



Australian Government

Department of Climate Change, Energy,  
the Environment and Water

# DRAFT Greenhouse Gas Emissions Estimation and Reporting Guidelines for Agriculture, Fisheries and Forestry

## Methodological Guidance

Chapter 12: Appendix



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#### Acknowledgement of Country

We acknowledge the Traditional Owners of Country throughout Australia and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past and present.

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## 12 Appendix

1 Default data tables for relevant calculations taken from Australian National Inventory Report  
2 Vol 2 or other industry sources as noted in data and parameter tables.

### 3 12.1 Enteric Fermentation and Manure Management

#### 4 12.1.1 Beef – Pasture

##### 5 Table 12.1.1.1: Beef pasture cattle – Liveweight (kg)

State	Region	Season	Bull	Bull	Cow	Cow	Cow	Steer	Steer
			<1	>1	<1	1-2	>2	<1	>1
ACT/NSW	n/a	Spring	80	480	75	300	440	75	380
		Summer	170	520	160	360	470	160	420
		Autumn	240	550	220	390	490	220	450
		Winter	280	560	260	410	500	260	460
South Australia	n/a	Spring	250	800	220	400	500	230	420
		Summer	320	800	280	420	500	290	420
		Autumn	80	700	70	300	450	75	400
		Winter	160	700	140	350	450	150	400
Tasmania	n/a	Spring	105	700	85	300	490	90	480
		Summer	480	750	150	350	530	160	460
		Autumn	250	725	200	360	500	215	490
		Winter	260	700	210	380	460	230	470
Victoria	n/a	Spring	250	820	240	410	560	240	510
		Summer	280	850	260	440	550	270	520
		Autumn	100	700	95	300	450	95	410
		Winter	150	720	140	320	470	140	440
Western Australia	South West	Spring	340	800	260	420	550	300	480
		Summer	380	780	300	450	530	340	470
		Autumn	100	680	80	320	480	100	340
		Winter	190	700	150	330	490	170	360
	Pilbara	Spring	80	450	70	260	340	80	370
		Summer	150	500	140	310	360	150	400
		Autumn	230	550	220	330	380	230	420
		Winter	250	500	240	340	360	250	390
	Kimberley	Spring	220	500	180	300	320	210	340
		Summer	110	550	90	220	380	100	390
		Autumn	170	600	140	270	390	160	430
		Winter	200	550	150	280	350	190	400

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7 Table 12.1.1.2: Beef pasture cattle – Liveweight (kg) for NT and QLD

State	Region	Season	Bull <1	Bull >1	Cow s <1	Cow s 1-2	Cow s 2-3	Cow s >3	Steer <1	Steer 1-2	Steer 2-3	Steer >3
Northern Territory	Alice Springs	Spring	220	706	208	323	415	467	223	371	493	585
		Summer	110	703	112	256	368	465	108	280	421	543
		Autumn	170	721	169	306	392	464	176	339	470	580
		Winter	200	727	211	338	432	492	222	377	498	590
	Barkly	Spring	220	620	227	319	398	452	216	334	NO	NO
		Summer	110	650	108	262	346	430	111	236	NO	NO
		Autumn	170	670	170	266	363	444	169	282	NO	NO
		Winter	200	660	225	307	398	452	214	326	NO	NO
	Northern	Spring	220	620	177	267	365	406	231	249	324	NO
		Summer	110	650	102	203	299	380	102	218	263	NO
		Autumn	170	670	173	250	336	414	175	243	304	NO
		Winter	200	660	202	272	365	390	208	260	337	NO
Queensland	High	Spring	260	705	215	302	416	519	234	455	551	660
		Summer	153	703	118	277	397	483	111	304	521	547
		Autumn	168	718	191	319	440	506	188	326	520	582
		Winter	235	722	207	352	470	514	209	421	512	605
	Moderate/High	Spring	230	674	217	344	357	467	242	370	550	620
		Summer	113	669	113	283	361	477	120	273	545	553
		Autumn	172	685	172	309	376	471	238	329	573	620
		Winter	241	692	208	344	364	484	260	350	567	620
	Moderate/Low	Spring	236	674	178	310	428	466	193	370	519	565
		Summer	120	669	112	250	390	448	115	273	433	556
		Autumn	125	685	140	277	407	455	141	296	445	593
		Winter	180	692	183	316	438	468	189	354	500	553
	Low	Spring	190	617	174	265	371	415	170	272	392	531
		Summer	119	591	140	205	310	405	133	218	315	445
		Autumn	175	610	163	232	351	427	146	242	320	471
		Winter	192	615	162	255	364	420	157	261	342	484

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9 Table 12.1.1.3: Beef pasture cattle – Liveweight gain (kg/head/day)

State	Region	Season	Bull	Bull	Cow	Cow	Cow	Steer	Steer
			<1	>1	<1	1-2	>2	<1	>1
ACT/NSW	n/a	Spring	0.5	0.2	0.5	0.4	0.3	0.5	0.4
		Summer	1.0	0.4	0.9	0.7	0.3	0.9	0.4
		Autumn	0.8	0.3	0.7	0.3	0.2	0.7	0.3
		Winter	0.4	0.1	0.4	0.2	0.1	0.4	0.1
South Australia	n/a	Spring	0.99	1.1	0.88	0.55	0.55	0.88	0.22
		Summer	0.77	0.0	0.66	0.22	0.0	0.66	0.0
		Autumn	0.9	-1.1	0.7	0.22	-0.55	0.8	-0.22
		Winter	0.88	0.0	0.77	0.55	0.0	0.82	0.0
Tasmania	n/a	Spring	1.0	0.50	1.0	1.0	-0.44	1.0	0.5
		Summer	0.82	0.55	0.71	0.55	0.99	0.77	0.5
		Autumn	0.77	0.50	0.55	0.11	-0.33	0.6	0.33
		Winter	0.11	-0.27	0.11	0.22	-0.44	0.16	-0.22
Victoria	n/a	Spring	1.10	1.10	1.10	0.99	0.99	1.10	0.77
		Summer	0.33	0.33	0.22	0.33	-0.10	0.33	0.11
		Autumn	0.50	0.20	0.55	0.44	0.20	0.55	0.20
		Winter	0.55	0.22	0.49	0.22	0.22	0.49	0.33
Western Australia	n/a	Spring	1.64	1.10	1.21	0.99	0.66	1.42	1.10
		Summer	0.44	-0.22	0.44	0.33	-0.22	0.44	-0.11
		Autumn	0.60	0.00	0.60	0.22	-0.55	0.60	0.00
		Winter	0.99	0.22	0.77	0.11	0.11	0.77	0.44
	Pilbara	Spring	0.70	-0.55	0.70	0.22	-0.22	0.70	-0.22
		Summer	0.77	0.55	0.77	0.66	0.55	0.77	0.33
		Autumn	0.88	0.55	0.88	0.22	0.22	0.88	0.22
		Winter	0.22	-0.55	0.22	0.11	-0.22	0.22	-0.33
	Kimberley	Spring	0.22	-0.55	0.33	0.22	-0.33	0.22	-0.55
		Summer	0.80	0.55	0.70	0.44	0.66	0.80	0.55
		Autumn	0.66	0.55	0.55	0.55	0.11	0.66	0.55
		Winter	0.33	-0.55	0.11	0.11	-0.44	0.33	-0.55

