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APPENDIX 1.

MORPHOMETRIC DATA COLLECTED FROM THE POUCH YOUNG

LENGTHS

The following abbreviations have been used.

No = Sample number.

A = Area,

1 = S.R.S.F. site

2 = Diamond Flat

S = Sex,

1 = Male

2 = Female

EA = Estimated age.

MI = Molar Index.

Wt = Weight (in kg).

WTT= White tail tip.

0 = NOT recorded

1 = present

2 = not present

E = Ear length (in cms).

H = Head length (in cms).

FA = Forearm length (in cms).

P = Paw length (in cms).

B = Body length (in cms).

T = Tail length (in cms).

L = Leg length (in cms).

F = Pes length (in cms).

WHERE THE MEASUREMENT WAS NOT RECORDED AN "*" HAS BEEN INSERTED.

No	DATE	A	S	EA	MI	Wt	WTT	E	H	FA	P	B	T	L	F
1	260479	1	1	4.0	2.51	12.6	0	8.0	15.9	14.2	5.5	64.5	66.8	32.6	20.1
2	260479	1	2	3.8	2.44	10.1	0	8.1	14.9	12.2	4.7	54.3	66.0	27.5	19.6
3	260479	1	2	4.1	2.53	11.8	0	9.2	15.2	12.9	5.0	59.4	66.0	32.6	20.2
4	260479	1	2	3.1	2.20	11.3	0	8.7	15.0	14.0	5.2	58.7	68.1	32.5	21.5
5	260479	2	1	5.3	2.83	15.0	0	9.6	16.5	16.2	6.5	63.0	74.5	33.7	20.8
6	170579	1	1	5.1	2.79	13.5	0	8.0	15.5	13.7	5.2	59.0	65.6	32.0	21.0
7	170579	1	2	2.8	2.07	11.3	0	7.3	15.4	13.7	5.7	58.8	60.2	31.0	22.0
8	170579	1	2	4.3	2.59	10.0	0	7.5	13.5	12.5	5.2	59.3	69.5	28.0	19.5
9	170579	1	1	3.1	2.21	14.1	0	9.1	14.5	14.0	5.8	64.0	68.0	35.5	21.5
10	170579	1	2	4.6	2.67	10.7	2	8.7	15.2	12.7	5.0	55.7	63.5	28.5	25.0
11	170579	1	1	5.4	2.86	12.7	2	9.2	16.7	14.7	6.0	59.2	73.5	30.7	21.0
12	170579	1	2	3.9	2.47	10.4	2	9.0	15.2	13.0	5.1	56.2	65.0	28.0	20.0
13	170579	2	2	4.1	2.52	13.2	2	9.0	15.0	13.5	5.2	59.7	69.0	31.0	21.0
14	170579	2	1	5.7	2.92	17.5	1	9.6	17.0	15.9	6.6	63.0	80.0	32.2	23.2
15	170579	2	1	5.1	2.79	15.0	2	7.9	16.2	15.2	6.0	60.0	68.5	32.0	20.5
16	170579	2	1	5.6	2.90	13.5	2	8.5	15.8	15.7	5.6	58.0	69.5	31.5	21.5
17	170579	2	1	4.9	2.73	14.3	2	8.7	16.7	16.7	6.1	62.0	70.5	32.0	22.0
18	140679	1	1	3.9	2.47	13.2	1	9.0	15.0	14.3	6.1	59.5	65.0	29.0	20.0
19	140679	1	1	2.2	1.81	9.5	2	8.3	14.4	12.2	5.1	56.5	62.0	26.8	20.2
20	140679	1	1	3.4	2.31	10.7	1	8.2	14.0	12.8	5.0	51.7	64.5	27.0	20.0
21	140679	1	2	3.1	2.21	9.8	2	8.2	13.5	11.8	4.8	49.5	60.5	27.5	19.5
22	140679	1	2	5.6	2.89	13.4	2	9.3	14.2	12.8	5.8	60.0	64.5	28.5	21.0
23	140679	1	1	3.1	2.21	9.3	2	8.4	13.8	12.2	5.0	55.0	62.5	26.5	19.5
24	140679	1	2	3.9	2.47	11.4	1	9.2	14.5	12.5	5.5	53.5	65.5	27.8	20.5
25	140679	1	1	2.6	2.00	8.9	2	8.0	14.5	11.8	5.0	50.5	61.0	25.5	19.5
26	140679	1	1	5.1	2.78	14.1	1	9.0	15.5	15.0	6.5	60.0	76.0	30.5	22.0
27	140679	1	1	5.2	2.81	12.9	2	9.0	15.0	14.0	5.7	60.5	67.0	30.5	21.0
28	140679	1	1	4.0	2.51	14.3	2	9.0	15.5	15.0	6.0	66.0	75.0	30.5	22.0
29	140679	1	1	6.0	2.98	12.7	2	8.5	14.6	14.5	6.2	57.0	66.0	30.0	20.5
30	140679	2	2	5.6	2.89	12.7	1	9.0	15.0	13.7	5.5	55.0	66.0	30.0	20.0

No	DATE	A	S	EA	MI	Wt	WTT	E	H	FA	P	B	T	L	F
31	140679	2	1	7.8	3.29	15.7	2	9.9	16.0	16.0	7.0	59.0	76.0	31.5	22.0
32	140679	2	1	2.1	1.74	9.5	1	8.5	14.0	12.0	5.5	53.0	60.5	26.5	20.5
33	140679	2	1	4.1	2.54	12.0	2	8.7	14.5	14.0	6.0	55.0	71.0	29.5	20.0
34	030779	2	2	7.6	3.26	12.3	1	8.5	14.0	13.2	5.2	57.0	72.0	29.0	20.3
35	030779	2	1	6.7	3.11	13.9	2	8.1	14.7	15.6	6.0	58.5	72.0	31.0	21.0
36	040779	2	1	5.3	2.84	16.1	1	8.6	15.5	16.5	7.0	63.0	75.0	31.5	22.0
37	040779	2	2	2.3	1.85	9.8	2	8.5	14.5	12.3	5.0	50.0	66.0	27.0	20.5
38	040779	2	1	5.1	2.78	15.7	2	9.2	15.5	14.5	6.0	61.0	77.5	30.5	22.5
39	040779	2	1	7.0	3.16	16.1	2	9.0	14.5	16.0	6.2	59.5	71.5	31.0	22.0
40	040779	2	2	5.6	2.90	12.9	1	9.0	15.0	13.5	5.5	58.5	72.0	30.5	22.5
41	040779	2	1	3.9	2.47	14.3	1	9.0	15.5	15.0	6.0	64.5	77.0	31.0	22.5
42	040779	2	2	5.4	2.85	10.0	2	9.2	15.0	13.2	5.0	54.0	63.0	27.5	19.5
43	050779	1	1	4.1	2.54	13.2	2	8.1	15.0	14.0	5.5	57.0	67.5	29.0	19.5
44	050779	1	1	4.8	2.71	12.3	2	9.0	15.5	14.5	5.5	58.5	67.0	30.0	21.0
45	050779	1	1	5.6	2.90	12.9	2	8.5	15.0	15.0	6.0	54.5	71.0	30.0	21.5
46	050779	1	2	2.2	1.83	8.4	2	8.5	14.0	10.5	4.5	51.0	60.0	25.0	17.5
47	050779	1	1	4.3	2.59	13.6	1	9.2	16.0	15.0	6.5	59.5	67.5	31.5	20.5
48	050779	1	2	7.3	3.20	10.4	1	8.5	15.5	12.5	5.0	54.5	63.0	28.0	20.0
49	050779	1	2	5.1	2.79	11.4	2	8.0	14.5	13.0	5.0	55.0	63.0	29.5	20.5
50	050779	1	2	4.8	2.71	10.9	2	8.5	15.0	12.5	5.0	51.5	62.0	28.0	19.5
51	060879	1	1	6.1	3.00	16.4	2	8.7	14.5	15.0	6.0	65.5	71.0	31.0	21.0
52	060879	1	2	4.2	2.56	11.2	2	9.0	14.5	13.0	5.5	55.0	72.0	28.0	21.0
53	060879	1	1	5.5	2.88	13.2	2	9.9	16.0	15.0	6.5	60.0	78.0	30.0	22.0
54	060879	1	1	5.9	2.96	11.6	2	9.0	15.0	14.5	5.5	56.0	61.0	28.0	20.0
55	060879	1	1	3.5	2.35	15.2	1	9.5	15.0	16.0	6.5	58.0	70.0	31.5	21.5
56	060879	2	1	6.4	3.06	16.6	2	8.0	16.0	16.5	6.5	60.0	75.0	31.5	23.3
57	080879	2	1	7.6	3.25	15.2	2	8.5	15.5	14.5	6.0	58.0	67.0	28.0	20.0
58	080879	2	2	5.3	2.83	14.4	2	8.5	14.5	12.5	5.0	52.5	63.0	28.0	19.5
59	080879	2	2	7.5	3.24	12.6	1	8.5	14.5	13.0	5.0	52.0	61.5	27.0	19.5
60	080879	2	1	6.1	3.00	13.7	1	9.0	15.0	14.5	5.5	57.0	67.5	29.5	21.0

