

Appendix A: Livestock Emissions

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Appendix Table A-1 Population of animals in each State, 2001

	Beef cattle	Dairy cattle	Swine	Sheep	Goat	Horse	Poultry ¹
	<i>Head</i>						
Alabama	1,459,094	31,452	195,000	9,867	27,578	93,169	199,103,000
Alaska	9,752	1,475	1,000	9,867	167	ND	0
Arizona	776,920	169,005	133,000	132,000	41,000	82,694	0
Arkansas	1,909,130	51,089	633,750	9,867	17,083	87,771	245,163,697
California	3,215,926	2,264,980	110,000	840,000	40,191	247,722	34,104,205
Colorado	2,987,013	132,305	775,000	420,000	12,841	178,855	4,210,000
Connecticut	29,920	36,806	3,500	8,333	1,460	14,886	3,749,629
Delaware	16,244	12,287	26,000	9,867	674	7,113	48,187,848
Florida	1,751,208	192,471	35,000	9,867	24,209	120,188	34,086,636
Georgia	1,286,886	115,101	310,000	9,867	36,637	77,354	257,954,818
Hawaii	152,856	9,819	27,000	9,867	3,305	ND	822,636
Idaho	1,493,988	509,077	24,000	275,000	6,269	130,440	1,225,000
Illinois	1,364,354	174,411	4,150,000	75,000	10,781	113,206	5,080,625
Indiana	730,055	209,239	3,162,500	66,000	11,664	128,401	33,518,261
Iowa	3,409,002	323,140	14,950,000	270,000	12,275	132,328	44,157,704
Kansas	6,551,039	161,886	1,552,500	110,000	7,293	115,699	2,139,000
Kentucky	2,267,812	167,516	405,000	9,867	13,877	210,101	51,672,727
Louisiana	854,078	68,223	26,000	9,867	8,315	65,975	2,700,000
Maine	46,323	56,334	6,500	8,333	2,214	12,593	5,607,000
Maryland	134,907	113,939	52,000	9,867	5,311	49,350	56,791,110
Massachusetts	21,032	29,456	18,000	8,333	2,490	20,609	373,104
Michigan	606,015	422,144	937,500	71,000	10,603	144,987	9,470,798
Minnesota	1,913,768	792,741	5,825,000	170,000	7,871	122,357	38,117,066
Mississippi	1,108,265	50,091	285,000	9,867	18,389	69,188	149,533,455
Missouri	4,357,024	211,072	3,000,000	73,000	22,683	187,670	16,279,590
Montana	2,500,403	28,403	170,000	360,000	4,909	155,920	480,000
Nebraska	6,390,010	103,176	2,912,500	114,000	5,185	100,390	14,322,182
Nevada	507,643	36,279	7,000	95,000	1,828	31,143	0
New Hampshire	19,074	25,517	3,500	8,333	2,368	10,219	216,954
New Jersey	29,139	21,634	13,000	9,867	4,040	49,534	2,360,332
New Mexico	1,347,289	312,437	3,000	255,000	45,294	85,011	0
New York	501,358	947,192	75,000	60,000	14,322	104,588	5,314,306
North Carolina	946,349	97,187	9,675,000	9,867	36,892	90,182	161,636,606
North Dakota	1,915,644	59,129	154,000	138,000	6,315	76,879	521,173
Ohio	947,591	373,051	1,452,500	142,000	20,003	166,993	46,863,427
Oklahoma	5,269,788	108,714	2,320,000	55,000	31,967	205,239	46,631,364
Oregon	1,246,188	146,461	29,000	245,000	16,608	149,531	3,704,000
Pennsylvania	873,198	873,144	1,050,000	81,000	20,403	142,514	56,477,008
Rhode Island	3,572	2,635	2,500	8,333	298	2,446	0
South Carolina	453,531	31,398	320,000	9,867	27,153	50,331	45,942,743
South Dakota	3,942,645	129,130	1,277,500	420,000	5,101	113,393	4,373,091
Tennessee	2,249,948	137,296	225,000	9,867	49,755	194,956	38,304,545
Texas	14,022,015	438,754	887,500	1,150,000	1,280,431	529,963	128,919,182
Utah	802,534	138,240	610,000	390,000	5,974	107,506	3,775,000
Vermont	98,209	213,232	2,500	8,333	2,617	19,426	221,658
Virginia	1,602,670	172,578	410,000	61,000	19,830	110,125	61,735,226
Washington	866,879	343,704	24,000	54,000	9,509	128,708	6,372,000
West Virginia	400,288	21,688	11,000	35,000	7,572	36,765	19,615,778
Wisconsin	1,633,252	1,921,876	565,000	80,000	20,071	114,866	11,790,909
Wyoming	1,575,754	5,935	117,000	530,000	6,174	110,716	17,000
Total	88,597,582	12,994,849	58,959,750	6,965,000	1,989,799	5,300,000	2,054,998,477

Source: USDA NASS (2002):cattle, cattle on feed, chicken and eggs, hogs and pigs, sheep and goats; FAO (2002) for horses.

¹ 151,356,084 head from unspecified States are included in the total, but not represented in State totals for confidentiality.

