

Real-time analyses of BHB in milk can monitor ketosis and it's impact on reproduction in dairy cows



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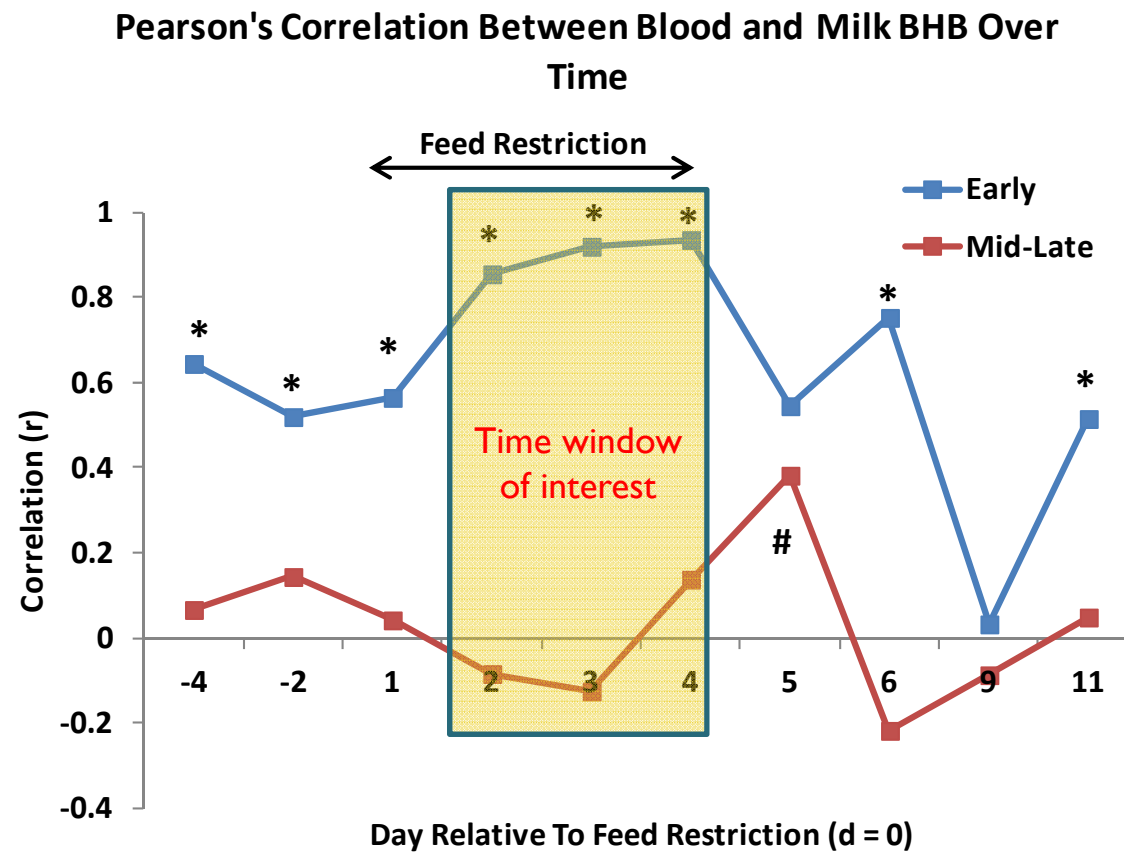
Outline of presentation

- Definitions
- Herd Navigator® – the biomodel and ketosis risk
- Ketosis in three selected herds
- Implications of subclinical ketosis for production and reproductive performance
- Conclusions