No	DATE	A	S	EA	MI	Wt	WTT	E	H	FA	P	B	T	L	F
61	080879	2	1	5.7	2.92	14.9	2	8.5	15.0	15.5	6.5	56.0	65.5	30.0	21.0
62	080879	2	2	5.5	2.87	12.4	2	9.5	13.5	12.5	5.5	53.5	62.5	28.0	19.5
63	080879	2	2	7.0	3.16	12.8	2	8.5	13.5	13.0	5.0	53.5	67.0	28.5	19.0
64	080879	2	2	6.1	3.00	12.7	1	8.5	14.0	12.5	5.0	57.0	63.0	27.0	19.5
65	080879	2	2	5.0	2.76	13.8	2	8.5	14.0	13.0	5.0	57.0	59.5	28.5	19.5
66	090879	1	1	7.0	3.16	15.0	1	8.0	13.5	14.0	5.0	58.0	68.5	28.5	19.0
67	090879	1	2	1.8	1.54	7.8	1	8.0	12.5	11.0	4.5	45.5	52.5	24.0	18.0
68	140879	1	1	6.1	3.00	12.6	1	9.0	15.0	15.0	6.0	61.0	76.0	32.0	21.5
69	140879	1	1	3.7	2.42	9.0	2	8.0	14.5	13.5	5.5	55.5	64.0	29.5	21.5
70	150879	1	1	4.2	2.56	12.1	1	8.5	14.0	14.2	5.5	57.0	67.0	29.0	19.5
71	270879	1	1	5.2	2.81	13.6	2	8.0	14.5	15.0	5.5	60.0	70.0	30.5	20.5
72	270879	1	2	5.5	2.88	12.2	2	8.0	13.5	12.5	5.0	53.5	65.5	27.0	20.0
73	270879	1	2	6.4	3.06	11.0	1	8.5	14.0	13.0	5.0	55.5	63.5	28.0	19.5
74	270879	1	2	5.2	2.82	13.0	1	8.5	14.5	13.0	5.5	58.0	67.0	28.5	20.5
75	270879	1	1	4.8	2.72	14.6	1	9.0	16.0	14.0	6.0	61.0	68.0	29.5	21.0
76	270879	1	1	4.1	2.52	15.4	2	9.5	15.0	15.0	6.0	61.0	67.5	30.5	22.0
77	270879	1	1	8.3	3.35	14.0	2	8.5	15.5	15.0	6.0	58.0	70.0	31.0	21.0
78	280879	1	1	5.2	2.81	14.0	2	9.0	15.0	14.5	6.0	59.0	72.0	31.0	21.0
79	280879	1	2	4.9	2.75	13.0	2	9.0	15.0	13.5	5.5	60.0	68.0	29.5	20.5
80	280879	1	2	3.5	2.36	12.0	2	9.0	14.0	12.5	5.0	55.0	65.0	29.0	20.5
81	280879	1	1	5.5	2.87	14.2	2	8.5	14.5	16.0	6.5	58.0	68.0	30.0	22.0
82	280879	1	2	5.2	2.81	15.0	2	9.0	15.0	14.0	5.5	62.0	64.0	31.0	21.0
83	290879	2	2	5.3	2.83	10.2	2	8.5	14.5	13.0	5.0	55.0	66.5	28.5	20.0
84	290879	2	1	3.3	2.29	15.3	2	9.0	16.0	16.0	7.0	62.0	75.0	31.5	22.0
85	290879	2	2	5.4	2.86	10.4	2	8.0	14.0	13.0	5.0	53.0	68.5	28.0	20.0
86	290879	2	1	3.7	2.40	14.8	2	9.0	14.5	16.0	6.5	57.0	78.0	32.0	22.5
87	300879	1	1	5.2	2.80	15.4	2	8.5	15.5	15.5	6.5	63.5	76.5	30.5	21.0
88	010979	2	2	5.5	2.88	13.1	2	8.5	14.5	13.5	5.5	56.0	66.0	30.0	20.5
89	010979	2	1	6.6	3.09	14.6	2	9.0	15.0	15.0	6.0	60.0	74.0	30.5	21.5
90	010979	2	1	6.7	3.11	15.8	2	8.5	15.5	16.0	6.0	60.0	73.0	31.0	21.0

No	DATE	A	S	EA	MI	Wt	WTT	E	H	FA	P	B	T	L	F
91	300979	2	1	4.3	2.58	13.0	1	8.5	15.0	15.0	6.0	58.0	65.5	31.0	22.0
92	300979	2	1	1.1	1.00	6.0	2	7.5	12.5	10.5	4.5	45.0	55.0	23.0	18.5
93	011079	2	1	5.4	2.86	11.8	2	8.0	14.5	14.5	6.0	57.0	69.0	29.5	20.0
94	011079	2	2	2.3	1.87	9.1	2	8.0	14.0	12.0	5.0	54.5	60.5	26.5	18.0
95	011079	2	1	5.7	2.91	12.6	1	8.5	15.0	14.5	6.0	62.0	69.5	29.0	20.0
96	011079	2	1	3.0	2.16	9.4	2	8.5	14.5	13.0	5.5	54.0	68.0	28.5	21.0
97	011079	2	1	3.5	2.35	11.9	2	9.0	15.0	13.0	6.0	59.0	72.0	29.5	21.0
98	011079	2	1	5.5	2.88	17.2	1	8.5	16.0	16.5	7.0	66.0	72.0	32.0	22.5
99	021079	2	1	6.1	3.00	15.6	2	9.0	15.5	15.5	6.5	62.0	73.0	31.5	21.5
100	021079	2	1	3.8	2.46	15.4	1	9.0	15.0	15.5	6.5	63.0	71.0	31.0	21.5
101	021079	1	1	6.3	3.03	15.0	1	8.5	15.0	15.5	6.5	65.0	73.0	30.5	21.5
102	031079	1	2	3.8	2.45	9.3	1	8.0	14.0	12.5	4.5	51.0	70.0	28.0	20.0
103	031079	1	2	7.0	3.16	11.7	1	9.0	15.0	14.0	6.0	58.0	69.5	30.0	21.0
104	031079	1	2	6.1	3.00	11.4	1	8.0	14.5	13.0	5.5	55.0	71.0	29.0	19.5
105	031079	1	2	3.1	2.20	10.2	1	8.5	13.5	12.5	5.0	53.5	65.0	27.5	20.0
106	041079	1	1	5.7	2.92	12.3	2	8.0	14.5	14.5	6.0	58.0	70.0	29.5	20.0
107	041079	1	2	3.2	2.25	10.9	2	8.5	14.0	12.5	5.5	54.0	63.5	29.0	20.0
108	041079	1	2	4.9	2.74	10.4	2	8.5	14.5	14.0	5.5	55.5	69.0	29.0	20.5
109	041079	1	1	5.1	2.78	11.8	2	8.5	15.0	15.0	6.0	58.0	69.0	30.0	20.0
110	041079	1	2	6.7	3.11	10.0	2	8.0	14.0	13.0	5.5	52.5	64.0	28.0	20.0
111	291079	1	2	4.1	2.54	10.8	1	8.5	14.0	13.5	5.5	55.5	64.5	29.0	20.0
112	291079	1	1	6.7	3.11	11.8	2	8.5	14.5	15.5	6.0	54.5	72.0	28.5	19.5
113	291079	1	1	3.1	2.21	10.6	2	8.5	14.5	13.5	5.5	55.5	66.5	28.5	20.0
114	291079	1	2	5.3	2.83	12.3	2	8.0	14.5	13.5	5.5	60.5	71.0	28.0	20.0
115	291079	1	1	4.3	2.60	13.1	2	9.0	15.0	15.0	6.0	58.5	69.5	30.5	21.5
116	291079	1	1	7.4	3.22	13.1	2	8.5	15.0	15.0	5.5	57.5	70.0	30.0	21.0
117	291079	1	2	2.6	2.00	8.4	2	8.0	13.5	12.0	5.0	55.0	63.0	26.5	18.0
118	291079	1	2	5.2	2.81	12.0	1	8.0	14.0	13.0	5.0	59.0	72.5	29.0	20.0
119	291079	1	1	5.5	2.89	13.6	2	8.5	15.0	15.0	6.0	64.0	70.0	30.5	21.5
120	291079	1	2	3.9	2.46	12.8	2	8.5	14.5	13.0	5.5	63.0	65.0	29.0	21.0

No	DATE	A	S	EA	MI	Wt	WTT	E	H	FA	P	B	T	L	F
121	291079	2	1	5.6	2.90	16.0	2	9.0	15.5	17.0	6.5	58.0	69.5	31.0	22.0
122	291079	2	2	5.7	2.92	11.6	1	8.0	15.0	13.0	5.5	56.0	68.5	29.5	21.0
123	291079	2	1	3.3	2.29	16.8	1	8.0	15.5	15.0	6.5	62.0	71.0	31.0	22.5
124	291079	2	2	6.4	3.05	10.5	2	8.0	14.0	12.5	5.0	56.5	65.0	27.5	20.5
125	291079	2	1	2.0	1.71	10.0	2	8.5	13.5	13.0	5.5	51.5	68.5	28.5	21.5
126	301079	2	2	5.4	2.85	12.2	2	8.5	14.5	14.0	5.5	61.0	70.5	29.0	20.0
127	301079	2	1	1.1	1.00	4.8	2	7.5	12.5	9.5	4.5	41.0	52.5	21.5	18.0
128	301079	2	1	5.0	2.77	13.6	2	8.0	15.0	14.0	6.0	56.0	64.0	29.0	20.5
129	301079	2	2	6.0	2.98	13.9	2	9.0	15.0	13.5	6.0	55.5	70.5	30.0	21.0
130	261179	1	2	4.6	2.67	9.6	1	8.0	14.5	13.0	5.0	54.5	68.0	30.0	20.5
131	271179	1	1	4.4	2.62	12.1	2	9.0	15.0	14.5	6.0	56.5	67.5	28.5	20.5
132	271179	1	1	2.9	2.11	14.0	2	9.5	15.0	16.0	6.5	58.0	70.0	31.5	21.5
133	271179	1	1	3.1	2.21	11.6	2	8.5	15.0	14.0	6.0	55.0	65.0	28.5	21.0
134	271179	1	1	5.6	2.89	16.3	2	8.5	15.5	16.5	6.5	59.0	71.0	32.5	22.0
135	271179	1	2	4.8	2.71	10.6	2	8.5	14.5	13.5	5.0	53.0	65.0	28.0	20.5
136	271179	1	1	4.3	2.58	13.4	2	8.5	15.5	16.0	6.0	55.5	69.0	28.0	21.0
137	271179	1	1	5.1	2.78	11.0	1	8.0	14.0	15.0	6.0	59.5	71.0	30.0	22.0
138	271179	1	1	2.8	2.08	12.6	2	8.5	14.5	15.0	6.0	56.0	71.0	29.5	20.0
139	271179	1	1	5.5	2.87	10.1	1	8.0	14.0	13.0	5.0	51.5	66.0	28.0	20.5
140	281179	2	2	1.1	0.96	3.3	2	7.5	11.0	8.0	4.0	36.5	49.0	18.2	16.0
141	281179	2	2	1.7	1.52	8.8	1	8.0	13.0	11.5	5.0	50.5	59.5	26.0	20.0
142	281179	2	1	4.8	2.72	13.2	2	9.0	15.5	15.0	6.0	56.5	69.0	29.5	20.0
143	291279	1	1	6.7	3.10	10.6	1	9.0	15.0	15.0	6.0	58.0	69.0	30.0	20.0
144	291279	1	1	3.2	2.23	10.9	2	8.5	14.5	13.5	6.0	57.0	64.0	28.0	20.0
145	080180	2	2	5.5	2.88	12.1	2	8.5	15.0	14.0	5.5	58.5	72.5	30.0	21.5
146	090180	2	1	5.5	2.88	15.2	2	9.0	15.0	15.0	6.0	60.0	73.0	31.0	20.5
147	090180	2	1	4.5	2.65	14.4	2	9.0	15.0	15.0	6.0	57.0	72.0	30.0	20.5
148	090180	2	1	3.0	2.16	10.6	2	8.5	14.0	13.5	5.5	55.5	70.5	30.0	20.0
149	230180	1	1	3.0	2.16	10.4	2	8.5	15.0	12.5	5.0	57.5	68.0	28.5	20.5
150	230180	1	1	3.7	2.42	10.8	1	8.0	14.0	13.0	5.0	52.0	63.5	29.0	20.0

