

Supplementary Material

Nutritional composition of plants and preliminary assessment of nutrition in free-ranging bare-nosed wombats (*Vombatus ursinus*)

Fiona F. Casey^A, Blaire T. Vallin^A, Jack Wolfenden^A, Julie M. Old^A and Hayley J. Stannard^{B,}*

^ASchool of Science, Western Sydney University, Penrith, NSW, 2751, Australia

^BSchool of Agricultural, Environmental and Veterinary Sciences, Charles Sturt University, Wagga Wagga, NSW 2678, Australia

*Correspondence to: Email: hstannard@csu.edu.au

1 Supplementary Table 1. Plants collected from each site and season

Winter	Common Name	Scientific Name
<u>Wolgan Valley</u>		
Sample 1	Finger Grass	<i>Digitaria parviflora</i>
Sample 2	Dallis Grass	<i>Paspalum dilatatum</i>
Sample 3	Common couch	<i>Elymus repens</i>
Sample 4	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 5	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 6	Dallis Grass	<i>Paspalum dilatatum</i>
<u>Badger Ground</u>		
Sample 1	Spear grass	<i>Austrostipa spp.</i>
Sample 2	Kangaroo Grass	<i>Themeda triandra</i>
Sample 3	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 4	Plantago	<i>Plantago lanceolata</i>
Sample 5	Summer Grass	<i>Digitaria ciliaris</i>
Sample 6	Kikuyu	<i>Cenchrus clandestinus</i>
<u>Eagle's Drift</u>		
Sample 1	Spear grass	<i>Austrostipa spp.</i>
Sample 2	Liver seed grass	<i>Urochloa panicoides</i>
Sample 6	Wallaby grass	<i>Austrodanthonia caespitosa</i>
<u>Robertson</u>		
Sample 1	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 3	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 4	Plantago	<i>Plantago lanceolata</i>
Sample 6	Fleabane	<i>Conyza bilbaoana</i>
<u>Coolagolite</u>		
Sample 1	Weeping grass	<i>Microlaena spp.</i>
Sample 3	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 4	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 5	Common couch	<i>Elymus repens</i>
Sample 6	Summer Grass	<i>Digitaria ciliaris</i>
Spring		
<u>Badger Ground</u>		
Sample 1	Finger Grass	<i>Digitaria parviflora</i>
Sample 2	Kikuyu	<i>Cenchrus clandestinus</i>
<u>Eagle's Drift</u>		

Sample 1	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 2	Spear grass	<i>Austrostipa</i>
Sample 3	Liver seed grass	<i>Urochloa panicoides</i>
Sample 4	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 5	Wallaby grass	<i>Austrodanthonia caespitosa</i>
Sample 6	Summer Grass	<i>Digitaria ciliaris</i>
<u>Robertson</u>		
Sample 1	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 2	Canary Grass	<i>Phalaris aquatica</i>
Sample 3	Yorkshire Fog	<i>Holcus lanatus</i>
<u>Coolagolite</u>		
Sample 1	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 2	Common couch	<i>Elymus repens</i>
Sample 3	Summer Grass	<i>Digitaria ciliaris</i>
Sample 4	Common couch	<i>Elymus repens</i>
Summer		
<u>Wolgan Valley</u>		
Sample 1	Finger Grass	<i>Digitaria parviflora</i>
Sample 2	Weeping grass	<i>Microlaena</i>
Sample 3	Dallis Grass	<i>Paspalum dilatatum</i>
Sample 4	Summer Grass	<i>Digitaria ciliaris</i>
<u>Badger Ground</u>		
Sample 1	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 2	Weeping grass	<i>Microlaena</i>
Sample 3	Meadow Grass	<i>Poa affinis</i>
<u>Eagle's Drift</u>		
Sample 1	Spear grass	<i>Austrostipa</i>
Sample 2	Common couch	<i>Elymus repens</i>
Sample 3	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 4	Wallaby grass	<i>Austrodanthonia caespitosa</i>
Sample 5	Liver seed grass	<i>Urochloa panicoides</i>
<u>Robertson</u>		
Sample 1	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 2	Plantago	<i>Plantago lanceolata</i>
Sample 3	Fleabane	<i>Conyza bilbaoana</i>
<u>Coolagolite</u>		