Definitions of ketosis

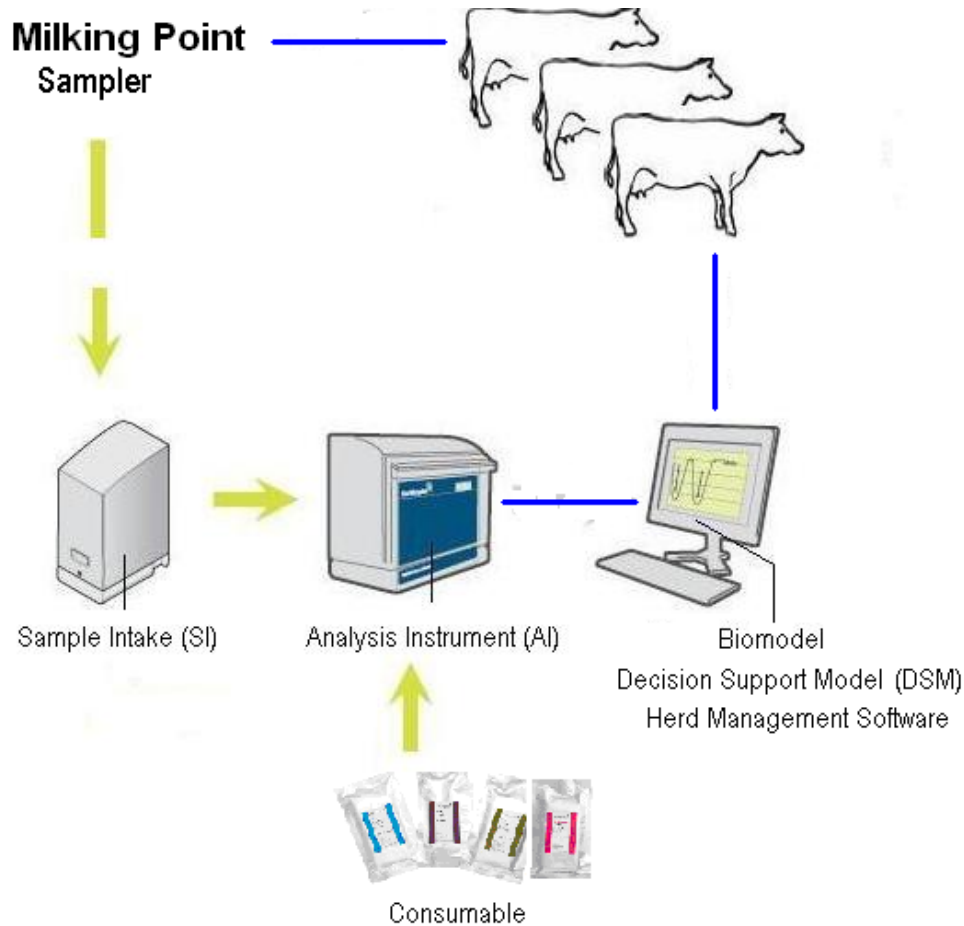
- Ketosis, a common disorder in cows within the first month after calving, defined by elevated levels of ketone bodies in blood (Gold Standard for ketosis), urine and milk
- Prevalence: Vary among herds, 4-20 %. Recent European study: 21.8 % (11.2-36.6 %) (Suthar et. al. 2013)
Clinical signs: Reduced appetite, milk yield drop, loss of weight, hypoglycemia and hyperketonemia.
- Subclinical ketosis: β -Hydroxy Butyrate (BHB) levels: Blood: ≥ 1.2 mM , milk: ≥ 0.12 mM

Reliability of milk BHB for ketosis monitoring:



Bjerre-Harpøth et al. 2013, unpublished

General layout of Herd Navigator®



Herd Navigator is a proactive herd management system

Reproduction (progesterone)

