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Differences in serum immunoglobulin g1 and total protein concentrations in neonatal calves on days 1, 5, and 10

Abstract

Immunoglobulin G1 (IgG1) serum concentrations are used to evaluate passive transfer of immunity in neonatal calves. Total serum proteins also can be measured to evaluate calf health. If IgG1 and total serum protein concentrations change with age, it becomes imperative to compare samples only from a narrow time period. Otherwise, differences might be due to age and not immune status. To help define this time period, blood was drawn from 10 beef calves when they were 1, 5, and 10 days of age. Serum samples were analyzed for IgG1 and total protein concentrations. Total protein concentrations decreased from days 1 to 5 ($P < .05$) or days 1 to 10 ($P < .05$), but not from days 5 to 10 ($P = .46$). IgG1 concentrations declined from days 1 to 10 ($P < .05$), but values from days 1 to 5 were similar ($P = .17$). Thus, it is important to collect serum on day 1 to guarantee correct results when evaluating IgG1 and total proteins collectively. However, if IgG1 alone is evaluated, serum can be collected between days 1 and 5.

Keywords

Cattlemen's Day, 2000; Kansas Agricultural Experiment Station contribution; no. 00-287-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 850; Beef; Immunoglobulin G1; Total protein; Calves

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DIFFERENCES IN SERUM IMMUNOGLOBULIN G1 AND TOTAL PROTEIN CONCENTRATIONS IN NEONATAL CALVES ON DAYS 1, 5, AND 10

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Summary

Immunoglobulin G1 (IgG1) serum concentrations are used to evaluate passive transfer of immunity in neonatal calves. Total serum proteins also can be measured to evaluate calf health. If IgG1 and total serum protein concentrations change with age, it becomes imperative to compare samples only from a narrow time period. Otherwise, differences might be due to age and not immune status. To help define this time period, blood was drawn from 10 beef calves when they were 1, 5, and 10 days of age. Serum samples were analyzed for IgG1 and total protein concentrations. Total protein concentrations decreased from days 1 to 5 ($P < .05$) or days 1 to 10 ($P < .05$), but not from days 5 to 10 ($P = .46$). IgG1 concentrations declined from days 1 to 10 ($P < .05$), but values from days 1 to 5 were similar ($P = .17$). Thus, it is important to collect serum on day 1 to guarantee correct results when evaluating IgG1 and total proteins collectively. However, if IgG1 alone is evaluated, serum can be collected between days 1 and 5.

(Key Words: Immunoglobulin G1, Total Protein, Calves.)

Introduction

Serum IgG1 concentration is a good indicator of passive immunity transfer in beef cattle. Total serum protein can be used as an indicator of health. However, when research is conducted involving these blood characteristics, collecting serum around 24 hours postpartum can be difficult. This

experiment was designed to identify the calf age at which serum samples should be collected for evaluation of IgG1 and total serum protein.

Experimental Procedures

In January, 1999, blood was collected via jugular venipuncture at 1, 5, and 10 days of age from three Hereford, three Simmental, and four Angus calves born within 6 days of each other at the Kansas State Purebred Teaching Unit. Serum was analyzed for IgG1 using radial immunodiffusion kits specific for IgG1. Total serum protein was determined using a temperature-compensated hand-held refractometer. Results then were analyzed using the Proc Mixed procedure of SAS.

Results and Discussion

Serum total protein concentrations declined from days 1 to 5 ($P < .05$) and from days 1 to 10 ($P < .05$). However, concentrations on days 5 and 10 were not different ($P = .46$) (Figure 1). Serum IgG1 concentrations were similar from days 1 to 5 ($P = .17$), and the difference in values for days 5 vs. 10 approached significance ($P = .06$). Nonetheless, days 1 and 10 differed significantly ($P < .05$) (Figure 2). These results indicate that when research is conducted to assess passive transfer of immunity, IgG1 should be measured only at 1 to 5 days of age to secure accurate data. However, if both IgG1 and total serum protein are measured, blood should be drawn on day 1.

