Cowside Diagnostic Blood/Serum Chemistry Device

John C. Haupert, DVM
Veterinary Associate of Palmlab, Inc.

Introduction

Over the past two years Palmlab, Inc has intensely investigated and developed methodology for rapid cowside blood chemistry diagnostics. Personnel at Palmlab have developed a multitude of blood-serum (plasma)-, and milk-analysis test procedures. These procedures incorporate miniaturized chemistry analyzers that operate in remote scenarios utilizing liquid chemistry reagents.

Materials and Methods

Utilizing both standard blood- and serum-procurement procedures, and specialized microhematocrit blood-measuring devices, Palmlab personnel have developed an accurate, rapid, inexpensive tool for measuring many blood and milk metabolites. Most procedures require use of either serum or plasma. Some procedures utilize heparinized blood, milk or colostrum. Using standard laboratory techniques, these blood chemistry exams have been manipulated to fit the hand-held (1.5x3x9 inches), battery-operated Palmlab. The Palmlab gives results in standard blood chemistry units and stores up to 100 test results, including date and time of testing. Currently included in the scope of tests are 26 various blood chemistries including: NEFA, BHBA, fibrinogen, and IgG-specific (colostrum, serum, and whole blood). Whole-blood calcium and IgG tests can be performed in one minute using special heparinized pre-measured capillary tubes. Each test is standardized at test time using liquid chemicals as standard reagent.

Further investigation has resulted in a much smaller, but more limited-capacity, blood chemistry analyzer we call Palmchek. This unit operates on the same principles as do other liquid chemistry analyzers. Results of each test are read off an interpretive chart. Many veterinarians utilize both machines for various situations.

Performance of tests requires accurate collection and mixing techniques, which most veterinarians or technicians can perform in the field. Because of the precision of the Palmlab and the Palmchek, exacting amounts of serum must be obtained. After a short period of chemical development, (as short as one minute with certain tests, with an average time of five minutes per test), each test tube is inserted into the Palmlab, automatically read and results displayed. Simple keystrokes on the keyboard of the machine will enter the parameters for additional chemistry tests. Each chemistry test requires use of individual, pre-measured test tube reagent. Both Palmlab and Palmchek utilize similar standard operation procedures.

Results and Conclusions

Comparison of test results against COBAS MIRA (standard liquid blood-chemistry analyzer) has yielded consistent accurate results. Complete blood-chemistry measurements can be done cowside, or at site of operation, with inexpensive laboratory devices which include pipettes, cuvettes, 12V centrifuge, and all components necessary to perform any of 26 different test procedures. Further development of new tests, and updates to the analytical machines, are being conducted on an ongoing basis.