- Heat
- Pregnancy
- Reproduction disorders

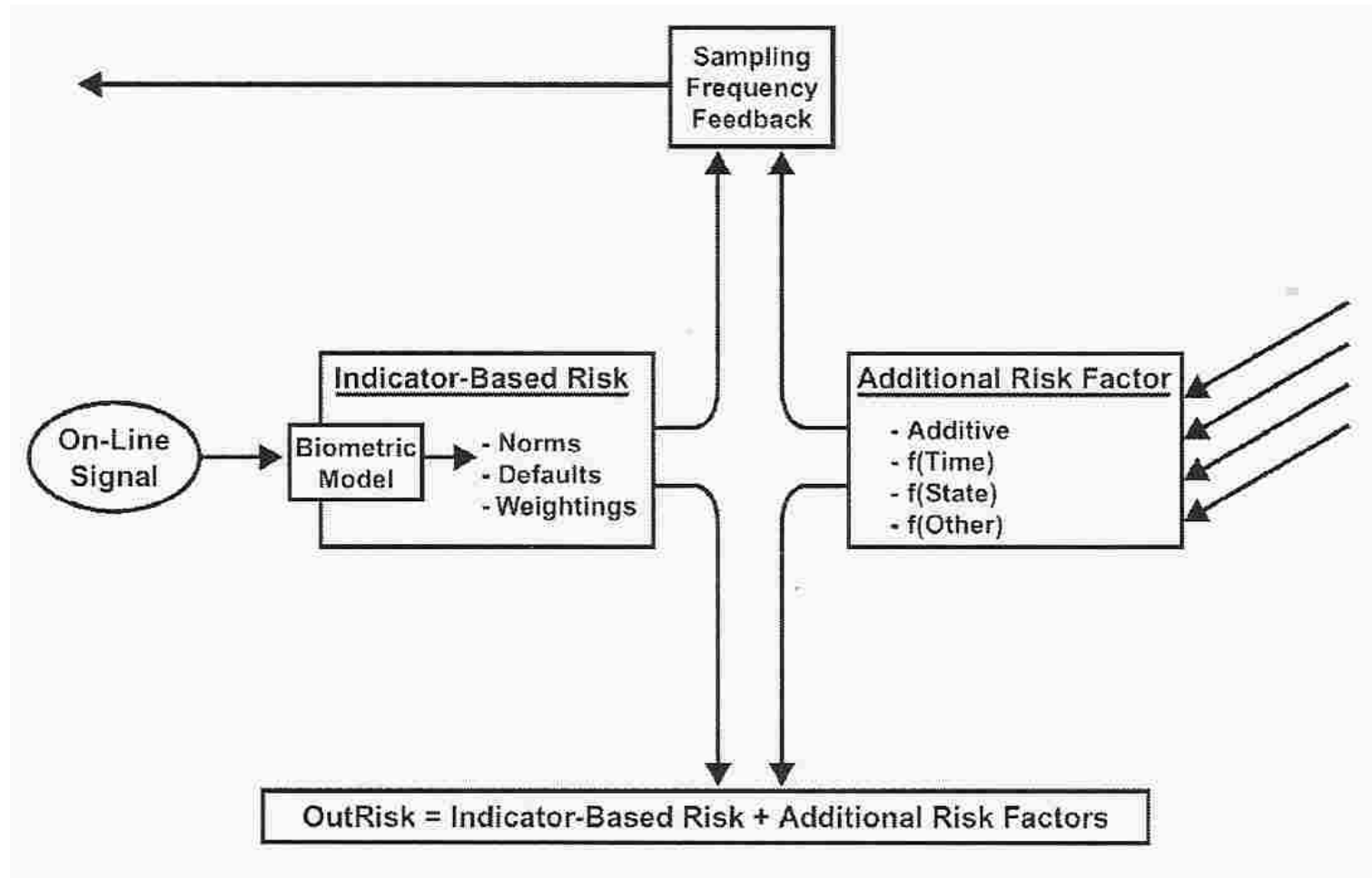
Health

- Mastitis (LDH)
- Ketosis (BHB)

Feed Balance (urea)

