

Validation of a prototype cow-side instrument for the measurement of blood ionized calcium concentrations in dairy cattle

R.C. Neves, DVM, MSc¹; T. Stokol, B.V.Sc, PhD, DACVP¹; M.D. Curler, DVM²; M.J. Thomas, DVM, DABVP-Dairy²; J.A.A. McArt, DVM, PhD¹

¹Department of Population Medicine & Diagnostic Sciences, Cornell University, Ithaca, NY 14853

²Dairy Health & Management Services, Lowville, NY 13367

Introduction

There is currently no efficient and inexpensive method for field measurement of blood calcium concentrations. Ionized calcium (iCa) is the homeostatic form of the mineral and is thought to have greater biological relevance over that of total calcium. The objective of this study was to evaluate the linearity and precision of a prototype cow-side instrument (Horiba, Japan) for measuring blood iCa concentrations.

Materials and Methods

Blood (300 mL) was collected from the right jugular vein of a multiparous dairy cow (4 days-in-milk) into lithium heparin tubes immediately before (T0) and 5 minutes after (T5) intravenous administration of 500 mL of 23% calcium borogluconate. The iCa concentrations were determined using a blood-gas analyzer (ABL-800 FLEX, Radiometer) as a gold-standard. The T0 sample was diluted using 0.9% saline to create a sample with low iCa (reference interval = 1.10 to 1.35 $\mu\text{mol/L}$). The diluted T0 sample was then mixed with the T5 sample in different ratios (100/0, 75/25, 50/50, 25/75, 0/100) to obtain 5 levels of iCa concentrations (0.69, 1.0, 1.28,

1.58, and 1.82 $\mu\text{mol/L}$). Each mixture was then analyzed in triplicate using 3 different prototypes under 1-point (1P) and 2-point (2P) calibration with the means compared to results from the blood-gas analyzer.

Results

Cumulative sum tests for linearity from Passing and Bablok regressions showed no deviation from linearity for the combined results of all 3 prototypes under 1P vs the gold-standard ($P=0.19$) and under 2P vs the gold-standard ($P=0.19$). Instrument precision (coefficient of variation; CV) was determined by 10 repeat measurements of the diluted T0 sample, T0, and T5 samples under 1P and 2P calibrations. The CV ranged from 1.3 to 5% for the 3 prototypes.

Significance

Laboratory results indicate good accuracy and precision for a cow-side instrument at the tested iCa concentrations. The performance of the instrument under field conditions is currently under investigation.

Association of rumination time with non-esterified fatty acid, β -hydroxybutyrate, and serum calcium concentrations in transition dairy COWS

S. Paudyal, BVSc, AH¹; F. Maunsell, BVSc, PhD²; J. Smith, BS³; G.A. Donovan, DVM, MS²; A. DeVries, PhD; P. Pinedo, DVM, PhD⁴

¹West Texas A&M University, Canyon, TX 79016

²Department of Large Animal Clinical Sciences, University of Florida, Gainesville, FL 32610

³Department of Animal Sciences, University of Florida, Gainesville, FL 32611

⁴Texas A&M AgriLife Research, Amarillo, TX 79106

Introduction

Monitoring of health status is crucial during the transition period of dairy cows. Rumination behavior has been suggested as a parameter for assessing cow health. The

objective of the current study was to explore the association between changes in rumination and blood concentrations of non-esterified fatty acids (NEFA), β -hydroxybutyrate (BHBA), and calcium (CA) in transition dairy cows.