Sample 1	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 2	Common couch	<i>Elymus repens</i>
Sample 3	Weeping grass	<i>Microlaena spp.</i>
Sample 4	Goosefoot	<i>Chenopodium spp.</i>
Sample 5	Kikuyu	<i>Cenchrus clandestinus</i>
Autumn		
<u>Wolgan Valley</u>		
Sample 1	Common couch	<i>Elymus repens</i>
Sample 2	Summer Grass	<i>Digitaria ciliaris</i>
Sample 3	Finger Grass	<i>Digitaria parviflora</i>
Sample 4	Dallis Grass	<i>Paspalum dilatatum</i>
<u>Badger Ground</u>		
Sample 1	Buffalo	<i>Stenotaphrum secundatum</i>
Sample 2	Kikuyu	<i>Cenchrus clandestinus</i>
<u>Eagle's Drift</u>		
Sample 1	Green pigeon grass	<i>Setaria viridis</i>
Sample 2	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 3	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 4	Wallaby grass	<i>Austrodanthonia caespitosa</i>
Sample 5	Rhodes grass	<i>Chloris gayana Kunth</i>
<u>Robertson</u>		
Sample 1	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 2	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 3	Plantago	<i>Plantago lanceolata</i>
Sample 4	Kikuyu	<i>Cenchrus clandestinus</i>
<u>Coolagolite</u>		
Sample 1	Kikuyu	<i>Cenchrus clandestinus</i>
Sample 2	Common couch	<i>Elymus repens</i>
Sample 3	Weeping grass	<i>Microlaena spp.</i>
Sample 4	Kikuyu	<i>Cenchrus clandestinus</i>

3 Supplementary Table 2 Mean \pm SD concentration of energy, protein and lipids (on a dry matter basis) in selected plant samples

4

	Energy MJ/kg	Protein %	Lipid %
<i>Season</i>			
Winter (n=24)	16.79 \pm 3.29 ^b	8.50 \pm 3.74 ^{b,d}	1.45 \pm 0.52 ^b
Spring (n=15)	16.50 \pm 2.76 ^b	12.08 \pm 3.08 ^c	1.71 \pm 0.31
Summer (n=20)	18.78 \pm 1.74 ^a	9.53 \pm 2.20 ^b	1.92 \pm 0.96 ^a
Autumn (n=19)	18.15 \pm 1.99	14.25 \pm 5.52 ^a	1.27 \pm 0.47 ^b
<i>Site</i>			
Wolgan Valley (n=14)	17.28 \pm 0.94	11.05 \pm 3.50	1.48 \pm 0.50 ^b
Robertson (n=14)	17.03 \pm 2.26	11.61 \pm 3.85	1.58 \pm 0.68
Eagle's Drift (n=19)	16.79 \pm 2.64	10.93 \pm 6.15	1.42 \pm 0.40 ^b
Badger Ground (n=13)	16.00 \pm 3.59	10.37 \pm 4.45	1.29 \pm 0.41 ^b
Coolagolite (n=18)	20.19 \pm 1.39 ^a	10.60 \pm 3.57	2.10 \pm 0.93 ^a

5 ^{a-b c-d} significantly different from each other P<0.05

6

7

8 Supplementary Table 3. Average monthly rainfall (mm) for all years for each study site (Bureau of Meteorology, 2023)

Study site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean yearly
Eagle's Drift	72.1	67.8	55.6	38.8	36.4	44	38.7	34.3	39.8	48.4	52.9	70.2	599
Robertson	131	190.5	184.8	158.6	106.2	138.8	107.5	150.3	85.3	119.8	126.5	104.1	1603.4
Coolagolite	84.3	106.1	100.5	71	74.5	85.9	53	51.5	54.5	76.7	79	83.1	920.1
Badger Ground	101.1	97.2	108.6	58.4	53	73	66.3	56.3	70.8	69.7	97.6	88.7	940.7
Wolgan Valley	86.5	76.6	70.8	43.2	47.2	48.9	51	63.5	53.5	67.9	74.3	72.7	756.1

9 Supplementary Table 4. Drought category for each study site from June 2018 to May 2019 (Department of Primary Industry, 2023)