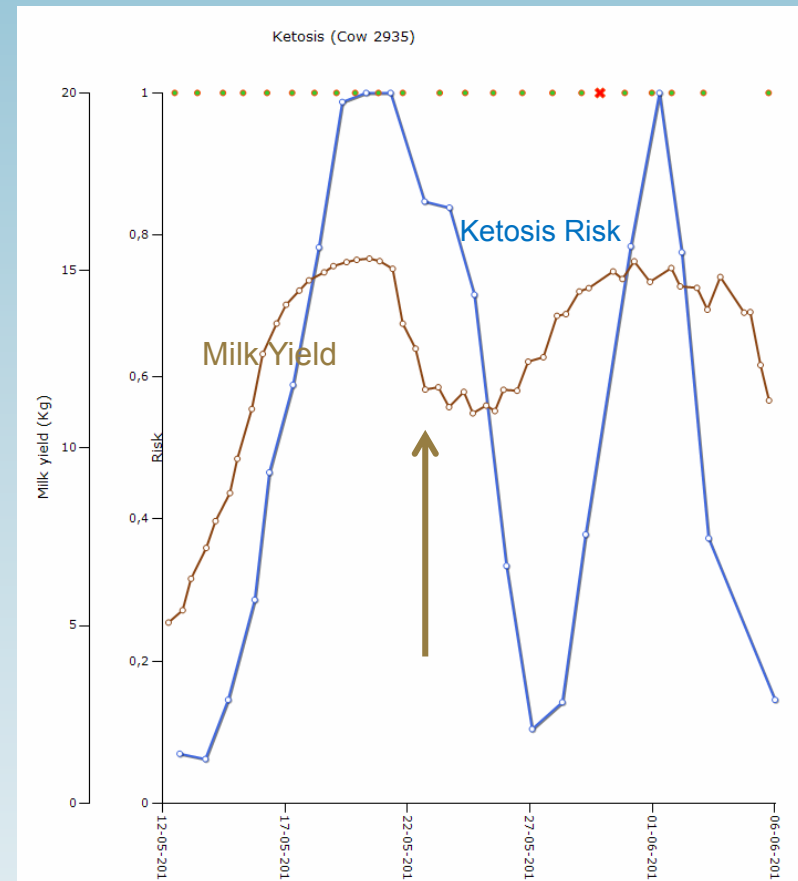
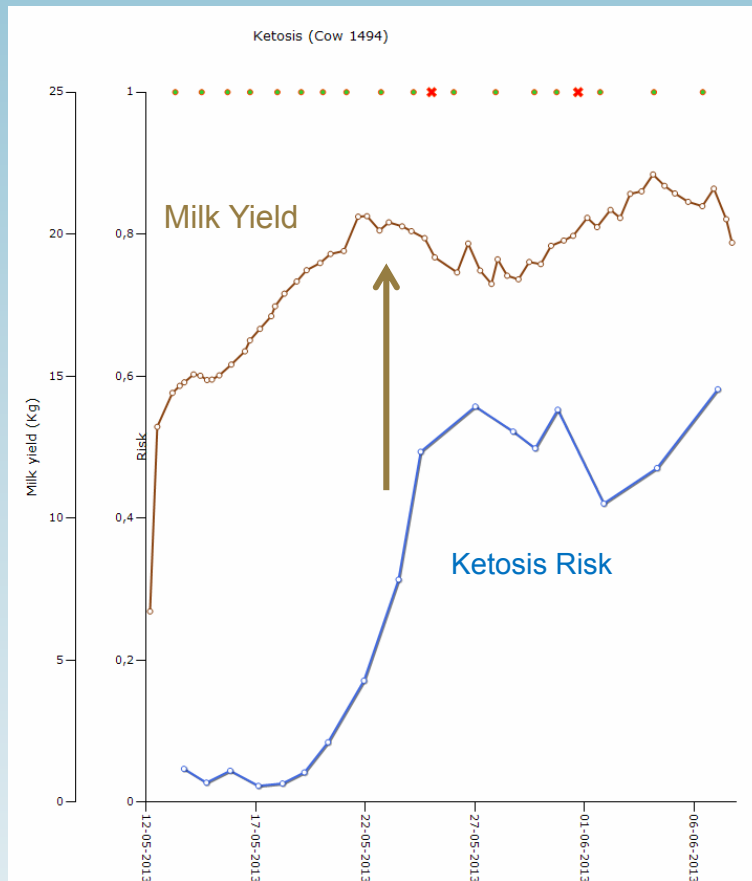
- Detecting disproportions of protein and energy in feed ration