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11 Table 12.1.1.4: Beef pasture cattle – Liveweight gain (kg/head/day) for NT and QLD

State	Region	Season	Bull		Cow			Steer		Steer		
			<1	>1	<1	1-2	2-3	>3	<1	1-2	2-3	>3
Northern Territory	Alice Springs	Spring	0.22	-0.23	0.25	0.17	0.18	-0.28	0.32	0.24	0.25	-0.05
		Summer	0.66	0.20	0.62	0.54	0.38	0.27	0.75	0.64	0.55	0.48
		Autumn	0.49	0.13	0.54	0.45	0.35	0.15	0.63	0.54	0.42	0.26
		Winter	0.27	-0.80	0.22	0.09	0.12	0.02	0.25	0.18	0.12	0.03
	Barkly	Spring	0.22	-0.44	0.20	0.21	0.18	0.01	0.12	0.09	NO	NO
		Summer	0.66	0.22	0.68	0.22	0.24	0.25	0.64	0.37	NO	NO
		Autumn	0.49	0.05	0.64	0.25	0.29	0.12	0.57	0.49	NO	NO
		Winter	0.27	-0.27	0.31	0.29	0.19	0.04	0.26	0.28	NO	NO
	Northern	Spring	0.22	-0.44	0.00	0.15	0.08	0.17	0.06	0.02	-0.14	NO
		Summer	0.66	0.22	0.79	0.40	0.38	0.27	0.80	0.16	0.30	NO
		Autumn	0.49	0.05	0.55	0.38	0.36	0.06	0.58	0.23	0.40	NO
		Winter	0.27	-0.27	0.02	0.09	0.16	-0.04	0.21	0.03	0.11	NO
Queensland	High	Spring	0.27	-0.19	0.38	0.25	0.07	0.05	0.52	0.55	0.19	0.60
		Summer	0.16	0.16	0.80	0.57	0.76	0.49	0.84	0.51	0.36	0.17
		Autumn	0.45	0.10	0.49	0.41	0.40	0.17	0.54	0.64	-0.05	0.32
		Winter	0.51	-0.07	0.13	-0.09	-0.13	0.07	0.25	0.71	0.17	0.43
	Moderate / High	Spring	-0.12	-0.19	0.41	0.09	0.41	-0.19	0.07	1.07	-0.08	0.00
		Summer	0.65	0.19	0.65	0.51	0.18	0.63	1.30	0.48	1.12	0.38
		Autumn	0.70	0.13	0.52	0.34	0.02	0.04	0.77	0.42	0.12	0.74
		Winter	0.32	-0.06	0.25	0.19	-0.10	-0.02	0.02	0.23	-0.13	0.00
	Moderate / Low	Spring	0.62	-0.19	0.37	0.41	0.06	-0.02	0.47	0.44	0.30	0.13
		Summer	0.05	0.19	0.31	0.54	0.53	0.15	0.28	0.57	0.42	0.40
		Autumn	0.33	0.13	0.39	0.36	0.26	0.11	0.40	0.44	0.37	-0.01
		Winter	0.61	-0.06	0.21	0.18	0.12	0.06	0.29	0.41	0.41	-0.15
	Low	Spring	-0.20	0.02	0.24	0.30	0.23	-0.05	0.34	0.30	0.57	0.52
		Summer	0.62	0.21	0.25	0.32	0.47	0.31	0.14	0.40	0.26	0.43
		Autumn	0.40	0.13	0.12	0.27	0.30	0.08	0.13	0.24	0.15	0.21
		Winter	0.08	0.04	0.06	0.18	0.11	-0.07	0.13	0.16	0.40	0.33

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13 Table 12.1.1.5: Beef pasture cattle – Dry matter digestibility of feed intake (fraction)

State	Region	Season			
		Spring	Summer	Autumn	Winter
ACT/NSW	n/a	0.55	0.65	0.60	0.50
NT	n/a	0.55	0.61	0.57	0.54
QLD	n/a	0.53	0.57	0.55	0.51
SA	n/a	0.70	0.55	0.55	0.75
TAS	n/a	0.75	0.60	0.70	0.75
VIC	n/a	0.80	0.55	0.60	0.76
WA	South West	0.80	0.58	0.50	0.75
	Pilbara	0.40	0.65	0.55	0.45
	Kimberley	0.40	0.65	0.55	0.45

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15 Table 12.1.1.6: Beef pasture cattle – Crude protein content of feed intake (fraction)

State	Region	Season			
		Spring	Summer	Autumn	Winter
ACT/NSW	n/a	0.07	0.13	0.1	0.06
NT	n/a	0.058	0.092	0.075	0.053
QLD	n/a	0.072	0.099	0.078	0.059
SA	n/a	0.16	0.07	0.09	0.2
TAS	n/a	0.2	0.1	0.16	0.2
VIC	n/a	0.25	0.07	0.1	0.21
WA	South West	0.2	0.09	0.06	0.2
	Pilbara	0.04	0.12	0.09	0.06
	Kimberley	0.04	0.12	0.09	0.06

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17 Table 12.1.1.7: Beef pasture cattle – Feed intake adjustment and milk production

Breed	Season	Feed adjustment	Milk intake / production (kg/day)
Hereford or Shorthorn breeds	Spring	1.3	6
	Summer	1.1	4
	Autumn	0	0
	Winter	0	0
Northern	Spring	0	0

