

Hematology and serum biochemistry of Holstein dairy calves: Age related changes and comparison with blood composition in adults

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Abstract

Specific reference intervals are needed for each animal species for appropriate interpretation of hematological and serum biochemical results. The aim of the present study was to investigate the blood composition of growing calves in order to evaluate the need for defining reference values for different age groups. Thirty two Holstein calves (18 male and 14 female) were blood sampled. A blood sample was taken within 24–48 h following birth and at 14, 28, 42, 56, 70 and 84 days of age. CBC determination and the measurements of some blood serum metabolites, enzymes, electrolytes and minerals were performed. There were significant age related changes for most hematological and biochemical parameters ($p < 0.05$) except for the numbers of band neutrophils and monocytes and the amounts of sodium, potassium, chloride and BUN. The results of the present study showed that for some hematological and biochemical parameters such as hemoglobin, MCV, MCH, MCHC, inorganic phosphorus, serum total protein, globulin, AST and ALP at the first three months of life and also, neutrophil numbers and glucose levels at the 24–48 h of life, the age specific reference values must be considered for precise interpretation of laboratory results.

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Keywords: Dairy calf; Hematology; Serum biochemistry; Reference value

1. Introduction

The ability to interpret laboratory data is based on knowledge regarding the normal physiologic mechanisms underlying each laboratory test and recognition of the effects of diseases on these normal physiologic mechanisms and therefore, on the test results themselves. If performed properly, laboratory testing and interpretation of laboratory data can provide significant insights regarding diseases and therapeutic approaches (Thrall, 2004). Specific reference intervals are needed for each animal species for appropriate interpretation of hematological and serum biochemical results. Less often, a distinct reference value is needed for an analyte from a specific age or breed of animal. Many values vary with the age of the animal, with major changes occurring before puberty. Consequently,

some analyte require different reference intervals for different age groups (Meyer and Harvey, 2004).

Several statistical methods exist for establishing reference ranges. The choice of method to be used partially depends on the distribution of values obtained from population sampled. With Gaussian distribution, parametric tests are appropriate for determining the reference range. Conversely, if the distribution does not form Gaussian distribution, the data are either analyzed by non-parametric statistical methods or transformed to produce a more normal distribution (Thrall, 2004).

Diseases of the newborn and neonatal mortality are a major cause of economic loss in livestock production. Thus, specific hematological and serum biochemical reference ranges could help and promote the ability of clinicians to more accurate interpretation of clinical pathology data and diagnosis of neonatal diseases. There are reports concerning the changes of hematological and serum biochemical values of dairy calves but the number of calves used in

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