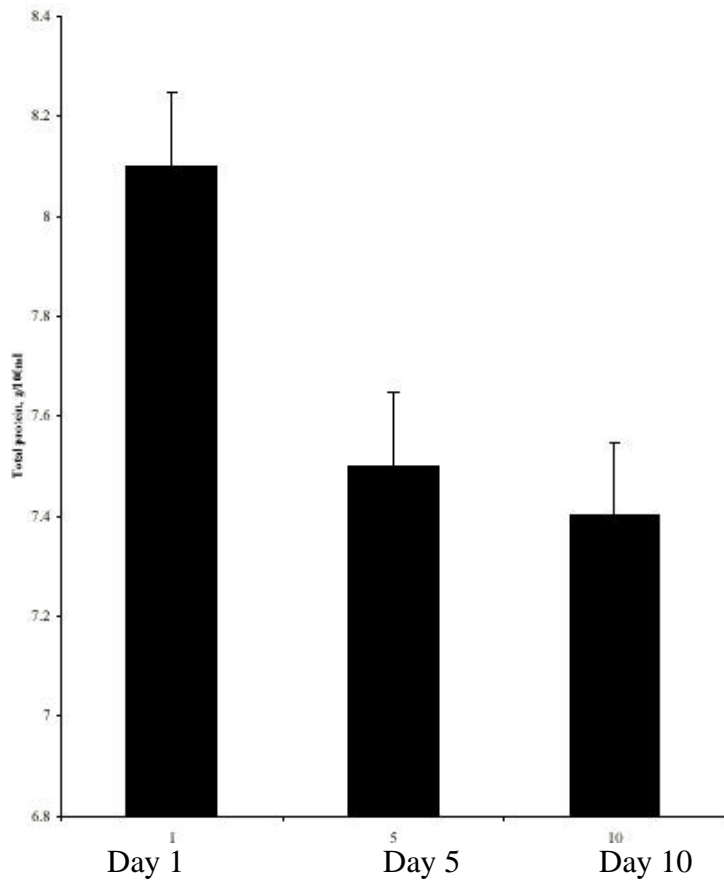


Figure 1. Total Protein Concentrations of Serum Samples from Calves 1, 5, and 10 Days of Age

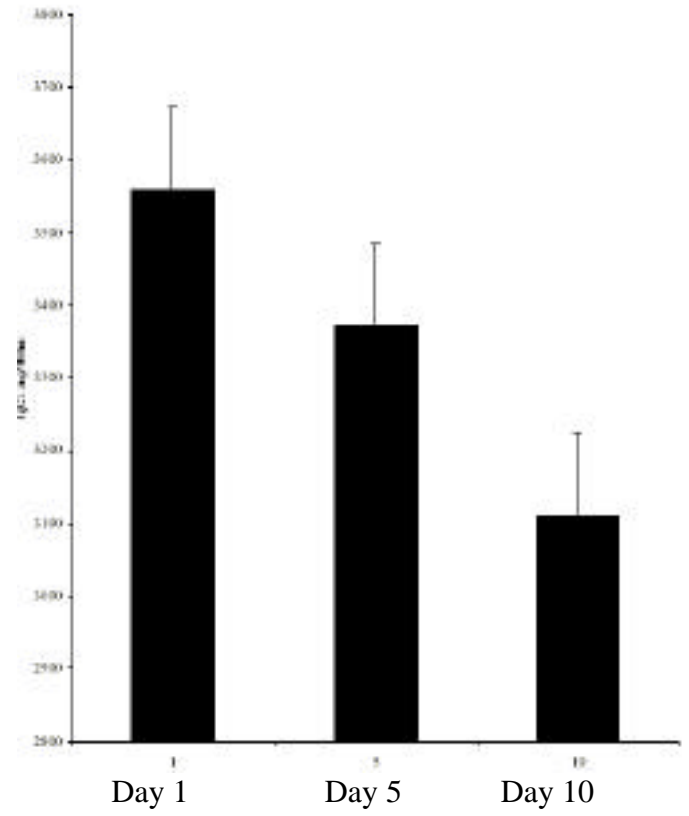


Figure 2. IgG1 Concentrations of Serum Samples from Calves 1, 5, and 10 Days of Age