Appendix Table A-2 U.S. livestock population, 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	<i>1,000 head</i>											
Dairy cattle	14,143	13,980	13,830	13,767	13,566	13,502	13,305	13,138	12,992	13,026	13,070	12,995
Dairy cows	10,007	9,883	9,714	9,679	9,504	9,491	9,410	9,309	9,200	9,142	9,220	9,166
Dairy heifers	4,135	4,097	4,116	4,088	4,062	4,011	3,895	3,829	3,793	3,884	3,850	3,828
Swine	53,941	56,478	58,532	58,016	59,951	58,899	56,220	58,728	61,991	60,245	58,892	58,960
Market swine	47,043	49,247	51,276	50,859	52,669	51,973	49,581	51,888	55,150	53,871	52,658	52,772
Market <60 lbs.	18,359	19,212	19,851	19,434	20,157	19,656	18,851	19,886	20,691	19,928	19,582	19,628
Market 60-119 lbs.	11,734	12,374	12,839	12,656	13,017	12,836	12,157	12,754	13,552	13,256	12,933	12,940
Market 120-179 lbs.	9,440	9,840	10,253	10,334	10,671	10,545	10,110	10,480	11,235	11,043	10,753	10,747
Market >180 lbs.	7,510	7,822	8,333	8,435	8,824	8,937	8,463	8,768	9,672	9,645	9,390	9,457
Breeding swine	6,899	7,231	7,255	7,157	7,282	6,926	6,639	6,840	6,841	6,374	6,233	6,188
Beef cattle	86,087	87,267	88,548	90,321	92,571	94,391	94,269	92,290	90,730	90,032	89,215	88,598
Feedlot steers	7,338	7,920	7,581	7,984	7,797	7,763	7,380	7,644	7,845	7,781	8,280	8,566
Feedlot heifers	3,621	4,035	3,626	3,971	3,965	4,047	3,999	4,396	4,459	4,578	4,872	5,035
Bulls not on feed	2,180	2,198	2,220	2,239	2,306	2,392	2,392	2,325	2,235	2,241	2,196	2,187
Calves not on feed	23,909	23,853	24,118	24,209	24,586	25,170	25,042	24,363	24,001	23,895	23,508	22,953
Heifers not on feed	8,872	8,938	9,520	9,850	10,469	10,680	10,869	10,481	9,998	9,725	9,353	9,224
Steers not on feed	7,490	7,364	8,031	7,935	8,346	8,693	9,077	8,452	8,050	7,864	7,248	7,009
Cows not on feed	32,677	32,960	33,453	34,132	35,101	35,645	35,509	34,629	34,143	33,948	33,760	33,624
Sheep	11,358	11,174	10,797	10,201	9,836	8,989	8,465	8,024	7,825	7,215	7,032	6,965
Sheep not on feed	10,271	10,168	9,748	9,151	8,940	8,193	7,697	7,270	7,085	6,519	6,351	6,290
Sheep on feed	1,088	1,055	1,049	1,050	896	797	768	754	740	696	681	675
Goats	2,516	2,516	2,516	2,410	2,305	2,200	2,095	1,990	1,990	1,990	1,990	1,990
Poultry	1,537,074	1,594,944	1,649,998	1,707,422	1,769,135	1,679,704	1,882,078	1,926,790	1,963,919	2,007,284	2,072,877	2,054,998
Hens	119,551	117,178	121,103	131,688	135,094	133,841	138,048	140,966	150,778	151,914	153,232	153,237
Pullets	227,083	239,559	243,267	240,712	243,286	246,599	247,446	261,515	265,634	274,520	273,801	279,726
Chickens	6,545	6,857	7,113	7,240	7,369	7,637	7,243	7,549	7,682	9,659	8,088	8,126
Broilers	1,066,209	1,115,845	1,164,089	1,217,147	1,275,916	1,184,667	1,381,229	1,411,673	1,442,596	1,481,093	1,549,818	1,525,291
Turkeys	117,685	115,504	114,426	110,635	107,469	106,960	108,112	105,088	97,229	90,098	87,938	88,619
Horses	5,069	5,100	5,121	5,130	5,110	5,130	5,150	5,170	5,237	5,170	5,240	5,300

Source: USDA NASS (2002); cattle on feed, chicken and eggs, hogs and pigs, and sheep and goats; FAO (2002) for horses.

Appendix Table A-3 State-level methane emissions from enteric fermentation, 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	<i>Tg CO₂ eq.</i>											
Alabama	1.79	1.74	1.77	1.78	1.84	1.94	1.91	1.74	1.70	1.64	1.62	1.51
Alaska	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.02
Arizona	1.10	1.10	1.15	1.14	1.14	1.12	1.11	1.07	1.11	1.11	1.08	1.08
Arkansas	2.05	1.95	1.97	1.95	2.12	2.24	2.17	2.15	2.06	2.05	2.07	2.07
California	6.61	6.42	6.51	6.17	6.44	6.50	6.06	6.21	6.20	6.50	6.59	6.72
Colorado	3.15	2.99	3.26	3.18	3.20	3.22	3.25	3.30	3.32	3.26	3.18	3.12
Connecticut	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.10
Delaware	0.04	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Florida	2.52	2.53	2.54	2.52	2.59	2.64	2.50	2.45	2.34	2.28	2.29	2.26
Georgia	1.64	1.66	1.67	1.65	1.69	1.72	1.65	1.60	1.50	1.47	1.48	1.44
Hawaii	0.25	0.27	0.24	0.23	0.22	0.23	0.22	0.23	0.24	0.23	0.22	0.20
Idaho	2.26	2.30	2.38	2.33	2.37	2.51	2.52	2.56	2.63	2.67	2.77	2.83
Illinois	2.12	2.09	2.14	2.14	2.08	2.00	1.87	1.82	1.80	1.82	1.80	1.74
Indiana	1.50	1.44	1.42	1.37	1.42	1.42	1.34	1.34	1.27	1.28	1.23	1.16
Iowa	5.05	4.95	5.01	4.79	4.67	4.75	4.43	4.32	4.21	4.34	4.27	4.15
Kansas	5.70	5.56	5.55	5.62	5.70	6.01	5.95	5.94	5.82	5.97	5.94	5.98
Kentucky	2.89	2.94	3.01	2.97	2.99	3.03	3.00	2.90	2.80	2.69	2.52	2.57
Louisiana	1.34	1.28	1.21	1.24	1.20	1.22	1.20	1.19	1.17	1.14	1.14	1.10
Maine	0.17	0.17	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.15	0.15
Maryland	0.47	0.47	0.45	0.46	0.45	0.45	0.42	0.39	0.38	0.38	0.37	0.35
Massachusetts	0.13	0.12	0.13	0.12	0.12	0.11	0.11	0.10	0.10	0.10	0.10	0.08
Michigan	1.52	1.47	1.49	1.50	1.52	1.52	1.46	1.41	1.37	1.37	1.34	1.31
Minnesota	3.37	3.42	3.44	3.45	3.25	3.38	3.34	3.30	3.18	3.15	3.20	3.16
Mississippi	1.51	1.50	1.52	1.57	1.56	1.51	1.53	1.43	1.36	1.31	1.24	1.25
Missouri	5.08	5.10	5.14	5.24	5.46	5.42	5.39	5.32	5.11	5.10	4.98	4.94
Montana	3.11	3.25	3.49	3.44	3.43	3.63	3.60	3.56	3.49	3.49	3.53	3.48
Nebraska	5.74	5.84	5.91	5.82	6.10	6.21	6.43	6.49	6.62	6.69	6.58	6.39
Nevada	0.69	0.69	0.72	0.70	0.69	0.71	0.68	0.71	0.70	0.70	0.72	0.73
New Hampshire	0.07	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.08	0.08	0.07
New Jersey	0.13	0.13	0.13	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.09	0.09
New Mexico	1.91	1.88	1.92	1.99	2.03	2.12	2.22	2.24	2.30	2.33	2.35	2.35
New York	2.49	2.50	2.54	2.43	2.40	2.37	2.27	2.29	2.32	2.34	2.35	2.26
North Carolina	1.15	1.22	1.29	1.31	1.39	1.49	1.53	1.52	1.39	1.40	1.38	1.39
North Dakota	2.19	2.25	2.28	2.34	2.46	2.53	2.42	2.41	2.29	2.39	2.40	2.55
Ohio	1.96	1.95	1.92	1.81	1.78	1.79	1.79	1.70	1.67	1.60	1.59	1.59
Oklahoma	5.49	5.53	5.59	5.50	5.40	5.83	5.70	5.57	5.63	5.49	5.48	5.40
Oregon	2.02	2.02	2.01	1.99	2.11	2.21	2.24	2.22	2.17	2.15	2.11	2.01
Pennsylvania	2.67	2.66	2.74	2.60	2.53	2.53	2.45	2.43	2.42	2.40	2.39	2.37
Rhode Island	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
South Carolina	0.67	0.59	0.62	0.63	0.61	0.61	0.61	0.59	0.56	0.56	0.55	0.53
South Dakota	4.20	4.18	4.35	4.62	4.49	4.80	4.59	4.47	4.32	4.52	4.62	4.91
Tennessee	2.61	2.59	2.59	2.58	2.72	2.80	2.76	2.56	2.48	2.38	2.35	2.39
Texas	14.78	14.53	15.27	15.53	16.22	16.47	16.11	15.16	15.12	15.03	14.59	14.33
Utah	1.23	1.24	1.23	1.30	1.30	1.34	1.36	1.39	1.39	1.35	1.40	1.42
Vermont	0.52	0.51	0.51	0.51	0.49	0.50	0.48	0.48	0.50	0.51	0.50	0.49
Virginia	1.97	1.98	2.00	1.94	1.93	1.96	1.95	1.95	1.86	1.84	1.76	1.81
Washington	1.96	1.99	1.98	2.00	2.02	1.94	1.85	1.79	1.76	1.73	1.77	1.70
West Virginia	0.57	0.59	0.60	0.59	0.58	0.59	0.57	0.53	0.52	0.51	0.49	0.47
Wisconsin	5.64	5.59	5.51	5.36	5.13	5.11	4.98	4.88	4.85	4.79	4.83	4.77
Wyoming	1.66	1.66	1.78	1.86	2.00	1.95	1.94	2.09	2.13	2.01	2.03	1.98
Total	117.85	117.10	119.39	118.82	120.40	122.96	120.47	118.33	116.70	116.58	115.68	114.82

