

Title:

Relationship between Keto-Test results and health and reproduction variables: a retrospective study using data from herd health visits in private practice.

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Introduction

Cows in negative energy balance (NEB) can develop subclinical ketosis (SCK) and elevated Beta-hydroxybutyrate (BHB) concentrations in milk. A milk strip cow-side test (Keto-Test; KTST) can be used to measure BHB and initiate vet-client discussions about transition cow management and energy issues during regular herd health visits. The purpose of this study was to relate KTST results to first-breeding conception rate and to the incidence of some metabolic diseases.

Materials and Methods

In 22 herds followed by a single dairy practitioner in southern Quebec, milk from cows between 4 and 21 days in milk (DIM) at the time of herd health visit was submitted to KTST. Keto-Test results, as well as diseases, reproduction and DHI data, were compiled using the herd health monitoring software DSA over a three-year period. Result to KTST was considered positive at cut-off value 100 µmol/L of BHB. Variables were herd (HERD), lactation number (LN), calving season (CS), DIM at 1st breeding (DIMAI1), breeding season (BS), success at 1st breeding (PREG) and occurrence of milk fever (MF), retained placenta (RP), metritis (ME), ovarian cyst (CY), clinical mastitis (MA), lameness (LA) or displaced abomasum (DA) in the same lactation. Logistic regression was used to test the effect of KTST on PREG or on metabolic diseases. Potentially confounding variables and their interaction with KTST were retained in the complete model when *P* was less than 0.25. The reduced model was obtained after deleting all variables that did not qualitatively change the odds ratio (OR).

Results

Results to KTST: 1034 negative cows and 394 positive cows (27.5 %). The complete logistic model for PREG included KTST, HERD, LN, MF, RP, ME, CY and DA. The reduced model contained only KTST and confirmed that KTST was not associated with PREG (*P*= 0,74), OR = 0.96, 95% CI (0.73 - 1.26), 32.1 and 31.1 % PREG for negative and positive cows, respectively.

The complete model for MA included KTST, HERD, LN, CS, MF, KTSTxMF, RP, ME, CY, and KTSTxCY. The reduced model contained only KTST and confirmed its strong association with MA (*P* = 0.002), OR = 1.55, 95 % CI (1.17 - 2.05) 17.6 vs. 24.9%.

The complete model for DA included KTST, HERD, KTSTxHERD, LN, CS, RP, LA, KTSTxLA. The reduced model contained KTST, HERD, and KTSTxHERD and showed a strong association of KTST with DA (*P* = 0.001), OR = 3.81, 95 % CI (1.70 to 8.51), 3.48 vs. 7.87% DA. Odds ratio was 1.48, 1.45, and 3.81 for herds with a low (< 5%), medium (5 – 10%), and high (> 10%) incidence of DA.

Other disease incidences (MF, RP, ME, CY and LA) were not significantly associated with KTST results.

Significance

This study did not prove a relationship between KTST results and 1st breeding conception rate, contrary to what was expected. Possible reasons for that are: low cut-off chosen (only 116 cows would have been positive at a 200 µmol/L cut-off), missing important variables in the analysis and false negative KTST results when cows were tested at the end of the 4-21 DIM interval. Other reproductive variables (days open, 2nd, 3rd-breeding conception rates) should also be analyzed.

The strong relationship between occurrence of a DA and KTST result is not surprising. It must be interpreted with caution since in some cases, DA preceded KTST whereas, in other cases, DA happened after KTST. Results suggest that the risk for clinical mastitis during the lactation is significantly increased in cows with a positive KTST result between 4-21 DIM. This finding underlines the link between metabolic status during transition/early lactation and health during the rest of lactation.

Routine submission of fresh cows to Keto-Test during herd health visits is an easy to implement practice which creates a “teachable moment” to discuss fresh cow nutrition and health. Evidence of a link between fresh cow Keto-Test result and health in later lactation is an additional reason to encourage Keto-Test use.