Breed	Season	Feed adjustment	Milk intake / production (kg/day)
Brahman cross breed	Summer	1.3	4
	Autumn	1.1	3
	Winter	0	0

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19 **Table 12.1.1.8: Beef pasture cattle – Standard reference weights (kg)**

State	Cows 1-						
	Bulls <1	Bulls >1	Cows <1	2	Cows >2	Steer <1	Steer >1
ACT/NSW	700	700	500	500	500	600	600
Northern Territory	770	770	550	550	550	660	660
Queensland	770	770	550	550	550	660	660
South Australia	770	770	550	550	550	660	660
Tasmania	770	770	550	550	550	660	660
Victoria	770	770	550	550	550	660	660
Western Australia	770	770	550	550	550	660	660

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21 **Table 12.1.1.9: Beef pasture cattle – Methane conversion factor per climate zone**

Feedlot Type	Climate Zone	Sub-Climate Zone	MCF <sub>im</sub>
Pasture, range and paddock	All climate zones	N/A	0.0046
Uncovered anaerobic lagoon	Cool	Cool Temp. Moist	0.0060
		Cool Temp. Dry	0.0067
		Boreal Moist	0.0050
		Boreal Dry	0.0049
	Temperate	Warm Temp. Moist	0.0073
		Warm Temp. Dry	0.0076
	Warm	Tropical Montane	0.0076
		Tropical Wet	0.0080
		Tropical Moist	0.0080
		Tropical Dry	0.0080

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23 **12.1.2 Beef – Feedlot**24 **Table 12.1.2.1: Beef feedlot cattle – Duration of stay**

Feedlot Type	Length of Stay
Domestic	1-80 days
Mid-fed	81-200 days
Long-fed	201+days

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26 **Table 12.1.2.2: Beef feedlot cattle – Animal characteristics**

		1990-1994 <sup>(a)</sup>	1995-1999 <sup>(a)</sup>	2000-2004 <sup>(a)</sup>	2005-2009 <sup>(a)</sup>	2010-2014 <sup>(a)</sup>	2015-2019	2020-2023
<b>Domestic</b>								
Days on feed		75	75	70	70	70	70	75
Feed intake	kg DM/day	8.8	8.8	9.8	10.0	10.0	10.4	10.4
N retention	per cent of intake	21.4	22.3	22.2	21.1	20.4	20.4	20.4
<b>Mid-fed</b>								
Days on feed		140	120	115	115	115	120	150
Feed intake	kg DM/day	11.6	11.6	11.2	11.2	10.8	10.8	10.8
N retention	per cent of intake	11.8	11.6	12.0	12.5	12.7	12.7	12.7
<b>Long-fed</b>								
Days on feed		250	250	250	250	250	250	250
Feed intake	kg DM/day	9.3	9.3	9.0	9.0	8.5	8.2	8.2
N retention	per cent of intake	6.4	6.3	6.1	6.6	7.0	7.0	7.0

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28 **Table 12.1.2.3: Beef feedlot cattle – Diet properties**

Nutrient analysis	Unit	1990-1994 <sup>(a)</sup>	1995-1999 <sup>(a)</sup>	2000-2004 <sup>(a)</sup>	2005-2009 <sup>(a)</sup>	2010-2014 <sup>(a)</sup>	2015-2019	2020-2023
<b>Domestic</b>								
Dry matter digestibility	fraction	0.80	0.81	0.81	0.81	0.81	0.81	0.81
Crude protein	fraction	0.14	0.14	0.14	0.14	0.14	0.14	0.14
NDF	per cent	27.0	27.0	24.0	23.0	22.0	22.0	22.0
Ether Extract	per cent	4.0	4.0	4.0	4.5	4.5	4.8	4.8

Nutrient analysis	Unit	1990-1994 <sup>(a)</sup>	1995-1999 <sup>(a)</sup>	2000-2004 <sup>(a)</sup>	2005-2009 <sup>(a)</sup>	2010-2014 <sup>(a)</sup>	2015-2019	2020-2023
<b>Mid-fed</b>								
Dry matter digestibility	fraction	0.80	0.81	0.81	0.81	0.81	0.81	0.81
Crude protein	fraction	0.14	0.14	0.13	0.13	0.125	0.12	0.12
NDF	per cent	33.0	33.0	27.0	24.0	22.0	22.0	22.0
Ether Extract	per cent	4.0	4.0	4.0	5.0	5.0	5.0	5.0
<b>Long-Fed</b>								
Dry matter digestibility	fraction	0.80	0.81	0.81	0.81	0.81	0.81	0.81
Crude protein	fraction	0.14	0.14	0.13	0.13	0.125	0.12	0.12
NDF	per cent	27.0	27.0	27.0	24.0	24.0	24.0	24.0
Ether Extract	per cent	4.0	4.0	4.5	5.0	5.0	5.5	5.5

29

30 **Table 12.1.2.4: Beef feedlot cattle – MCFs**

Treatment stage	MMS	NSW	QLD	SA	VIC	WA
Primary	Dry lot (Feedpad)	0.01	0.03	0.01	0.01	0.01
Secondary	Solid Storage (Stockpile)	0.02	0.02	0.02	0.02	0.02
	Composting (Passive Windrow)	0.01	0.01	0.01	0.01	0.01
	Direct Application to soil	0	0	0	0	0
Tertiary	Uncovered anaerobic lagoon (Effluent pond)	0.75	0.77	0.75	0.75	0.77

31

32 **Table 12.1.2.5: Beef feedlot cattle – Nitrous oxide EFs (kg N<sub>2</sub>O-N / kgN)**

Treatment stage	MMS	N <sub>2</sub> O
Primary	Dry lot (Feedpad)	0.0054
Secondary	Solid Storage (Stockpile)	0.005
	Composting (Passive Windrow)	0.01
	Direct Application to soil	0
Tertiary	Uncovered anaerobic lagoon (Effluent pond)	0

33

34 **Table 12.1.2.6: Beef feedlot cattle – Fraction of N volatilised by MMS**

MMS		FracGASM
Primary	Dry lot (Feedpad)	0.6
Secondary	Solid Storage (Stockpile)	0.25
	Composting (Passive Windrow)	0.4
	Direct Application to soil	
Tertiary	Uncovered anaerobic lagoon (Effluent pond)	0.35

35

36 **12.1.3 Dairy**37 **Table 12.1.3.1: Dairy cattle – Liveweight (kg) – Cows and Heifers**