Appendix Table A-4 State-level methane emissions from enteric fermentation by livestock category, 2001

	Beef cattle	Dairy cattle	Swine	Sheep	Goats	Horses
	<i>Tg CO₂ eq.</i>					
Alabama	1.40	0.06	0.01	0.00	0.00	0.04
Alaska	0.01	0.00	0.00	0.00	0.00	**
Arizona	0.59	0.43	0.00	0.02	0.00	0.03
Arkansas	1.91	0.10	0.02	0.00	0.00	0.03
California	2.11	4.37	0.00	0.14	0.00	0.09
Colorado	2.69	0.27	0.02	0.07	0.00	0.07
Connecticut	0.02	0.08	0.00	0.00	0.00	0.01
Delaware	0.01	0.03	0.00	0.00	0.00	0.00
Florida	1.80	0.41	0.00	0.00	0.00	0.05
Georgia	1.16	0.24	0.01	0.00	0.00	0.03
Hawaii	0.18	0.02	0.00	0.00	0.00	**
Idaho	1.54	1.20	0.00	0.05	0.00	0.05
Illinois	1.20	0.35	0.13	0.01	0.00	0.04
Indiana	0.57	0.43	0.10	0.01	0.00	0.05
Iowa	2.93	0.64	0.47	0.05	0.00	0.05
Kansas	5.56	0.31	0.05	0.02	0.00	0.04
Kentucky	2.12	0.35	0.01	0.00	0.00	0.08
Louisiana	0.93	0.14	0.00	0.00	0.00	0.02
Maine	0.03	0.12	0.00	0.00	0.00	0.00
Maryland	0.09	0.24	0.00	0.00	0.00	0.02
Massachusetts	0.01	0.06	0.00	0.00	0.00	0.01
Michigan	0.35	0.86	0.03	0.01	0.00	0.05
Minnesota	1.33	1.57	0.18	0.03	0.00	0.05
Mississippi	1.11	0.10	0.01	0.00	0.00	0.03
Missouri	4.33	0.43	0.09	0.01	0.00	0.07
Montana	3.30	0.06	0.01	0.06	0.00	0.06
Nebraska	6.03	0.21	0.09	0.02	0.00	0.04
Nevada	0.62	0.09	0.00	0.02	0.00	0.01
New Hampshire	0.01	0.05	0.00	0.00	0.00	0.00
New Jersey	0.02	0.05	0.00	0.00	0.00	0.02
New Mexico	1.46	0.81	0.00	0.04	0.00	0.03
New York	0.23	1.98	0.00	0.01	0.00	0.04
North Carolina	0.85	0.20	0.30	0.00	0.00	0.03
North Dakota	2.37	0.13	0.00	0.02	0.00	0.03
Ohio	0.69	0.76	0.05	0.02	0.00	0.06
Oklahoma	5.02	0.22	0.07	0.01	0.00	0.08
Oregon	1.59	0.33	0.00	0.04	0.00	0.06
Pennsylvania	0.45	1.82	0.03	0.01	0.00	0.05
Rhode Island	0.00	0.01	0.00	0.00	0.00	0.00
South Carolina	0.43	0.06	0.01	0.00	0.00	0.02
South Dakota	4.47	0.28	0.04	0.07	0.00	0.04
Tennessee	2.02	0.28	0.01	0.00	0.01	0.07
Texas	12.88	0.89	0.03	0.19	0.13	0.20
Utah	0.97	0.32	0.02	0.07	0.00	0.04
Vermont	0.03	0.45	0.00	0.00	0.00	0.01
Virginia	1.39	0.35	0.01	0.01	0.00	0.04
Washington	0.82	0.82	0.00	0.01	0.00	0.05
West Virginia	0.41	0.05	0.00	0.01	0.00	0.01
Wisconsin	0.81	3.89	0.02	0.01	0.00	0.04
Wyoming	1.83	0.01	0.00	0.09	0.00	0.04
Total	82.65	26.93	1.86	1.17	0.21	2.00

Appendix Table A-5 Cattle population categories used for estimating methane emissions

Dairy cattle	Beef cattle
Calves	Calves
Heifer replacements	Heifer replacements
Cows	Heifer and steer stockers
	Animals in feedlots
	Cows
	Bulls

Source: EPA (2003a).

Appendix Table A-6 Dairy lactation by region

Year	California	West	Northern Great Plains	South Central	Northeast	Midwest	Southeast
	<i>(lbs/year)/cow</i>						
1990	18,443	17,293	13,431	13,399	14,557	14,214	12,852
1991	18,522	17,615	13,525	13,216	14,985	14,446	13,053
1992	18,709	18,083	13,998	13,656	15,688	14,999	13,451
1993	18,839	18,253	14,090	14,027	15,602	15,086	13,739
1994	20,190	18,802	14,686	14,395	15,732	15,276	14,111
1995	19,559	18,708	14,807	14,294	16,254	15,680	14,318
1996	19,148	19,076	15,040	14,402	16,271	15,651	14,232
1997	19,815	19,537	15,396	14,330	16,519	16,116	14,517
1998	19,461	19,814	15,922	14,722	16,865	16,676	14,404
1999	20,763	20,495	16,378	14,986	17,271	16,966	14,860
2000	21,134	20,782	17,297	15,314	17,484	17,426	15,196
2001	20,898	20,656	17,347	14,813	17,602	17,218	15,303

Source: USDA NASS Milk Production (2002, 2001, 2000); USDA NASS Cattle (1999, 1995); EPA (2003a).

