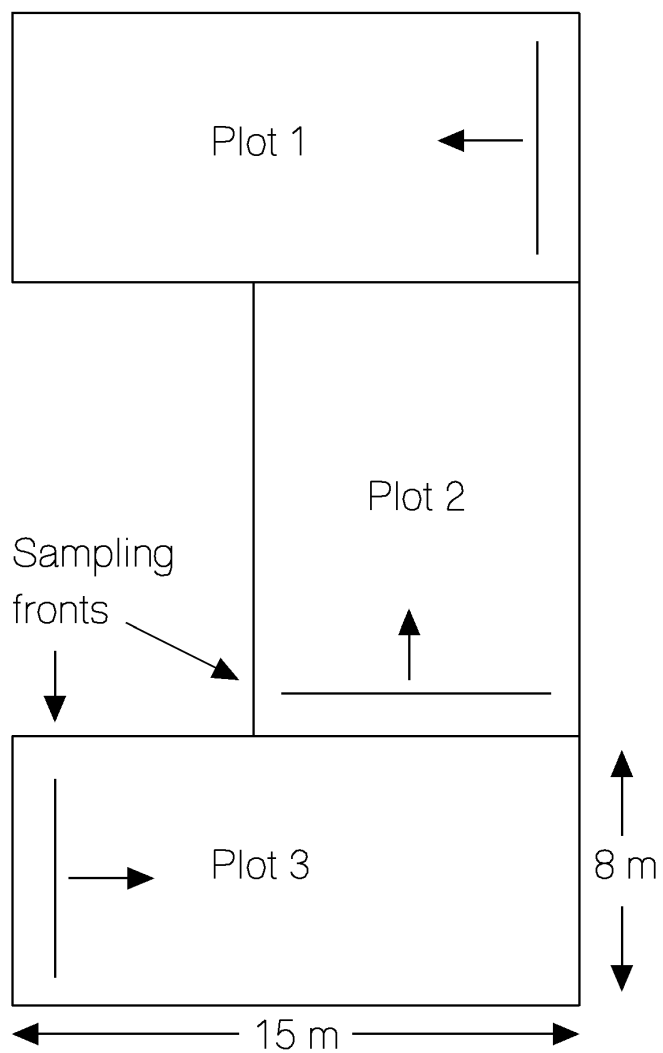
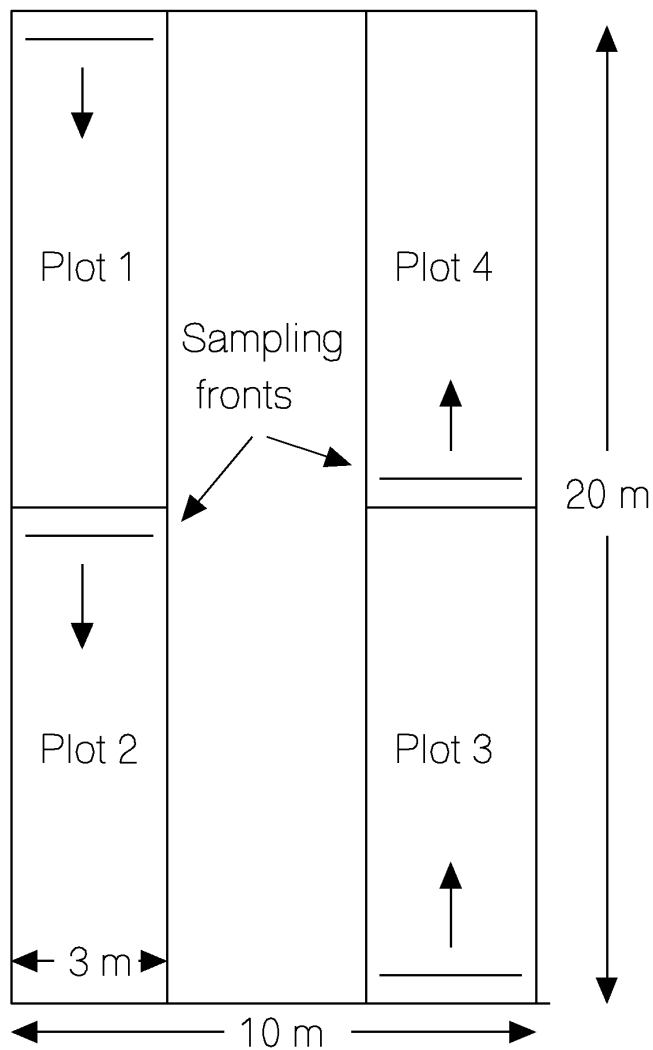


8.0 APPENDICES

Appendix 1. Plot layout and direction of sampling fronts for yield and soil moisture at sites 1 and 2 from October 1986 to November 1987.



