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HAEMATOLOGY AND CLINICAL CHEMISTRY OF HAIRY-NOSED WOMBATS *(Lasiorhinus latifrons)*

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Abstract: The report summarises an investigation into the health of wombats *(Lasiorhinus latifrons)* in the field during the breeding season of a drought year. Health was assessed by morphometry, haematology and clinical chemistry and the findings were compared with those obtained for apparently healthy captive wombats.

The erythrocyte count was lower and the erythrocyte size greater in free-ranging wombats than in captive wombats. Plasma values for potassium, urea, lactate dehydrogenase and aspartate transaminase were greater in free-ranging wombats than captive wombats. Plasma values for creatinine, total bilirubin and alkaline phosphatase were lower in the free-ranging group.

INTRODUCTION

The hairy-nosed wombat *(Lasiorhinus latifrons)* is a herbivorous fossorial marsupial inhabiting arid and semi-arid regions of southern Australia west of the Murray River. In one part of its range, near Blanche Town in South Australia, Gaughwin and Wells[5] found that wombats did not breed in years of drought.

An investigation was made into the health of wombats in this area during a drought year. Health was assessed by measuring a number of haematological and chemical constituents in blood and plasma. The values obtained were compared with a reference range for haematological and chemical constituents which was established for apparently healthy captive wombats.

MATERIALS AND METHODS

In August and October of the 1977 breeding season, 22 adult wombats were examined (under licence from the South Australian National Parks and Wildlife Service) in the Blanche Town, Swan Reach region of South Australia. Wombats were killed by shooting in the head or neck while they were grazing or resting, the chest cavity was opened and blood samples were taken directly from the heart within 2 min of death. Lithium heparin and dipotassium EDTA were the anticoagulants mixed with blood collected for clinical chemistry and haematology, respectively. Whole blood and plasma were stored on crushed ice, the plasma being separated from the blood cells within 30 min of collection. The specimens were at the laboratory within 18 h of collecting the samples in the field. Total body weight and body length measurements were obtained for each wombat.

For captive wombats, blood samples were taken from a foreleg vein within 5-10 min of immobilising the animal with an intramuscular injection of ketamine hydrochloride (12 mg/kg).[3] Wombats had been in captivity for at least a year. They were housed in enclosures with a concrete floor and a wooden shelter box and were given a ration of a 2:1 mixture

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of oats and commercial kangaroo pellets. Water was provided *ad libitum*. The haematological and chemical methods used in this study have been described by Needham *et al.*[7] and Cargill *et al.*,[2] respectively.

Mean values were compared by using the Student's *t*-test. The results for male and female wombats were combined as there was no effect of sex (P>0.05) on any of the measurements. Unusually high plasma enzyme activities in 3 of the free-ranging wombats were excluded from the combined results but are listed separately.

RESULTS

The mean body weight and body length of the 22 wild wombats were 24.7±2.8 (SD) kg and 88±3 cm respectively, values near the average weight of 25 kg found for free-ranging wombats by Crowcroft.[3] The average weight of 9 captive wombats measured on 20 occasions over the period blood samples were obtained (3 years) was 28.1±2.6 kg and average body length was 89±3 cm.

Table 1 summarizes the haematological findings for free-ranging and captive wombats. The erythrocyte count (RBC), haemoglobin (Hb) concentration and haematocrit were significantly lower in the free-ranging wombats whereas the mean volume of RBCs was greater in free-ranging than in captive wombats. Captive wombats had significantly more leucocytes (WBC) than wild wombats, due mainly to a higher number of neutrophils.

Clinical chemical values for free-ranging and captive wombats are given in Table 2. Except for potassium there were no differences in plasma electrolytes between free-ranging and captive wombats. Plasma urea concentrations were significantly greater in free-ranging wombats than in captive wombats whereas creatinine was significantly elevated in captive wombats. Both plasma cholesterol and protein were lower in free-ranging wombats. Conjugated bilirubin concentrations were similar for free-ranging and captive wombats but significantly higher total bilirubin concentrations of captive wom

TABLE 1. Haematological values of *Lasiorhinus latifrons* (Mean ± SD).

