

# Ear vein sampling procedure with a commercial beta-hydroxybutyrate meter as a cow side test for ketosis

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## Introduction

The objective of this study was to evaluate the Precision<sup>®</sup> Xceed<sup>™</sup> (Abbott, Illinois) ketometer as a cow side test for (sub)clinical ketosis in an ergonomic sampling procedure on venous blood samples directly from the ear veins of dairy cattle.

## Materials and methods

On 12 farms, a total of 119 late gestation/early lactation cows were selected. Sampling was performed after milking during daily routine, when cows were fixated in the headlocks at the feed bunk. No disinfection with alcohol or other rinsing or clipping procedures were performed. A small notch was made with a 21 G needle into the ear vein (*vena auricularis lateralis*, *intermedia* or *medialis*). The ketometer was held against the drop of blood on the ear and the digital result was displayed (figures 1 to 6). The test results were compared with the gold standard being beta-hydroxybutyrate (BHBA) determination on serum from jugular samples, taken within one minute after ear sampling.

## Results

Table 1: Test results, with subclinical ketosis being defined as a serum BHBA concentration higher than or equal to 1,4 mmol/L.

Parameter	Result
Prevalence of subclinical ketonemia	3,40%
Sensitivity	100%
Specificity	97,40%
Positive predictive value	57,10%
Negative predictive value	100%
Pearson Correlation Coefficient	88.1% (P>0.0001)
Correlation (R2)	0,77
Standardized agreement index	0,44 (>0,5= good agreement)



Figure 1: Vascular anatomy of the ear 1: *vena auricularis intermedia*, 2: *vena auricularis lateralis*, 3: needle