No	DATE	A	S	EA	MI	Wt	WTT	E	H	FA	P	B	T	L	F
151	230180	2	1	2.7	2.05	11.0	2	8.0	14.0	13.0	5.0	53.0	66.0	28.0	21.0
152	230180	2	2	4.9	2.73	11.0	2	8.5	14.5	13.5	5.5	59.5	62.5	28.5	20.5
153	230180	1	2	5.6	2.89	13.3	2	8.5	15.0	13.5	5.5	56.5	73.0	29.0	20.5
154	230180	1	1	5.3	2.84	16.0	1	9.0	15.5	16.0	7.0	59.0	75.5	31.0	22.5
155	230180	1	2	6.1	3.00	13.0	2	8.5	14.5	13.5	5.5	58.5	69.0	30.0	20.5
156	040280	2	2	5.6	2.90	11.5	2	8.0	14.0	13.0	5.0	53.5	70.5	28.5	19.5
157	180280	1	1	3.1	2.22	11.5	2	8.0	14.5	13.5	5.5	53.0	70.5	27.5	20.5
158	180280	1	1	2.7	2.05	10.2	2	8.0	14.0	13.0	5.5	52.0	66.5	27.0	19.5
159	180280	1	2	4.5	2.64	11.4	1	8.0	14.5	13.5	5.0	53.0	63.0	28.5	19.5
160	180280	1	2	5.6	2.90	13.5	2	8.0	15.0	14.0	5.5	58.0	70.0	28.5	20.0
161	180280	1	1	6.8	3.12	13.2	2	8.0	14.5	15.0	5.5	53.0	67.0	30.0	20.0
162	180280	1	2	3.8	2.43	9.5	1	8.0	14.0	13.0	5.0	50.0	70.0	28.0	20.0
163	180280	1	1	2.2	1.81	9.0	2	8.5	14.0	12.5	5.0	53.0	63.5	26.0	20.0
164	180280	1	1	5.2	2.80	14.2	2	9.0	15.0	15.5	6.0	57.0	73.0	30.0	20.5
165	190280	1	1	5.1	2.79	11.2	2	8.5	13.5	14.0	5.5	51.5	66.0	27.5	19.0
166	210280	1	2	5.2	2.81	10.8	1	8.5	14.5	13.5	5.5	53.0	66.0	29.5	20.5
167	210280	1	1	2.6	2.00	10.6	2	8.0	14.0	12.5	5.5	52.0	68.0	28.0	20.5
168	210280	1	2	4.2	2.55	11.2	2	8.0	14.0	13.0	5.5	55.5	64.5	28.0	20.0
169	210280	1	1	5.9	2.95	15.7	2	8.5	15.0	15.5	6.0	60.0	72.0	31.0	22.0
170	210280	1	1	3.5	2.34	11.0	2	7.5	14.0	14.0	5.0	52.5	71.0	28.5	20.5
171	280280	2	1	4.1	2.54	12.0	2	8.5	14.5	13.0	5.5	55.0	68.5	28.0	21.5
172	040380	2	1	2.6	2.00	11.3	2	8.5	13.5	13.0	5.5	54.5	64.5	29.0	21.5
173	060380	2	2	1.7	1.53	9.8	2	8.0	13.5	9.5	4.5	49.5	61.0	24.0	19.0
174	160380	1	1	4.9	2.74	12.2	2	8.5	15.0	14.5	5.5	55.0	76.5	30.0	21.5
175	180380	1	2	1.7	1.48	5.8	2	8.0	13.0	10.5	4.5	40.5	54.5	23.5	18.0
176	180380	1	2	2.0	1.71	9.0	2	9.5	14.0	13.5	5.0	51.0	65.0	29.0	22.5
177	180380	1	1	2.8	2.11	12.2	2	8.0	14.5	14.5	5.5	52.5	73.5	30.0	22.0
178	180380	1	1	5.2	2.82	12.8	2	8.5	14.5	15.0	6.0	60.0	71.0	30.0	21.5
179	190380	1	2	*	*	10.8	2	8.5	*	13.0	5.0	49.0	67.5	29.0	19.0
180	190380	1	1	5.7	2.92	13.5	1	9.0	14.0	15.0	6.0	49.5	70.0	29.5	20.5

No	DATE	A	S	EA	MI	Wt	WTT	E	H	FA	P	B	T	L	F
181	190380	1	1	5.6	2.90	13.1	2	8.0	14.5	15.0	5.0	58.0	67.0	29.5	20.0
182	190380	1	1	4.7	2.68	12.8	2	8.5	14.0	13.5	5.5	55.0	66.0	28.5	20.5
183	190380	1	1	5.5	2.88	15.0	2	8.5	15.5	15.0	6.5	59.0	67.5	29.0	21.0
184	190380	1	2	3.6	2.37	11.8	2	8.0	14.5	13.0	5.0	56.0	63.5	28.5	19.5
185	190380	1	2	1.1	1.00	3.8	2	6.5	11.0	8.5	3.5	37.0	42.5	18.5	15.5
186	040480	2	2	*	*	*	*	*	*	*	*	*	*	*	*
187	070480	2	1	6.1	3.00	12.8	2	9.0	15.0	15.0	6.0	56.0	71.0	31.0	20.5
188	070480	1	1	6.1	3.00	15.8	2	9.0	15.0	15.0	6.0	60.0	76.0	31.5	22.0
189	070480	1	1	7.0	3.16	13.3	2	8.5	14.5	14.5	5.5	58.0	70.0	28.5	19.5
190	080480	1	2	4.4	2.62	11.8	2	9.0	15.0	13.5	5.5	54.5	72.0	29.0	20.0
191	080480	1	1	4.8	2.71	13.0	2	9.0	14.5	15.5	5.5	54.0	74.0	30.0	21.0
192	080480	1	2	4.6	2.66	10.0	2	7.5	13.5	13.0	5.0	51.0	68.0	26.5	18.5
193	080480	1	2	2.8	2.10	10.0	2	8.5	13.0	12.0	5.0	49.0	63.0	26.5	19.0
194	080480	1	1	5.1	2.79	13.6	2	8.0	15.0	15.5	6.0	51.0	71.0	30.0	21.0
195	090480	1	1	6.9	3.13	13.3	2	8.5	14.5	15.0	6.5	59.0	74.0	30.0	21.5
196	090480	1	1	1.4	1.30	7.1	2	8.0	13.0	11.0	5.0	46.0	61.0	24.5	19.0
197	090480	1	1	5.5	2.87	11.1	2	8.5	14.5	14.0	5.5	51.0	69.0	28.0	20.0
198	150580	2	1	6.0	2.97	16.6	2	9.0	16.0	16.0	6.5	58.0	68.0	30.0	21.0
199	150580	2	2	4.2	2.55	10.3	2	8.5	14.0	12.5	4.5	51.5	64.0	27.0	18.5
200	150580	2	1	5.5	2.87	15.5	2	9.0	15.5	16.0	6.0	56.5	72.5	30.0	21.5
201	190580	1	2	2.6	2.00	8.6	2	9.0	13.5	11.0	5.0	47.0	60.0	26.0	18.5
202	190580	1	1	*	*	9.0	2	9.0	*	13.5	5.5	49.5	68.0	28.5	20.5
203	190580	1	2	4.1	2.53	10.0	1	8.5	14.0	12.5	5.0	52.0	67.0	27.5	20.0
204	200580	1	2	3.8	2.43	11.0	2	9.0	15.5	14.0	5.5	51.0	68.0	28.5	20.5
205	200580	1	2	5.7	2.92	10.9	1	8.5	14.5	13.0	5.0	52.5	65.0	28.5	20.0
206	200580	1	1	5.0	2.76	13.0	1	8.0	14.5	15.5	5.5	58.0	66.0	30.0	21.0
207	200580	1	2	6.7	3.11	11.3	2	8.0	14.0	13.0	5.0	55.5	69.5	29.5	21.0
208	210580	1	1	4.2	2.56	10.0	2	8.0	13.5	13.5	5.5	52.5	71.0	27.5	20.0
209	210580	1	1	5.6	2.89	15.0	2	8.5	15.0	16.0	6.0	59.0	69.0	30.0	21.0
210	120680	2	1	5.0	2.77	14.4	2	8.5	14.5	15.0	5.5	54.5	79.0	29.5	21.5

No	DATE	A	S	EA	MI	Wt	WTT	E	H	FA	P	B	T	L	F
211	120680	2	2	2.5	1.96	10.1	2	8.5	14.0	12.5	5.0	53.0	67.0	29.0	22.0
212	120680	2	1	3.5	2.36	11.0	1	8.5	15.0	13.0	5.5	54.0	68.5	27.5	20.0
213	120680	2	1	1.3	1.15	8.5	2	8.0	13.0	11.5	5.0	48.0	62.5	25.0	20.5
214	120680	2	1	2.4	1.89	7.9	1	8.0	13.5	11.5	5.0	48.0	62.0	26.5	19.0
215	120680	2	1	4.5	2.65	16.0	1	9.0	16.5	16.5	6.0	61.0	76.5	32.0	21.5
216	120680	2	1	6.1	3.00	14.0	2	9.0	15.0	15.0	5.5	59.0	78.0	30.5	21.0
217	130680	2	2	5.8	2.93	13.5	2	8.5	15.5	14.0	5.5	56.0	75.0	29.5	20.5
218	130680	1	2	5.1	2.78	14.9	2	8.5	15.0	14.0	5.5	55.5	63.5	28.5	21.0
219	130680	1	1	4.3	2.58	16.0	2	9.0	15.0	15.0	6.5	62.0	73.0	30.0	21.5
220	180680	2	1	1.9	1.66	8.1	2	8.5	13.5	11.5	5.0	47.0	59.0	25.0	19.5
221	180680	2	2	5.1	2.80	12.1	2	8.5	14.5	13.0	5.0	55.5	71.5	29.0	20.0
222	180680	2	1	4.9	2.74	16.1	2	8.5	16.0	16.5	6.0	55.5	70.5	29.5	21.0
223	180680	2	1	5.9	2.95	11.5	2	8.0	15.0	14.0	5.5	54.0	64.0	28.0	19.0
224	180680	2	1	4.7	2.69	13.1	2	8.0	15.5	14.5	5.5	56.5	66.0	29.5	20.5
225	230680	1	1	5.3	2.82	11.0	2	8.0	14.0	14.5	5.5	53.5	73.5	29.0	21.0
226	230680	1	1	4.8	2.72	13.5	1	8.5	15.5	15.5	6.0	57.5	67.5	28.5	21.0
227	240680	1	1	4.2	2.57	13.1	2	8.5	14.5	14.0	5.5	57.0	63.0	29.5	20.5
228	240680	1	1	4.4	2.62	14.5	2	8.5	15.0	15.0	5.5	58.0	73.0	30.0	21.0
229	240680	1	1	4.7	2.68	15.0	2	8.5	15.0	15.0	6.0	58.0	72.0	30.0	21.0
230	240680	1	1	6.8	3.12	13.9	2	9.0	15.0	15.0	5.5	56.0	69.5	29.0	20.0
231	250680	1	2	4.9	2.74	13.5	1	9.0	15.0	13.0	5.5	57.0	72.5	30.0	21.0
232	250680	1	1	5.0	2.76	14.0	2	9.0	14.5	14.0	6.0	56.5	75.5	29.5	22.0
233	250680	1	1	6.9	3.14	14.0	1	8.5	14.5	15.0	6.0	54.0	72.5	31.0	20.5
234	250680	1	1	4.8	2.71	14.2	2	8.5	15.5	15.5	6.0	54.5	67.5	29.5	20.5
235	250680	1	2	5.2	2.81	14.2	1	9.0	15.0	13.0	5.5	58.0	68.0	29.0	20.5
236	020780	1	2	4.4	2.61	12.8	1	8.5	14.5	13.0	5.5	52.5	63.5	27.5	20.5
237	020780	2	1	5.9	2.96	15.0	2	8.5	14.5	15.0	5.5	55.0	70.0	29.0	20.5
238	030780	2	2	6.1	3.00	13.2	1	8.5	15.0	13.0	5.0	53.5	68.0	29.0	20.5
239	030780	2	1	5.1	2.79	16.2	2	9.0	14.5	15.5	6.0	55.0	67.5	29.5	21.0
240	030780	2	1	4.1	2.54	15.2	2	8.5	15.0	15.5	6.0	55.0	71.0	29.0	21.0

DIAMETERS

The following abbreviations have been used in this section

No = Sample number.