Ketosis monitoring: The biomodel



Nielsen et al., J. Dairy Sci., 88, 2005, 2144..

Ketosis monitoring: The output



Purpose of study, Materials and Methods

- Purpose of study

- Analyse prevalence of subclinical ketosis in high yielding dairy herds using Herd Navigator[®]
- Analyse relationships between ketosis and reproductive performance

- Participating herds (convenience sample):

- Herd 1 (DK): 278 cows, 4 VMS, 278 cows
- Herd 2 (NL): 2 X 10 parlour , 151 cows
- Herd 3 (CA): 2 VMS, 126 cows
- Continuous measurements of BHB and progesterone (P_4)
- Data from 2012, analysed in Herd Navigator[®] biomodels and graphically displayed in MATLAB[®]

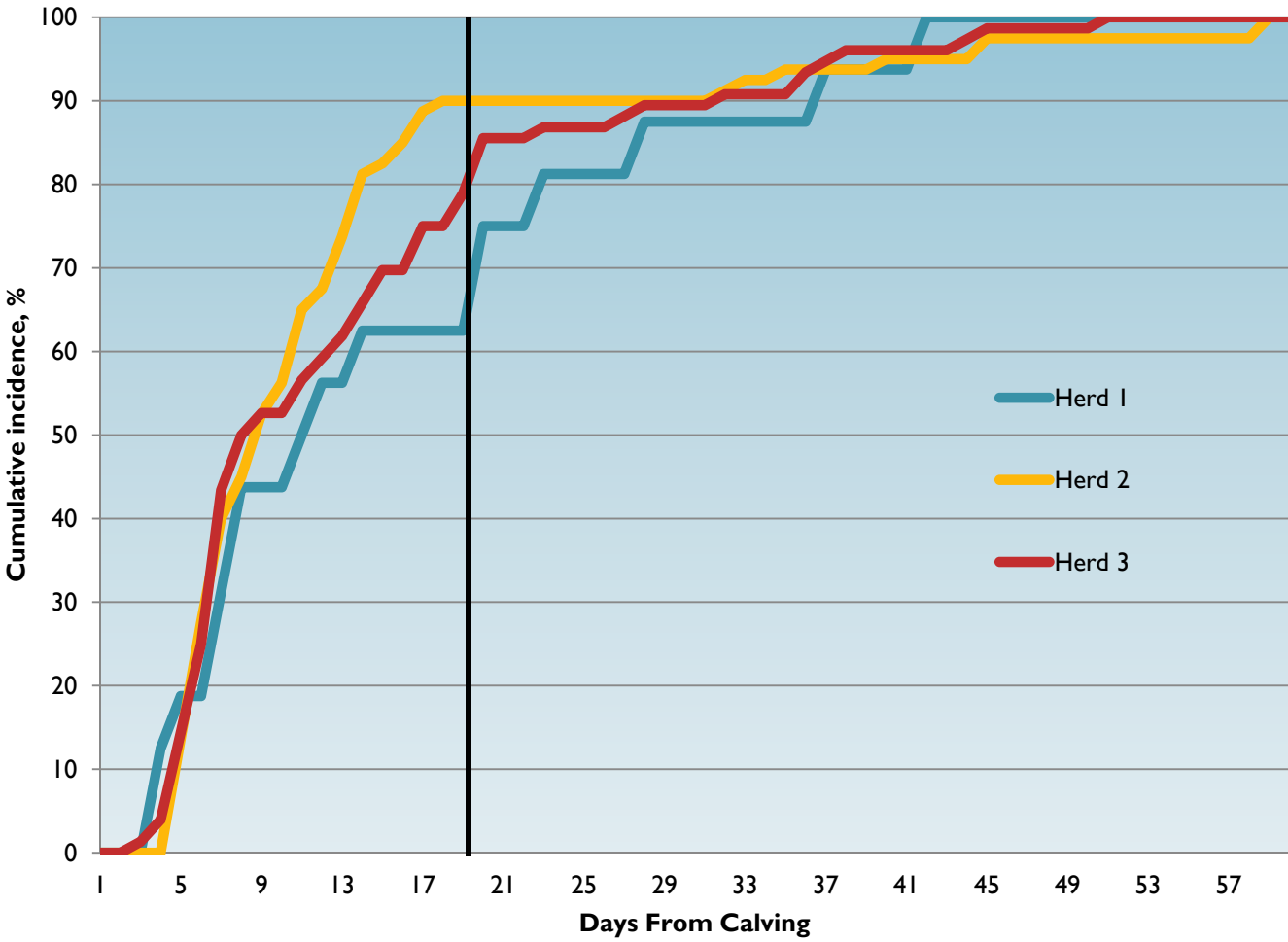
Prevalence of ketosis and Post Partum Anoestrus (PPA)

	Herd 1	Herd 2	Herd 3
# cows	278	151	126
Milk yield per cow/year	10,900	8,900	10,500
BHB samples per year	8,948	3,116	3,411
% BHB samples above threshold ("BHB load")	1.8	14.2	10.3
# ketosis alarms per 100 calvings	3	29	38
# early alarms (<10 DIM)	48 %	48 %	51 %
Start measurements for P ₄ , DIM	30	20	60
# PPA alarms per 100 calvings	23	20	4

Prevalence of ketosis and Post Partum Anoestrus (PPA)

