	1.10	0.60	(0.51, 0.66)	BHBA at Wk 0 ≥ 1.0	<0.01	0.02
1	0.90	0.53	(0.45, 0.61)	BHBA at Wk 0 ≥ 1.2	<0.01	0.01
2	0.70	0.48	(0.41, 0.56)	BHBA at Wk 0 ≥ 1.4	<0.01	0.21
3	0.70	0.58	(0.50, 0.66)			
4	1.40	0.51	(0.42, 0.60)			
5	0.70	0.49	(0.41, 0.57)			
Max BHBA ^c	1.30	0.52	(0.44, 0.60)			
				Age	0.26	
				Breed	0.67	
				BCS at calving	0.00	0.05
				Herd	0.00	NT
				Region	0.00	0.00

^a Confidence intervals ≤ 0.5 were not considered associated with the outcome measure

^b Area under curve

^c Maximum concentration of BHBA in blood within 5 weeks post-calving

Supplementary Table 3. Optimal cut-point of concentration of beta-hydroxybutyrate (mmol/L of BHBA) in blood at different times post-calving for prediction of 6-week pregnancy rate from receiver operating characteristic (ROC) analysis^a and univariable and multivariable associations between categorical factors and 6-week pregnancy rate.

Week post-calving	ROC			Factor	Univariable	Multivariable
	Optimal cut-point	AUC ^b	95% CI		p-value	p-value
0	0.90	0.57	(0.51, 0.63)	BHBA at Wk 0 ≥1.0	0.07	0.14
1	1.20	0.53	(0.47, 0.60)			
2	0.70	0.52	(0.46, 0.58)			
3	1.30	0.55	(0.48, 0.61)			
4	1.70	0.53	(0.47, 0.60)			
5	1.20	0.53	(0.46, 0.60)			
Max BHBA ^c	1.70	0.57	(0.51, 0.62)	Max BHBA ≥1.2	0.05	0.01
				Max BHBA ≥1.4	0.05	0.05
				Max BHBA ≥1.6	0.04	0.05
				Max BHBA ≥1.8	0.03	0.05
				Age	0.37	
				Breed	0.19	0.27
				BCS at calving	0.39	
				Herd	0.00	NT
				Region	0.40	

^a Confidence intervals ≤0.5 were not considered associated with the outcome measure

^b Area under curve

^c Maximum concentration of BHBA in blood within 5 weeks post-calving

Supplementary Table 4. Optimal cut-point of concentration of beta-hydroxybutyrate (mmol/L of BHBA) in blood at different times post-calving for prediction of final pregnancy rate from receiver operating characteristic (ROC) analysis ^a and univariable associations between categorical factors and final pregnancy rate.

Week post-calving	ROC			Univariable	
	Optimal cut-point	AUC ^b	95% CI	Factor	p-value
0	1.10	0.52	(0.42, 0.62)		
1	2.10	0.57	(0.46, 0.67)		
2	0.65	0.51	(0.42, 0.60)		
3	1.20	0.44	(0.34, 0.54)		
4	1.60	0.46	(0.35, 0.57)		
5	2.80	0.38	(0.29, 0.48)		
Max BHBA ^c	1.80	0.55	(0.45, 0.65)		
				Age	0.50
				Breed	0.09
				BCS at calving	0.01
				Herd	0.00
				Region	0.01

^a Confidence intervals ≤ 0.5 were not considered associated with the outcome measure

^b Area under curve

^c Maximum concentration of BHBA in blood within 5 weeks post-calving

Supplementary Table 5. Optimal cut-point of concentration of beta-hydroxybutyrate (mmol/L of BHBA) in blood at different times post-calving for prediction of low quartile milk solids production at first test in lactation from receiver operating characteristic (ROC) analysis ^a and univariable and multivariable associations between categorical factors and milk solids production at the first test in lactation.

Week post-calving	ROC			Factor	Univariable	Multivariable
	Optimal cut-point	AUC ^b	95% CI		p-value	p-value
0	1.70	0.45	(0.38, 0.51)	BHBA at Wk 0 $\geq$ 1.8	0.12	0.08
1	3.10	0.41	(0.34, 0.48)			
2	0.60	0.53	(0.47, 0.59)			
3	6.70	0.42	(0.36, 0.48)			
4	1.60	0.50	(0.43, 0.57)			
5	0.10	0.35	(0.29, 0.41)			
Max BHBA ^c	2.80	0.51	(0.44, 0.57)			
				Age	<0.01	<0.01
				Breed	0.00	0.03
				BCS at calving	1.00	
				Herd	<0.01	NT
				Region	0.00	0.04

^a Confidence intervals ≤ 0.5 were not considered associated with the outcome measure

^b Area under curve

^c Maximum concentration of BHBA in blood within 5 weeks post-calving

Supplementary Table 6. Optimal cut-point of concentration of beta-hydroxybutyrate (mmol/L of BHBA) in blood at different times post-calving for prediction of low quartile mean daily milk solids production from receiver operating characteristic (ROC) analysis ^a and univariable and multivariable associations between categorical factors and mean daily milk solids production.

Week post-calving	ROC			Factor	Univariable	Multivariable
	Optimal cut-point	AUC ^b	95% CI		p-value	p-value
0	1.80	0.42	(0.34, 0.50)	BHBA at Wk 0 ≥1.8	0.03	0.14
1	2.80	0.46	(0.38, 0.55)			
2	0.60	0.48	(0.41, 0.55)			
3	6.70	0.43	(0.36, 0.51)			
4	1.10	0.56	(0.47, 0.64)			
5	0.50	0.35	(0.28, 0.42)			
Max BHBA ^c	1.60	0.52	(0.44, 0.60)	Max BHBA ≥1.8	0.11	0.90
				Age	<0.01	<0.01
				Breed	<0.01	0.39
				BCS at calving	1.00	
				Herd	<0.01	NT
				Region	<0.01	<0.01

^a Confidence intervals ≤0.5 were not considered associated with the outcome measure

^b Area under curve

^c Maximum concentration of BHBA in blood within 5 weeks post-calving

Supplementary Table7. Optimal cut-point of concentration of beta-hydroxybutyrate (mmol/L of BHBA) in blood at different times post-calving for prediction of removal from herd within 5 weeks post-calving from receiver operating characteristic (ROC) analysis ^a and univariable associations between categorical factors and removal from herd within 5 weeks post-calving.

Week post-calving	ROC			Univariable	
	Optimal cut-point	AUC ^b	95% CI	Factor	p-value
0	1.20	0.45	(0.32, 0.58)		
1	1.30	0.54	(0.40, 0.69)		
2	0.70	0.55	(0.42, 0.68)		
3	1.20	0.44	(0.29, 0.59)		
4	2.40	0.43	(0.28, 0.59)		
5	2.80	0.35	(0.21, 0.49)		
Max BHBA ^c	2.80	0.57	(0.43, 0.70)		
				Age	0.01
				Breed	0.06
				BCS at calving	0.06
				Herd	0.02
				Region	0.14

^a Confidence intervals ≤ 0.5 were not considered associated with the outcome measure

^b Area under curve

^c Maximum concentration of BHBA in blood within 5 weeks post-calving

Supplementary Figure 1. Plot of concentration of beta-hydroxybutyrate (BHBA) in blood by interval post-calving of 10 randomly selected cows from one herd, with horizontal dashed line (---) showing cut-point for diagnosis of subclinical ketosis (concentration of blood BHBA ≥ 1.2 mmol/L).