Breed	Milking Cows	Heifers >1 <sup>a</sup>	Heifers <1 (weaned) <sup>b</sup>
Medium Friesian	550	380	155
Large Friesian	600	415	170
Holstein-Friesian	650	450	185
Friesian crossbred	500	350	145
Jersey	400	275	115
Jersey crossbred	450	315	130
Ayrshire	540	375	150
Guernsey	480	335	140
Brown Swiss	600	415	170
Illawarra/Aussie Red	550	375	150

38 Note: a - rising 2 year old, b – rising 1 year old

39

40 **Table 12.1.3.2: Dairy cattle – Liveweight (kg) – Bulls**

Breed	Bulls >1	Bulls <1 (weaned)
All breeds	600	225

41

42

43 **Table 12.1.3.1: Dairy cattle – Liveweight gain (kg/day)**

Milking Cows	Heifers >1	Heifers <1 (weaned)	Bulls >1	Bulls <1 (weaned)
0.016	0.6	0.57	0.1	0.8

44

45 **Table 12.1.3.2: Dairy cattle – Standard reference weights (kg)**

Milking Cows	Heifers >1	Heifers <1 (weaned)	Bulls >1	Bulls <1 (weaned)
590	590	590	770	770

46

47 **Table 12.1.3.3: Dairy cattle – Data for pre-weaned calves**

	CH <sub>4</sub> production	Volatile solids	Faecal N	Urinary N
	(kg/day)			
Heifers<1	0.0176	0.2685	0.0055	0.0082
Bulls<1	0.0204	0.3003	0.0050	0.0042

48

49 **Table 12.1.3.4: Dairy cattle – Dairy cattle - MCFs**

MMS	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
Pasture	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
Anaerobic lagoon	0.72	0.76	0.8	0.78	0.74	0.69	0.73	0.76
Sump and dispersal systems <sup>(b)</sup>	0.005	0.005	0.01	0.005	0.005	0.001	0.005	0.005
Drains to paddocks <sup>(c)</sup>	0.15	0.18	0.50	0.24	0.17	0.13	0.17	0.18
Solid Storage	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

50

51 **Table 12.1.3.5: Dairy cattle – Nitrous oxide EFs and fraction of N volatilised by MMS**

MMS	EF (kg N <sub>2</sub> O-N/kg N excreted)	FracGASM <sub>m</sub> (kg N <sub>2</sub> O-N/kg N excreted)
M=14 Pasture	0	0
M=1 Anaerobic lagoon	0	0.35
M=2 Daily Spread – Sump and Dispersal	0	0.07
M=3 Daily Spread – Drains to Paddock	0	0.2
M=3 Solid Storage	0.005	0.3

52

53 **Table 12.1.3.6: Dairy cattle – Methane production for pre-weaned heifer and bull**  
 54 **calves (kgCH<sub>4</sub>/head/day)**

Animal Class	MPW <sub>ENTERIC</sub>
Heifers < 1 year	0.0176
Bulls < 1 year	0.0204

55

56 **Table 12.1.3.7: Dairy cattle – Increased metabolic rate when producing milk**

Animal Class	MR <sub>j</sub>
Milking cows, and house cows	1.1
All other cattle classes	1.0

57

58 **Table 12.1.3.8: Dairy cattle – Fraction of volatile solids voided to each manure**  
 59 **management system**

Feeding system	Annual fraction of time spent per area		
	Pasture	Milking Shed	Feedpad
System 1: Grazed Only	0.89	0.11	0
System 2: On feedpad for <10 hr/day for <3 months/year	0.79	0.11	0.10
System 3: Pasture-grazed 3-9 months/year	0.534	0.11	0.356
System 4: Zero grazing	0	0.11	0.89

60

61 **Table 12.1.3.9: Dairy cattle – EF for nitrous oxide per MMS (kg N<sub>2</sub>O-N/kg N)**

MMS	EF <sub>m</sub>
m=14 Pasture	0
m=1 Anaerobic Lagoon	0
m=2 Daily Spread: Sump and dispersal	0
m=3 Daily Spread: Drains to paddocks	0
m=4 Solid Storage	0.005

62

## 63 12.1.4 Sheep

64 Table 12.1.4.1: Sheep – Liveweight (kg)

State	Season	Rams	Wethers	Sheep > 1			Sheep < 1
				Maiden Ewes (intended for breeding)	Breeding Ewes	Other Ewes	Lambs & Hoggets
ACT/NSW	Spring	75	62	44	54	56	20
	Summer	75	55	42	49	51	27
	Autumn	69	55	43	50	50	32
	Winter	69	55	45	50	51	34
Queensland	Spring	58	50	35	40	45	20
	Summer	61	55	40	45	50	25
	Autumn	63	55	40	45	50	20
	Winter	60	50	35	42	48	25
South Australia	Spring	80	70	52	55	55	40
	Summer	70	65	52	55	55	45
	Autumn	70	60	52	55	55	20
	Winter	70	60	52	55	55	30
Tasmania	Spring	90	55	45	50	50	14
	Summer	90	55	45	50	50	24
	Autumn	75	50	45	50	50	36
	Winter	75	45	50	55	50	42
Victoria	Spring	70	60	50	55	50	22
	Summer	65	55	45	50	50	28
	Autumn	65	52	43	48	50	33
	Winter	60	50	40	45	50	35
Western Australia	Spring	75	60	50	55	55	30
	Summer	65	55	45	50	50	30
	Autumn	65	48	40	45	45	10
	Winter	65	48	45	50	50	20