Appendix 2. Plot layout and direction of sampling fronts for yield and soil moisture at sites 3 to 9 from October 1988 to November 1990.



Appendix 3. Detailed results of native pasture primary productivity experiments in south-west Queensland.

Table 8.1 Dry matter yield, green cover, nitrogen concentration of plant tops (where measured) and cumulative rainfall for nine native pasture primary production sites in south-west Queensland from October 1986 to November 1990. (Legend at end of Table 8.2)

Site and Date	Dry Matter Yield (kg/ha)	SD	Green Cover (%)	SD	Nitrogen Conc. (%)	Rain Cum. (mm)
Biddenham						
21.11.86						0.0
17.12.86	86 a	18	13.1 fg	2.5	2.57	62.0
07.01.87	187 b	7	16.5 g	4.2	2.12	103.5
26.02.87	1144 c-f	123	44.9 h	9.0	1.23	228.5
18.03.87	1633 ef	522	16.8 g	8.4	0.82	228.5
08.04.87	950 c	47	6.8 d-f	2.3	0.66	245.5
29.04.87	1238 c-f	98	4.1 b-e	1.0	M	269.5
21.05.87	1129 c-e	182	2.9 a-d	2.0	0.59	273.2
12.06.87	1040 c	225	0.6 a	0.8	0.64	273.2
24.06.87	1289 c-f	200	2 a-c	1.9	0.74	336.2
16.07.87	1463 d-f	81	1.2 ab	1.1	0.64	336.2
11.08.87	1678 f	147	3.9 b-c	2.6	0.64	343.2
26.08.87	1177 c-e	500	7.9 ef	5.3	0.63	370.2
18.09.87	1127 c-e	487	5.5 c-e	2.6	0.65	370.2
08.10.87	1093 cd	180	5.3 b-e	2.3	0.63	420.0
29.10.87	1405 c-f	284	7 d-f	3.7	0.65	426.2
25.11.87						476.2
10.12.87						479.7
Charleville						
24.10.86						0.0
05.12.86	206 a	65	16.7 de	2.9	2.46	120.4
31.12.86	243 a	105	9.1 bc	2.8	1.79	125.4
21.01.87	195 a	49	8.9 bc	5.6	1.77	145.4
11.02.87	275 a	165	19.6 e	9.5	2.08	276.4
04.03.87	703 b	485	29.3 f	15.7	2.42	338.4
26.03.87	645 b	387	17.1 de	8.6	1.20	395.4
16.04.87	799 bc	408	18.4 de	6.8	1.26	395.9
20.05.87	720 bc	190	6.6 b	1.9	1.04	416.9
11.06.87	847 bc	329	0 a	0.0	1.02	416.9
01.07.87	612 bc	104	10.4 b-d	2.1	1.45	495.9
29.07.87	834 bc	324	11.3 b-e	4.0	1.38	503.3
19.08.87	905 bc	429	12.5 c-e	3.6	1.67	536.9
02.09.87	943 bc	558	16.3 de	2.8	1.72	536.9
23.09.87	1190 e	139	16.6 de	3.4	1.24	545.4
15.10.87	985 bc	65	8.9 bc	1.9	0.83	595.9
05.11.87						605.4
26.11.87						640.4