Component	Units	Free-ranging Wombats n = 22	Captive Wombats* n = 12
Erythrocytes	Cells × 10^{12}/l	4.68 ± 0.51[a]	5.68 ± 0.57[a]
Haemoglobin (Hb)	g/l	128 ± 15[c]	140 ± 12[c]
Haematocrit Value	l/l	0.397 ± 0.045[c]	0.433 ± 0.040[c]
Mean Cell Volume	fl	85 ± 3[a]	76 ± 4[a]
Mean Cell Hb Concentration	g/l	324 ± 14	322 ± 17
Leucocytes	Cells × 10^9/l	10.0 ± 4.0[b]	14.3 ± 2.5[b]
Neutrophils**	Cells × 10^9/l	5.43 ± 2.38[b]	7.98 ± 1.27[b]
Lymphocytes	Cells × 10^9/l	4.96 ± 2.65	6.03 ± 1.57
Monocytes	Cells × 10^9/l	0.01 ± 0.03	0.03 ± 0.08
Eosinophils	Cells × 10^9/l	0.55 ± 0.68	0.27 ± 0.22
Basophils	Cells × 10^9/l	0.0	0.0

*12 measurements from 8 wombats

**n = 10 for differential leucocyte count on free-ranging wombats.

For each component, values with the same superscript 'a' or 'b' or 'c' were significantly different at P<0.001, P<0.01 and P<0.05 respectively ('t' test).

TABLE 2. Plasma chemical values of *Lasiorhinus latifrons* (Mean ± SD).

Constituent	Units	Free-ranging Wombats (n = 22)	Captive Wombats† (n = 29)
Sodium	mmol/l	143 ± 10	140 ± 3
Potassium	mmol/l	5.7 ± 1.2[a]	4.2 ± 0.4
Chloride	mmol/l	101 ± 6	100 ± 2
Bicarbonate	mmol/l	24 ± 6	28 ± 4
Glucose	mmol/l	6.4 ± 1.4	6.1 ± 1.0
Urea	mmol/l	13.1 ± 1.8[a]	7.7 ± 1.5
Creatinine	mmol/l	0.15 ± 0.03[a]	0.22 ± 0.03
Urate	mmol/l	0.06 ± 0.02[a]	0.03 ± 0.02
Phosphate	mmol/l	1.55 ± 0.45	1.43 ± 0.25
Calcium	mmol/l	2.65 ± 0.30	2.57 ± 0.15
Protein	g/l	70 ± 9[c]	75 ± 6
Cholesterol	mmol/l	3.1 ± 0.6[a]	3.6 ± 0.3
Conjugated Bilirubin	umol/l	1.2 ± 0.4	1.2 ± 0.5
Total Bilirubin	umol/l	2.2 ± 1.1[c]	3.3 ± 1.8
Alkaline Phosphatase	U/l	101 ± 46[a]	302 ± 81
Lactate Dehydrogenase	U/l	355 ± 137[a]	246 ± 72
Aspartate Transaminase	U/l	65 ± 35[a]	32 ± 10
Creatine Kinase	U/l	376 ± 240	278 ± 198

†29 measurements from 9 wombats

For each constituent values with the same superscript 'a' or 'c' were significantly different at $P<0.001$ and $P<0.05$ respectively.

bats indicated higher concentrations of unconjugated bilirubin in this group. The low plasma concentrations of uric acid indicated that adequate detoxification and/or excretion of this compound occurred in *L. latifrons.* There were significant differences between free-ranging and captive wombats in the activities of all enzymes measured except for creatine kinase. The activities of lactate dehydrogenase and aspartate transaminase were higher in free-ranging wombats while alkaline phosphatase was higher in captive wombats. Three free-ranging wombats had high values for lactate dehydrogenase (450-550 U/l) aspartate transaminase (80-270 U/l) and creatine kinase (800-1700 U/l).

DISCUSSION

While there were differences between free-ranging and captive wombats in a number of haematological measurements the free-ranging wombats could not be regarded as being significantly anaemic. Their Hb and RBC values were within the ranges reported by Munday[6] and by Parsons *et al.*[8] for many other marsupial species.

Lasiorhinus latifrons appears to have a greater number of WBC than many other marsupials.[6,8] This is probably characteristic of the Vombatidae since Presidente[10] also found high numbers of WBC in the common wombat *(Vombatus ursinus).*

The greater body weights, Hb concentration and total WBC of captive wombats may reflect an improved nutritional status. A positive correlation between nutritional status and certain haematological characteristics has been well documented for a number of other marsupial species.[1,4]

When compared with published values for other marsupials[9] the plasma electrolyte concentrations measured in the wombats indicated adequate fluid balance and renal function. The high values for potassium, urea and urate in free-ranging wombats may represent part of a general adaptation to a water deficient environment by minimizing the water loss associated with the excretion of these substances, as occurs in other desert adapted mammals.[11]

Liver function as assessed by the concentrations of bilirubin, protein and cholesterol appeared to be adequate. The marked elevation in the activity of aspartate transaminase in 3 of the wombats was accompanied by an elevation of both creatine kinase and lactate dehydrogenase activity indicating that generalized trauma e.g. fighting or heavy physical exercise could have been the cause.

Overall, there was little evidence from this study to suggest that the drought conditions prevailing at the times of collecting the specimens had significantly affected the health of the wombats. The differences observed between free-ranging and captive wombats were probably related to improved nutrition of the latter group.

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