65

66 Table 12.1.4.2: Sheep – Dry matter digestibility of feed intake (fraction)

State	Season	Rams	Wethers	Sheep > 1			Sheep < 1
				Maiden Ewes (intended for breeding)	Breeding Ewes	Other Ewes	Lambs & Hoggets
ACT/NSW	Spring	0.75	0.75	0.75	0.75	0.75	0.75
	Summer	0.61	0.61	0.61	0.61	0.61	0.61
	Autumn	0.64	0.64	0.64	0.64	0.64	0.64
	Winter	0.72	0.72	0.72	0.72	0.72	0.72
Queensland	Spring	0.51	0.51	0.51	0.51	0.51	0.51
	Summer	0.55	0.55	0.55	0.55	0.55	0.55
	Autumn	0.59	0.59	0.59	0.59	0.59	0.59
	Winter	0.58	0.58	0.58	0.58	0.58	0.58
South Australia	Spring	0.70	0.70	0.70	0.70	0.70	0.70
	Summer	0.55	0.55	0.55	0.55	0.55	0.55
	Autumn	0.55	0.55	0.55	0.55	0.55	0.55
	Winter	0.75	0.75	0.75	0.75	0.75	0.75
Tasmania	Spring	0.75	0.75	0.75	0.75	0.75	0.75
	Summer	0.55	0.55	0.55	0.55	0.55	0.55
	Autumn	0.67	0.67	0.67	0.67	0.67	0.67
	Winter	0.70	0.70	0.70	0.70	0.70	0.70
Victoria	Spring	0.70	0.70	0.70	0.70	0.70	0.70
	Summer	0.55	0.55	0.55	0.55	0.55	0.55
	Autumn	0.65	0.65	0.65	0.65	0.65	0.65
	Winter	0.60	0.60	0.60	0.60	0.60	0.60
Western Australia	Spring	0.73	0.73	0.73	0.73	0.73	0.73
	Summer	0.55	0.55	0.55	0.55	0.55	0.55
	Autumn	0.50	0.50	0.70	0.70	0.50	0.70
	Winter	0.76	0.76	0.76	0.76	0.76	0.76

67

68 Table 12.1.4.3: Sheep – Feed availability (t/ha)

State	Season	Rams	Wethers	Sheep > 1			Sheep < 1
				Maiden Ewes (intended for breeding)	Breeding Ewes	Other Ewes	Lambs & Hoggets
ACT/NSW	Spring	2.9	2.9	2.9	2.9	2.9	2.9

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State	Season	Sheep > 1				Sheep < 1	
		Rams	Wethers	Maiden Ewes (intended for breeding)	Breeding Ewes	Other Ewes	Lambs & Hoggets
	Summer	2.5	2.5	2.5	2.5	2.5	2.5
	Autumn	1.6	1.6	1.6	1.6	1.6	1.6
	Winter	1.7	1.7	1.7	1.7	1.7	1.7
Queensland	Spring	1.5	1.5	1.5	1.5	1.5	1.5
	Summer	2.0	2.0	2.0	2.0	2.0	2.0
	Autumn	2.2	2.2	2.2	2.2	2.2	2.2
	Winter	1.7	1.7	1.7	1.7	1.7	1.7
South Australia	Spring	4.0	4.0	4.0	4.0	4.0	4.0
	Summer	2.5	2.5	2.5	2.5	2.5	2.5
	Autumn	0.7	0.7	0.7	0.7	0.7	0.7
	Winter	0.9	0.9	0.9	0.9	0.9	0.9
Tasmania	Spring	2.5	2.5	2.5	2.5	2.5	2.5
	Summer	2.5	2.5	2.5	2.5	2.5	2.5
	Autumn	1.3	1.3	1.3	1.3	1.3	1.3
	Winter	0.8	0.8	0.8	0.8	0.8	0.8
Victoria	Spring	3.2	3.2	3.2	3.2	3.2	3.2
	Summer	3.0	3.0	3.0	3.0	3.0	3.0
	Autumn	1.8	1.8	1.8	1.8	1.8	1.8
	Winter	1.0	1.0	1.0	1.0	1.0	1.0
Western Australia	Spring	3.5	3.5	3.5	3.5	3.5	3.5
	Summer	1.5	1.5	1.5	1.5	1.5	1.5
	Autumn	0.7	0.7	0.7	0.7	0.7	0.7
	Winter	1.2	1.2	1.2	1.2	1.2	1.2

69

70 **Table 12.1.4.4: Sheep – Crude protein content of feed intake (fraction)**

State	Season	Sheep > 1				Sheep < 1	
		Rams	Wethers	Maiden Ewes (intended for breeding)	Breeding Ewes	Other Ewes	Lambs & Hoggets
ACT/NSW	Spring	0.20	0.20	0.20	0.20	0.20	0.20
	Summer	0.10	0.10	0.10	0.10	0.10	0.10
	Autumn	0.12	0.12	0.12	0.12	0.12	0.12

State	Season	Rams	Wethers	Sheep > 1			Sheep < 1
				Maiden Ewes (intended for breeding)	Breeding Ewes	Other Ewes	Lambs & Hoggets
	Winter	0.18	0.18	0.18	0.18	0.18	0.18
Queensland	Spring	0.08	0.08	0.08	0.08	0.08	0.08
	Summer	0.10	0.10	0.10	0.10	0.10	0.10
	Autumn	0.09	0.09	0.09	0.09	0.09	0.09
	Winter	0.07	0.07	0.07	0.07	0.07	0.07
South Australia	Spring	0.16	0.16	0.16	0.16	0.16	0.16
	Summer	0.07	0.07	0.07	0.07	0.07	0.07
	Autumn	0.09	0.09	0.09	0.09	0.09	0.09
	Winter	0.20	0.20	0.20	0.20	0.20	0.20
Tasmania	Spring	0.20	0.20	0.20	0.20	0.20	0.20
	Summer	0.07	0.07	0.07	0.07	0.07	0.07
	Autumn	0.14	0.14	0.14	0.14	0.14	0.14
	Winter	0.16	0.16	0.16	0.16	0.16	0.16
Victoria	Spring	0.16	0.16	0.16	0.16	0.16	0.16
	Summer	0.07	0.07	0.07	0.07	0.07	0.07
	Autumn	0.13	0.13	0.13	0.13	0.13	0.13
	Winter	0.10	0.10	0.10	0.10	0.10	0.10
Western Australia	Spring	0.18	0.18	0.18	0.18	0.18	0.18
	Summer	0.06	0.06	0.06	0.06	0.06	0.06
	Autumn	0.06	0.06	0.16	0.16	0.06	0.16
	Winter	0.21	0.21	0.21	0.21	0.21	0.21

71

72 Table 12.1.4.5: Sheep – Liveweight gain (kg/day)

State	Season	Rams	Wethers	Sheep > 1			Sheep < 1
				Maiden Ewes (intended for breeding)	Breeding Ewes	Other Ewes	Lambs & Hoggets
ACT/NSW	Spring	0.07	0.08	0.07	0.04	0.05	0.16
	Summer	0	-0.08	0.00	-0.05	-0.05	0.08
	Autumn	-0.07	0.00	0.00	0.01	-0.01	0.05
	Winter	0.00	0.00	0.02	0.00	0.01	0.04
Queensland	Spring	-0.02	0.00	0.00	-0.02	-0.03	0.20