Appendix Table A-7 Typical livestock weights

Cattle type	Typical weights
	<i>lbs.</i>
<i>Beef replacement heifer data</i>	
Replacement weight at 15 months	715
Replacement weight at 24 months	1,078
Mature weight at 36 months	1,172
<i>Dairy replacement heifer data</i>	
Replacement weight at 15 months	800
Replacement weight at 24 months	1,225
Mature weight at 36 months	1,350
<i>Stockers data – grazing/forage based only</i>	
Steer weight gain/month to 12 months	45
Steer weight gain/month to 24 months	35
Heifer weight gain/month to 12 months	35
Heifer weight gain/month to 24 months	30

Source: Feedstuffs (1998), Western Dairyman (1998), Johnson (1999), NRC (1999), EPA (2003a).

Appendix Table A-8 U.S. feedlot placement in 2001

Weight when placed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	<i>Number of animals placed, 1,000 head</i>												
< 600 lbs.	499	336	329	334	499	419	469	510	528	891	655	418	5,887
600 - 700 lbs.	716	402	414	384	509	442	444	472	448	758	588	475	6,052
700 - 800 lbs.	664	517	614	494	799	631	606	667	561	592	381	413	6,939
> 800 lbs.	384	325	485	339	565	473	467	555	604	461	284	272	5,214
Total	2,263	1,580	1,842	1,551	2,372	1,965	1,986	2,204	2,141	2,702	1,908	1,578	22,184

Source: USDA NASS Cattle on feed (2002, 2001, 2000); USDA NASS Cattle (1999, 1995); EPA (2003a).

Note: Totals may not sum due to independent rounding.

Appendix Table A-9 Regional estimates of digestible energy and methane conversion rates for enteric fermentation

Livestock Category	Data	Northern						
		California	West	Great Plains	South Central	North-east	Midwest	Southeast
Beef replacement heifer	DE ^a	65	59	66	64	65	65	64
	Ym ^b	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
	Pop. ^c	3%	10%	31%	23%	2%	14%	17%
Dairy replacement heifer	DE	66	66	66	64	68	66	66
	Ym	5.90%	5.90%	5.60%	6.40%	6.30%	5.60%	6.90%
	Pop.	18%	12%	5%	4%	18%	36%	7%
Steer stockers	DE	65	59	66	64	65	65	64
	Ym	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
	Pop.	4%	8%	42%	22%	2%	18%	5%
Heifer stockers	DE	65	59	66	64	65	65	64
	Ym	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
	Pop.	2%	7%	50%	22%	1%	15%	4%
Steer feedlot	DE	85	85	85	85	85	85	85
	Ym	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
	Pop.	3%	8%	48%	24%	1%	16%	1%
Heifer feedlot	DE	85	85	85	85	85	85	85
	Ym	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
	Pop.	3%	8%	48%	24%	1%	16%	1%
Beef cows	DE	63	57	64	62	63	63	62
	Ym	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
	Pop.	2%	8%	28%	26%	2%	14%	19%
Dairy cows	DE	69	66	69	68	69	69	68
	Ym	4.80%	5.80%	5.80%	5.70%	5.80%	5.80%	5.60%
	Pop.	17%	13%	5%	6%	18%	33%	8%
Steer step-up	DE	73	73	73	73	73	73	73
	Ym	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%
Heifer step-up	DE	73	73	73	73	73	73	73
	Ym	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%

Source: EPA (2003a).

^a Digestible Energy in units of percent GE (MJ/Day).

^b Methane Conversion Rate is the fraction of GE in feed converted to methane.

^c Percent of each subcategory population present in each region.

Appendix Table A-10 DE values and representative regional diets (percent of diet for each region) for the

Feed	Source of TDN (NRC 2000)	Unweighted							
		TDN or DE	California	West	Northern	South Central	Northeast	Midwest	Southeast
Alfalfa hay	Table 11-1, feed #4	59.6%	65.0%	30.0%	30.0%	29.0%	12.0%	30.0%	
Barley	Table 11-1, feed #12	86.3%	10.0%	15.0%					
Bermuda	Table 11-1, feed #17	48.5%							35.0%
Bermuda hay	Table 11-1, feed #17	48.5%				40.0%			
Corn	Table 11-1, feed #38	88.1%	10.0%	10.0%	25.0%	11.0%	13.0%	13.0%	
Corn silage	Table 11-1, feed #39	71.2%			25.0%		20.0%	20.0%	
Cotton seed meal	Table 11-1, feed #42	74.4%				7.0%			
Grass hay	Table 1a, feed #129, 147, 148	53.7%		40.0%				30.0%	
Orchard	Table 11-1, feed #61	53.5%							40.0%
Soybean meal supplement	Table 11-1, feed #70	83.1%		5.0%	5.0%				5.0%
Sorghum	Table 11-1, feed #67	81.3%							20.0%
Soybean hulls	Table 11-1, feed #69	76.4%						7.0%	
Timothy hay	Table 11-1, feed #77	55.5%					50.0%		
Whole cotton seed	Table 11-1, feed #41	89.2%	5.0%				5.0%		
Wheat middlings	Table 1a, feed #433	83.0%			15.0%	13.0%			
Wheat	Table 11-1, feed #83	87.2%	10.0%						
Weighted total			65.2%	65.1%	62.4%	65.0%	74.3%	58.8%	69.3%

Sources: EPA (2003a), representative regional diets, Donovan (1999), NRC (2000).

Appendix Table A-11 Percent of each diet that is supplemental, and the resulting DE values for each region

Region	Percent supplement	Percent forage	Calculated weighted average DE
West	10	90	59.2%
Northeast	15	85	64.7%
South Central	10	90	64.4%
Midwest	15	85	64.7%
Northern Great Plains	15	85	66.1%
Southeast	5	95	64.4%
California	5	95	64.9%

Sources: EPA (2003a); percent of diet that is supplemental, Donovan (1999).

Appendix Table A-12 Methane emissions from cattle from enteric fermentation

Cattle type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	<i>Gg</i>											
Dairy	1,375	1,378	1,375	1,316	1,314	1,320	1,254	1,255	1,251	1,266	1,284	1,282
Cows	1,142	1,148	1,143	1,082	1,082	1,088	1,024	1,028	1,026	1,038	1,059	1,055
Replacements 7-11 months	49	49	49	49	49	49	48	48	48	48	48	48
Replacements 12-23 months	184	181	183	185	183	183	181	179	177	180	177	179
Beef	3,961	3,920	4,031	4,070	4,147	4,272	4,227	4,124	4,046	4,035	3,976	3,936
Cows	2,428	2,432	2,468	2,494	2,585	2,628	2,638	2,574	2,531	2,520	2,506	2,492
Replacements 7-11 months	52	54	57	60	62	61	60	56	54	53	53	54
Replacements 12-23 months	190	196	203	216	229	232	225	216	206	198	198	200
Steer stockers	430	402	464	482	435	479	455	430	418	393	369	372
Heifer stockers	231	220	233	240	231	249	239	241	236	227	213	215
Feedlot cattle	413	397	384	353	374	383	371	375	378	420	416	384
Bulls	218	220	222	224	231	239	239	233	223	224	220	219
Total	5,336	5,298	5,406	5,385	5,461	5,591	5,481	5,379	5,297	5,300	5,260	5,218

Source: EPA (2003a).