A = Area,

1 = S.R.S.F. site

2 = Diamond Flat

S = Sex,

1 = Male

2 = Female

EA = Estimated age.

MI = Molar Index.

Wt = Weight (in kg).

C = Chest diameter (in cms).

Bi = Bicep diameter (in cms).

TB = Tail butt diameter (in cms).

N = Neck diameter (in cms).

No	DATE	A	S	EA	MI	Wt	C	Bi	TB	N
1	260479	1	1	4.0	2.51	12.6	36.5	14.0	23.2	18.4
2	260479	1	2	3.8	2.44	10.1	27.5	11.0	16.7	*
3	260479	1	2	4.1	2.53	11.8	*	10.7	17.1	17.5
4	260479	1	2	3.1	2.20	11.3	28.5	10.4	19.0	17.5
5	260479	2	1	5.3	2.83	15.0	35.2	15.5	17.7	21.1
6	170579	1	1	5.1	2.79	13.5	28.0	10.5	15.5	18.0
7	170579	1	2	2.8	2.07	11.3	29.0	11.0	19.0	*
8	170579	1	2	4.3	2.59	10.0	28.0	10.0	19.0	*
9	170579	1	1	3.1	2.21	14.1	29.5	11.0	21.5	17.0
10	170579	1	2	4.6	2.67	10.7	25.5	9.5	14.5	*

No	DATE	A	S	EA	MI	Wt	C	Bi	TB	N
11	170579	1	1	5.4	2.86	12.7	30.1	12.5	20.0	19.0
12	170579	1	2	3.9	2.47	10.4	25.5	9.5	17.5	*
13	170579	2	2	4.1	2.52	13.2	32.0	11.0	18.5	18.5
14	170579	2	1	5.7	2.92	17.5	36.5	15.0	22.2	20.0
15	170579	2	1	5.1	2.79	15.0	32.0	14.0	20.0	20.5
16	170579	2	1	5.6	2.90	13.5	29.5	12.0	20.2	17.5
17	170579	2	1	4.9	2.73	14.3	32.0	13.0	20.0	*
18	140679	1	1	3.9	2.47	13.2	31.0	12.5	21.0	19.0
19	140679	1	1	2.2	1.81	9.5	26.5	10.5	19.0	*
20	140679	1	1	3.4	2.31	10.7	25.0	10.0	19.0	16.0
21	140679	1	2	3.1	2.21	9.8	*	*	19.5	16.5
22	140679	1	2	5.6	2.89	13.4	27.5	11.5	20.5	17.5
23	140679	1	1	3.1	2.21	9.3	25.0	9.0	17.0	15.0
24	140679	1	2	3.9	2.47	11.4	25.0	10.0	18.5	17.0
25	140679	1	1	2.6	2.00	8.9	23.5	9.5	17.5	15.0
26	140679	1	1	5.1	2.78	14.1	31.0	13.0	20.0	18.0
27	140679	1	1	5.2	2.81	12.9	28.5	12.0	*	*
28	140679	1	1	4.0	2.51	14.3	32.0	12.5	20.0	*
29	140679	1	1	6.0	2.98	12.7	29.5	13.5	21.0	19.0
30	140679	2	2	5.6	2.89	12.7	27.5	10.5	19.0	16.0
31	140679	2	1	7.8	3.29	15.7	35.0	14.0	22.0	19.0
32	140679	2	1	2.1	1.74	9.5	24.5	9.0	17.5	16.0
33	140679	2	1	4.1	2.54	12.0	29.0	12.0	19.0	*
34	030779	2	2	7.6	3.26	12.3	29.5	10.5	16.0	*
35	030779	2	1	6.7	3.11	13.9	33.0	14.5	23.0	18.0
36	040779	2	1	5.3	2.84	16.1	37.0	13.5	24.0	18.5
37	040779	2	2	2.3	1.85	9.8	*	8.5	19.0	16.5
38	040779	2	1	5.1	2.78	15.7	31.0	12.5	19.5	17.0
39	040779	2	1	7.0	3.16	16.1	32.0	13.5	20.5	19.0
40	040779	2	2	5.6	2.90	12.9	30.0	10.5	17.5	17.0

No	DATE	A	S	EA	MI	Wt	C	Bi	TB	N
41	040779	2	1	3.9	2.47	14.3	30.0	12.0	20.0	*
42	040779	2	2	5.4	2.85	10.0	*	10.0	17.5	17.5
43	050779	1	1	4.1	2.54	13.2	33.0	12.5	20.0	18.0
44	050779	1	1	4.8	2.71	12.3	27.0	11.0	20.0	17.0
45	050779	1	1	5.6	2.90	12.9	28.0	11.0	20.0	*
46	050779	1	2	2.2	1.83	8.4	21.0	8.5	19.0	15.5
47	050779	1	1	4.3	2.59	13.6	32.0	13.0	21.0	19.5
48	050779	1	2	7.3	3.20	10.4	28.5	9.0	16.5	17.5
49	050779	1	2	5.1	2.79	11.4	*	9.5	19.0	16.5
50	050779	1	2	4.8	2.71	10.9	25.0	10.0	18.0	17.0
51	060879	1	1	6.1	3.00	16.4	33.5	15.5	19.0	19.0
52	060879	1	2	4.2	2.56	11.2	28.0	9.0	18.0	18.0
53	060879	1	1	5.5	2.88	13.2	*	11.0	21.5	19.0
54	060879	1	1	5.9	2.96	11.6	31.0	11.0	17.0	18.0
55	060879	1	1	3.5	2.35	15.2	*	14.0	21.0	20.0
56	060879	2	1	6.4	3.06	16.6	35.0	14.0	19.0	20.0
57	080879	2	1	7.6	3.25	15.2	30.0	12.0	20.0	18.0
58	080879	2	2	5.3	2.83	14.4	28.0	9.5	20.0	18.0
59	080879	2	2	7.5	3.24	12.6	27.5	10.0	18.0	18.0
60	080879	2	1	6.1	3.00	13.7	30.0	11.0	20.0	18.0
61	080879	2	1	5.7	2.92	14.9	31.0	13.0	19.0	19.5
62	080879	2	2	5.5	2.87	12.4	28.0	10.5	25.0	19.5
63	080879	2	2	7.0	3.16	12.8	27.0	10.0	17.5	*
64	080879	2	2	6.1	3.00	12.7	25.0	10.0	18.0	17.5
65	080879	2	2	5.0	2.76	13.8	31.0	11.0	18.0	18.5
66	090879	1	1	7.0	3.16	15.0	*	11.0	19.0	17.0
67	090879	1	2	1.8	1.54	7.8	25.0	8.0	15.0	15.0
68	140879	1	1	6.1	3.00	12.6	*	10.0	20.0	17.0
69	140879	1	1	3.7	2.42	9.0	28.0	10.0	18.0	14.0
70	150879	1	1	4.2	2.56	12.1	29.0	12.0	20.0	19.0

No	DATE	A	S	EA	MI	Wt	C	Bi	TB	N
71	270879	1	1	5.2	2.81	13.6	29.0	11.5	20.0	18.0
72	270879	1	2	5.5	2.88	12.2	28.0	10.0	18.0	18.5
73	270879	1	2	6.4	3.06	11.0	24.0	9.5	17.5	16.0
74	270879	1	2	5.2	2.82	13.0	28.0	11.0	20.0	18.0
75	270879	1	1	4.8	2.72	14.6	*	13.5	21.0	18.0
76	270879	1	1	4.1	2.52	15.4	32.0	14.5	21.0	18.5
77	270879	1	1	8.3	3.35	14.0	*	12.0	21.0	17.0
78	280879	1	1	5.2	2.81	14.0	32.0	13.0	21.0	18.0
79	280879	1	2	4.9	2.75	13.0	*	9.5	21.0	18.0
80	280879	1	2	3.5	2.36	12.0	*	*	17.0	17.0
81	280879	1	1	5.5	2.87	14.2	34.0	14.0	23.5	*
82	280879	1	2	5.2	2.81	15.0	29.0	11.0	19.0	18.0
83	290879	2	2	5.3	2.83	10.2	26.0	9.0	19.0	15.5
84	290879	2	1	3.3	2.29	15.3	32.0	12.5	21.5	19.0
85	290879	2	2	5.4	2.86	10.4	29.0	9.0	18.5	*
86	290879	2	1	3.7	2.40	14.8	35.0	14.0	21.0	*
87	300879	1	1	5.2	2.80	15.4	33.5	14.0	24.0	*
88	010979	2	2	5.5	2.88	13.1	30.5	9.0	19.0	17.0
89	010979	2	1	6.6	3.09	14.6	34.5	14.5	21.0	19.0
90	010979	2	1	6.7	3.11	15.8	35.0	12.5	20.0	19.5
91	300979	2	1	4.3	2.58	13.0	35.0	16.0	21.0	*
92	300979	2	1	1.1	1.00	6.0	23.0	8.0	15.0	*
93	011079	2	1	5.4	2.86	11.8	29.0	12.0	20.0	17.0
94	011079	2	2	2.3	1.87	9.1	23.0	8.5	18.0	15.5
95	011079	2	1	5.7	2.91	12.6	29.0	12.5	20.0	17.0
96	011079	2	1	3.0	2.16	9.4	29.0	10.0	20.0	18.0
97	011079	2	1	3.5	2.35	11.9	32.0	10.0	20.5	17.0
98	011079	2	1	5.5	2.88	17.2	36.0	15.0	25.0	20.0
99	021079	2	1	6.1	3.00	15.6	34.0	14.0	22.0	19.0
100	021079	2	1	3.8	2.46	15.4	33.0	14.0	23.0	18.5