Table 8.1 Continued

Site and Date	Dry Matter Yield (kg/ha)		SD	Green Cover (%)		SD	Rain Cum. (mm)
Airlie							
10.11.88							0.0
16.01.89	53	a	31	2.3	a	2.0	53.3
27.02.89	80	a	20	2.6	a	0.0	122.3
10.04.89	45	a	42	6.8	b	2.0	183.5
03.07.89	388	b	125	12.2	c	2.1	543.3
14.08.89	411	b	106	14.5	cd	2.6	560.1
25.09.89	560	b	135	21.3	d	1.6	560.1
28.11.89	1216	c	216	33.6	e	2.3	694.1
12.02.90							698.1
Lisnalee							
13.01.89							
02.03.89	648	a	77	24.2	c	2.9	31.5
14.04.89	1137	b-e	284	59.1	e	6.3	174.5
23.05.89	1052	b-d	170	43.0	d	6.5	228.5
06.07.89	1092	b-d	239	0.0	a	0.0	308.5
17.08.89	976	b-c	174	2.1	a	0.7	331.5
28.09.89	1385	e	91	7.5	b	1.5	331.5
01.12.89	1163	c-e	214	10.2	b	2.1	375.5
20.02.90	782	a	52	0.2	a	0.2	483.0
11.05.90	2009	f	236	81.6	f	7.1	816.0
22.11.90	1267	de	133				966.8
Maxvale							
14.09.88							0.0
09.12.88	20	a	3	0.3	ab	0.7	35.4
19.01.89	72	b	47	2.6	cd	1.4	84.2
01.03.89	54	ab	25	0.2	a	0.3	90.4
13.04.89	85	b	46	7.0	d	3.1	140.5
22.05.89	278	c	149	M		NC	333.9
05.07.89	444	de	241	26.7	f	6.0	410.3
17.08.89	495	c-e	269	19.6	ef	7.4	426.0
28.09.89	742	e	279	16.7	e	7.5	429.0
01.12.89	399	cd	168	3.1	bc	3.2	483.7
20.02.90							593.9
Turn Turn							
20.09.88							0.0
07.12.88	11	a	6	0.2	a	0.3	45.0
17.01.89	11	a	13	0.5	a	1.0	46.0
28.02.89	11	a	6	1.1	a	2.3	46.0
11.04.89	17	a	14	1.6	ab	1.3	139.0
04.07.89	302	b	180	21.4	d	6.5	334.0
15.08.89	370	b	104	18.2	d	6.7	338.0
26.09.89	371	b	125	7.0	c	5.9	338.0
29.11.89	259	b	80	5.0	bc	4.3	343.0
13.02.90							358.0

Table 8.1 Continued

Site and Date	Dry Matter Yield (kg/ha)		SD	Green Cover (%)		SD	Rain Cum. (mm)
Wittenburra Open							
21.09.88							0.0
07.12.88	9	a	8	0.3	a	0.7	6.0
17.01.89	61	b	19	3.4	b	1.9	28.0
28.02.89	16	a	6	0.3	a	0.7	28.0
11.04.89	7	a	4	0.5	a	0.3	105.0
04.07.89	64	b	22	6.7	bc	1.8	281.0
15.08.89	178	c	110	10.7	c	8.8	281.0
26.09.89	260	c		5.9	bc		281.0
Wittenburra Enclosed							
21.09.88							0.0
07.12.88	4	a	3	0.0	a	0.0	6.0
17.01.89	19	a	20	1.1	a	1.3	28.0
28.02.89	7	a	6	0.3	a	0.7	28.0
11.04.89	0	a	0	0.7	a	0.9	105.0
04.07.89	157	b	161	16.4	b	17.4	281.0
15.08.89	228	b		10.4	b		281.0
26.09.89	193	b	134	0.5	a	0.6	281.0
29.11.89							303.0
Wongalee							
22.09.88							0.0
07.12.88	83	a	21	4.5	a	1.4	31.5
16.01.89	225	ab	151	6.0	a	6.3	33.5
27.02.89	395	bc	304	8.5	a	6.6	33.5
10.04.89	443	bc	219	4.9	a	4.3	112.5
22.05.89	648	c	405	M		NC	309.5
03.07.89	426	bc	506	8.9	a	1.7	388.5
14.08.89	288	bc	129	9.4	a	5.1	406.5
25.09.89	295	bc	217	13.6	ab	8.8	413.0
28.11.89	621	c		27.3	b		493.0
12.02.90							536.5

Table 8.2 Soil moisture for three layers (0-50cm, 50-100cm, 0-100cm), cumulative rainfall and calculated cumulative evapo-transpiration for nine native pasture primary production sites in south-west Queensland from October 1986 to November 1990.