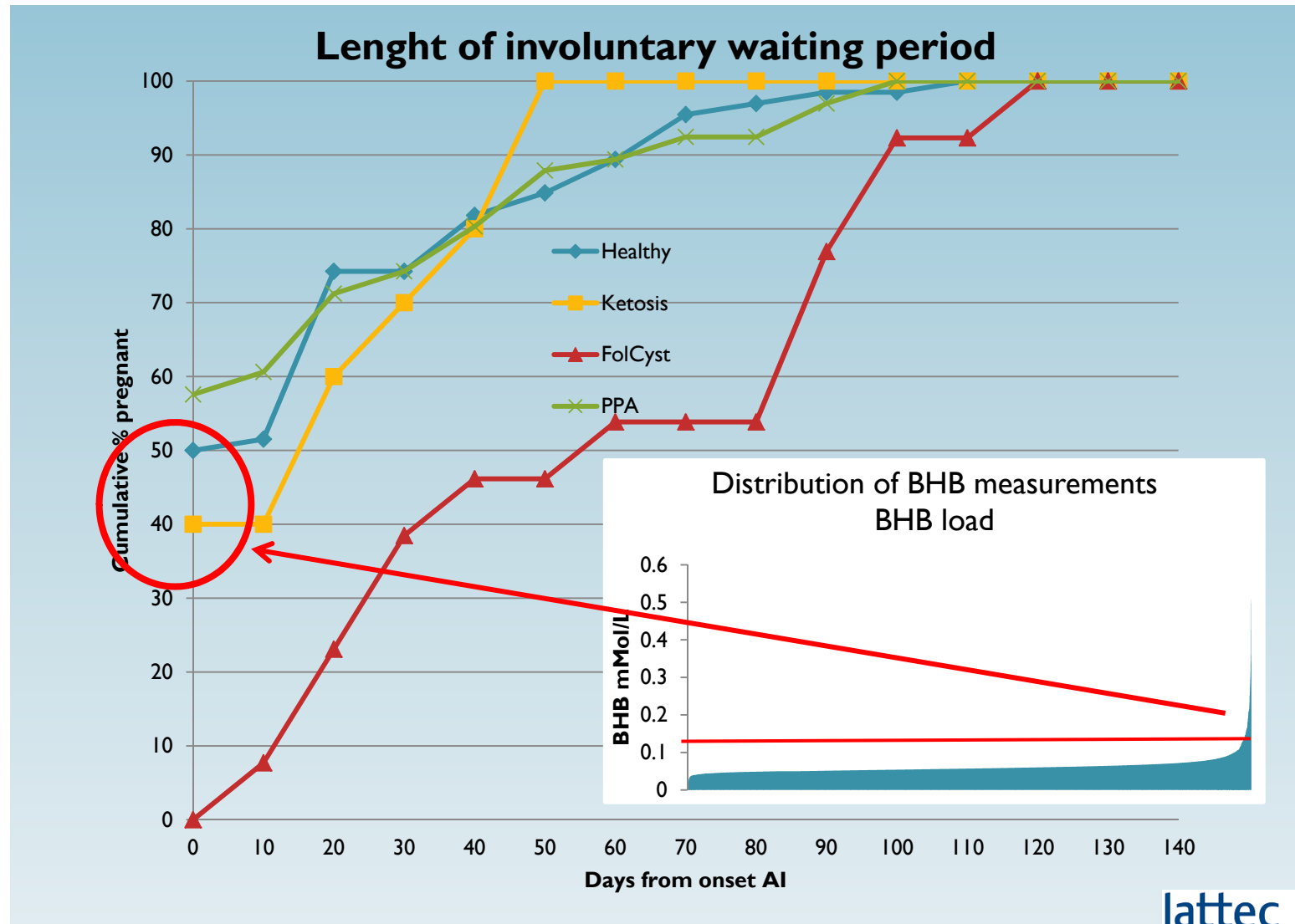
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Cumulative incidence of ketosis alarms