Note: Totals may not sum due to independent rounding.

Appendix Table A-13 IPCC emission factors for livestock

Emission factors	
<i>kg CH₄/head/year</i>	
Bulls	100
Calves	0
Swine	1.5
Sheep	8
Goats	5
Horses	18

Source: IPCC (2000).

Appendix Table A-14 Methane emissions from manure management in 2001 by State and animal

	Beef cattle	Dairy cattle	Poultry	Swine	Goats	Horses	Sheep	Total
	<i>Tg CO₂ eq.</i>							
Alabama	0.0541	0.0152	0.2549	0.0694	0.0001	0.0111	0.0000	0.4048
Alaska	0.0004	0.0014	0.0033	0.0000	0.0000	0.0000	0.0000	0.0052
Arizona	0.0300	0.6822	0.0033	0.0534	0.0007	0.0099	0.0006	0.7801
Arkansas	0.0701	0.0173	0.1072	0.2609	0.0001	0.0105	0.0000	0.4662
California	0.0974	5.5804	0.1259	0.0417	0.0002	0.0295	0.0043	5.8794
Colorado	0.1091	0.2423	0.0636	0.1637	0.0000	0.0213	0.0024	0.6024
Connecticut	0.0008	0.0179	0.0066	0.0004	0.0000	0.0018	0.0000	0.0275
Delaware	0.0005	0.0055	0.0189	0.0065	0.0000	0.0008	0.0000	0.0323
Florida	0.0677	0.4188	0.1713	0.0051	0.0008	0.0143	0.0000	0.6780
Georgia	0.0457	0.0808	0.4459	0.0314	0.0002	0.0092	0.0000	0.6132
Hawaii	0.0072	0.0303	0.0050	0.0078	0.0000	0.0000	0.0000	0.0504
Idaho	0.0653	1.2628	0.0179	0.0039	0.0000	0.0155	0.0013	1.3667
Illinois	0.0480	0.0902	0.0061	1.0032	0.0000	0.0135	0.0004	1.1616
Indiana	0.0242	0.0949	0.0304	0.7401	0.0000	0.0153	0.0002	0.9051
Iowa	0.1243	0.1372	0.0333	4.5277	0.0000	0.0158	0.0012	4.8395
Kansas	0.2326	0.0757	0.0046	0.4351	0.0000	0.0138	0.0008	0.7627
Kentucky	0.0834	0.0362	0.0273	0.0287	0.0001	0.0250	0.0000	0.2008
Louisiana	0.0334	0.0385	0.0530	0.0039	0.0001	0.0079	0.0000	0.1368
Maine	0.0013	0.0159	0.0158	0.0001	0.0000	0.0015	0.0000	0.0345
Maryland	0.0041	0.0478	0.0275	0.0125	0.0000	0.0059	0.0000	0.0978
Massachusetts	0.0006	0.0104	0.0006	0.0027	0.0000	0.0025	0.0000	0.0168
Michigan	0.0181	0.2959	0.0175	0.1962	0.0001	0.0173	0.0003	0.5453
Minnesota	0.0581	0.3029	0.0374	1.2267	0.0000	0.0146	0.0007	1.6404
Mississippi	0.0422	0.0220	0.2249	0.1267	0.0001	0.0082	0.0000	0.4242
Missouri	0.1596	0.1041	0.0188	0.7291	0.0001	0.0224	0.0004	1.0344
Montana	0.1054	0.0307	0.0067	0.0325	0.0000	0.0186	0.0014	0.1954
Nebraska	0.2420	0.0502	0.0171	0.6714	0.0000	0.0120	0.0007	0.9933
Nevada	0.0249	0.1017	0.0033	0.0001	0.0000	0.0037	0.0007	0.1344
New Hampshire	0.0005	0.0085	0.0004	0.0004	0.0000	0.0012	0.0000	0.0109
New Jersey	0.0009	0.0085	0.0043	0.0022	0.0000	0.0059	0.0000	0.0218
New Mexico	0.0605	1.0896	0.0033	0.0000	0.0005	0.0101	0.0018	1.1658
New York	0.0125	0.3919	0.0085	0.0124	0.0001	0.0125	0.0003	0.4381
North Carolina	0.0336	0.0299	0.2805	3.9581	0.0001	0.0107	0.0000	4.3129
North Dakota	0.0758	0.0196	0.0042	0.0285	0.0000	0.0092	0.0004	0.1377
Ohio	0.0310	0.1698	0.0261	0.3025	0.0001	0.0199	0.0008	0.5503
Oklahoma	0.1858	0.1930	0.1078	1.0173	0.0003	0.0244	0.0004	1.5291
Oregon	0.0628	0.1876	0.0313	0.0024	0.0001	0.0178	0.0013	0.3034
Pennsylvania	0.0233	0.2387	0.0303	0.2372	0.0001	0.0170	0.0004	0.5470
Rhode Island	0.0001	0.0004	0.0000	0.0004	0.0000	0.0003	0.0000	0.0012
South Carolina	0.0167	0.0150	0.1369	0.1314	0.0001	0.0060	0.0000	0.3062
South Dakota	0.1500	0.0599	0.0057	0.2815	0.0000	0.0135	0.0017	0.5124
Tennessee	0.0802	0.0350	0.0174	0.0163	0.0003	0.0232	0.0000	0.1724
Texas	0.5203	1.0565	0.1408	0.3653	0.0099	0.0631	0.0092	2.1651
Utah	0.0385	0.2868	0.0622	0.1393	0.0000	0.0128	0.0020	0.5417
Vermont	0.0021	0.0826	0.0004	0.0000	0.0000	0.0023	0.0000	0.0875
Virginia	0.0568	0.0419	0.0405	0.1490	0.0001	0.0131	0.0005	0.3018
Washington	0.0377	0.6253	0.0271	0.0039	0.0000	0.0153	0.0003	0.7096
West Virginia	0.0152	0.0074	0.0118	0.0019	0.0000	0.0044	0.0001	0.0409
Wisconsin	0.0410	0.8358	0.0083	0.1142	0.0001	0.0137	0.0004	1.0134
Wyoming	0.0613	0.0073	0.0002	0.0252	0.0000	0.0132	0.0025	0.1097

Appendix Table A-15 Nitrous oxide emissions from manure management in 2001 by State and animal

