The effects of sample temperature on the concentrations of glucose and β-OH butyrate measured by the Precision Xtra meter in plasma from periparturient dairy cattle

A.A. Megahed, BVSc, MS1; M.H. Hiew, BVSc, PhD1; P.D. Constable, BVSc, MS, PhD, DACVIM, DACVNB1
1Veterinary Clinical Sciences Department, Purdue University, West Lafayette, IN 47907
2Veterinary Clinical Medicine Department, University of Illinois at Urbana-Champaign, Urbana, IL 61802

Introduction

Early and accurate diagnosis of hypoglycemia and hyperketonemia is helpful in the diagnosis and treatment of ketosis in periparturient dairy cattle. The results of a preliminary study recently indicated that the glucose concentration [gluc] and β-OH butyrate concentration [BHB] measured by the Precision Xtra meter was impacted by sample temperature when temperature <89.6°F (<32°C). The objective of this study was to fully characterize the effects of sample temperature on the accuracy of the Precision Xtra® meter for measuring [gluc] and [BHB].

Materials and Methods

Ten plasma samples with [gluc] at 98.6°F (37°C) ranging from approximately 30 to 409 mg/dL, and 14 plasma samples with [BHB] at 98.6°F (37°C) ranging from approximately 0.5 to 7.5 mmol/L, were obtained from periparturient Holstein-Friesian cattle. Plasma samples were placed in a water bath at 44.6, 53.6, 62.6, 71.6, 80.6, 89.6, 98.6, and 107.6°F (7, 12, 17, 22, 27, 32, 37, and 42°C) for 30 minutes and then immediately analyzed in duplicate using the Precision Xtra meter. Linear regression was used to characterize the relationship between [gluc]_meter and temperature, and between [BHB]_meter and temperature.

Results

Plasma [gluc]_meter was minimally affected by the variation in sample temperature from 44.6 to 107.6°F (7 to 42°C) when the plasma [gluc]_meter was <160 mg/dL; however, [gluc]_meter increased linearly with temperature when plasma [gluc]_meter > 160 mg/dL. Variation in sample temperature from 44.6 to 107.6°F (7 to 42°C) had no effect on the measured value for plasma [BHB]_meter when plasma [BHB]_meter was <2.6 mmol/L; however, [BHB]_meter increased linearly with temperature when plasma [BHB]_meter > 2.6 mmol/L.

Significance

Sample temperature should be taken into the consideration whenever plasma [gluc]_meter > 160 mg/dL or plasma [BHB]_meter > 2.6 mmol/L as measured by Precision Xtra meter. We anticipate similar findings would occur when blood at different temperatures was measured by the meter.