

VII. Summary

***In vitro* studies on the transport of potassium across the ruminal epithelium of sheep**

The transport of potassium across the sheep rumen was studied with the USSING chamber technique by using ^{86}Rb .

- a. In all experiments a net secretion of potassium was observed. There was a large variability of the unidirectional Rb fluxes.
- b. The manipulation of the Na transport and therefore the activity of the basolateral $\text{Na}^+\text{-K}^+\text{-ATPase}$ by replacement of anions (Cl^- , HCO_3^- , SCFA) by gluconate or by a decrease of the incubation temperature did not influence transport of Rb significantly.
- c. The removal of calcium and magnesium from the mucosal buffer solution led to a significant increase of J_{sm} and J_{net} .
- d. The serosal addition of barium (3mmol/l) caused a significant increase of J_{sm} . No modification of the Rb transport was observed after mucosal addition of barium.
- e. The K_{ATP} -channel-blocker glibenclamid caused variable effects on Rb fluxes and an increase of Gt.
- f. The obtained results show, that uptake of Rb (K) into the epithelial cells of the stratum basale is mediated by the basolateral located $\text{Na}^+\text{-K}^+\text{-ATPase}$. Obviously two different K-channels allow the outflow of potassium from the epithelium. Most of the Rb taken up by the $\text{Na}^+\text{-K}^+\text{-ATPase}$ in the micromolar range is recycled through a Ba-sensitive K-channel in the basolateral membrane. The outflow of Rb through a channel in the luminal membrane is very low (nanomolar range).
- g. A second uptake mechanism for Rb in basolateral membrane, which is independent of the $\text{Na}^+\text{-K}^+\text{-ATPase}$, cannot be excluded.