No	DATE	A	S	EA	MI	Wt	C	Bi	TB	N
101	021079	1	1	6.3	3.03	15.0	*	12.5	21.0	18.0
102	031079	1	2	3.8	2.45	9.3	28.0	8.0	16.5	17.0
103	031079	1	2	7.0	3.16	11.7	31.0	9.5	19.0	17.0
104	031079	1	2	6.1	3.00	11.4	*	10.0	19.0	17.0
105	031079	1	2	3.1	2.20	10.2	28.0	9.5	16.5	15.5
106	041079	1	1	5.7	2.92	12.3	30.5	11.0	18.0	17.0
107	041079	1	2	3.2	2.25	10.9	*	10.0	17.0	17.5
108	041079	1	2	4.9	2.74	10.4	26.0	9.0	18.0	15.0
109	041079	1	1	5.1	2.78	11.8	*	11.0	17.0	16.0
110	041079	1	2	6.7	3.11	10.0	*	9.0	18.0	18.0
111	291079	1	2	4.1	2.54	10.8	27.0	10.0	17.0	16.0
112	291079	1	1	6.7	3.11	11.8	30.0	11.0	19.0	17.0
113	291079	1	1	3.1	2.21	10.6	27.5	11.0	18.0	18.0
114	291079	1	2	5.3	2.83	12.3	27.0	10.0	20.0	17.0
115	291079	1	1	4.3	2.60	13.1	30.0	11.0	21.0	17.0
116	291079	1	1	7.4	3.22	13.1	29.0	11.0	20.0	18.0
117	291079	1	2	2.6	2.00	8.4	22.5	8.5	19.0	*
118	291079	1	2	5.2	2.81	12.0	27.0	9.5	19.0	17.0
119	291079	1	1	5.5	2.89	13.6	32.0	12.0	21.0	18.0
120	291079	1	2	3.9	2.46	12.8	28.0	10.0	19.0	17.0
121	291079	2	1	5.6	2.90	16.0	36.0	15.0	22.0	20.0
122	291079	2	2	5.7	2.92	11.6	28.5	10.0	21.5	18.0
123	291079	2	1	3.3	2.29	16.8	39.0	15.0	22.5	19.0
124	291079	2	2	6.4	3.05	10.5	27.0	10.0	18.0	16.5
125	291079	2	1	2.0	1.71	10.0	*	11.0	21.0	16.0
126	301079	2	2	5.4	2.85	12.2	*	10.0	20.0	16.0
127	301079	2	1	1.1	1.00	4.8	21.0	7.0	13.0	14.5
128	301079	2	1	5.0	2.77	13.6	32.0	12.5	19.5	17.5
129	301079	2	2	6.0	2.98	13.9	28.0	10.5	19.5	16.5
130	261179	1	2	4.6	2.67	9.6	28.0	10.0	20.0	*

No	DATE	A	S	EA	MI	Wt	C	Bi	TB	N
131	271179	1	1	4.4	2.62	12.1	29.0	12.0	22.0	17.0
132	271179	1	1	2.9	2.11	14.0	34.0	16.0	24.0	*
133	271179	1	1	3.1	2.21	11.6	26.0	11.5	21.0	17.0
134	271179	1	1	5.6	2.89	16.3	33.0	14.5	18.0	23.0
135	271179	1	2	4.8	2.71	10.6	26.0	10.5	21.0	16.5
136	271179	1	1	4.3	2.58	13.4	33.0	13.0	20.0	18.0
137	271179	1	1	5.1	2.78	11.0	32.0	14.0	20.0	*
138	271179	1	1	2.8	2.08	12.6	31.0	12.0	20.0	18.0
139	271179	1	1	5.5	2.87	10.1	29.0	9.5	17.5	16.5
140	281179	2	2	1.1	0.96	3.3	19.0	6.5	14.0	13.0
141	281179	2	2	1.7	1.52	8.8	26.0	9.5	18.5	16.0
142	281179	2	1	4.8	2.72	13.2	34.0	13.5	21.0	17.5
143	291279	1	1	6.7	3.10	10.6	*	14.0	22.0	18.0
144	291279	1	1	3.2	2.23	10.9	29.0	11.0	19.0	17.0
145	080180	2	2	5.5	2.88	12.1	30.0	9.5	20.0	17.0
146	090180	2	1	5.5	2.88	15.2	34.0	15.0	20.5	18.0
147	090180	2	1	4.5	2.65	14.4	31.5	14.0	22.0	18.0
148	090180	2	1	3.0	2.16	10.6	28.0	11.0	19.0	*
149	230180	1	1	3.0	2.16	10.4	28.0	10.5	21.0	16.5
150	230180	1	1	3.7	2.42	10.8	26.5	11.0	20.0	17.0
151	230180	2	1	2.7	2.05	11.0	26.0	11.0	20.0	18.5
152	230180	2	2	4.9	2.73	11.0	26.0	10.0	21.0	17.0
153	230180	1	2	5.6	2.89	13.3	29.0	10.0	19.0	18.0
154	230180	1	1	5.3	2.84	16.0	32.0	15.0	22.5	19.0
155	230180	1	2	6.1	3.00	13.0	29.0	10.0	19.0	16.5
156	040280	2	2	5.6	2.90	11.5	25.0	10.0	21.0	*
157	180280	1	1	3.1	2.22	11.5	29.0	11.0	20.0	*
158	180280	1	1	2.7	2.05	10.2	29.0	11.0	19.5	17.0
159	180280	1	2	4.5	2.64	11.4	26.0	10.0	19.0	17.0
160	180280	1	2	5.6	2.90	13.5	29.0	10.0	21.0	17.0

No	DATE	A	S	EA	MI	Wt	C	Bi	TB	N
161	180280	1	1	6.8	3.12	13.2	32.0	13.0	22.0	19.0
162	180280	1	2	3.8	2.43	9.5	28.0	9.0	19.0	17.0
163	180280	1	1	2.2	1.81	9.0	25.0	10.0	20.0	17.0
164	180280	1	1	5.2	2.80	14.2	30.0	14.0	21.0	18.0
165	190280	1	1	5.1	2.79	11.2	26.0	12.0	21.0	17.0
166	210280	1	2	5.2	2.81	10.8	26.0	10.0	20.0	17.0
167	210280	1	1	2.6	2.00	10.6	25.5	9.5	18.0	17.0
168	210280	1	2	4.2	2.55	11.2	26.0	10.0	19.0	*
169	210280	1	1	5.9	2.95	15.7	34.0	14.0	23.0	*
170	210280	1	1	3.5	2.34	11.0	29.0	11.0	21.0	16.5
171	280280	2	1	4.1	2.54	12.0	*	10.0	22.0	16.5
172	040380	2	1	2.6	2.00	11.3	25.5	10.0	16.5	16.0
173	060380	2	2	1.7	1.53	9.8	25.5	*	*	15.5
174	160380	1	1	4.9	2.74	12.2	*	13.0	19.0	*
175	180380	1	2	1.7	1.48	5.8	23.0	7.0	15.0	15.0
176	180380	1	2	2.0	1.71	9.0	24.0	9.0	17.0	16.5
177	180380	1	1	2.8	2.11	12.2	*	11.0	20.0	18.0
178	180380	1	1	5.2	2.82	12.8	30.0	11.5	22.0	17.0
179	190380	1	2	*	*	10.8	27.0	9.0	18.5	*
180	190380	1	1	5.7	2.92	13.5	34.5	14.0	21.0	18.5
181	190380	1	1	5.6	2.90	13.1	31.0	13.0	20.0	17.0
182	190380	1	1	4.7	2.68	12.8	28.5	12.0	20.0	17.5
183	190380	1	1	5.5	2.88	15.0	36.0	14.0	23.0	19.0
184	190380	1	2	3.6	2.37	11.8	29.0	10.0	20.0	17.0
185	190380	1	2	1.1	1.00	3.8	16.5	7.0	12.0	13.0
186	040480	2	2	*	*	*	*	*	*	*
187	070480	2	1	6.1	3.00	12.8	30.0	11.5	21.0	20.0
188	070480	1	1	6.1	3.00	15.8	33.0	13.0	22.0	18.0
189	070480	1	1	7.0	3.16	13.3	32.0	12.5	21.0	18.0
190	080480	1	2	4.4	2.62	11.8	*	10.0	20.0	15.5

No	DATE	A	S	EA	MI	Wt	C	Bi	TB	N
191	080480	1	1	4.8	2.71	13.0	33.0	11.0	20.0	18.5
192	080480	1	2	4.6	2.66	10.0	28.0	10.0	18.0	16.0
193	080480	1	2	2.8	2.10	10.0	*	11.0	20.0	16.0
194	080480	1	1	5.1	2.79	13.6	*	12.0	23.0	17.0
195	090480	1	1	6.9	3.13	13.3	30.0	13.0	20.0	17.5
196	090480	1	1	1.4	1.30	7.1	*	8.0	17.5	16.0
197	090480	1	1	5.5	2.87	11.1	28.0	11.0	20.0	*
198	150580	2	1	6.0	2.97	16.6	35.0	16.0	22.5	19.0
199	150580	2	2	4.2	2.55	10.3	24.0	8.5	18.5	17.5
200	150580	2	1	5.5	2.87	15.5	30.0	13.0	24.0	18.0
201	190580	1	2	2.6	2.00	8.6	24.0	9.0	19.0	17.0
202	190580	1	1	*	*	9.0	24.5	10.0	20.5	16.0
203	190580	1	2	4.1	2.53	10.0	24.5	9.5	20.0	17.0
204	200580	1	2	3.8	2.43	11.0	25.0	10.0	19.5	17.0
205	200580	1	2	5.7	2.92	10.9	*	9.0	17.0	16.0
206	200580	1	1	5.0	2.76	13.0	*	11.5	21.5	18.0
207	200580	1	2	6.7	3.11	11.3	24.5	9.5	19.5	15.0
208	210580	1	1	4.2	2.56	10.0	29.0	10.0	20.0	16.0
209	210580	1	1	5.6	2.89	15.0	31.0	14.0	23.0	17.0
210	120680	2	1	5.0	2.77	14.4	32.0	13.0	22.0	19.0
211	120680	2	2	2.5	1.96	10.1	26.0	9.5	18.0	*
212	120680	2	1	3.5	2.36	11.0	27.0	11.0	19.5	16.0
213	120680	2	1	1.3	1.15	8.5	23.0	9.0	18.0	15.0
214	120680	2	1	2.4	1.89	7.9	23.0	9.0	17.0	15.0
215	120680	2	1	4.5	2.65	16.0	33.0	14.0	25.0	18.0
216	120680	2	1	6.1	3.00	14.0	34.0	15.0	23.0	18.0
217	130680	2	2	5.8	2.93	13.5	26.0	10.0	20.5	16.0
218	130680	1	2	5.1	2.78	14.9	27.0	10.5	20.0	17.5
219	130680	1	1	4.3	2.58	16.0	31.0	14.0	18.0	21.0
220	180680	2	1	1.9	1.66	8.1	21.0	9.0	17.0	16.0