	Beef cattle	Dairy cattle	Poultry	Swine	Goats	Horses	Sheep	Total
	<i>Tg CO₂ eq.</i>							
Alabama	0.0017	0.0029	0.6500	0.0013	0.0002	0.0036	0.0002	0.6598
Alaska	0.0000	0.0004	0.0005	0.0000	0.0000	0.0000	0.0002	0.0011
Arizona	0.1292	0.0314	0.0005	0.0010	0.0003	0.0032	0.0000	0.1656
Arkansas	0.0047	0.0061	0.9226	0.0047	0.0001	0.0034	0.0002	0.9419
California	0.1932	0.5174	0.1976	0.0008	0.0003	0.0095	0.0002	0.9190
Colorado	0.5279	0.0358	0.0252	0.0068	0.0001	0.0069	0.0070	0.6097
Connecticut	0.0001	0.0087	0.0039	0.0000	0.0000	0.0006	0.0000	0.0133
Delaware	0.0001	0.0030	0.1647	0.0002	0.0000	0.0003	0.0002	0.1685
Florida	0.0010	0.0280	0.0831	0.0001	0.0002	0.0046	0.0002	0.1171
Georgia	0.0013	0.0131	0.8126	0.0021	0.0003	0.0030	0.0002	0.8326
Hawaii	0.0002	0.0024	0.0012	0.0001	0.0000	0.0000	0.0002	0.0041
Idaho	0.1395	0.1417	0.0007	0.0001	0.0001	0.0050	0.0000	0.2871
Illinois	0.0923	0.0823	0.0214	0.0308	0.0001	0.0043	0.0004	0.2316
Indiana	0.0472	0.0884	0.1740	0.0236	0.0001	0.0049	0.0000	0.3382
Iowa	0.4507	0.1398	0.1484	0.1059	0.0001	0.0051	0.0024	0.8524
Kansas	1.0517	0.0745	0.0251	0.0122	0.0001	0.0044	0.0010	1.1690
Kentucky	0.0086	0.0242	0.1664	0.0028	0.0001	0.0081	0.0002	0.2104
Louisiana	0.0008	0.0081	0.0623	0.0001	0.0001	0.0025	0.0002	0.0741
Maine	0.0001	0.0139	0.0667	0.0000	0.0000	0.0005	0.0000	0.0812
Maryland	0.0043	0.0282	0.1896	0.0004	0.0000	0.0019	0.0002	0.2246
Massachusetts	0.0001	0.0074	0.0008	0.0001	0.0000	0.0008	0.0000	0.0091
Michigan	0.0816	0.1790	0.0960	0.0071	0.0001	0.0056	0.0000	0.3693
Minnesota	0.1245	0.3269	0.2991	0.0436	0.0001	0.0047	0.0017	0.8005
Mississippi	0.0015	0.0052	0.4907	0.0021	0.0002	0.0027	0.0002	0.5026
Missouri	0.0279	0.0953	0.1482	0.0213	0.0002	0.0072	0.0000	0.3001
Montana	0.0258	0.0108	0.0003	0.0013	0.0000	0.0060	0.0006	0.0447
Nebraska	1.0946	0.0462	0.0403	0.0209	0.0000	0.0039	0.0012	1.2071
Nevada	0.0107	0.0093	0.0005	0.0000	0.0000	0.0012	0.0000	0.0218
New Hampshire	0.0000	0.0064	0.0002	0.0000	0.0000	0.0004	0.0000	0.0071
New Jersey	0.0009	0.0055	0.0029	0.0001	0.0000	0.0019	0.0002	0.0114
New Mexico	0.0494	0.0581	0.0005	0.0000	0.0004	0.0033	0.0000	0.1117
New York	0.0129	0.2204	0.0093	0.0005	0.0001	0.0040	0.0000	0.2471
North Carolina	0.0021	0.0105	0.7124	0.0661	0.0003	0.0035	0.0002	0.7952
North Dakota	0.0258	0.0260	0.0098	0.0011	0.0001	0.0030	0.0011	0.0667
Ohio	0.0816	0.1607	0.0955	0.0096	0.0002	0.0064	0.0009	0.3548
Oklahoma	0.1781	0.0406	0.1695	0.0170	0.0003	0.0079	0.0000	0.4134
Oregon	0.0236	0.0334	0.0869	0.0001	0.0001	0.0057	0.0007	0.1505
Pennsylvania	0.0322	0.2196	0.1706	0.0079	0.0002	0.0055	0.0000	0.4359
Rhode Island	0.0000	0.0006	0.0000	0.0000	0.0000	0.0001	0.0000	0.0007
South Carolina	0.0017	0.0028	0.1826	0.0023	0.0002	0.0019	0.0002	0.1918
South Dakota	0.1567	0.0572	0.0313	0.0095	0.0000	0.0044	0.0021	0.2611
Tennessee	0.0043	0.0170	0.1279	0.0015	0.0004	0.0075	0.0002	0.1587
Texas	1.2619	0.1099	0.4067	0.0059	0.0105	0.0204	0.0031	1.8182
Utah	0.0150	0.0446	0.0250	0.0048	0.0000	0.0041	0.0000	0.0936
Vermont	0.0001	0.0510	0.0005	0.0000	0.0000	0.0007	0.0000	0.0524
Virginia	0.0129	0.0209	0.3153	0.0029	0.0002	0.0042	0.0002	0.3565
Washington	0.1095	0.0734	0.0674	0.0001	0.0001	0.0049	0.0000	0.2554
West Virginia	0.0030	0.0055	0.0825	0.0001	0.0001	0.0014	0.0000	0.0925
Wisconsin	0.0687	0.8231	0.0265	0.0039	0.0002	0.0044	0.0000	0.9268
Wyoming	0.0343	0.0016	0.0000	0.0010	0.0001	0.0043	0.0021	0.0434

