

# The Comparative Effectiveness of Carbicarb-R, Tribonate-R and Bicarbonate in the Treatment of Acidosis in Neonatal Calves

**J. Berchtold, H. Hartmann\*** and **W. Hofmann**

*Klinik für Klauentiere and Institut für Veterinär-Physiologie\*  
Fachbereich Veterinärmedizin, Freie Universität Berlin, Germany*

The objective of this study was to compare the buffering effects of sodium-bicarbonate ( $\text{NaHCO}_3$ ), Carbicarb-R (equimolar sodium-bicarbonate and sodium-carbonate [ $\text{Na}_2\text{CO}_3$ ]) and Tribonate-R (Tris buffer mixture) during i.v. treatment of acidosis in neonatal calves. Most alkalinizing agents such as bicarbonate, lactate or acetate are only effective after increased pulmonary elimination of  $\text{CO}_2$  produced in buffer reactions. These substances are not suitable and are even contraindicated in the therapy of primary respiratory or mixed respiratory-metabolic acidosis.

The study involved 36 neonatal calves (3 to 28 days of age) treated at the Large Animal Hospital of the Free University of Berlin for spontaneous occurring diarrhea or diarrhea plus pneumonia and consecutive metabolic, respiratory or mixed respiratory-metabolic acidosis. Calves were randomly assigned to 3 treatment groups. Each calf was infused with an isotonic solution containing 100 mmol/L buffer anions of the various buffers and sodium chloride. Buffer treatment was continued until acid-base status was almost normal or the calf was able to drink sufficient amounts of milk and electrolyte solutions. Acid-base status, blood gases, hematologic and biochemical examinations were measured immediately

before infusions began and after each 1.0 L of fluid containing 100 mmol buffer anions had been given.

During buffer treatment one calf died in each group. Carbicarb-R seemed to have superior alkalinizing effects compared to Tribonate-R and bicarbonate. Carbicarb-R induced greater changes with each treatment of 1.0 L of fluid plus buffer on blood-pH, blood bicarbonate concentration and base deficit than did bicarbonate and Tribonate-R.  $\text{PCO}_2$  increased initially after beginning of buffer treatment in bicarbonate treated calves, remained almost unchanged with Carbicarb-R and dropped severely with Tribonate-R. Overcorrection with pH shifted towards alkalosis ( $\text{pH} > 7.45$ ) was not seen in bicarbonate treated animals but was observed for one time in the Carbicarb-R and in the Tribonate-R group.

Carbicarb-R and Tribonate-R are correcting an acidosis as well as bicarbonate. These buffer agents do not undergo significant breakdown to  $\text{CO}_2$  and  $\text{H}_2\text{O}$ . They do not increase  $\text{PvCO}_2$  to the same extent as does bicarbonate. It could be assumed that potential side effects of  $\text{CO}_2$ , e.g. paradoxical intracellular and cerebrospinal acidosis arising from bicarbonate buffer reaction, could be minimized best with Carbicarb-R.