Figure 2: Drop of blood after a notch with a 21G needle



Figure 3: Insertion of test strip and presentation of blood drop



Figure 4: Aspiration of blood drop



Figure 5: 10 second count down

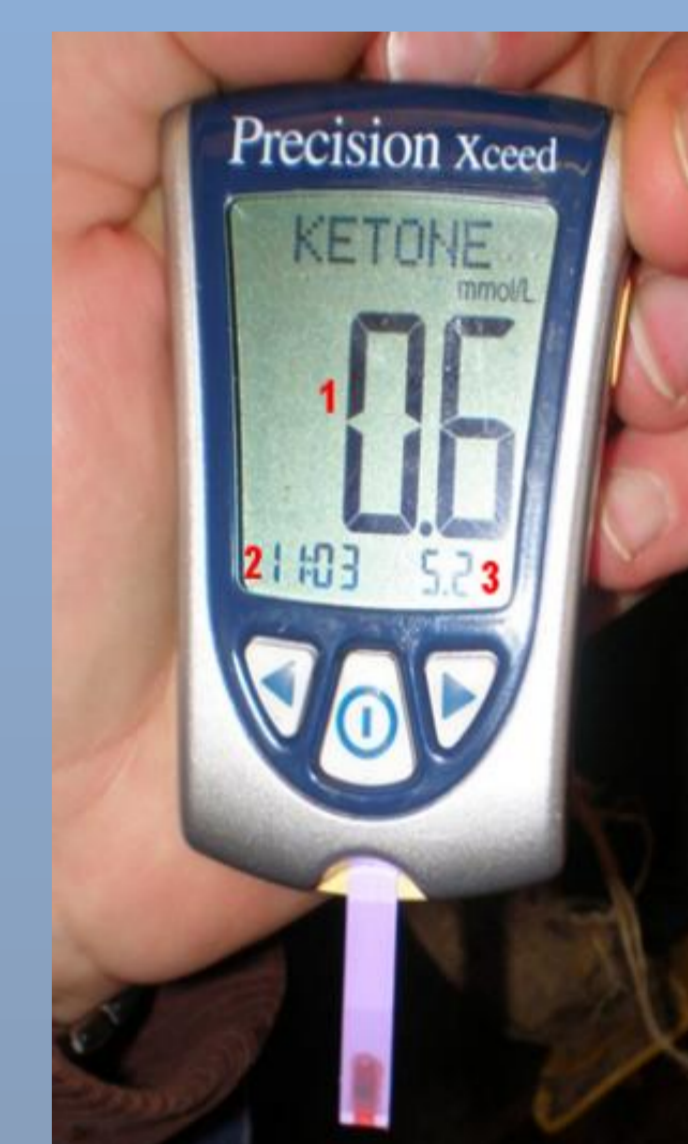


Figure 6: Presentation of results 1: BHBA (mmol/L); 2: time; 3: date

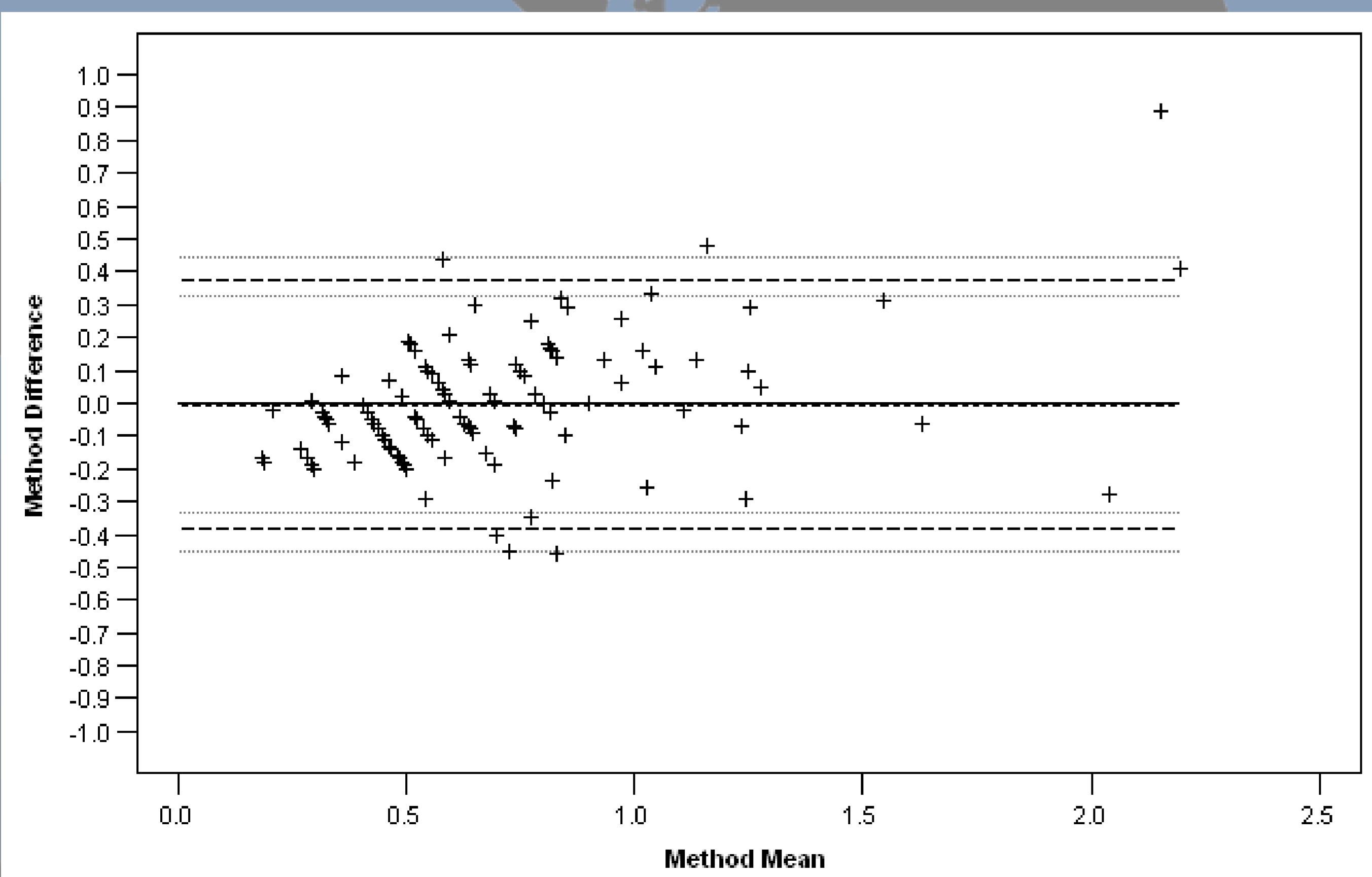


Figure 7: The method mean versus the method difference (+) (--- Mean difference — Method difference = 0 ..... Confidence bounds of limits of agreement — — Mean  $\pm$  2SD) Bland-Altman plot: 94% of the observed differences between the gold standard and the Precision<sup>®</sup> Xceed<sup>™</sup> are situated within the limits of agreement [-0.39, 0.38].

## Conclusions

Ear vein sampling procedure:

- Sensitivity and specificity are similar to earlier tests on blood from the tail vein, the correlation was lower than previous studies (0.90-0.96)<sup>1,2</sup>.
- Sampling at the feeding grid has an additional ergonomic value:
  - Technique is simple and fast
  - Easy to plan within daily routine when cows are fixated in the headlocks
  - Safe operational space
  - Avoids unnecessary movement between the cows
  - Avoids manure contamination or loss of the ketometer in the manure pit

### References:

- 1 Oetzel G.R., McGuirk S.M. (2007). Evaluation of a hand-held meter for cow side evaluation of blood-betahydroxybutyrate and glucose concentrations in dairy cows. Proceedings of the 40th annual convention of the American Association of Bovine Practitioners (AABP), p 234.
- 2 Burke C.M., Raphael W., Leslie K.E., Neuder L.M. (2008). Test comparison of precision Xtra and ketostix for ketosis in dairy cows. Proceedings of the 41st Annual Convention of the American Association of Bovine Practitioners (AABP), Charlotte (NC), September 25-27, p 287.