

Evaluation of the CARDY Potassium Meter as a point-of-care instrument for measurement of plasma and blood potassium concentrations in cattle

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Introduction

A point-of-care analyzer (CARDY K⁺ meter C-131, www.horiba.co.jp) for the measurement of potassium concentration ([K]) has recently become available. The objective of this study was to validate the CARDY meter for the measurement of [K] in bovine plasma and blood.

Materials and Methods

The CARDY meter (test method) and the Hitachi 911 analyzer (reference method) were used to measure the [K] in 143 plasma samples from lactating Holstein-Friesian cows with experimentally-induced electrolyte and acid-base imbalances (group 1; n = 15), and blood and plasma samples collected sequentially from periparturient dairy cows (group 2; 60). Blood samples were collected into 10 mL partially evacuated plastic tubes containing lithium heparin, and plasma was harvested for analysis.

Results

Within-day repeatability (n=20) was good for the CARDY meter as assessed by coefficient of variation

(CV); blood [K] = 2.9, 4.1, and 4.9 mmol/L with a CV = 4.3%, 3.2%, and 1.7%, respectively. Between-day reproducibility (n=20) was also good; linearity standard [K] = 1.9, 3.7, and 7.5 mmol/L with a CV = 4.5%, 4.1%, and 3.6%, respectively. In group 1, Deming regression provided mean estimates for constant bias (intercept, -0.7 mmol/L) and proportional bias (slope, 1.14). The difference plot indicated a mean bias of -0.3 mmol/L between the 2 analyzers, with 95% limits of agreement being -0.8 to +0.2 mmol/L. In group 2, the results of Deming regression and difference plots indicated equivalence of blood and plasma [K] measurements, with 95% limits of agreement being -0.2 to +0.2 mmol/L.

Significance

The CARDY K⁺ meter provided a low cost, battery powered, rapid, point-of-care instrument suitable for measuring [K] in plasma and whole blood from cattle.