State	Season	Sheep > 1				Sheep < 1	
		Rams	Wethers	Maiden Ewes (intended for breeding)	Breeding Ewes	Other Ewes	Lambs & Hoggets
	Summer	0.03	0.05	0.05	0.05	0.05	0.05
	Autumn	0.02	0.00	0.00	0.00	0.00	0.20
	Winter	-0.03	-0.05	-0.05	-0.03	-0.02	0.05
South Australia	Spring	0.11	0.11	0.00	0.00	0.00	0.11
	Summer	-0.10	-0.10	0.00	0.00	0.00	0.05
	Autumn	0.00	-0.10	0.00	0.00	0.00	0.16
	Winter	0.00	0.00	0.00	0.00	0.00	0.16
Tasmania	Spring	0.16	0.11	0.03	-0.02	0.00	0.15
	Summer	0.00	0.00	0.00	0.00	0.00	0.11
	Autumn	-0.20	-0.10	0.00	0.00	0.00	0.13
	Winter	0	-0.10	0.5	0.02	0.00	0.07
Victoria	Spring	0.11	0.11	0.16	0.11	0.00	0.15
	Summer	-0.05	-0.05	-0.05	-0.05	0.00	0.07
	Autumn	0.00	-0.03	-0.02	-0.02	0.00	0.05
	Winter	-0.05	-0.02	-0.03	-0.03	0.00	0.02
Western Australia	Spring	0.11	0.13	0.05	0.05	0.05	0.11
	Summer	-0.11	-0.05	-0.05	-0.05	-0.05	0.00
	Autumn	0.00	-0.08	0.11	-0.05	-0.05	0.11
	Winter	0.00	0.00	0.05	0.05	0.05	0.11

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74 Table 12.1.4.6: Sheep – Standard reference weights (kg)

State	Sheep > 1				Sheep < 1	
	Rams	Wethers	Maiden Ewes (intended for breeding)	Breeding Ewes	Other Ewes	Lambs & Hoggets
ACT/NSW	78	62	57	57	57	60
Queensland	70	60	50	50	50	55
South Australia	84	72	60	60	60	66
Tasmania	77	66	55	55	55	60
Victoria	70	60	50	50	50	55
Western Australia	84	72	60	60	60	66

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76 **Table 12.1.4.7: Sheep – Fraction of waste in each MMS (per cent)**

<b>MMS</b>	<b>MMS<sub>m</sub></b>
m=14 Pasture	0.95
m=1 uncovered anerobic Lagoon	0.05

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78 **Table 12.1.4.8: Sheep – Methane conversion factor per climate zone**

<b>Feedlot Type</b>	<b>Climate Zone</b>	<b>Sub-Climate Zone</b>	<b>MCF<sub>im</sub></b>
<b>Pasture, range and paddock</b>	All climate zones	N/A	0.0046
<b>Uncovered anaerobic lagoon</b>	Cool	Cool Temp. Moist	0.0060
		Cool Temp. Dry	0.0067
		Boreal Moist	0.0050
		Boreal Dry	0.0049
	Temperate	Warm Temp. Moist	0.0073
		Warm Temp. Dry	0.0076
	Warm	Tropical Montane	0.0076
		Tropical Wet	0.0080
		Tropical Moist	0.0080
		Tropical Dry	0.0080

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80

## 12.2 Fertiliser, Residues and Rice

### 12.2.1 Crop and Pasture Attributes

Table 12.2.1.1: Crop attributes

Crop type c	Residue: Crop ratio $R_{AGc}$	Below-ground: above-ground residue ratio $R_{BGc}$	Dry matter content $DM_c$	Carbon fraction in dry matter $CC_c$	N content above- ground $NC_{AGc}$	N content below- ground $NC_{BGc}$	Fraction of residue remaining at time of burning $S_c$	Burning efficiency $Z_c$
Wheat	1.50	0.29	0.88	0.40	0.006	0.010	0.5	0.90
Barley	1.24	0.32	0.88	0.40	0.007	0.010	0.5	0.85
Maize	0.81	0.39	0.85	0.42	0.005	0.007	1.0	0.80
Oats	1.42	0.43	0.88	0.40	0.006	0.010	0.5	0.85
Rice <sup>(d)</sup>	1.31	0.16	0.80	0.42	0.007	0.010	1.0	0.80
Sorghum	1.50	0.22	0.80	0.40	0.008	0.007	0.5	0.85
Triticale	1.50	0.42	0.88	0.40	0.006	0.010	0.5	0.85
Other cereals	1.46	0.36	0.88	0.40	0.006	0.010	0.5	0.85
Pulses	1.37	0.51	0.87	0.40	0.009	0.010	0.5	0.85
Tubers and roots	0.34	0.43	0.25	0.40	0.020	0.010	NA	0.85
Peanuts <sup>TM</sup>	1.07	0.20	0.80	0.42	0.016	0.014	0.5	0.85
Sugar cane <sup>(e)</sup>	0.25	0.45	0.20	0.40	0.005	0.007	1.0	0.80
Cotton <sup>191</sup>	1.90	0.30	0.90	0.40	0.01	0.01	NA	0.85
Hops	1.50	0.29	0.88	0.40	0.006	NA	NA	0.85
Oilseeds	2.08	0.33	0.96	0.40	0.009	0.010	0.5	0.85
Forage crops	1.34	0.37	0.88	0.40	0.006	0.010	NA	0.85

Table 12.2.1.2: Crop attributes – Fraction removed

Crop type <i>c</i>	State <i>i</i>	Fraction removed FFOD <sub><i>c</i></sub>
Rice	All states	0.06
Tubers and roots	All states	1
Cotton	All states	0
Hops	All states	0
Forage crops	All states	0.8
Sugar Cane	NSW	0
	QLD	0.03
	WA	0
All other crop types	NSW	0.05
	VIC	0.07
	QLD	0.04
	SA	0.09
	WA	0.11
	TAS	0.16
	NT	0.01
	ACT	0.00