Farm I: Reproductive performance

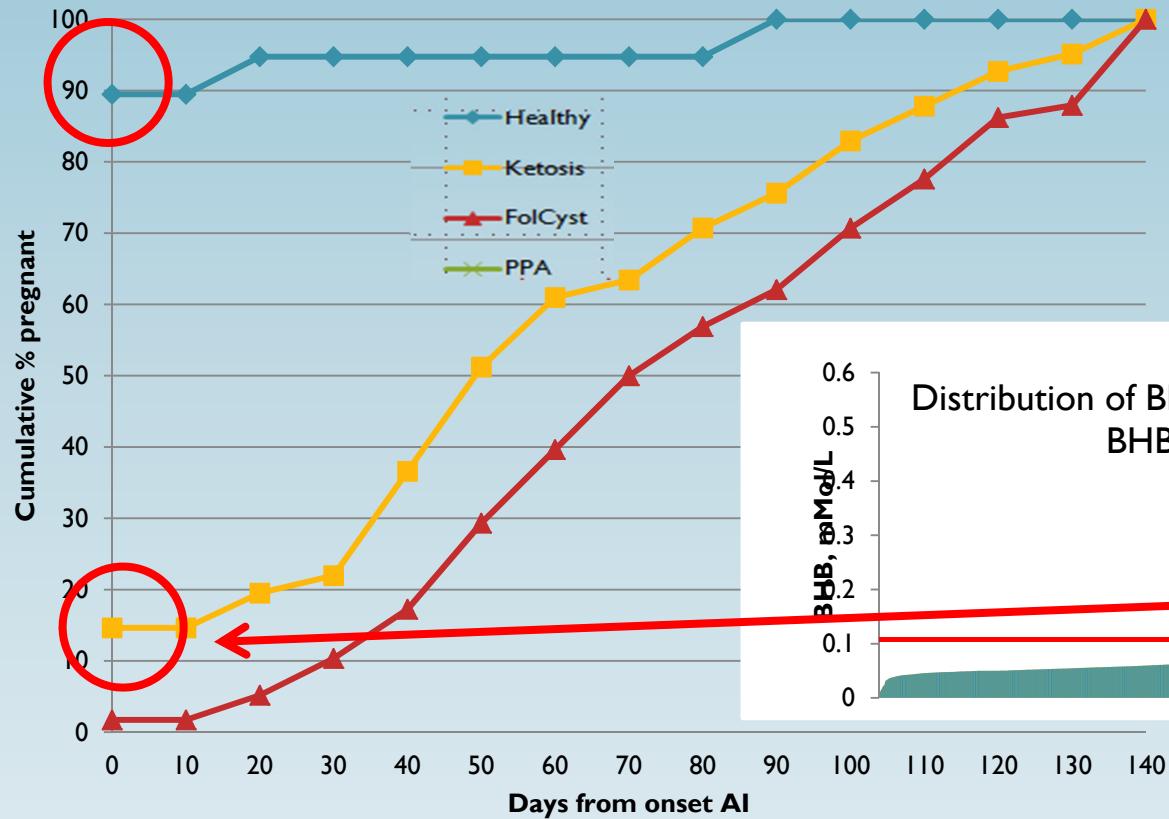
- starting point: 1st AI



Farm 2: Reproductive performance

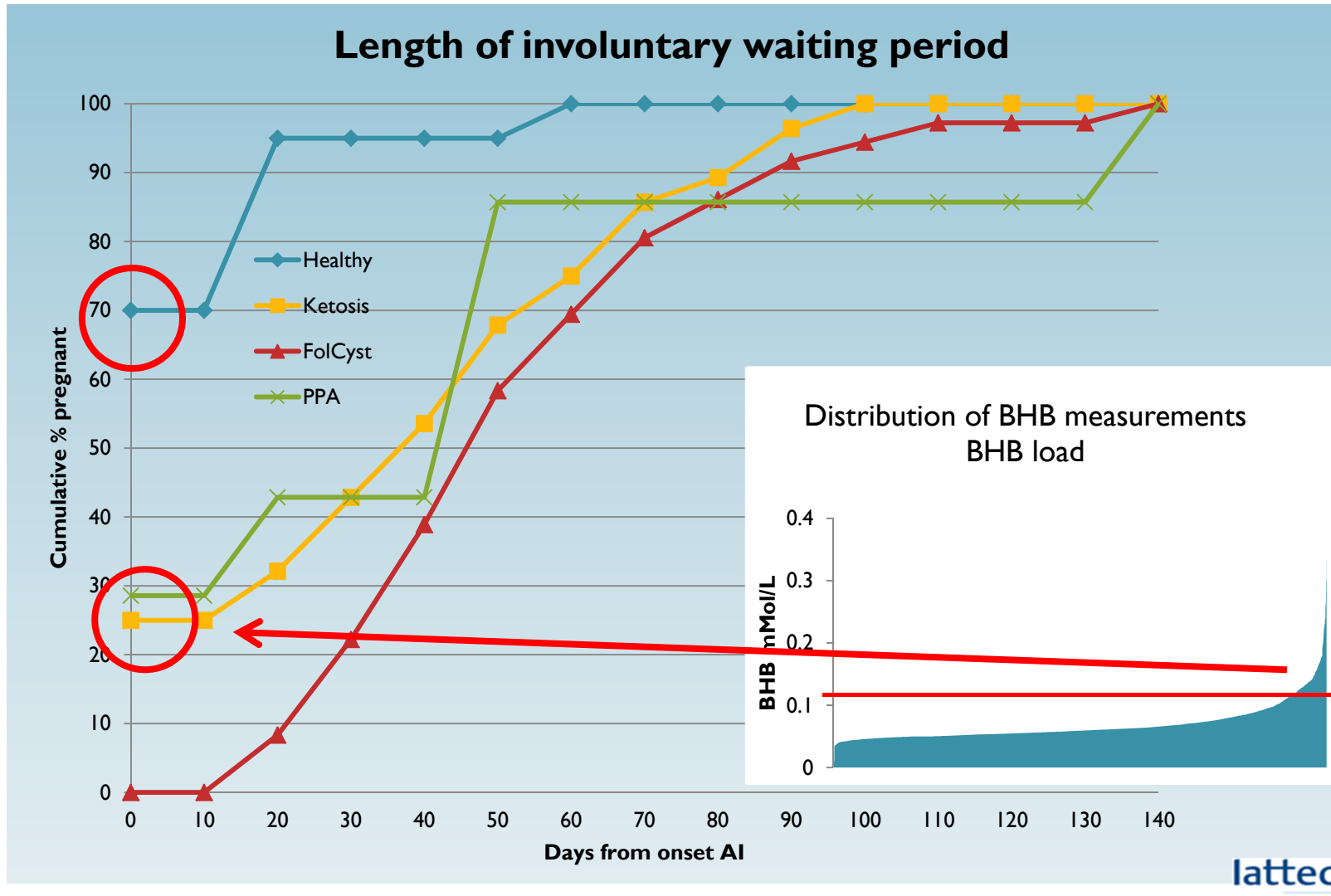
- starting point: 1st AI

Length of involuntary waiting period

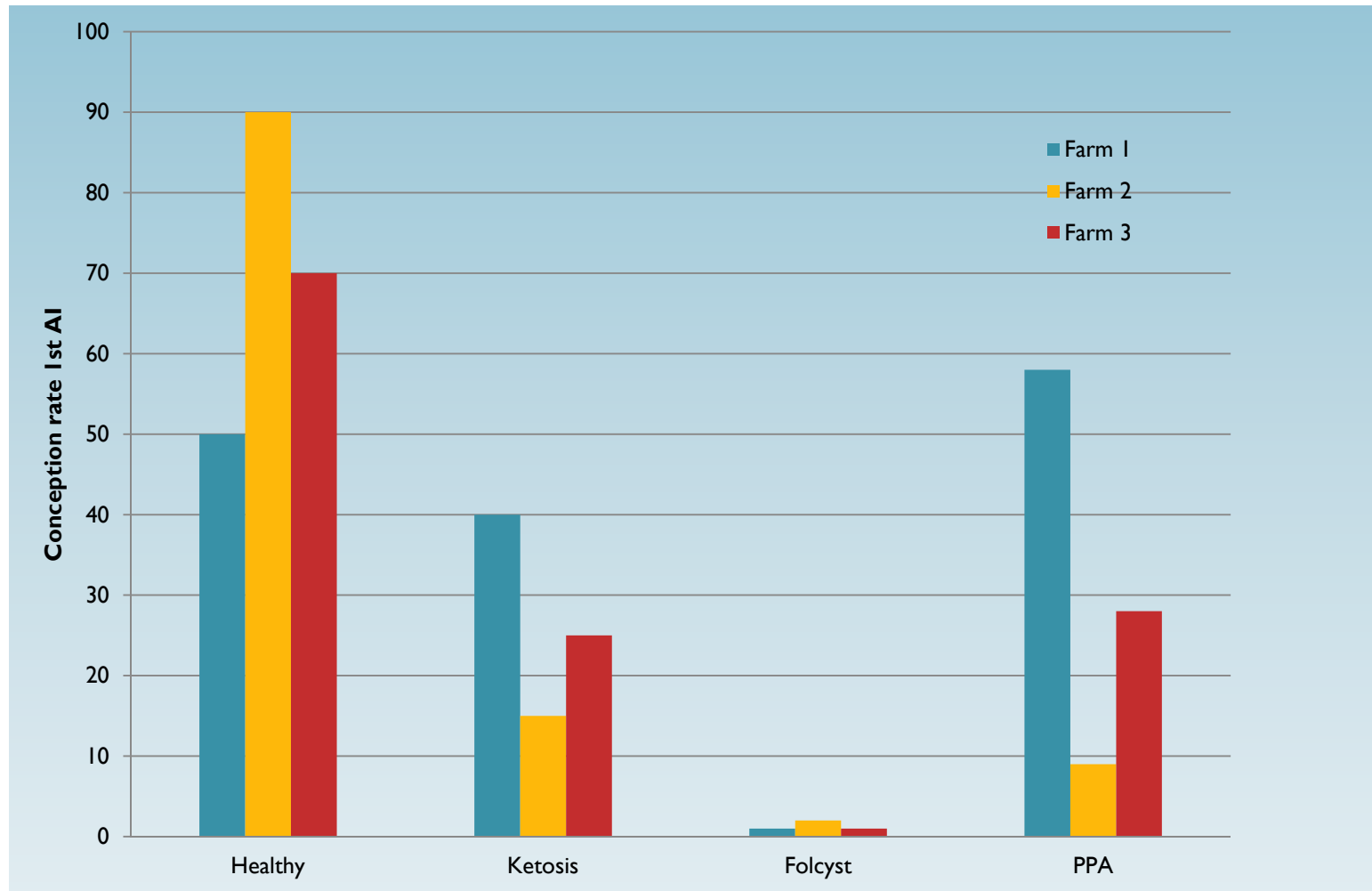


Farm 3: Reproductive performance

- starting point: 1st AI



Conception rates (%) for 1st AI



Conclusions

- Continuous measurements of milk BHB aid in the detection of subclinical ketosis
 - Detection long before clinical signs expect to occur: ~50 % occur before 10 DIM
 - Validate total "BHB-load" to the herd – impact on herd performance
- Conception rates in ketotic cows lower than in healthy cows at 1st AI
- Use of on-farm measurements can aid in elucidating underlying causes of reproductive failure

Thank you
We strive to keep cows flying!