Site and Date	Soil Water (mm)	SD	Soil Water (mm)	SD	Rain Cum. (mm)	Total Soil Water (mm)	SD	ET Cum. (mm)
Biddenham	0-50cm		50-85cm			0-85cm		
21.11.86	101.8 b-d	15.6	73.6 +		0.0	175.4 +		0.0
17.12.86	120.0 e	6.9	95.8 d	9.9	62.0	215.8 cd	7.3	21.7
07.01.87	108.5 de	9.8	86.4 c	8.7	103.5	194.9 b	16.9	84.1
26.02.87	118.5 e	4.3	78.1 ab	5.1	228.5	196.6 b	1.3	207.4
18.03.87	97.8 b-d	5.6	81.7 a-c	1.9	228.5	179.5 a	5.1	224.5
08.04.87	86.1 ab	8.0	D		245.5	D		NC
29.04.87	104.2 cd	7.0	80.1 a-c	3.9	269.5	184.3 ab	8.9	260.7
21.05.87	99.5 b-d	2.5	84.1 bc	1.6	273.2	183.6 ab	4.1	265.1
12.06.87	94.1 bc	4.4	83.9 bc	3.6	273.2	178.0 a	4.0	270.6
24.06.87	149.8 h	3.9	79.8 a-c	4.6	336.2	229.6 d	8.5	282.0
16.07.87	108.5 de	0.9	73.1 a	5.0	336.2	181.6 ab	15.3	330.1
11.08.87	120.2 ef	11.1	81.3 a-c	3.8	343.2	201.5 bc	14.9	317.1
26.08.87	126.2 +		D		370.2	D		NC
18.09.87	103.1 cd	3.5	D		370.2	D		NC
08.10.87	131.3 fg	11.1	84.6 bc	3.7	420.0	215.9 cd	9.2	379.5
29.10.87	105.8 d	3.5	82.7 a-c	1.6	426.2	188.5 ab	3.9	413.2
25.11.87	143.0 gh	12.0	83.3 a-c	4.4	476.2	226.3 d	16.4	425.4
10.12.87	79.9 a	3.3	D		479.7	D		NC
Charleville	0-50cm		50-100cm			0-100cm		
24.10.86	24.6 c	1.7	25.5 ab	1.4	0.0	50.1 bc	3.1	0.0
05.12.86	32.6 d-f	4.0	35.5 +		120.4	68.1 +		102.3
31.12.86	15.6 a	0.5	22.8 a	1.3	125.4	38.4 a	1.8	137.1
21.01.97	18.0 ab	0.7	23.2 a	1.3	145.4	41.2 ab	1.9	154.3
11.02.87	22.2 bc	2.2	30.9 bc	3.3	276.4	53.1 c	5.1	273.1
04.03.87	34.0 ef	8.6	30.5 bc	7.6	338.4	64.5 d	15.9	323.8
26.03.87	53.5 i	5.5	30.6 bc	3.9	395.4	84.1 f	9.3	361.4
16.04.87	20.0 a-c	1.5	24.9 ab	2.3	395.9	44.9 a-c	3.5	400.5
20.05.87	23.9 c	1.2	26.0 ab	2.1	416.9	49.9 bc	3.3	417.1
11.06.87	19.7 a-c	0.5	23.8 a	0.4	416.9	43.5 a-c	0.2	423.5
01.07.87	41.6 gh	2.6	34.9 c	2.7	495.9	76.5 ef	5.2	469.5
29.07.87	37.3 fg	1.3	34.6 c	3.3	503.3	71.9 de	4.6	481.4
19.08.87	46.2 h	5.0	33.5 c	5.8	536.9	79.7 ef	10.5	507.2
02.09.87	32.0 de	2.3	33.5 c	3.4	536.9	65.5 d	4.9	521.5
23.09.87	21.3 bc	1.5	24.4 a	1.3	545.4	45.7 a-c	2.3	549.7
15.10.87	20.9 bc	1.1	24.9 ab	0.7	595.9	45.8 a-c	1.2	600.5
05.11.87	20.8 a-c	1.5	23.9 a	1.5	605.4	44.7 a-c	3.0	610.7
26.11.87	20.9 bc	1.4	24.1 a	0.7	640.4	45.0 a-c	2.1	645.4

