

APPENDIX 3

Dehydration & Drinking Water

There is currently no published data on the water requirements of juvenile marsupials. However, since milk is the only source of water in the diet of pouch-bound marsupials, it is reasonable to assume that mother's milk adequately supplies the water requirements of young animals. For this reason, Wombaroo Milk Replacers are formulated to match the milk concentration and feed volumes that are naturally produced by lactating female marsupials. Mother-reared joeys do not usually receive additional water intake until they start emerging from the pouch. Conditions in the pouch are high in humidity and are at optimum temperature such that water losses from the joey are minimised.

Maintenance Water Requirements

Animals have a "maintenance" water requirement which supplies their basic needs for normal biological activity. This varies depending on the species and the size of the animal. In clinical veterinary practice, maintenance fluid requirements in small animal patients are often defined as 60mL/kg/day (6% bodyweight) for smaller dogs and 40mL/kg/day (4% body weight) for larger dogs (DiBartola 2006). In the absence of specific values for juvenile marsupials, these numbers are often quoted as a guideline, although its likely that pouch-bound marsupials have significantly lower water requirements due to their reduced energy expenditure. Denny & Dawson (1975) found that adult macropod water turnover rate was only about two-thirds that eutherian mammals such as dogs, and this was attributed to the marsupial's substantially lower metabolic rate. On this basis, a maintenance fluid requirement for marsupials of around 4 to 5% of body weight is probably appropriate.

Water quantities consumed in the milk for a typical kangaroo joey fed Wombaroo are given in the table below:

Milk Formula	Joey Weight (g)	Milk Fed (mL)	Water in milk (mL)	Water as % body weight
<0.4	250	45	43	17
0.4	500	63	57	11
0.6	1300	105	89	6.9
>0.7	1800	120	96	5.3

From the final column in the above table it can be seen that all stages of Wombaroo Milk Replacers provide fluid levels that meet or exceed the guidelines of 4-5% body weight predicted for marsupials.

Joeys at the 0.6 or younger stages, receive fluid from their milk well in excess of their maintenance water requirements, and therefore do not usually require additional water, unless they are significantly dehydrated. Joeys at the >0.7 stage are starting to emerge from the pouch (or are at least leaning out of the pouch), so should have free access to bowls of water, as well as fresh grass, which can be sprayed with water. In this way, joeys can start to regulate their own water intake, and not just rely on the water present in the milk. Additionally, the marsupial kidney at this age is developing its ability to concentrate urine, which helps to conserve water and further reduces the maintenance requirement.

Dehydration in Hand-Reared Joeys

Dehydration in hand-reared joeys occurs through respiration, which is directly linked to energy expenditure, as well as exposure to temperatures which exceed the thermoneutral zone. Husbandry conditions in captivity should mimic as closely as possible those in mother-raised joeys in order to avoid dehydration. However, often animals are kept at higher temperatures, lower humidity and with much more activity and stress (over handling) than they would have in the wild. These factors can all lead to dehydration, and the need to provide additional water, over and above that which is provided in the milk.

- ▶ **It is important to monitor joeys and determine if they have become dehydrated, especially during hot weather.**
- ▶ **Provide additional drinks of water in hot weather, if the joey is showing signs of dehydration and when joeys begin to emerge from the pouch and become more active.**

Healthy young animals will readily drink water when thirsty. Marginally dehydrated animals may only require an additional 1-2% of their body weight per day in water orally (ie 10-20mL/kg body weight). Severely dehydrated animals may require over 5% (50mL/kg) additional fluids, but in these cases it may be preferable to administer fluids subcutaneously under veterinary supervision.

- ▶ **If providing drinking water, do not add large volumes of extra water into the milk, as this dilutes energy intake and may reduce absorption of nutrients. If possible, give drinking water separately, between milk feeds.**

References

- Denny, MJS & TJ Dawson (1975). Comparative metabolism of tritiated water by macropodid marsupials. *American Journal of Physiology*. 228, 6, 1794-1799.
- DiBartola, SP (2006). *Fluid, Electrolyte, and Acid-Base Disorders in Small Animal Practice*. Third Edition. Saunders Elsevier. p21-22.
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