No	DATE	A	S	EA	MI	Wt	C	Bi	TB	N
221	180680	2	2	5.1	2.80	12.1	28.0	10.0	20.0	17.0
222	180680	2	1	4.9	2.74	16.1	38.0	17.0	21.0	19.5
223	180680	2	1	5.9	2.95	11.5	28.0	10.5	17.0	16.5
224	180680	2	1	4.7	2.69	13.1	*	12.0	21.0	18.0
225	230680	1	1	5.3	2.82	11.0	*	10.0	17.0	15.0
226	230680	1	1	4.8	2.72	13.5	29.0	13.5	19.0	19.0
227	240680	1	1	4.2	2.57	13.1	27.5	11.0	18.0	17.0
228	240680	1	1	4.4	2.62	14.5	30.0	13.0	21.0	18.0
229	240680	1	1	4.7	2.68	15.0	31.0	13.0	23.0	18.0
230	240680	1	1	6.8	3.12	13.9	28.0	11.5	19.0	17.5
231	250680	1	2	4.9	2.74	13.5	27.0	10.5	21.0	17.0
232	250680	1	1	5.0	2.76	14.0	27.0	11.0	21.0	16.5
233	250680	1	1	6.9	3.14	14.0	29.0	12.0	20.0	17.0
234	250680	1	1	4.8	2.71	14.2	32.0	14.0	22.0	19.0
235	250680	1	2	5.2	2.81	14.2	27.0	11.0	21.0	17.0
236	020780	1	2	4.4	2.61	12.8	27.5	9.5	18.0	*
237	020780	2	1	5.9	2.96	15.0	32.0	12.5	22.0	17.5
238	030780	2	2	6.1	3.00	13.2	26.5	10.0	18.0	16.5
239	030780	2	1	5.1	2.79	16.2	32.0	13.0	22.0	18.0
240	030780	2	1	4.1	2.54	15.2	31.0	14.5	22.0	18.0

APPENDIX 2.

MORPHOMETRIC DATA COLLECTED FROM THE POUCH YOUNG

The following abbreviations have been used.

MN = Mother's sample number.
 A = Area,
 1 = S.R.S.F. site
 2 = Diamond Flat
 S = Sex,
 1 = Male
 2 = Female
 ED = Estimated days old.
 EM = Estimated month of birth.
 Wt = Weight in grammes.
 E = Ear length (in cms).
 H = Head length (in cms).
 FA = Forearm length (in cms).
 P = Paw length (in cms).
 B = Body length (in cms).
 T = Tail length (in cms).
 L = Leg length (in cms).
 F = Pes length (in cms).

WHERE THE MEASUREMENT WAS NOT RECORDED AN "*" HAS BEEN INSERTED.

MN	DATE	A	S	ED	EM	Wt	E	H	FA	P	B	T	L	F
2	260479	1	2	42	3	12.5	0.8	2.4	1.5	0.7	5.8	3.0	2.1	1.5
3	260479	1	1	53	3	26.0	1.0	2.9	1.8	1.0	7.3	4.1	2.7	1.8
4	260479	1	2	48	3	15.8	0.9	2.6	1.5	0.6	5.7	3.6	2.2	1.6
7	170579	1	1	65	3	29.8	0.9	3.4	2.1	1.0	9.9	5.3	3.0	2.4
8	170579	1	2	64	3	36.0	0.9	3.3	1.8	1.1	9.5	5.2	2.9	2.3

MN	DATE	A	S	ED	EM	Wt	E	H	FA	P	B	T	L	F
10	170579	1	1	78	2	78.0	1.2	4.3	2.7	1.3	12.5	6.8	4.3	3.5
13	170579	2	1	85	2	76.8	1.2	4.3	2.4	1.2	12.0	7.5	4.1	3.4
22	140679	1	2	116	2	153.7	1.8	5.0	3.0	1.5	14.5	11.0	6.0	5.0
30	140679	2	1	196	12	835.0	4.9	8.5	7.0	3.5	24.5	27.5	13.7	12.5
34	030779	2	1	7	7	1.5	*	1.1	0.7	0.1	2.4	0.7	*	*
40	040779	2	1	7	7	1.0	*	0.8	0.6	0.1	2.2	0.8	*	*
42	040779	2	2	76	4	58.0	1.1	4.0	2.2	0.9	11.0	6.5	3.7	3.0
48	050779	1	2	80	4	62.0	1.2	4.1	2.4	1.3	10.7	7.0	3.9	3.1
49	050779	1	1	113	3	197.5	2.0	6.5	3.5	1.7	16.5	10.5	6.7	5.6
50	050779	1	2	151	2	331.5	2.9	*	4.4	2.2	*	16.0	8.0	8.5
52	060879	1	2	34	7	8.3	0.5	2.1	1.1	0.5	5.5	2.5	1.3	1.1
58	080879	2	2	223	12	1300.0	6.0	9.0	7.0	3.0	27.0	33.0	15.5	13.5
59	080879	2	2	164	2	400.0	3.2	6.5	4.7	2.5	18.0	18.5	10.0	9.0
62	080879	2	1	47	6	19.5	0.8	2.8	1.5	0.8	7.5	3.5	2.1	1.7
63	080879	2	1	149	3	280.0	3.0	7.0	4.7	2.0	18.5	15.5	9.5	8.3
64	080879	2	2	32	7	8.3	0.4	2.1	1.1	0.5	5.5	2.4	1.4	1.0
65	080879	2	1	146	3	290.0	3.0	6.5	4.5	2.0	12.5	15.0	9.0	7.5
72	270879	1	1	195	2	670.0	5.0	8.0	6.0	3.0	22.5	25.0	13.0	11.5
73	270879	1	2	146	4	250.0	2.5	6.0	4.0	2.0	18.0	15.0	8.0	7.0
74	270879	1	1	175	3	480.0	3.7	7.5	5.5	2.5	22.5	21.5	11.0	10.0
79	280879	1	1	213	1	815.0	5.5	8.0	6.5	3.0	25.0	29.5	13.5	12.5
80	280879	1	1	130	4	240.0	2.5	6.0	4.0	1.7	16.5	13.0	7.5	6.2
83	290879	2	1	214	1	705.0	4.5	8.5	6.5	3.0	23.0	30.0	13.0	12.5
85	290879	2	2	161	3	320.0	3.0	7.5	4.5	2.2	19.0	18.0	10.0	9.0
94	011079	2	1	7	9	1.3	*	0.8	0.6	0.1	2.2	0.8	*	*
102	031079	2	1	199	3	590.0	4.5	8.0	6.0	2.7	23.0	26.0	12.5	11.0
104	031079	1	1	197	3	590.0	4.5	8.5	6.0	3.0	22.5	25.5	13.0	11.5
105	031079	1	2	220	3	770.0	5.0	8.0	6.5	3.0	23.5	32.0	14.0	13.5
110	041079	1	2	220	3	900.0	5.7	9.0	7.0	3.0	25.5	32.0	15.5	13.8
117	291079	1	2	211	4	790.0	6.0	*	6.5	3.0	26.0	29.0	14.5	13.0
118	291079	1	1	103	7	120.0	1.6	5.0	3.0	1.5	13.5	9.5	5.6	4.2
120	291079	1	1	123	6	215.0	2.0	5.8	3.5	1.9	14.0	12.0	6.5	5.5
122	291079	2	1	151	5	310.0	2.5	6.5	4.5	2.5	15.5	16.0	9.0	7.5
124	291079	2	2	185	4	460.0	4.0	7.0	5.3	2.7	20.5	22.5	11.1	11.0

MN	DATE	A	S	ED	EM	Wt	E	H	FA	P	B	T	L	F
126	301079	2	2	12	10	4.2	*	1.6	0.7	0.3	3.6	1.3	0.7	0.6
129	311079	2	1	230	3	1100.0	5.5	9.5	7.0	3.5	27.5	35.0	15.5	14.0
130	261179	1	1	9	11	3.5	*	1.8	0.9	0.4	3.7	1.1	1.1	0.8
135	271179	1	2	12	11	4.2	*	1.5	0.8	0.4	3.7	1.3	0.8	0.7
145	080180	2	1	59	11	29.0	0.8	3.2	1.8	0.9	8.0	4.7	2.8	2.2
153	230180	1	1	78	11	80.0	1.1	4.0	2.4	1.3	12.2	6.8	4.3	3.4
155	230180	1	1	219	4	900.0	6.0	8.5	7.0	3.5	26.5	31.5	14.5	13.5
156	040280	2	2	118	10	201.0	1.9	6.0	2.7	1.8	15.0	11.3	6.5	5.2
159	180280	1	2	52	12	26.0	0.8	3.0	1.5	0.8	7.0	4.0	2.2	1.9
160	180280	1	2	9	2	3.7	0.2	1.2	0.7	0.3	3.4	1.1	0.6	0.5
168	210280	1	1	76	12	75.0	1.0	3.8	2.0	1.0	9.5	6.5	3.0	2.7
179	190380	1	1	7	3	1.1	0.1	1.1	0.5	0.2	2.7	0.7	0.4	0.4
184	190380	1	1	113	11	199.0	1.8	6.0	3.0	1.6	14.5	10.6	6.0	4.7
190	030480	1	1	45	2	19.0	0.7	2.5	1.7	0.7	7.5	3.3	1.9	1.6
192	080480	1	2	42	2	20.0	0.6	2.4	1.2	0.7	5.5	3.0	1.7	1.4
193	080480	1	1	117	12	200.0	2.1	6.5	3.2	1.6	15.5	11.1	7.4	5.8
199	150580	2	1	123	1	160.0	1.8	5.2	3.4	1.8	15.5	12.0	6.7	4.9
201	190580	1	1	63	3	*	1.0	*	1.3	0.9	8.0	5.1	*	2.0
203	190580	1	2	53	3	29.0	0.9	3.2	1.3	1.0	8.0	4.1	2.5	2.1
204	200580	1	1	89	2	81.0	1.1	4.3	2.4	1.3	11.5	8.0	4.2	3.4
205	200580	1	2	90	2	94.0	1.2	4.5	2.6	1.2	12.5	8.1	4.3	3.6
207	200580	1	1	57	3	32.0	0.9	3.2	1.6	1.1	9.0	4.5	2.6	2.4
211	110680	2	2	34	5	8.5	0.5	2.2	1.1	0.5	5.0	2.5	1.4	1.2
218	130680	1	2	222	11	1010.0	5.5	9.0	7.5	3.5	25.0	32.5	14.5	13.0
221	180680	2	1	113	2	190.0	1.5	5.1	3.1	1.5	14.5	10.5	5.9	4.7
231	250680	1	1	7	6	1.1	*	1.3	0.6	0.3	3.3	1.0	0.4	0.6
235	250680	1	1	213	11	730.0	4.5	9.5	6.2	3.0	22.5	29.5	12.5	12.0
236	020780	1	2	149	2	280.0	2.5	6.5	4.3	2.3	16.5	15.6	8.7	7.5
238	030780	2	2	57	5	26.5	0.9	3.2	2.0	0.9	8.5	4.5	3.0	2.3

ECOLOGY OF THE DINGO IN NORTH-EASTERN
NEW SOUTH WALES: III. MACROPOD BONE FRAGMENTS CONSUMED.

