

How Do Desert Mice Maintain Osmotic Homeostasis?

The sandy inland mouse (*Pseudomys hermannsburgensis*) is an Australian desert mammal that can survive indefinitely on a diet of dried seeds without drinking water. To study this species' adaptation to its arid environment, researchers constructed a laboratory experiment in which they controlled access to water.

Nine captured mice were kept in an environmentally controlled room and given birdseed (10% water by weight) to eat. In part A of the study the mice had unlimited access to tap water for drinking. In part B of the study, the mice were not given any drinking water for 35 days, similar to conditions in their natural habitat. At the end of parts A and B, the researchers measured the osmolarity and urea concentration of the urine and blood of each mouse. The mice were also weighed three times each week. It was found that when mice were given unlimited access to water, they drank about 33% of their body weight each day. The change in body weight during the study was negligible for all mice. The data are found in Table 1.

Table 1: Urine and blood osmolarity and urea concentration for mice in both treatment groups

Access to Water	Mean Osmolarity (mOsm/L)		Mean Urea Concentration (mM)	
	Urine	Blood	Urine	Blood
Part A: Unlimited	490	350	330	7.6
Part B: None	4700	320	2700	11

- Describe how the data differ between the unlimited water and no water conditions for:
 - osmolarity of urine
 - osmolarity of blood
 - urea concentration in urine
 - urea concentration in blood
- Do the data suggest evidence of homeostatic regulation? Justify your response.
- Calculate the ratio of urine osmolarity to blood osmolarity for both groups. Make a conclusion based on these ratios.
- If the amount of urine produced in the two groups had been different. How would that have affected your calculation.