



# Prevalence and impacts of subclinical ketosis detected by mid infra-red analysis of BHB in DHI milk samples



D.E. Santschi, R.K. Moore and D.M. Lefebvre

Valacta, Ste-Anne-de-Bellevue, Quebec, Canada

Contact: dsantschi@valacta.com

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## Introduction

Subclinical ketosis is a common early lactation disorder. Herd prevalence is often unknown because there are no specific clinical symptoms and because individual testing of dairy cows can be costly and time consuming. Since October 2011, Valacta (Dairy Centre of Expertise, Quebec and Atlantic Canada) offers routine infra-red (FTIR) testing of  $\beta$ -hydroxybutyrate (BHB) in DHI milk samples. The objective of this study was to analyze ketosis prevalence in our dairy cow population as well as to determine impacts of ketosis on production and reproduction.

## Materials and Methods

Based on a previously published trial comparing blood and milk BHB concentrations (Denis-Robichaud et al., J. Dairy Sci. 2014), threshold levels for milk BHB levels were established as follows:

- $\geq 0.20$  mM BHB: **ketotic (POS)**
- $< 0.15$  mM BHB: **non-ketotic (NEG)**
- intermediate BHB: **potentially ketotic (SUSP)**

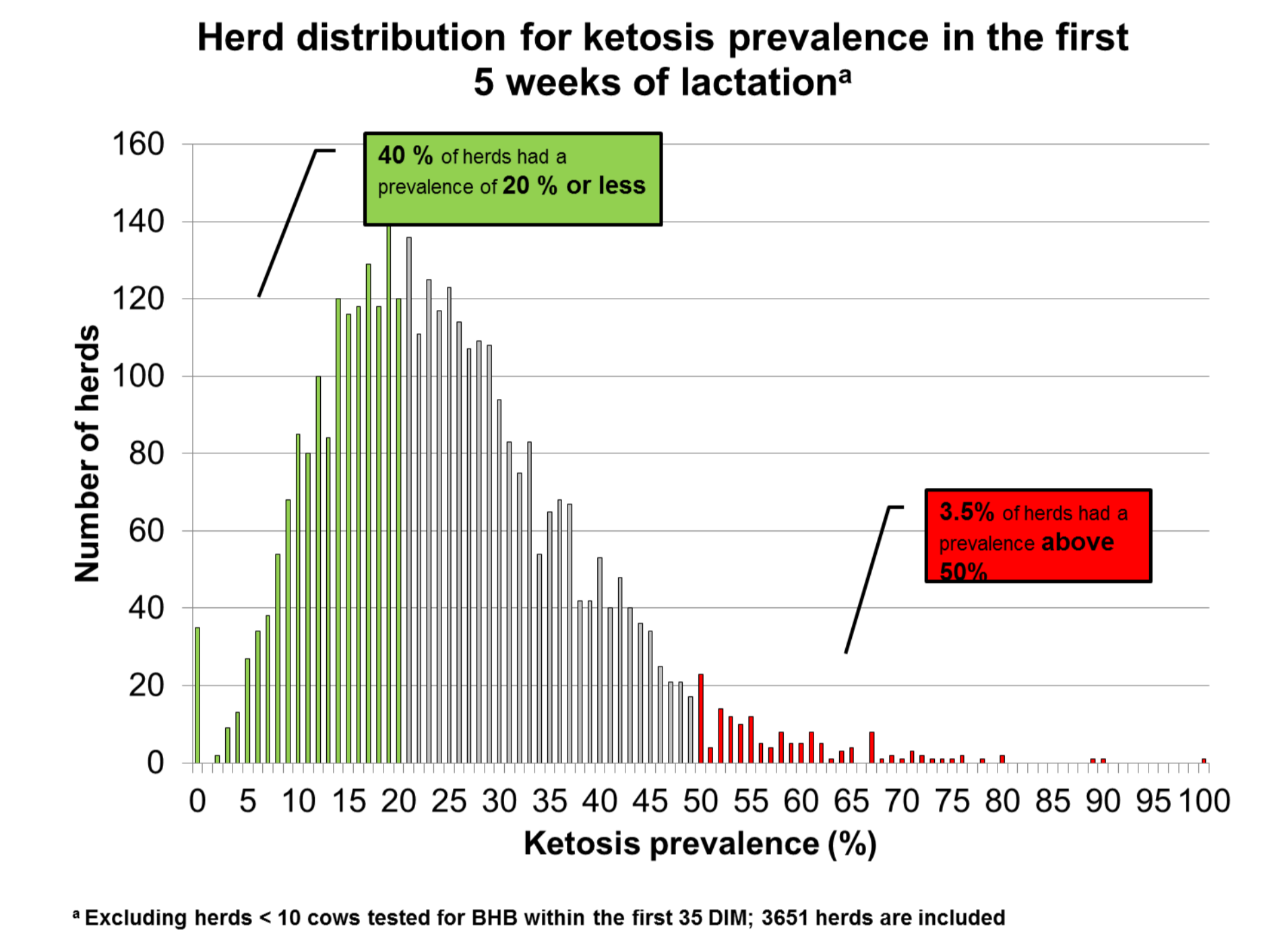
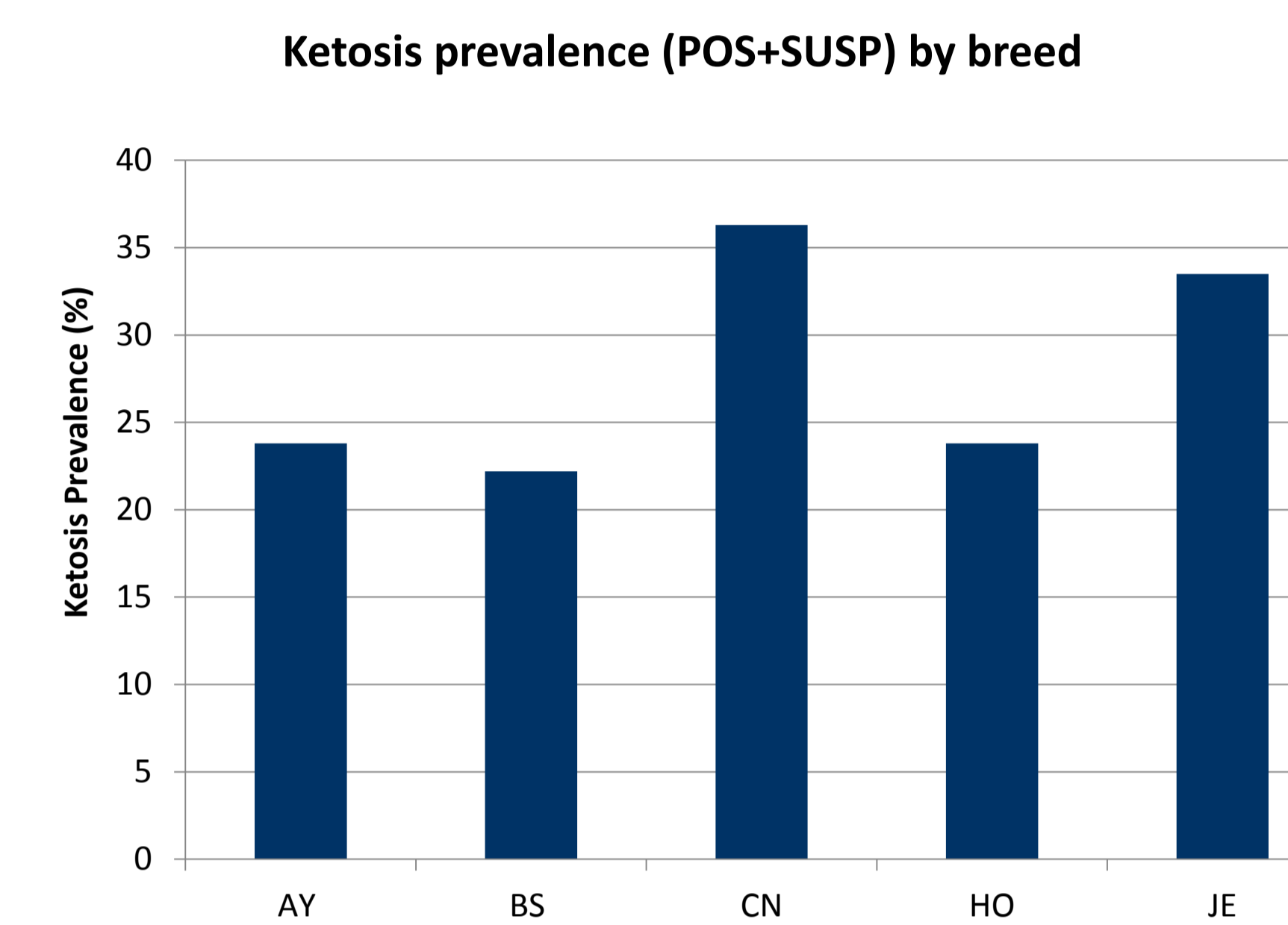
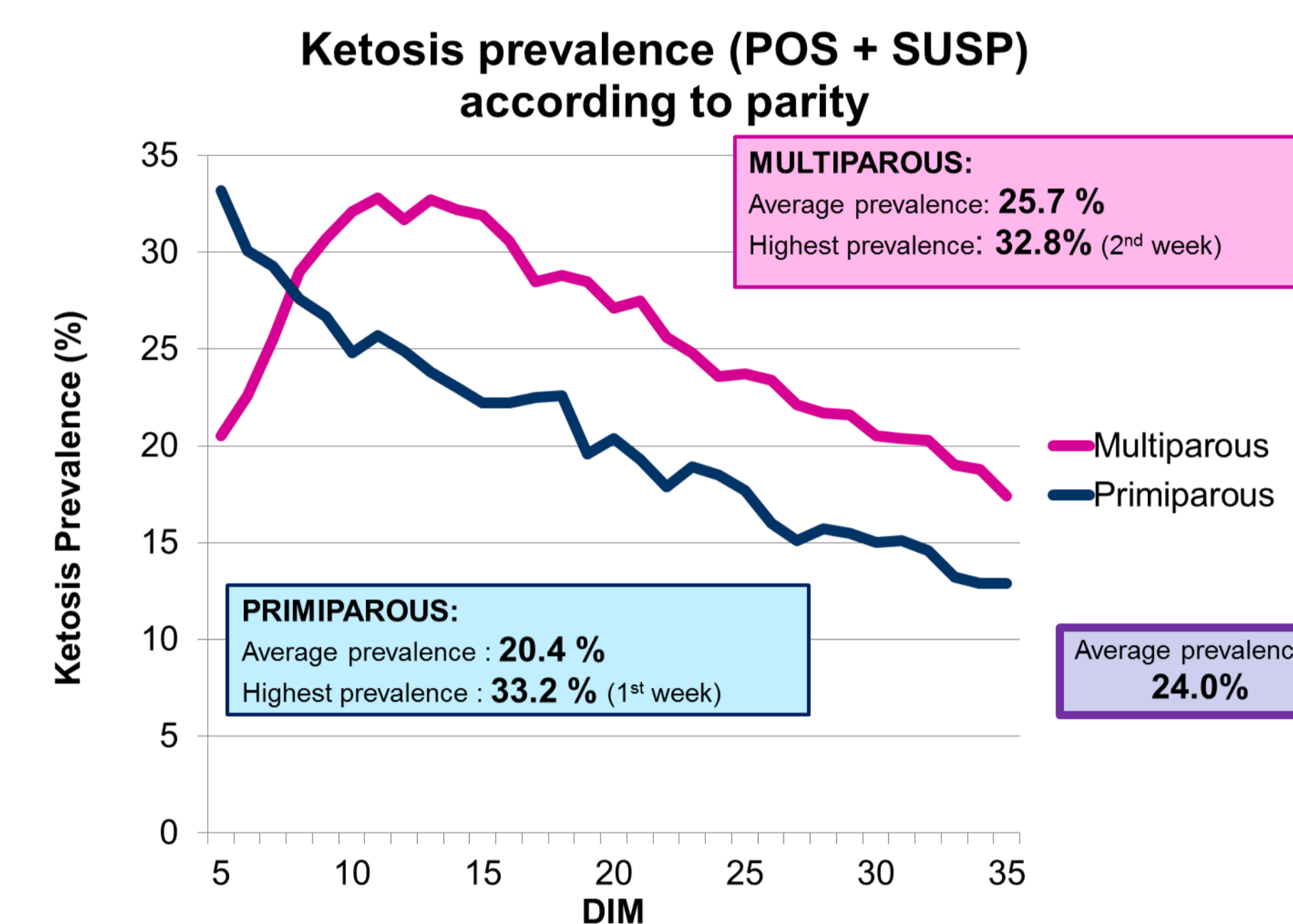
Over 1,200,000 samples from 4258 herds in Quebec, Canada were tested, of which 347,367 were from cows between 1 and 40 DIM (111,357 primiparous and 236,010 multiparous cows).