BY

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SHORT RUNNING TITLE: BONE FRAGMENTS CONSUMED BY DINGOES

ABSTRACT

Scat data was used to examine the relative contribution of two age classes of macropod, dependent and independent, to the diet of dingoes in north-eastern New South Wales. 951 dingo scats containing macropod hair, collected between 1972 and 1974, were examined. Seventy four percent (706) of these scats contained bone fragments which were large enough to identify to a skeletal zone and 61% (580) could be allocated to either dependent or independent macropod age classes. All parts of the skeletons of both age classes were represented in the scats. The frequency of occurrence of skull, leg and foot bones was greater for dependent than independent macropods while tail vertebrae occurrence was lower. The variation in the mean number of skeletal zones and mean weight of bone fragments for scats containing independent macropods indicated that carcass utilisation varied between years. The proportion in each age class also varied between years. Both the proportions of the scats containing bone and of bone which could be allocated to an age class were consistent over time. However, components of the unknown age class varied between years. The examination of the bone fragments found in the dingo scats showed that observations of macropod carcasses killed by dingoes was heavily biased towards older and larger wallabies.

INTRODUCTION

Macropod species are important prey for dingoes in eastern Australia forming 31 to 57% by occurrence of the diet (Coman, 1972; Newsome *et al.*, 1973; Newsome *et al.*, 1983; Robertshaw and Harden, 1984) and similarly in Western Australia where they were 69% by occurrence (Whitehouse, 1977). Little work has been published on what components of the various macropod populations contribute to this importance. Shepherd (1981) found that 96% of 83 *Macropus rufus* killed by dingoes were juveniles. This he stated suggested that the prime impact of the dingoes was on the recruitment into the adult prey population. Fifty four wallabies killed by dingoes were found in the escarpment country east of Armidale, New South Wales (unpublished data). In all cases the remains were considered to have come from adult wallabies, contrary to the findings of Shepherd (1981). The main prey species from this escarpment area (Robertshaw and Harden, 1984; Robertshaw, 1984) was *Wallabia bicolor*. This species has a range in adult weight of 9 to 17kg (Robertshaw, 1984) and thus weights of these adult wallabies were similar to the weights, 12 to 18kg, of the *M. rufus* juveniles killed (Shepherd, pers. com.). This suggested dingoes may prefer prey in the 10 to 20kg weight class. However, the observation of wallaby kills from the escarpment may have been biased towards the adult component as the small size of juvenile wallabies may allow dingoes to fully consume the carcass. Furthermore, other studies in the escarpment region indicated that the proportion of juvenile and adult wallabies consumed may not have been so biased towards the adults. Harrington (1976) and Jones (pers. com.) reported almost all female macropods were breeding yet Harden and Statham (unpublished data) observed less than 1% of their sightings to have been of young-at-foot during 296 transect counts.

The examination of the age class contribution of macropods to the diet of the dingo would require quantitative data on prey abundance by age class by year and a measure of the actual predation. With so few sightings of young-at-foot by Harden and Statham (unpub. data) and the difficulty in establishing an age class criteria which would allow observed wallabies to be aged, it is unlikely that quantitative data on

prey abundance by age class could be obtained from the thickly vegetated country east of Armidale. Thus to continue this avenue of research the potential use of scat data, collected from this region, is investigated in this paper.

METHODS

A reference collection of skeletal material was prepared from macropods shot in the study area (see Table 1). As *M. bicolor* was both the most abundant macropod in the study area (Harden and Statham, unpublished data) and most commonly taken prey species (Robertshaw and Harden, 1984) the reference collection contained proportionally more of this species. For simplicity only two age categories were chosen, dependent and independent (Kaufmann, 1974). The former included pouch young and young-at-foot while the other included sub-adults and adults. In the field this was decided by the degree of association with a female. If the specimen was in the pouch or close by the mother it was placed in the dependent category otherwise it was considered independent. This avoided the necessity to determine whether the specimen was sexually immature or mature indicating that it was a adult or juvenile. Also the difference in size between dependent and independent macropods was more marked within a species while more similar between species and less likely to be effected by sexual dimorphism than the difference in size between sexually immature and mature.

Of the 1638 dingo scats collected from 1972 to 1974 in Robertshaw and Harden (1984) those containing hair from a macropod (either *Wallabia bicolor* Desmarest, *Macropus giganteus* Shaw, *M. rufogriseus* Desmarest, *M. parma* Waterhouse or *Thylogale thetis* (Lesson)) were taken and separated into hair and bone. Bone fragments were cleaned and oven-dried at 50° C for 72 hours and weighed. Scats containing less than 0.1g of bone were considered as having no bone.

The criteria used to allocate the bone fragments to an age class were established from the reference collection. They were the dimensions of the bones (particularly ribs, ulna, radius, metacarpals and non-caudal vertebrae), the degree of fusion of articulating cartilage caps (epiphyses), the changes in the shape of muscle insertion sites, the

articulating surfaces with age and the strengthening of joints. In practice most were aged by bone dimensions alone. Where there was any doubt, or where there were insufficient bone material to apply the ageing criteria, scats were allocated to an unknown age class.

Scats containing bone fragments were examined to determine if one or more skeletal zones were present in the scat. Analysis of the proportion of these skeletal zones found in the scats was confined to those scats containing bone fragments that were allocated to an age class. The skeletal structure of the macropods was divided into eleven zones. These zones were the skull, neck, shoulder (top of the humerus, scapula and clavicle), arm (lower humerus, top of the ulna and radius), hand (lower ulna and radius and the phalanges of the fingers), thorax (ribs, sternum and thoracic vertebrae), lumbar region (lumbar vertebrae), pelvic region (pelvis, associated vertebrae and the top of the femur), leg (lower femur and the top of the tibia and fibula), foot (lower tibia and fibula, metatarsals and the phalanges of the toes) and tail.

Not all the bone fragments within a scat could be allocated to 1 or more of the 11 skeletal zones, and only the skeletal zones which could be identified were recorded. Where no fragments within the scat could be identified they were recorded as unidentified.

RESULTS

1) General

The number of scats collected varied between months and years. The between year variation was a result of changing field priorities which varied the length of firetrail from which the scats were collected. The percentage of scats collected in each month for each year was similar between years (see Figure 1.). More scats were collected from July to September, as a result of more scats being deposited per kilometre of firetrail, than during the rest of the year for all years studied.

A total of 951 scats contained macropod hair and 87% (830) of these contained bone fragments. Of the scats containing bone fragments 85% (706) had fragments which could be identified as coming from one or

more zones but of these bone fragments only 70% (580) could be allocated to an age class (ie. 61% of the 951 scats containing macropod hair). Only 9 scats contained both dependent and independent macropod remains. A summary of the results is presented in Table 2.

There were no significant differences between years in either the proportion of scats which could be allocated to an age class ($\chi^2 = 2.92$, 2df) or the proportion of scats containing bone ($\chi^2 = 4.98$, 2df). However, within those scats unaged, the number of scats containing bone fragments which were not allocated to an age class and the number of bone-free scats varied significantly between years ($\chi^2 = 11.95$, $P < 0.005$, 2df).

The proportion of dependent to independent macropod bone fragment remains in the scats varied significantly between years ($\chi^2 = 11.34$, $P < 0.005$, 2df). The proportion for 1972 and 1973 did not vary significantly ($\chi^2 = 0.53$, 1df) while the proportion for 1972 and 1973 was significantly different from 1974 ($\chi^2 = 10.95$, $P < 0.005$, 2df).

2) Skeletal zones represented in the scats

The relative occurrence of the various skeletal zones for each age class in each year are shown in Table 3. There was no difference in the proportion of skeletal zones present between years in either age class (dependent $\chi^2 = 6.3$, 20df; independent $\chi^2 = 17.8$, 20df).

The results for each year were pooled within age classes and the relative occurrence of each skeletal zone compared between age classes (Table 4). There was a significant difference between the two age classes in the proportion of the various skeletal zones ($\chi^2 = 41.8$, $P < 0.005$, 10df). This was due to significantly more occurrences of skull, leg and foot and significantly less occurrences of tail sections in scats containing bone fragments from dependent macropods.

3) The number of skeletal zones in a scat

Most scats contained bone fragments from more than one skeletal zone and the mean number of zones per scat for each year, in each age

class, is set out in Table 5. Differences between years and age classes were compared by one-way analysis of variance after the data were normalised by the $\sqrt{(n + 3/8)}$ transformation. There were significantly more skeletal zones per scat in scats containing bone from dependent macropods than in scats containing bone from independent macropods ($F_{1,565} = 10.7$, $P < 0.001$). There were no differences between years in the mean number of skeletal zones per scat containing remains of dependent macropods ($F_{2,212} = 1.579$). The mean number of skeletal zones per scat containing remains of independent macropods was greater in 1974 ($F_{2,353} = 5.159$, $P < 0.006$).

4) Bone fragment weight per scat

The mean weight of bone fragments per scat for each age class and for each year is set out in Table 6. Differences between age classes and years were compared by a one-way analysis of variance. The mean weight of bone material was significantly heavier from scats containing bone material from independent macropods (4.5g) than bone material from dependent macropods (2.8g) ($F_{1,565} = 59.8$, $P < 0.001$). The weights of bone fragments from independent macropods were significantly different between years ($F_{2,353} = 3.090$, $P < 0.046$) while bone fragment weights from dependent macropod remains were not ($F_{2,212} = 2.244$, $P < 0.109$).

DISCUSSION

The separation into only dependent and independent macropods was chosen because of the ease and quickness of separation by the crude criteria used. It proved a good choice as the bone fragments decidedly came from one class or the other with few borderline cases.

Less than 1% of the scats contained both independent and dependent bone fragments. This suggests that the two age classes were not eaten at the same time. While it is not known how the contents of a scat relates to a meal it is unlikely, for carnivores who generally feed periodically, that a scat would result from two or more meals separated in time. Females with large pouch young must then either eject them before being killed or the pouch young are not eaten together with the females. This latter explanation seemed unlikely as dingoes in captivity, when gorged on an adult wallaby carcass have been observed not to eat for the next

few days (pers. obs.) during which time in the field scavengers and flies limit the usefulness of carcasses as a food resource for the dingo. The former explanation appears plausible as the authors have observed females to eject large pouch young if sufficiently harassed. Given the frequent occurrence of bones from dependent macropods in the scats, it is interesting to speculate that the dingoes must have commonly taken ejected pouch young or young-at-foot separated from their mother. This has been previously suggested by Russell (1974).

The interpretation of the frequency of different types of bone fragments in the scats was essentially descriptive and not quantitative. However, differences between age classes or years in the relative occurrence of each skeletal zone in the scats did reflect differences in the relative utilisation of that part of the carcass. These results suggested that dingoes may consume bone from all parts of the carcass of both dependent and independent macropods. This contrasts with the findings of Shepherd (1981) that dingoes in north-western New South Wales consumed mainly "abdominal contents, hindquarter muscle and thoracic contents". The difference between the two sets of results may be that the dingoes he observed were apparently feeding from a more abundant prey source, as he also reports that kangaroos were killed and not eaten.