Table 8.2 Continued

Site and Date	Soil Water (mm)	SD	Soil Water (mm)	SD	Rain Cum. (mm)	Total Soil Water (mm)	SD	ET Cum. (mm)
Airlie	0-50cm		50-100cm			0-100cm		
10.11.88	43.2 b	9.1	D		0.0	86.5 +		0.0
16.01.89	44.3 b	6.4	D		53.3	88.6 +		51.2
27.02.89	43.8 b	7.1	D		122.3	87.6 +		121.2
10.04.89	66.4 c	6.3	D		183.5	132.9 +		137.1
03.07.89	133.8 d	3.0	140.8 +		543.3	274.7 +		355.1
14.08.89	M		M		560.1	M		NC
25.09.89	20.4 a	6.8	D		560.1	40.8 +		605.8
28.11.89	73.5 c	5.5	D		694.1	146.9 +		633.7
12.02.90	34.6 b	7.2	D		698.1	69.3 +		715.3
Lisnalee	0-50cm		50-100cm			0-100cm		
13.01.89	38.1 cd	2.4	D			95.5 +		0.0
02.03.89	17.4 a	3.1	D		31.5	43.6 +		83.4
14.04.89	40.4 c-e	3.4	D		174.5	101.3 +		168.7
23.05.89	37.2 bc	3.9	D		228.5	93.2 +		230.8
06.07.89	47.9 f	3.5	64.8 b	3.0	308.5	112.8 b	6.2	291.2
17.08.89	43.2 d-f	1.1	54.5 a	4.4	331.5	97.7 a	4.5	329.3
28.09.89	41.2 c-e	4.1	70.4 b	6.6	331.5	111.6 ab	11.3	315.4
01.12.89	19.1 a	2.1	D		375.5	47.9 +		423.1
20.02.90	44.2 ef	8.4	D		483.0	110.8 +		467.7
11.05.90	48.4 f	3.5	86.2 c	6.0	816.0	134.6 c	8.9	777.7
22.11.90	31.8 b	4.3	D		966.8	79.7 +		982.6
Maxvale	0-50cm		50-100cm			0-100cm		
14.09.88	39.3 c	9.0	56.3 a	1.8	0.0	95.7 a	7.3	0.0
09.12.88	M		M		35.4	M		NC
19.01.89	10.9 a	0.7	D		84.2	28.7 +		151.2
01.03.89	9.6 a	0.5	D		90.4	25.3 +		160.8
13.04.89	26.5 b	6.4	D		140.5	69.8 +		166.4
22.05.89	85.5 e	1.9	95.5 c	6.5	333.9	181.0 d	8.3	248.5
05.07.89	56.6 d	7.0	93.2 c	3.7	410.3	149.8 c	6.9	356.2
17.08.89	29.5 b	5.2	83.6 b	7.4	426.0	113.1 b	11.0	408.6
28.09.89	30.9 b	2.2	D		429.0	81.3 +		443.4
01.12.89	14.7 a	0.5	D		483.7	38.6 +		540.8
20.02.90	16.3 a	0.6	D		593.9	42.7 +		646.9
TurnTurn	0-50cm		50-100cm			0-100cm		
20.09.88	21.8 c	1.3	D		0.0	43.6 +		0.0
07.12.88	12.0 ab	2.1	D		45.0	24.0 +		64.6
17.01.89	12.0 ab	2.5	D		46.0	24.0 +		65.6
28.02.89	10.8 ab	2.0	D		46.0	21.6 +		68.0
11.04.89	30.9 d	8.1	D		139.0	61.5 +		120.8
04.07.89	33.7 d	6.9	D		334.0	67.5 +		310.2
15.08.89	M		M		338.0	M M		NC
26.09.89	14.5 b	3.4	D		338.0	29.1 +		352.6
29.11.89	16.2 bc	4.1	17.6		343.0	33.8 +		352.8
13.02.90	6.3 a	0.9	D		358.0	12.6 +		389.0