Table 12.2.1.3: Pasture attributes

Pasture type	Average Yield	N content			
	(t DM ha)	Below-ground: above-ground residue ratio	Above-ground	Below-ground	Fraction above ground residue removed
	$Y_p$	$R_{BGp}$	$NC_{AGp}$	$NC_{BGp}$	$FFOD_p$
Annual grass	4.41	0.4	0.015	0.012	0.8
Grass clover mixture	8.34	0.8	0.025	0.016	0.8
Lucerne	8.62	0.4	0.027	0.019	0.8
Other legume	5.62	0.4	0.027	0.022	0.8
Perennial pasture	8.35	0.8	0.015	0.012	0.8

**Table 12.2.1.4: Emission factor for crop residues returned to the soil**

No data yet exists at State level – placeholder only

**12.2.2 Parameters relating to Fertiliser Use, Atmospheric Deposition and Leaching and Run-off**

**Table 12.2.2.1: Fraction of fertiliser N available for leaching and runoff (FracWET)**

Production system	ACT/NSW	NT	Qld	SA	Tas	Vic	WA
Irrigated pasture	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Irrigated crops	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Non-irrigated pasture	0.194	0.322	0.230	0.012	0.532	0.337	0.241
Non-irrigated crops	0.092	0.980	0.030	0.014	0.631	0.036	0.055
Sugar	0.780		0.857				0.759
Cotton <sup>(a)</sup>	0.636	1.000	0.633				1.000
Horticultural crops	0.314	0.972	0.355	0.117	0.563	0.226	0.569

**Table 12.2.2.2: Fraction of animal waste available for leaching and runoff (FracWET)**

State	Region	Dairy	Beef cattle			Poultry		Other categories	
		cattle <sup>(a)</sup>	Pasture	Feedlot	Sheep	Pigs	Meat		Layer
ACT		1	0.87		0.97	0.17	0.442	0.88	0.98
NSW		1	0.54	0.192	0.30	0.17	0.442	0.64	0.16
NT		1	0.51				1.00	1.00	0.92
NT	Alice Springs		0.03						
NT	Barkly		0.07						
NT	Northern		0.92						
QLD		1	0.22	0.043	0.08	0.70	0.578	0.17	0.21
QLD	High		0.18						
QLD	Moderate/High		0.64						
QLD	Moderate/Low		0.07						
QLD	Low		0.18						
SA		1	0.22	0.279	0.12	0.07	0.147	0.16	0.40
TAS		1	0.71		0.59	0.73	1.000	0.70	0.79
VIC		1	0.56	0.438	0.23	0.41	0.901	0.57	0.41

State	Region	Dairy	Beef cattle		Poultry			Other categories	
		cattle <sup>(a)</sup>	Pasture	Feedlot	Sheep	Pigs	Meat		Layer
WA		1	0.51	0.223	0.07	0.50	0.891	0.11	0.13
WA	South West		0.89						
WA	Pilbara		0.28						
WA	Kimberley		0.30						

**Table 12.2.2.3: Nitrous oxide emission factors for inorganic fertiliser application (kg N<sub>2</sub>O-N/kg N)**

Production system	EF <sub>N<sub>2</sub>O</sub>
Irrigated pasture	0.0059
Irrigated crop (low rainfall)	0.0029
Irrigated crop (high rainfall)	0.008
Irrigated crop	0.007
Non-irrigated pasture	0.0018
Non-irrigated crops	0.0041
Sugar	0.0199
Cotton	0.0053
Horticultural crops	0.0064
Rice (continuous flooding)	0.003
Rice (single and multiple drainage, or alternate wetting and drying)	0.005

**Table 12.2.2.4: Emission factor for urine and dung posited on pasture, range or paddock (kg N<sub>2</sub>O-N/kg N)**

Production system	EF <sub>PRP</sub>
Wet climate zone	0.006
Dry climate zones	0.002

**Table 12.2.2.5: Fraction of lime as limestone (FracLime)**

State	FracLime
ACT	0.98
New South Wales	0.98
Northern Territory	0.60
Queensland	0.86
South Australia	0.95
Tasmania	0.73
Victoria	0.97
Western Australia	0.98
Australia	0.98

**Table 12.2.2.6: Fraction of nitrogen in common inorganic fertilisers ( $FN_{\text{inorganic},f}$ )**

Fertiliser	$FN_{\text{inorganic},f}$
Monoammonium phosphate (MAP)	0.10
Diammonium phosphate (DAP)	0.18
Urea	0.46
Sulphate of ammonia (SOA)	0.21
Urea-ammonium nitrate (UAN)	0.32
Ammonium nitrate (AN)	0.337
Calcium ammonium nitrate (CAN)	0.27

**Table 12.2.2.7: Fraction of urea in common inorganic fertilisers ( $FU_f$ )**

<b>Fertiliser</b>	<b><math>FU_f</math></b>
Monoammonium phosphate (MAP)	0
Diammonium phosphate (DAP)	0
Urea	1
Sulphate of ammonia (SOA)	0
Urea-ammonium nitrate (UAN)	0.35
Ammonium nitrate (AN)	0
Calcium ammonium nitrate (CAN)	0

**Table 12.2.2.8: Fraction of nitrogen in organic fertiliser type f sourced from particular livestock manure ( $FN_{organic,f}$ )**

<b>Livestock source of organic fertiliser f</b>	<b><math>FN_{organic,f}</math></b>
Dairy cattle	0.029
Beef cattle	0.023
Poultry	0.51
Swine	0.41
Sheep	0.033
Horses/Mules	0.013

**Table 12.2.2.9: Fraction of inorganic fertiliser f that volatilises as  $NH_3$  and  $NO_x$  ( $FracGASF_f$ )**

<b>Fertiliser type f</b>	<b><math>FracGASF_f</math></b>
Urea-based fertilisers	0.15
Ammonium-based fertilisers	0.08
Nitrate-based fertilisers	0.01
Ammonium-nitrate based fertilisers	0.05
Other fertilisers	0.11

### 12.2.3 Scaling Factors for Rice Cultivation Emission Factor

**Table 12.2.3.1: Scaling factor based on the water regime employed during the growing season cultivation period ( $SF_w$ )**

Cultivation method employed during growing season w		$SF_w$
Water regime type	Water regime sub-type	
Upland	Paddy rotation	0
	Fallow without flooding in previous year	0
Irrigated	Continuously flooded	1
	Single drainage period	0.71
	Multiple drainage periods	0.55
Rainfed and deep water	Regular rainfed	0.54
	Drought prone	0.16
	Deep water	0.06

