Biol Trace Elem Res (2008) 121:134–148
DOI 10.1007/s12011-007-8039-x

Tissue Response to a Supplement High in Aluminum and Silicon

K. K. Turner · B. D. Nielsen · C. I. O'Connor-Robison · F. H. Nielsen · M. W. Orth

Received: 15 August 2007 / Accepted: 23 September 2007 /
Published online: 23 October 2007

Abstract The objective was to determine the effects of sodium zeolite A (SZA) on mineral metabolism and tissue mineral composition in calves. Twenty calves were placed on study at 3 days of age and were placed into one of two groups: SS, which received 0.05% BW SZA added to their milk replacer, and CO, which received only milk replacer. Blood samples were taken on days 0, 30, and 60 for mineral analysis. Urine and feces were collected on day 30 for mineral metabolism, and on day 60, the calves were euthanized, and samples were taken from numerous organs for mineral analyses. Aluminum retention was increased in the SS calves ($p=0.001$). Silicon concentrations were increased in the aorta, spleen, lung, muscle, and kidney of the SS calves, and aluminum was increased in all SS tissues ($p<0.05$). Calcium concentrations were increased in aorta, liver, muscle, and tendon; phosphorus concentrations were increased in aorta, but decreased in plasma; magnesium concentrations were increased in aorta, heart, kidney, liver, and pancreas, but decreased in plasma; and iron concentrations were decreased in kidney and liver ($p<0.05$). The accumulation of tissue aluminum and therefore potential adverse consequences may preclude any benefits of using SZA as a dietary supplement.

Keywords Sodium zeolite A · Silicon · Aluminum · Mineral · Calf · Tissue response · Metabolism

K. K. Turner · B. D. Nielsen · C. I. O'Connor-Robison · M. W. Orth
Department of Animal Science, Michigan State University, East Lansing, MI 48824, USA

F. H. Nielsen
USDA, ARS, Grand Forks Human Nutrition Research Center, Grand Forks, ND 58202, USA

K. K. Turner (✉)
E.L. Rhodes Center, Animal and Dairy Science Department, The University of Georgia, Athens, GA 30602, Greece
e-mail: kturner@uga.edu