Month- Year	Wolgan Valley	Coolagolite	Robertson	Eagle's Drift	Badger Ground
Jun-18	Intense drought	drought affected (intensifying)	Intense drought	Intense drought	Drought
Jul-18	Intense drought	drought affected (intensifying)	Intense drought	Intense drought	Intense drought
Aug-18	Intense drought	drought affected (intensifying)	Intense drought	Intense drought	Drought
Sep-18	Intense drought	drought affected (intensifying)	Intense drought	Intense drought	Drought
Oct-18	Drought	Recovery	Drought	Intense drought	Drought affected (weakening)
Nov-18	Drought affected (weakening)	drought affected (intensifying)	Drought	Intense drought	Drought affected (weakening)
Dec-18	Drought affected (weakening)	drought affected (intensifying)	Drought	Intense drought	Drought affected (weakening)
Jan-19	Drought affected (weakening)	drought affected (weakening)	Drought affected (weakening)	Drought	Drought affected (weakening)
Feb-19	Drought affected (weakening)	Recovery	Drought affected (intensifying)	Drought	Drought affected (weakening)
Mar-19	Drought affected (intensifying)	Non-drought	Drought	Drought	Drought affected (intensifying)

Apr-19	Drought affected (intensifying)	Drought affected (intensifying)	Drought affected (intensifying)	Intense drought	Drought affected (intensifying)
May-19	Drought affected (intensifying)	Non-drought	Drought affected (intensifying)	Drought affected (intensifying)	Drought affected (intensifying)

10 Department of Primary Industry (2023) Parish-level drought histories. <https://edis.spaceport.intersect.org.au/%2FDroughtHistory%2FParish> accessed

11 16/08/2023

12 Supplementary Table 5. Mean \pm SD concentration of minerals (on a dry matter basis) in selected plant samples

13

	Calcium	Phosphorus	Sodium	Potassium	Magnesium	Iron	Manganese
	%	%	%	%	%	mg/kg	mg/kg
<i>Season</i>							
Winter (n=24)	0.45 \pm 0.36	0.12 \pm 0.07 ^a	0.03 \pm 0.08	1.01 \pm 0.84 ^a	0.15 \pm 0.09	1569 \pm 1786	402.5 \pm 287.3
Spring (n=15)	0.43 \pm 0.16	0.17 \pm 0.06 ^b	0.03 \pm 0.02	1.66 \pm 0.74 ^b	0.19 \pm 0.07	1079 \pm 2161	147.5 \pm 123.3
Summer (n=20)	0.43 \pm 0.27	0.17 \pm 0.05 ^b	0.10 \pm 0.16	1.61 \pm 0.57 ^b	0.23 \pm 0.13	2518 \pm 4377	276.2 \pm 462.0
Autumn (n=19)	0.43 \pm 0.22	0.19 \pm 0.06 ^b	0.03 \pm 0.06	1.36 \pm 0.48	0.19 \pm 0.07	1273 \pm 1293	230.6 \pm 252.3
<i>Site</i>							
Wolgan Valley (n=14)	0.40 \pm 0.18	0.17 \pm 0.05	0.01 \pm 0.00	1.60 \pm 0.49	0.17 \pm 0.04	1019 \pm 1280	476.7 \pm 362.4
Robertson (n=14)	0.47 \pm 0.28	0.20 \pm 0.04	0.09 \pm 0.14	1.57 \pm 0.70	0.22 \pm 0.09	2381 \pm 4822	242.0 \pm 118.3
Eagle's Drift (n=19)	0.37 \pm 0.19	0.14 \pm 0.08	0.01 \pm 0.00	1.33 \pm 0.88	0.19 \pm 0.15	1755 \pm 2106	131.1 \pm 88.1
Badger Ground (n=13)	0.48 \pm 0.47	0.13 \pm 0.08	0.06 \pm 0.11	1.13 \pm 0.97	0.11 \pm 0.06	1103 \pm 1309	317.1 \pm 258.5
Coolagolite (n=18)	0.48 \pm 0.23	0.16 \pm 0.06	0.09 \pm 0.14	1.28 \pm 0.57	0.23 \pm 0.07	1960 \pm 3084	274.1 \pm 474.9