**Table 12.2.3.2: Scaling factor based on the water regime employed in the pre-season before the growing period ( $SF_p$ )**

Water regime prior to cultivation period p	$SF_p$
Non flooded pre-season <180 days	1
Non flooded pre-season >180 days	0.89
Flooded pre-season >30 days	2.41
Non-flooded pre-season >365 days	0.59

**Table 12.2.3.3: Conversion factor for organic amendment i ( $CFOA_i$ )**

Organic amendment i	$CFOA_i$
Straw incorporated shortly (<30 days) before cultivation	1.00
Straw incorporated long (>30 days) before cultivation	0.19
Compost	0.17
Farm yard manure	0.21
Green manure	0.45

## 12.3 Scope 2 and 3

### 12.3.1 Purchased Goods and Services

**Table 12.3.1.1: Life-cycle emission factors for purchased livestock ( $EF_{co}$ )**

Livestock type, c	Origin of purchased livestock, o	$EF_{co}$
Beef cattle	QLD	12.4
	North NSW	11.7
	South NSW/VIC/South SA	11.7
	NSW/PA Pastoral Zone	12.4
	SW WA	11.7
	WA Pastoral Zone	12.4
	TAS	11.7
Dairy cattle	All	4.4
Merino sheep	All	9.3
Cross-bred sheep	All	6.9

**Table 12.3.1.2: Life-cycle emission factors for purchased feed ( $EF_j$ )**

Feed Type j	$EF_j$
Grain purchased	0.3
Cottonseed purchased	1.1
Hay purchased	0.225

**Table 12.3.1.3: Life-cycle emission factors for purchased mineral supplements ( $EF_m$ )**

Mineral Supplement Type m	Emission Factor $EF_m$
Mineral block	0.76
Weaner block	0.15
Dry season mix: 30% urea, 5.4% P, with protein meal	0.86
Dry season mix: 30% urea, 5.5% P	0.86
Dry season mix: 8% urea, 2.8% P, with protein meal	0.44
Wet season mix	1.09

**Table 12.3.1.4: Life-cycle emission factors for purchased inorganic fertilisers (EF<sub>f</sub>)**

Fertiliser type f	EF <sub>f</sub>
Ammonium nitrate (AN)	1.09
Calcium ammonium nitrate (CAN)	0.88
Diammonium phosphate (DAP)	1.00
Monoammonium phosphate (MAP)	0.83
Single Super Phosphate (SSP)	0.26
Sulphate of ammonia (SOA)	0.75
Urea	1.50

**Table 12.3.1.5: Life-cycle emission factors for the production of components contained in inorganic fertilisers (EF<sub>c</sub>)**

Component	EF <sub>c</sub>
N	0.05
P	0.06
K	0.06
S	0.06

**Table 12.3.1.6: Life-cycle emission factors for the production of components contained in inorganic fertilisers (EF<sub>h</sub>)**

Agrichemical type h	EF <sub>h</sub>
Herbicide (paraquat, diquat, glyphosate)	33
Other herbicide	18.6
Insecticide	18.9
Fungicide	12.6
Plant growth regulator	10.5

**Table 12.3.1.7: Life-cycle emission factors for purchased services (EF<sub>p</sub>)**

Service purchased p	Unit	EF <sub>p</sub> (kgCO <sub>2</sub> e per unit)
air blast spraying, orchards	ha	36.75
bed forming, cotton	ha	25.79

Service purchased p	Unit	EF <sub>p</sub> (kgCO <sub>2</sub> e per unit)
bed forming, horticulture	ha	37.40
boom spraying, cotton	ha	2.26
boom spraying, horticulture	ha	8.06
bulldozer operation, medium load factor	hr	93.29
disc ploughing, broadacre crop	ha	44.14
discing, cotton	ha	30.63
fertiliser application, cotton	ha	19.02
fertiliser side dressing, horticulture	ha	13.54
fertiliser spreading, cotton	ha	7.42
fertiliser spreading, horticulture	ha	6.45
fertilizing, broadacre crop, pre & post-emergence	ha	2.26
grader operation, broadacre crop, medium load factor	ha	65.55
grain collection, broadacre, in-field with tractor and bin	ha	6.77
harrowing, horticulture	ha	9.03
harvesting, broadacre crop, combine less than 200kW	ha	38.69
harvesting, cotton	ha	128.96
harvesting, specialised machine, horticulture, 150 kW combine	ha	354.64
hay baling, large square bales, broadacre crop	ha	7.48
hay baling, round bales, broadacre crop	ha	8.16
hay baling, small square bales, broadacre crop	ha	6.80
hay mowing, broadacre crop	ha	14.77
hay raking, broadacre crop	ha	1.32
inter-row cultivation, horticulture	ha	29.02
inter-row tractor, horticulture	ha	29.02
levelling, cotton	ha	141.86
liming, broadacre crop, pre & post-emergence	ha	3.71
offset disc harrowing, horticulture	ha	55.45
planting, broadacre crop, soil clay content greater than 20%	ha	19.99
planting, broadacre crop, soil clay content 0 to 10%	ha	10.96
planting, broadacre crop, soil clay content 10 to 20%	ha	14.19
planting, cotton	ha	11.28
precision planting, horticulture	ha	67.06
ripping, large implement, horticulture	ha	109.62
ripping, medium implement, horticulture	ha	67.70
rolling, cotton	ha	9.99
root cutting, cotton	ha	10.96
rotary hoeing, medium implement, horticulture	ha	150.24
scarifying, broadacre crop	ha	21.99
spraying, aerial, broadacre crop	ha	5.49
spraying, aerial, cotton	ha	4.97
spraying, broadacre crop, pre & post-emergence	ha	2.26
windrowing, broadacre crop	ha	15.48

### 12.3.2 Parameters relating to Waste

**Table 12.3.2.1: Emission factors for wastes disposed of at different treatment facilities ( $EF_{wt}$ )**

Treatment facility t	Waste type w	$EF_{wt}$
Landfill	Municipal solid waste	1.6
	Commercial and industrial waste	1.3
	Construction and demolition waste	0.2
Incineration	Industrial Waste	1.649
	Municipal Solid Waste	0.0537

**Table 12.3.2.2: Volume to mass conversion factor for various waste types ( $CF_w$ )**

Waste type w	$CF_w$
Municipal solid waste	0.36
Commercial and industrial waste	0.33
Construction and demolition waste	0.39