Supplemental Tables for: Case studies investigating the epidemiology of hyperketonemia in grazing dairy cows in early lactation: Incidence, prevalence, and time to resolution of hyperketonemia

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Herd Characteristics Among Farms

Associations among farms and herd characteristics (including age, calving season day, %Holstein-Friesian, BCS and BW precalving and at 5 wk postcalving, and change in BCS within 5 wk postcalving) were investigated using a two-way ANOVA performed using PROC MIXED with cow as a random effect, and the fixed effect of farm. Precalving BCS recording day was included as a covariate in the models described below where precalving BCS, change in BCS, and farm by week associations with BCS were the outcomes of interest. Precalving BW recording day was included as a covariate where precalving BW and farm by week associations with BW were the outcomes of interest. This was due to the difference in days relative to calving these measures were recorded among farms. Further, to investigate the associations between milk yield, ECM yield and components (fat and protein) within the first 15 weeks in milk, a repeated measures ANOVA was performed using PROC MIXED with cow as a random effect, and the fixed effect of farm, week, and their interactions. The htype=1 option was specified to include the fixed effects sequentially. The covariance structures selected were compound symmetry based on the lowest Akaike's information criterion. All variables were checked for skewness and to meet the assumption of normal distribution of the residuals. All results are presented as LSM ± SEM in the text, tables, and figures and pairwise comparisons were Tukey-adjusted.

Supplemental Table S1. Description of the population of 980 Holstein-Friesian grazing dairy cows across 3 New Zealand farms that were undergoing repeated testing for HYK (blood BHB ≥1.2 mmol/L) from 1 to 35 DIM. Least squares mean (SEM) for cow characteristics, BCS, BW, daily milk and ECM yield and fat and crude protein components.

Variable	Farm A	Farm B	Farm C	*P*-value[1]
n (cows)	297	256	427	
Age, yr	4.7 (0.2)	4.5 (0.2)	4.5 (0.1)	0.67
Calving season day,[2] d	20.9 (0.73)[b]	14.5 (0.78)[a]	14.5 (0.78)[a]	<0.001
Holstein-Friesian,[3] %	92.0 (0.75)[b]	98.9 (0.81)[c]	57.9 (0.63)[a]	<0.001
Precalving BCS,[4] units	4.77 (0.08)[a]	4.88 (0.08)[b]	5.40 (0.04)[c]	<0.001
Precalving BW,[4] kg	519 (11.8)[a]	561 (12.1)[b]	574 (7.74)[b]	<0.01
Postcalving BCS,[5] units	4.16 (0.02)[a]	4.06 (0.02)[b]	4.91 (0.02)[c]	<0.001
Postcalving BW,[5] kg	456 (3.62)[a]	482 (3.83)[b]	477 (2.96)[b]	<0.001
ΔBCS Pre to 5 wk postcalving[6]	–0.77 (0.07)[b]	–0.98 (0.07)[a]	–0.54 (0.03)[c]	<0.001
Production Outcomes[7]				
Milk yield, kg/d	20.0 (0.27)[a]	20.9 (0.28)[a]	26.0 (0.19)[b]	<0.001
ECM yield, kg/d	20.7 (0.28)[a]	21.7 (0.30)[b]	30.1 (0.23)[c]	<0.001
Fat yield, kg/d	0.85 (0.01)[a]	0.89 (0.01)[a]	1.28 (0.01)[b]	<0.001
Crude protein, kg/d	0.70 (0.01)[a]	0.73 (0.01)[a]	1.03 (0.01)[b]	<0.001
Fat, %	4.24 (0.03)[a]	4.30 (0.03)[a]	4.98 (0.02)[b]	<0.001
Crude protein, %	3.52 (0.01)[a]	3.51 (0.01)[a]	3.97 (0.01)[b]	<0.001

[1]Models included the fixed effect of farm, week, and their interactions. *P*-values indicate the effect of farm.
[2]Calving season day within farm was calculated as the difference between actual calving date for the individual cow and the planned start of seasonal calving date for the herd.
[3]Breed is presented as the percentage Holstein-Friesian due to the unknown contribution of Jersey among farms. The median value is presented as this data is not normally distributed due to a maximum of 100%.
[4]BCS on a 10-point scale, where 1 is emaciated and 10 is obese (Roche et al., 2004). Precalving BW and BCS includes one record per cow within –6 ± 5 d and –10 ± 9 d precalving (mean day precalving ± SD), respectively. For Farms A and B, the mean day precalving that BCS and BW data were recorded was –4 ± 2 d and –4 ± 2 d, respectively. For Farm C, the mean day precalving that BCS and BW data were recorded was –19 ± 9 d and –13 ± 8 d, respectively.
[5]Postcalving BW and BCS at 5 wk postcalving.
[6]The difference in postcalving BCS at 5 wk postcalving and the precalving BCS measure.
[7]Mean daily milk yield, ECM, fat and protein yield and fat and protein components within the first 15 weeks in milk.