Appendix Table A-16 Waste characteristics data

Livestock	Average TAM	Source	Nitrogen, N _{ex}		Max Methane Generation, B ₀		Source	Volatile Solids VS		Source
			kg	kg/day per 1,000 kg mass	m ³ CH ₄ /kg VS added	kg/day per 1,000 kg mass				
Dairy cow	604	Safley 2000	0.44	USDA NRCS 1996	0.24	Morris 1976	Table M-3	Peterson et al., 2002		
Dairy heifer	476	Safley 2000	0.31	USDA NRCS 1996	0.17	Bryant et al. 1976	Table M-3	Peterson et al., 2002		
Feedlot steers	420	USDA NRCS 1996	0.3	USDA NRCS 1996	0.33	Hashimoto 1981	Table M-3	Peterson et al., 2002		
Feedlot heifers	420	USDA NRCS 1996	0.3	USDA NRCS 1996	0.33	Hashimoto 1981	Table M-3	Peterson et al., 2002		
NOF bulls	750	Safley 2000	0.31	USDA NRCS 1996	0.17	Hashimoto 1981	6.04	USDA NRCS 1996		
NOF calves	159	USDA NRCS 1998	0.3	USDA NRCS 1996	0.17	Hashimoto 1981	6.41	USDA NRCS 1996		
NOF heifers	420	USDA NRCS 1996	0.31	USDA NRCS 1996	0.17	Hashimoto 1981	Table M-3	Peterson et al., 2002		
NOF steers	318	Safley 2000	0.31	USDA NRCS 1996	0.17	Hashimoto 1981	Table M-3	Peterson et al., 2002		
NOF cows	590	Safley 2000	0.33	USDA NRCS 1996	0.17	Hashimoto 1981	Table M-3	Peterson et al., 2002		
Market swine <60 lbs.	15.88	Safley 2000	0.6	USDA NRCS 1996	0.48	Hashimoto 1984	8.8	USDA NRCS 1996		
Market swine 60-119 lbs.	40.6	Safley 2000	0.42	USDA NRCS 1996	0.48	Hashimoto 1985	5.4	USDA NRCS 1996		
Market swine 120-179 lbs.	67.82	Safley 2000	0.42	USDA NRCS 1996	0.48	Hashimoto 1984	5.4	USDA NRCS 1996		
Market swine >180 lbs.	90.75	Safley 2000	0.42	USDA NRCS 1996	0.48	Hashimoto 1984	5.4	USDA NRCS 1996		
Breeding swine	198	Safley 2000	0.24	USDA NRCS 1996	0.48	Hashimoto 1984	2.6	USDA NRCS 1996		
Sheep	27	ASAE 1999	0.42	ASAE 1999	NA	NA	NA	NA		
Goats	64	ASAE 1999	0.45	ASAE 1999	NA	NA	NA	NA		
Horses	450	ASAE 1999	0.3	ASAE 1999	NA	NA	NA	NA		
Hens >/= 1 yr	1.8	ASAE 1999	0.83	USDA NRCS 1996	0.39	Hill 1982	10.8	USDA NRCS 1996		
Pullets	1.8	ASAE 1999	0.62	USDA NRCS 1996	0.39	Hill 1982	9.7	USDA NRCS 1996		
Other chickens	1.8	ASAE 1999	0.83	USDA NRCS 1996	0.39	Hill 1982	10.8	USDA NRCS 1996		
Broilers	0.9	ASAE 1999	1.1	USDA NRCS 1996	0.36	Hill 1984	15	USDA NRCS 1996		
Turkeys	6.8	ASAE 1999	0.74	USDA NRCS 1996	0.36	Hill 1984	9.7	USDA NRCS 1996		

Source: EPA (2003a).

Appendix Table A-17 State volatile solids production rates for 2001

	Dairy cow	Dairy heifer	Cow (not on feed)	Heifer (not on feed)	Steer (not on feed)	Feedlot heifer	Feedlot steer
	<i>kg/day/1000 kg mass</i>						
Alabama	8.56	6.82	6.74	7.16	7.47	3.33	3.26
Alaska	10.71	6.82	8.71	9.42	9.87	3.33	3.26
Arizona	10.71	6.82	8.71	9.43	9.87	3.33	3.26
Arkansas	8.06	7.57	6.72	7.13	7.45	3.36	3.3
California	9.36	6.82	6.57	6.95	7.27	3.32	3.26
Colorado	8.33	6.82	6.19	6.51	6.82	3.35	3.28
Connecticut	8.41	6.14	6.62	7.03	7.33	3.4	3.33
Delaware	8.41	6.14	6.62	7.01	7.33	3.4	3.33
Florida	8.56	6.82	6.74	7.17	7.47	3.33	3.26
Georgia	8.56	6.82	6.74	7.16	7.47	3.33	3.26
Hawaii	10.71	6.82	8.71	9.42	9.87	3.33	3.26
Idaho	10.71	6.82	8.71	9.4	9.87	3.33	3.26
Illinois	8.29	6.82	6.63	7.01	7.34	3.39	3.32
Indiana	8.29	6.82	6.63	7.01	7.34	3.39	3.32
Iowa	8.29	6.82	6.63	7	7.34	3.39	3.32
Kansas	8.33	6.82	6.19	6.51	6.82	3.35	3.28
Kentucky	8.56	6.82	6.74	7.16	7.47	3.33	3.26
Louisiana	8.06	7.57	6.72	7.14	7.45	3.36	3.3
Maine	8.41	6.14	6.62	7.04	7.33	3.4	3.33
Maryland	8.41	6.14	6.62	7.02	7.33	3.4	3.33
Massachusetts	8.41	6.14	6.62	7.02	7.33	3.4	3.33
Michigan	8.29	6.82	6.63	7.02	7.34	3.39	3.32
Minnesota	8.29	6.82	6.63	7.01	7.34	3.39	3.32
Mississippi	8.56	6.82	6.74	7.17	7.47	3.33	3.26
Missouri	8.29	6.82	6.63	7.02	7.34	3.39	3.32
Montana	8.33	6.82	6.19	6.54	6.82	3.35	3.28
Nebraska	8.33	6.82	6.19	6.51	6.82	3.35	3.28
Nevada	10.71	6.82	8.71	9.41	9.87	3.33	3.26
New Hampshire	8.41	6.14	6.62	7.04	7.33	3.4	3.33
New Jersey	8.41	6.14	6.62	7.03	7.33	3.4	3.33
New Mexico	10.71	6.82	8.71	9.4	9.87	3.33	3.26
New York	8.41	6.14	6.62	7.01	7.33	3.4	3.33
North Carolina	8.56	6.82	6.74	7.17	7.47	3.33	3.26
North Dakota	8.33	6.82	6.19	6.52	6.82	3.35	3.28
Ohio	8.29	6.82	6.63	7.02	7.34	3.39	3.32
Oklahoma	8.06	7.57	6.72	7.11	7.45	3.36	3.3
Oregon	10.71	6.82	8.71	9.42	9.87	3.33	3.26
Pennsylvania	8.41	6.14	6.62	7.02	7.33	3.4	3.33
Rhode Island	8.41	6.14	6.62	7.04	7.33	3.4	3.33
South Carolina	8.56	6.82	6.74	7.17	7.47	3.33	3.26
South Dakota	8.33	6.82	6.19	6.52	6.82	3.35	3.28
Tennessee	8.56	6.82	6.74	7.16	7.47	3.33	3.26
Texas	8.06	7.57	6.72	7.11	7.45	3.36	3.3
Utah	10.71	6.82	8.71	9.41	9.87	3.33	3.26
Vermont	8.41	6.14	6.62	7.02	7.33	3.4	3.33
Virginia	8.56	6.82	6.74	7.16	7.47	3.33	3.26
Washington	10.71	6.82	8.71	9.4	9.87	3.33	3.26
West Virginia	8.41	6.14	6.62	7.03	7.33	3.4	3.33
Wisconsin	8.29	6.82	6.63	7.01	7.34	3.39	3.32
Wyoming	8.33	6.82	6.19	6.53	6.82	3.35	3.28

Source: Peterson et al. (2002); EPA (2003a).