Table 8.2 Continued

Site and Date	Soil Water (mm)	SD	Soil Water (mm)	SD	Rain Cum. (mm)	Total Soil Water (mm)	SD	ET Cum. (mm)
Wittenburra Open	0-50cm		50-100cm			0-50cm		
21.09.88	33.0 c	2.4	D		0.0	33.0 +		0.0
07.12.88	19.7 a	0.7	D		6.0	19.7 +		19.3
17.01.89	27.1 b	3.1	D		28.0	27.1 +		33.9
28.02.89	22.8 ab	3.6	D		28.0	22.8 +		38.1
11.04.89	34.4 c	3.9	D		105.0	34.4 +		103.6
04.07.89	59.4 d	2.6	D		281.0	59.4 +		254.5
15.08.89	M		M		281.0	M		NC
26.09.89	25.2 b		D		281.0	25.2 +		288.7
Wittenburra Enclosed	0-50cm		50-100cm			0-50cm		
21.09.88	36.4 c	4.4	D		0.0	36.4 +		0.0
07.12.88	20.5 a	3.2	D		6.0	20.5 +		21.8
17.01.89	21.8 a	1.3	D		28.0	21.8 +		42.6
28.02.89	18.7 a	2.3	D		28.0	18.7 +		45.7
11.04.89	34.7 c	1.9	D		105.0	34.7 +		106.7
04.07.89	59.0 d	5.4	D		281.0	59.0 +		258.5
15.08.89	M		M		281.0	M		NC
26.09.89	28.5 b	2.2	D		281.0	28.5 +		288.9
29.11.89	29.6 b	2.8	D		303.0	29.6 +		309.8
Wongalee	0-50cm		50-100cm			0-100cm		
22.09.88	34.4 b	3.4	47.7 a	4.2	0.0	82.1 a	2.5	0.0
07.12.88	M		M		31.5	M		NC
16.01.89	11.3 a	1.6	D		33.5	25.4 +		90.2
27.02.89	9.3 a	1.3	D		33.5	20.8 +		94.8
10.04.89	48.2 c	4.5	58.5 a	11.1	112.5	106.8 b	15.1	87.9
22.05.89	102.7 e	11.7	W		309.5	231.0 +		160.6
03.07.89	97.4 e	8.1	88.2 b	5.3	388.5	185.7 d	11.7	284.9
14.08.89	M		M		406.5	M		NC
25.09.89	66.4 d	5.7	85.1 b	18.0	413.0	151.5 c	15.9	343.5
28.11.89	31.3 b	4.0	48.9 a	11.8	493.0	80.2 a	15.6	494.8
12.02.90	8.2 a	0.7	D		536.5	18.4 +		600.2

Legend for Tables 8.1 and 8.2

- M Missing value
- NC Not Calculated due to missing value
- D Profile too dry to auger
- W Profile too wet to auger
- SD Based on 8 quadrats of 0.5*1.0m
- * Peak yield used to calculate water use efficiency (WUE)
- WUE Peak yield / Cumulative evapo-transpiration to peak yield
- + Insufficient samples to calculate LSD

Values followed by the same letter are not significantly different at P<0.05

Table 8.3 Percent composition of dry matter yield by weight at the Biddenham (mitchell grass) and Charleville (mulga pastures) native pasture primary productivity sites from October 1986 to November 1987.