## Conclusion

Results suggest different patterns of ketosis prevalence according to week of lactation for primiparous compared to multiparous cows as well as for different breeds. There was also a wide distribution of prevalence among herds. Ketosis status influenced milk yield and composition, reproductive performance as well as chances of staying in the herd until 100 DIM or until the next lactation. Cows positive at 0-20 or 21-40 DIM showed different responses on pregnancy and culling rates, but results strongly suggest that cows should be tested for ketosis at least until 40 DIM. In this regard, routine testing for herd ketosis prevalence in DHI milk samples is an interesting herd diagnosis tool for producers.

## Results

### Ketosis prevalence:

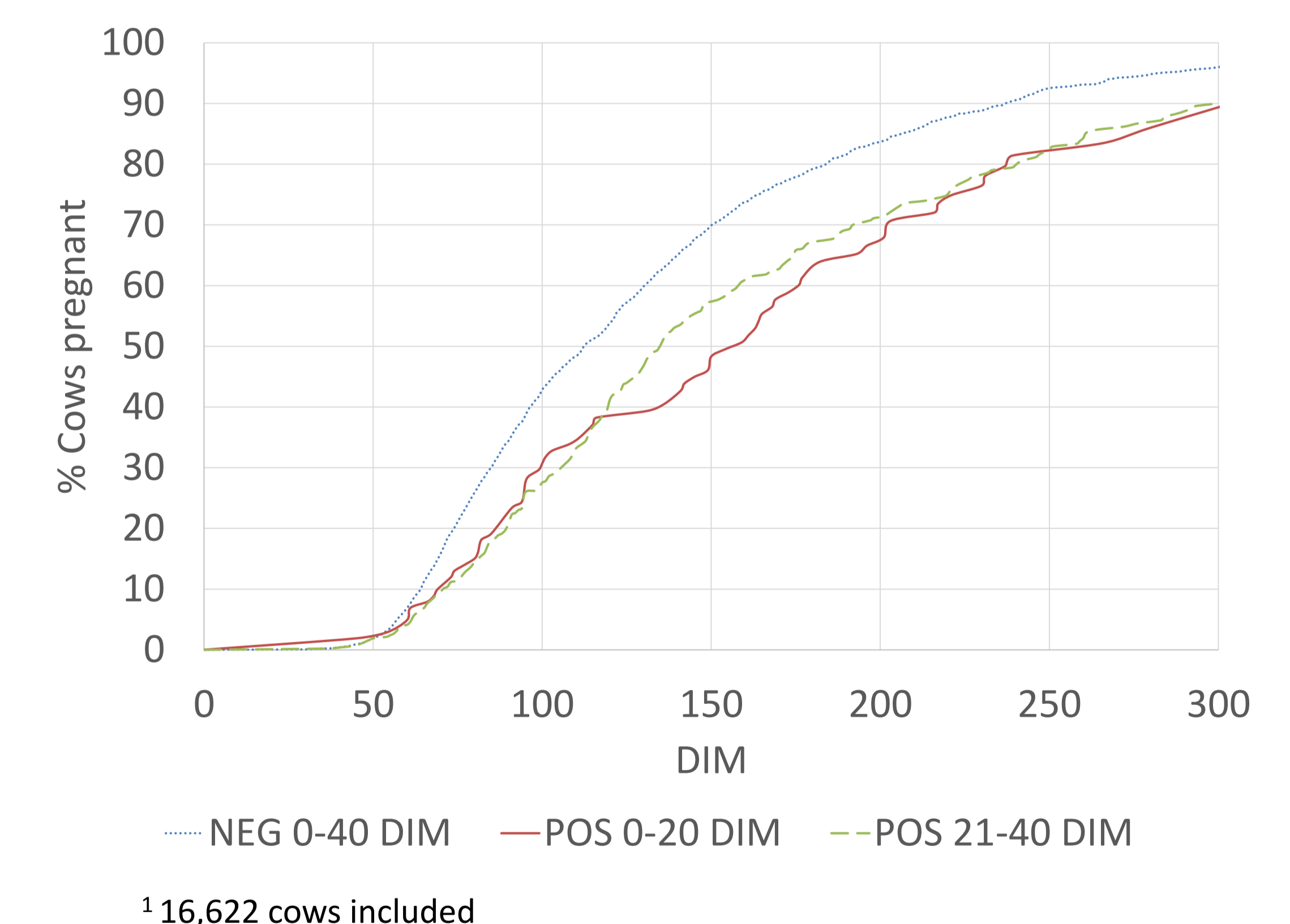


### Impacts of BHB status on production and reproduction:

	POS	SUSP	NEG	SE	P
<b>Test Day Milk Yield and Components (N=347,367)</b>					
Milk yield (kg/d)	30.1 <sup>a</sup>	32.3 <sup>b</sup>	32.5 <sup>b</sup>	0.2	0.001
Fat (%)	5.07 <sup>c</sup>	4.62 <sup>b</sup>	4.10 <sup>a</sup>	0.02	0.001
Protein(%)	3.19 <sup>b</sup>	3.17 <sup>a</sup>	3.25 <sup>c</sup>	0.01	0.001
SCC (1000 cells)	360 <sup>c</sup>	318 <sup>b</sup>	232 <sup>a</sup>	23	0.001
Urea (mg N/dL)	9.2 <sup>a</sup>	10.0 <sup>b</sup>	10.5 <sup>c</sup>	0.1	0.001
Protein:Fat ratio	0.65 <sup>a</sup>	0.71 <sup>b</sup>	0.82 <sup>c</sup>	0.01	0.001
TCI <sup>®1</sup>	-68 <sup>a</sup>	202 <sup>b</sup>	189 <sup>b</sup>	40	0.001
<b>305d Milk Yield and Components (N=16,622)</b>					
305d Milk yield (kg)	9495 <sup>c</sup>	9538 <sup>b</sup>	9357 <sup>a</sup>	12	0.001