14 ^{a-b} significantly different from each other P<0.05

15

16

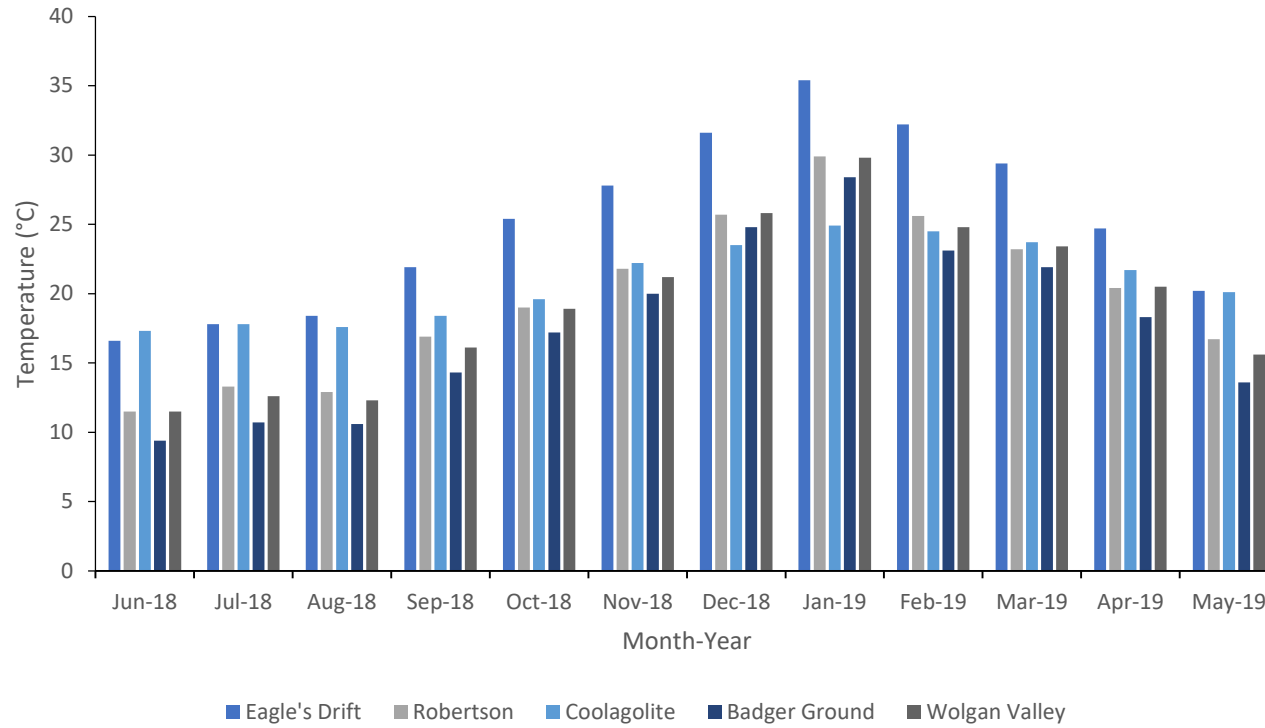
17 Supplementary Table 6. Mean \pm SD concentration of protein (on a dry matter basis) in scat samples of bare-nosed wombats

Site	Season	Number	Protein
Wolgan Valley	Winter	6	11.65 \pm 1.68
Wolgan Valley	Spring	3	9.78 \pm 2.03
Wolgan Valley	Summer	6	7.52 \pm 2.72
Wolgan Valley	Autumn	6	10.29 \pm 1.07
Badger Ground	Winter	6	6.60 \pm 1.80
Badger Ground	Summer	5	9.25 \pm 1.46
Badger Ground	Spring	6	9.10 \pm 1.22
Badger Ground	Autumn	5	9.47 \pm 1.52
Eagle's Drift	Winter	6	6.16 \pm 1.50
Eagle's Drift	Spring	5	9.13 \pm 0.54
Eagle's Drift	Summer	5	9.15 \pm 1.11
Eagle's Drift	Autumn	5	8.76 \pm 0.98
Robertson	Winter	6	12.93 \pm 0.68
Robertson	Spring	6	16.15 \pm 1.84
Robertson	Summer	5	14.53 \pm 2.34
Robertson	Autumn	5	12.69 \pm 1.39
Coolagolite	Winter	6	8.84 \pm 1.29

Coolagolite	Spring	6	15.66 ± 1.27
Coolagolite	Summer	5	9.38 ± 1.59
Coolagolite	Autumn	6	9.54 ± 2.27

19

20



21

22 Supplementary Figure 1. Mean maximum monthly temperature at the five study sites (Bureau of Meteorology, 2023)

23