Site and Date	Green Leaf %	Dead Leaf %	Green Stem %	Dead Stem %	Seed Head %	Forbs %
Biddenham						
21.11.86						
17.12.86	82.5	0.8	13.5	2.6	0.0	0.7
07.01.87	55	4.1	23.2	0.0	0.8	16.9
26.02.87	M					
18.03.87	16.0	24.7	39.5	6.3	11.4	2.1
08.04.87	10.8	20.9	30.1	24.2	5.1	9.1
29.04.87	4.6	38.9	31.6	19.6	4.9	0.4
21.05.87	6.4	39.4	32.1	13.2	4.4	4.5
12.06.87	1.7	39.7	30.5	19.8	6.8	1.5
24.06.87	1.6	41.3	42.3	11.5	2.6	0.8
16.07.87	2.9	43.2	38.9	10.2	0.3	4.6
11.08.87	3.9	40.7	48.6	3.9	2.2	0.8
26.08.87	1.5	32.6	52.2	8.4	2.3	3.0
18.09.87	2.5	34.7	45.9	8.8	2.2	5.9
08.10.87	5.4	37.8	40.8	14.1	1.0	0.9
29.10.87	11.9	38.5	33.2	12.9	1.9	1.6
25.11.87						
10.12.87						
Charleville						
24.10.86						
05.12.86	63.8	9.7	15.6	10.5	0.5	0.0
31.12.86	48.5	27.8	13.0	6.7	2.0	2.0
21.01.97	30.9	35.6	22.0	7.3	4.1	0.0
11.02.87	37.3	9.8	31.1	14.8	7.1	0.0
04.03.87	9.0	14.0	40.1	3.0	4.6	28.4
26.03.87	17.5	32.6	28.2	14.0	6.2	1.6
16.04.87	32.1	30.4	21.5	6.8	6.0	3.2
20.05.87	15.3	40.6	16.7	17.1	5.6	4.5
11.06.87	13.2	37.9	28.1	14.6	3.2	3.1
01.07.87	17.9	33.8	21.6	13.8	4.7	8.2
29.07.87	17.3	36.5	20.0	18.7	2.3	5.4
19.08.87	23.0	33.0	20.2	22.1	1.6	0.0
02.09.87	31.4	34.5	8.5	20.6	5.0	0.0
23.09.87	23.2	25.5	13.1	27.5	8.5	2.3
15.10.87	17.6	36.1	12.8	20.8	12.2	0.4
05.11.87						
26.11.87						

M = Missing data

Table 8.4 Ground cover at the Biddenham (mitchell grass) and Charleville (mulga pastures) native pasture primary productivity sites from October 1986 to November 1987.

Site and Date	Green Cover %	Dead Cover %	Litter Cover %	Bare Ground %
Biddenham				
21.11.86				
17.12.86	13.1	0.4	18.1	66.9
07.01.87	16.5	0.7	19.3	63.4
26.02.87	44.9	3.4	9.5	42.9
18.03.87	16.8	21.5	16.0	45.2
08.04.87	6.8	30.3	20.4	42.4
29.04.87	4.1	34.5	19.6	41.8
21.05.87	2.9	34.3	26.2	36.7
12.06.87	0.6	31.0	30.3	37.9
24.06.87	2.0	37.3	20.6	39.9
16.07.87	1.2	44.3	19.8	34.6
11.08.87	3.9	47.2	20.7	28.3
26.08.87	7.9	36.7	26.8	28.7
18.09.87	5.5	38.2	27.5	28.8
08.10.87	5.3	34.2	25.3	36
29.10.87	7.0	32.2	29.6	31.1
25.11.87				
10.12.87				
Charleville				
24.10.86				
05.12.86	16.7	1.3	20.9	60.3
31.12.86	9.1	4.3	15.6	71.2
21.01.97	8.9	6.2	15.8	69.1
11.02.87	19.6	0.7	6.8	72.8
04.03.87	29.3	0.9	8.9	60.8
26.03.87	17.1	7.5	12.0	63.2
16.04.87	18.4	11.6	13.1	57.9
20.05.87	6.6	21.3	16.8	55.0
11.06.87	0.0	29.3	18.2	52.5
01.07.87	10.4	20.1	14.5	54.7
29.07.87	11.3	27.3	14.8	46.5
19.08.87	12.5	20.0	12.6	54.7
02.09.87	16.3	19.3	19.3	44.7
23.09.87	16.6	14.5	24.8	41.9
15.10.87	8.9	17.8	18.9	54.1
05.11.87				
26.11.87				

Appendix 4. Average proportion of soil moisture in top half of the profile (where complete profiles were available) for nine native pasture primary productivity sites in south-west Queensland.

Site	Proportion in Top Half of Profile (%)	SD
Biddenham	49	4.69
Charleville	49	5.73
Airlie	47	2.63
Lisnalee	40	4.07
Maxvale	38	8.90
Turn Turn	48	NC*
Wittenburra Open	NC	
Wittenburra Enclosed	NC	
Wongalee	44	4.63
Average	45	

NC* = Not Calculated

The equation to estimate the total soil moisture in the profile to allow the calculation of evapotranspiration for all sampling times was as follows.

$$\text{Total Moisture in Profile (mm)} = (100 * \text{Amount in Top (mm)}) / (\text{Proportion in Top (\%)})$$