305d Fat yield (kg)	378 <sup>c</sup>	375 <sup>b</sup>	364 <sup>a</sup>	0.5	0.001
305d Prot yield (kg)	300 <sup>a</sup>	303 <sup>b</sup>	303 <sup>b</sup>	0.4	0.001
305d Fat %	4.00 <sup>c</sup>	3.95 <sup>b</sup>	3.91 <sup>a</sup>	0.01	0.001
305d Protein %	3.16 <sup>a</sup>	3.18 <sup>b</sup>	3.26 <sup>c</sup>	0.01	0.001
Protein:Fat ratio	0.78 <sup>a</sup>	0.81 <sup>b</sup>	0.83 <sup>c</sup>	0.01	0.001
<b>Reproduction and culling (N=16,622)</b>					
Calving to first service	85.8 <sup>b</sup>	84.2 <sup>b</sup>	82.0 <sup>a</sup>	0.7	0.001
Nb services /conception	2.23 <sup>c</sup>	2.08 <sup>b</sup>	1.88 <sup>a</sup>	0.01	0.001
Non-Return Rate	0.58 <sup>a</sup>	0.60 <sup>a</sup>	0.63 <sup>b</sup>	0.01	0.001
First service to conception	41.4 <sup>b</sup>	36.9 <sup>b</sup>	30.9 <sup>a</sup>	0.4	0.001
Days Open	154.0 <sup>b</sup>	146.6 <sup>b</sup>	130.7 <sup>a</sup>	3.8	0.001
Culling rate (before 100 DIM)	28.8 <sup>b</sup>	26.1 <sup>b</sup>	14.2 <sup>a</sup>	1.8	0.001
Culling rate (lactation)	42.8 <sup>b</sup>	39.2 <sup>b</sup>	30.3 <sup>a</sup>	1.9	0.001

<sup>a,b,c</sup> Means within the same row with different superscripts differ;  $P \leq 0.05$   
<sup>1</sup> Transition Cow Index (TCI<sup>®</sup>), calculated for multiparous cows only, N=236,010

### Proportion of cows pregnant according to DIM at ketosis diagnosis<sup>1</sup>:



### Culling rate before 100 DIM according to DIM at diagnosis<sup>1</sup>:

	NEG 0-40	POS 0-20	POS 21-40	P
Primiparous	7.7	9.1	6.2	0.08
Multiparous	10.2	15.1	9.9	0.001

<sup>1</sup> 119,229 cows included