There were two major shortcomings in studying the age composition and carcass utilization by analysis of the scat material. Firstly, small bone material could be dissolved by the digestive process (Johnson and Aldred, 1982). Therefore bone fragments in the scat may not represent all the bone material ingested. However, the digestion of bone material by dingoes was probably limited to the bones of hairless pouch young whose skeletal structure is composed of a high percentage of cartilage. Secondly, the data indicate only the frequency of occurrence of each age class or skeletal zone in the scats. Because of differences in bodyweight between the two age classes and thus the potential for differing utilisation of the carcasses, the ratio of dependent to independent macropods cannot be directly related to the relative number of each age class killed. Nor can similar occurrences of different skeletal zones or the same skeletal zone be assumed to represent the same dietary value as they may differ significantly in volume or weight.

Furthermore, caution should be exercised in interpreting the ratio of dependent to independent macropod derived from the bone fragments as only 61% of the scats could be allocated to an age class. Hence while the change in the ratio of scats containing dependent to independent macropod bone fragments from 1:1.59 in 1972 to 1:2.94 in 1974 indicates a relative increase in the consumption of independent macropods, the size of and the between year variation within, the unknown age class may alter this conclusion. However, the increase in the number of bone-free scats and decrease in the number of scats containing bone material from the unknown age class is consistent with the hypothesis that the larger individuals occurred more frequently in the diet for two reasons. Firstly, the greater biomass of independent wallabies has the potential for a greater proportion of bone-free macropod in the diet and if these individuals were to increase in importance in the diet it would be expected that there would be an increased occurrence of bone-free scats. The increased consumption of independent macropods may also have resulted from the greater utilisation of independent macropod carcasses and not from simply killing more independents. Thus secondly, the greater utilisation of wallaby carcasses would increase the probability of a scat containing a bone fragment allocated to an age class. While these interpretations are mutually exclusive if dingoes either killed more individuals or increased their utilisation of a similar number of kills, they are not if the dingo population were doing both concurrently to increase their consumption of independent carcasses. The variation within the unknown age class between years suggests that the dingoes were implementing both strategies concurrently.

This conclusion is supported by findings from the examination of the weight of bone fragment material and the number of skeletal zones per scat. The weight of bone consumed and the number of zones found in scats containing bone fragments from independent macropods increased from 1972 and 1973 to 1974. This indicated that dingoes consumed more parts of each carcass and an increased amount of bone material from these carcasses in 1974 than they had in the prior two years. The increase in the mean weight of bone material per scat with time also suggested that the 1972 independent carcasses were under-utilised and that their full utilization may not have been achieved by 1974. The mean weight of bone fragments and the mean number of zones per scat containing dependent macropod were

not significantly different between years. This was not surprising as the small size of dependent wallabies relative to the size of an adult dingo would suggest that their entire carcase could be fully consumed by a dingo upon capture. Furthermore as a result of their small size it was likely that all material injected from dependent wallabies would contain bone fragments unlike that of material from independent macropods where there was the possibility that meat and fur only were injected. This suggests that the unknown age class may consist entirely of independent macropod remains.

Assuming this, the ratio of dependent to independent macropod in the scats would become 1:4.2, 1:3.9 and 1:5.9 for 1972, 1973 and 1974 respectively. These ratios illustrate a similarity between 1972 and 1973 and a difference between these years and 1974 that was also found by the comparison of bone fragments alone. The major difference between the data sets was the reduction in the magnitude of the difference between 1972-1973 and 1974. While it remains only speculation this latter ratio may be the closer approximation of the ratio of dependent to independent macropod in the scats. If this ratio were to be in error it would overestimate the independent macropod component (for example, through the loss of bone material from dependent macropods during digestion). Thus such a ratio would represent the upper limit for these years and suggests that the major proportion of macropod intake comes from these older individuals.

However, such a ratio also indicates a high selection by dingoes for the younger macropods. The difference in biomass of dependent macropod (whose weights range from 1-3kg) to independent macropods (3-17kg) allows for potentially more meals from an independent macropod. Also the number of extra meals per carcase would depend on the degree of utilisation of the independent carcase. If only one extra meal per independent carcase was obtained this ratio would drop to approximately 1:2 or 1:3. Predation at this level by dingoes on young macropods could produce a negative recruitment rate in a portion of the wallaby population. The degree to which this negative recruitment rate occurs within the wallaby population would depend on the relative number of wallabies available per dingo.

The change in the bone fragments consumed and the age of macropod prey consumed between 1973 and 1974 was probably not related to variation within the macropod population but associated with a change in the relative numbers of wallabies per dingo. While little is known about the breeding season of the macropod species in the study area, the scats were collected in a similar proportion for each month between years negating any bias due to the time or size of the collection. In eastern New South Wales climatic conditions do not greatly effect the number of young born and it is likely that almost all sexually mature females breed each year (Harrington, 1976; Jones pers. comm.). Thus output per female would remain constant between years in the absence of dingo predation in this region. Furthermore, changes in the climatic conditions are mild and its is unlikely that loss of body condition would occur to such an extent that it could alter the muscle to bone ratio and effect the comparison of bone fragments consumed between years. However, throughout the period of scat collection dingo numbers were observed to have increased (Harden, pers. obs.) although quantitative data was not available. We suggest that the change in the proportion of the two age classes and the increased utilisation of independent carcasses was related to either a reduction in the relative availability of dependent macropods to dingoes and/or a change in the selection of prey by dingoes as a result of increasing dingo numbers.

While the interpretation of the age ratio was speculative, we found that the evidence for the selection of older wallabies based on the observation of carcasses was unreliable.

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TABLE 1.

Ages, sexes and weights of the species
taken for the reference skeletal material.

CATEGORY	SPECIES	SEX	WEIGHT (kgs)	MOLAR INDEX	COMMENTS
DEPENDENTS	<i>W. bicolor</i>	m	1.3	-	Young-at-foot *
	<i>W. bicolor</i>	f	1.4	-	Large pouch young *
	<i>W. bicolor</i>	m	1.9	0.38	Young-at-foot *
INDEPENDENTS	<i>W. bicolor</i>	f	3.25	0.9	*
	<i>W. bicolor</i>	f	3.8	1.0	*
	<i>W. bicolor</i>	m	6.0	1.0	*
	<i>M. rufogriseus</i>	m	7.7	1.13	*
	<i>M. parma</i>	f	4.0	1.42	
	<i>T. thetis</i>	f	3.3	1.44	2cm joey
	<i>W. bicolor</i>	f	8.2	1.67	*
	<i>T. thetis</i>	m	4.1	-	
	<i>W. bicolor</i>	m	9.0	2.00	
	<i>W. bicolor</i>	f	10.9	2.45	2cm joey
	<i>W. bicolor</i>	m	13.8	2.68	
	<i>T. thetis</i>	m	5.85	3.23	
	<i>M. rufogriseus</i>	f	12.9	3.25	lactating teat
	<i>M. rufogriseus</i>	m	16.8	3.38	

m = male, f = female and * = sexually

TABLE 2.

The frequency and percentage
of aged and unaged scats per year.

CATEGORY	1972 freq %	1973 freq %	1974 freq %	TOTAL freq %
SCATS ALLOCATED TO AN AGE CLASS				
Ω Dependent	49 22.0	133 25.1	33 16.7	215 22.6
Ω Independent	78 35.0	181 34.2	97 49.0	356 37.4
Ω Both	4 1.8	4 0.8	1 0.5	9 0.9
TOTAL AGED FROM BONE FRAGMENTS	131 59%	318 60%	131 66%	580 61%
SCATS NOT ALLOCATED TO AN AGE CLASS				
Ω	40 18.0	69 13.0	17 6.0	126 13.0
Ψ	32 14.0	74 14.0	18 9.0	124 13.0
Bone fragments	72 32.3	143 27.0	35 17.7	250 26.3
No bone	20 9.1	69 13.0	32 16.2	121 12.7
TOTAL UNKNOWN	92 41.0	212 40.0	67 34.0	371 39.0
TOTAL NUMBER OF SCATS	223	530	198	951
RATIO DEP:INDEP	1:1.59	1:1.36	1:2.94	1:1.66
Ω	Contained bone fragments which could be allocated to one or more skeletal zones (n = 706).			
Ψ	Contained bone fragments which could not be allocated to one or more skeletal zones (n = 124).			

TABLE 4.

The percentage and frequency of occurrence of skeletal zones represented in the scats by macropod age class, and level of significance of the Chi-square evaluation of zone by age class.

SKELETAL ZONE	AGE CLASS		Level of Significance
	Independent % f	Dependent % f	
Skull	17(62)	34(62)	*
Neck	7(24)	8(18)	ns
Shoulder	16(57)	15(32)	ns
Arm	15(52)	21(46)	ns
Hand	14(51)	17(36)	ns
Thoracic	42(149)	40(85)	ns
Lumbar	13(48)	8(18)	ns
Pelvic	22(79)	23(50)	ns
Leg	16(57)	33(72)	***
Foot	26(94)	42(90)	*
Tail	29(104)	17(36)	***
Number of scats	356	215	

χ^2 =(all zones by age class) = 41.81 10df. P<0.005

*** = Significant at the 0.1% level 2df.

* = Significant at the 5.0% level 2df.

ns = Not significantly different.

TABLE 5.

Analysis of variance of the number of skeletal zones per scat from each age class for each year, based on transformed data ($\sqrt{(n+3/8)}$). The underlined untransformed means represent years which were not significantly different.

INDEPENDENT BONE FRAGMENTS

Source of Variance	Degrees of Freedom	Sum of Squares	Mean Square	
Between	2	13.664	6.832	F= 5.159 P<0.006
Within	353	467.468	1.324	
YEAR	1972	1973	1974	
MEAN	1.91	2.15	2.46	

DEPENDENT BONE FRAGMENTS

Source of Variance	Degrees of Freedom	Sum of Squares	Mean Square	
Between	2	5.981	2.990	F= 1.579 P<0.209
Within	212	401.508	1.894	
YEAR	1973	1974	1972	
MEAN	2.43	2.52	2.84	

TABLE 6.

Analysis of variance of the weight of bone fragments from each age class for each year.
The underlined means represent years which were not significantly different.

INDEPENDENT BONE FRAGMENTS

Source of Variance	Degrees of Freedom	Sum of Squares	Mean Square	
Between	2	48.784	24.392	F= 3.090 P<0.046
Within	353	2778.949	7.872	
YEAR	1972	1973	1974	
MEAN	3.89	4.51	4.95	

DEPENDENT BONE FRAGMENTS

Source of Variance	Degrees of Freedom	Sum of Squares	Mean Square	
Between	2	20.826	10.413	F= 2.244 P<0.109
Within	212	983.792	4.641	
YEAR	1973	1972	1974	
MEAN	2.43	2.52	2.84	