Effect of duration and temperature during the delivery of bovine blood samples to the analytical laboratory on metabolic parameters serum assays

Barbara Galmiche, Catherine Garnier, Laurent Alvès de Oliveira

Results: RT was sign. influenced by time of day and ambient temperature. RT was also sign. affected by the occurrence of estrus. The mean RT on the day of estrus was 0.15° C higher than the day before. The maximum RT-4-hour average on the day of estrus (39.71° C) was also increased sign. The results for heat detection showed an area under curve (AUC) of 0.81. A sign. effect of parturition on the RT was also found. 48 hours prior to calving RT decreased sign. by 0.43° C. No sign. difference was found between one day before parturition and the day of parturition. Up to a temperature threshold of ≥0.40° C, 100% of the parturitions were detected by RT within 24 up to 48 hours, with a specificity of up to 93%. The prediction of a parturition within 24 and 48 hours showed an AUC of 0.99.

Conclusions: We conclude that continuous RT measurement as used herein is highly suitable for detecting upcoming parturitions and, to a lesser extent, to indentify cows in heat. Further results are promising for the early detection of health problems linked with an increase or decrease of body temperature.

Herd Health Management: Dairy

P02-002-104

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Objectives: Blood samples collected in bovine medecine are often exposed to a range of environmental conditions prior to analysis in a laboratory. The stability of the molecules in the bovine blood is poorly understood. The aim of this study was to determine analyte stability of blood specimens in serum tubes exposed to a range times and two storage temperatures prior to centrifugation.

Materials and Methods: Blood samples were taken in 10 lactating Montbeliarde cows in one farm, 1.5 hours after the morning diet distribution. 17 blood tubes were taken from the jugular vein of each animal. The samples were immediately placed in a cooler box, protected from light, and sent to the laboratory. For each cow, one tube was centrifuged and analyzed in the 3 hours after collection (D0) as controls. 8 samples, uncentrifuged, were placed in a refrigerated chamber at 4°C and 8 samples, left at room temperature (25°C). All tubes were kept sheltered from the light. The day D1, D2, D3, D4, D7, D8, D9, D10, one tube stored at room temperature and one kept cool tube were centrifuged and analyzed (in duplicate). The analysis methods used were HPLC for vitamin A, E, and β carotene or enzymatic colorimetric method with an automated biochemistry analyser (JEOL Biomajesty 6010 with Biomérieux, Diasys, Diacron and Randox kits).

Statistical analysis was performed with the Excel © software. Outliers were removed by the Grubbs test. For each pair number storage day / storage temperature and each parameter, the averages of the 10 cows was compared with the average to D0 by a Student's t test for paired data if the distribution was normal (checked by Shapiro-Wilk test) and the variances equal (verified by Cochran's test) or by test of Wilcoxon signed rank in other cases. The results of stored samples were considered to be different from the value on D0 (reference) if the difference between average of stored samples and D0 average was greater than the measurement uncertainty or if p> 0.05.

Results: Assay results are identical to the D0 value during the numbers of days (d) following : (for samples stored at 4°C and 25°C respectively) : Bile acids : 3 d, 3 d ; nonesterified fatty acids (NEFA) 8 d, 1 d ; pancreatic amylase 8 d, 8 d ; aspartate amino transferase (ASAT) 4 d, 2 d ; βcarotene 8 d, 8 d ; conjugated bilirubin 2 d, 1 d ; total bilirubin 2 d, 1 d ; βhydroxybutyrate (BOH) 10 d, 4 d ; calcium 10 d, 7 d ; chloride 8 d, 8d ; cholesterol 10 d, 10 d ; creatine kinase (CK) 4 d, 2 d ; total carbon dioxide 8 d, 8 d ; creatinine 9 d, 9 d ; reactive oxygen species production (d- ROMs, a subclass of reactive oxygen metabolites (ROM) used to determine the antioxidant capacity of plasma) 4 d, 1 d ; iron 9 d, 4 d ; gamma glutamyl transferase (GGT) 4 d, 4 d ; glutamate deshydrogenase (GLDH) 10 d, 7 d ; lipase 2 d, 2 d ; magnesium 10 d, 10 d ; serum total antioxidant capability (OXY-adsorben test, measures the ability of a plasma sample to object to a massive oxidative insult induced in vitro by a solution of hypochlorous acid) 10 d, 10 d ; Alkaline phosphatase (PAL) 10 d, 10 d ; Phosphate Inorganic 10 d, 3 d ; Potassium 1 d, 1 d ; Total Protein 10 d, 10 d ; Sodium 4 d, 4 d ; Total Iron-Binding Capacity (TIBC) 10 d, 10 d ; Triglycerides 4 d, 3 d ; Urea 10 d, 3 d ; vitamin A 10 d, 10 d and vitamin E 10 d, 10 d.

The storage temperature has no effect on the duration of biochemical parameters stability for half of the measured parameters, for the others parameters, the stability is better when the sample is kept cool.

Conclusions: The stability of some biochemical indicator is very long, it reached 10 days (Total Protein, BHB, urea, cholesterol, Ca, Mg, Phosphate Inorganic, PAL, GLDH, …) especially for vitamin A and E deemed fragile. Very few parameters require analysis rapidly after collection (bile acids, bilirubin, lipase). These results show a very good stability of biochemical parameters in cattle. The use of biochimical assays should not be limited even if the delivery times in the laboratory is several days. However, the laboratory should check the temperature on receipt of samples to ensure the reliability of the value (NEFA, CK, d-ROMs, potassium, urea).

Herd Health Management: Dairy

P02-002-105

Diversity of behavioural patterns displayed by an autumn calved, recently weaned cohort of dairy calves in SE QLD dairy herd

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Objectives: Timely detection of morbid animal has a detrimental effect on animal productivity and animal welfare [1]. Movement trends have been extensive studied in wildlife to monitor annual migration and prey-predator interactions.[2-4] Different species of animals develop distinct movement trajectories that can be monitored overtime and used as indicator of health. [5] The objective of the study was to describe diversity of the movement patterns displayed by a recently weaned cohort of dairy calves soon after weaning and to assess the feasibility of collecting such data as a proof of concept to monitor dairy calves' movement patterns.

Materials and Methods: This pilot cohort study was conducted on dairy calves at the University of Queensland, Gatton campus, South East Queensland in September 2015. There were 14 Holstein calves comprised of six males and eight females. The age range for these calves was 8-9 weeks old. The calves were fitted with GPS data loggers (Igot-U GT600, Mobile Action Technology Inc, Taipei, Taiwan) to capture coordinates, distance, time and speed. Each calf was identified by an ear