INFLUENCE OF DIET ON SERUM CHEMISTRY VALUES IN CAPTIVE GIRAFFE OVER FOUR YEARS

Cheryl Dikeman, PhD,[1]* Danielle Pogge, BS,[1] Elizabeth Koutsos, PhD,[2] Doug Armstrong, DVM,[1] Julie Napier, DVM,[1] and Mark Griffin, PhD[2]

[1]Omaha's Henry Doorly Zoo, Omaha, NE 68107 USA; [2]Mazuri Exotic Animal Nutrition, St. Louis, MO 63166 USA

Abstract

Over the past several years, herbivore diet formulations have transitioned toward lower starch and sugar and higher concentrations of structural carbohydrates such as neutral detergent fiber. Following the Giraffe Nutrition Workshop in 2005, recommendations were released that encouraged diets containing less than 5% starch and less than 0.5% phosphorus for captive giraffe. In December 2005, seven giraffe (*Giraffa camelopardalis reticulata)* were transitioned to a pellet that contained less than 4% starch, and 0.35% phosphorus (Mazuri®, PMI, St. Louis, MO); the previous pellet contained approximately 16% starch and 0.75% phosphorus. Giraffe were offered hay (alfalfa/grass blend) and pellets at a rate of 60 and 40% of dietary weight, respectively. Blood samples were collected bi-annually in the summer and winter, and were analyzed for Ca, P, and serum chemistries. Data were analyzed using the Mixed Models procedure of SAS® (SAS Institute, Inc., 100 SAS Campus Drive, Cary, NC 27513-2414 USA) with a probability of $p < 0.05$ accepted as statistically significant. Phosphorus concentrations decreased 21% ($P < 0.05$) between 2005 (8.33 mg/dl) and 2008 (6.60 mg/dl). Calcium-to-phosphorus ratios increased 28% ($P < 0.05$) between 2005 (1.22) and 2008 (1.44). Mean corpuscular volume and mean corpuscular hemoglobin increased ($P < 0.05$) 22 and 18%, respectively, between 2005 and 2008; however, values were considered to be within reference ranges. In contrast, platelet counts were reduced 66% ($P < 0.05$) from 2005 ($456*10^3/\mu l$) to 2008 ($151*10^3/\mu l$); the latter value is considered to be below reference range. When considering the impact of season, phosphorus concentrations were 14% higher ($P < 0.05$) in the winter (7.89 mg/dl) compared with summer (6.76 mg/dl), resulting in 16% ($P < 0.05$) higher Ca:P in the summer (1.38) compared with winter (1.19) months. The linear reduction in platelet count is unclear and needs further study. Comparison of free-ranging giraffe calcium and phosphorus concentrations of 9.5 and 9.1 mg/dl, respectively, warrant further study and discussion regarding optimal diets for captive giraffe.[1,2]

LITERATURE CITED

1. Schmidt, D.A., E.A. Koutsos, M.R. Ellersieck, and M.E. Griffin. 2009. Serum concentration comparisons of amino acids, fatty acids, lipoproteins, vitamins A and E, and minerals between zoo and free-ranging giraffes (*Giraffa camelopardalis*). J. Zoo Wildl. Med. 40:29-38.
2. Schmidt, D.A., R.L. Ball, D. Grobler, M.R. Ellersieck, M.E. Griffin, S.B. Citino, and M. Bush. 2007. Serum concentrations of amino acids, fatty acids, lipoproteins, vitamins A and E, and minerals in apparently healthy, free-ranging southern giraffe (*Giraffa camelopardalis giraffa)*. Zoo Biol. 0:1-13.