Appendix Table A-18 State base methane emissions factors by waste management system for 2001

	Liquid/ slurry	Anaerobic lagoon	Deep pit
Alabama	0.3511	0.7663	0.3511
Alaska	0.1507	0.4845	0.1507
Arizona	0.4673	0.7918	0.4673
Arkansas	0.3760	0.7617	0.3760
California	0.3630	0.7554	0.3630
Colorado	0.2297	0.6668	0.2297
Connecticut	0.2545	0.6763	0.2545
Delaware	0.2823	0.6862	0.2823
Florida	0.5195	0.7935	0.5195
Georgia	0.3263	0.6578	0.3263
Hawaii	0.5973	0.7728	0.5973
Idaho	0.2311	0.6741	0.2311
Illinois	0.2935	0.7202	0.2935
Indiana	0.2792	0.7097	0.2792
Iowa	0.2634	0.6986	0.2634
Kansas	0.3401	0.7493	0.3401
Kentucky	0.2726	0.6301	0.2726
Louisiana	0.4542	0.7860	0.4542
Maine	0.2119	0.6390	0.2119
Maryland	0.2847	0.7190	0.2847
Massachusetts	0.2448	0.6871	0.2448
Michigan	0.2395	0.6751	0.2395
Minnesota	0.2407	0.6785	0.2407
Mississippi	0.4015	0.7722	0.4015
Missouri	0.3252	0.7398	0.3252
Montana	0.2153	0.6508	0.2153
Nebraska	0.2815	0.7166	0.2815
Nevada	0.2597	0.7009	0.2597
New Hampshire	0.2191	0.6501	0.2191
New Jersey	0.2778	0.7160	0.2778
New Mexico	0.3210	0.7387	0.3210
New York	0.2307	0.6683	0.2307
North Carolina	0.3320	0.7473	0.3320
North Dakota	0.2256	0.6612	0.2256
Ohio	0.2652	0.6985	0.2652
Oklahoma	0.3962	0.7681	0.3962
Oregon	0.2120	0.6429	0.2120
Pennsylvania	0.2610	0.7000	0.2610
Rhode Island	0.2242	0.6032	0.2242
South Carolina	0.3804	0.7690	0.3804
South Dakota	0.2552	0.6970	0.2552
Tennessee	0.2796	0.6343	0.2796
Texas	0.4466	0.7817	0.4466
Utah	0.2681	0.7116	0.2681
Vermont	0.2134	0.6407	0.2134
Virginia	0.2816	0.7142	0.2816
Washington	0.2153	0.6498	0.2153
West Virginia	0.2613	0.6968	0.2613
Wisconsin	0.2353	0.6714	0.2353
Wyoming	0.2244	0.6635	0.2244

Source: EPA (2003a).

Appendix Table A-19 Additional nitrous oxide and methane emission factors

	CH ₄	N ₂ O
Pasture	0.015	
Daily spread	0.005	
Solid Storage	0.015	
Dry lot	0.015	
Poultry with bedding	0.015	
Poultry without bedding	0.015	
Liquid systems		0.001
Dry Systems		0.02

Source: IPCC (2000).

Appendix Table A-20 State-weighted methane conversion factors for livestock waste emissions for 2001

	Beef feed- lot-heifer	Beef feed- lot-steer	Dairy cow	Dairy heifer	Swine- market	Swine- breeding	Layer	Broiler	Turkey
<i>Proportion of waste attributed to livestock category</i>									
Alabama	0.0200	0.0170	0.1019	0.0189	0.4889	0.4912	0.3290	0.0150	0.0150
Alaska	0.0170	0.0170	0.1652	0.0165	0.0150	0.0150	0.1324	0.0150	0.0150
Arizona	0.0169	0.0166	0.6180	0.0165	0.5272	0.5272	0.4842	0.0150	0.0150
Arkansas	0.0199	0.0199	0.0754	0.0188	0.5499	0.5539	0.0150	0.0150	0.0150
California	0.0195	0.0197	0.5167	0.0184	0.5056	0.5022	0.1061	0.0150	0.0150
Colorado	0.0159	0.0159	0.4365	0.0157	0.2839	0.2835	0.4032	0.0150	0.0150
Connecticut	0.0175	0.0175	0.1082	0.0170	0.1443	0.1311	0.0492	0.0150	0.0150
Delaware	0.0181	0.0181	0.0967	0.0175	0.3315	0.3315	0.0329	0.0150	0.0150
Florida	0.0220	0.0220	0.4274	0.0204	0.2150	0.2160	0.3413	0.0150	0.0150
Georgia	0.0200	0.0200	0.1465	0.0188	0.0019	0.4957	0.3258	0.0150	0.0150
Hawaii	0.0228	0.0228	0.5474	0.0210	0.3966	0.3966	0.2045	0.0150	0.0150
Idaho	0.0159	0.0159	0.4509	0.0157	0.2101	0.2093	0.4043	0.0150	0.0150
Illinois	0.0167	0.0167	0.1219	0.0164	0.3354	0.3355	0.0293	0.0150	0.0150
Indiana	0.0167	0.0167	0.1002	0.0164	0.3230	0.3233	0.0150	0.0150	0.0150
Iowa	0.0166	0.0166	0.1009	0.0163	0.4187	0.4195	0.0150	0.0150	0.0150
Kansas	0.0170	0.0170	0.1236	0.0167	0.3638	0.3637	0.0297	0.0150	0.0150
Kentucky	0.0182	0.0182	0.0421	0.0175	0.0016	0.4517	0.0510	0.0150	0.0150
Louisiana	0.0209	0.0209	0.1121	0.0196	0.2039	0.2035	0.4777	0.0150	0.0150
Maine	0.0171	0.0171	0.0642	0.0167	0.0150	0.0150	0.0464	0.0150	0.0150
Maryland	0.0178	0.0177	0.0916	0.0172	0.2957	0.2956	0.0507	0.0150	0.0150
Massachusetts	0.0174	0.0175	0.0774	0.0169	0.1974	0.1968	0.0486	0.0150	0.0150
Michigan	0.0164	0.0164	0.1589	0.0162	0.2937	0.2927	0.0284	0.0150	0.0150
Minnesota	0.0164	0.0164	0.0916	0.0162	0.3064	0.3062	0.0150	0.0150	0.0150
Mississippi	0.0202	0.0202	0.0939	0.0190	0.5618	0.5622	0.4697	0.0150	0.0150
Missouri	0.0169	0.0169	0.1109	0.0166	0.3551	0.3550	0.0150	0.0150	0.0150
Montana	0.0159	0.0159	0.2602	0.0157	0.2625	0.2625	0.3985	0.0150	0.0150
Nebraska	0.0167	0.0167	0.1065	0.0164	0.3279	0.3275	0.0291	0.0150	0.0150
Nevada	0.0160	0.0160	0.5146	0.0157	0.0150	0.0150	0.0150	0.0150	0.0150
New Hampshire	0.0172	0.0172	0.0733	0.0167	0.1228	0.1221	0.0470	0.0150	0.0150
New Jersey	0.0178	0.0178	0.0831	0.0172	0.1894	0.1911	0.0500	0.0150	0.0150
New Mexico	0.0162	0.0162	0.5294	0.0159	0.0150	0.0150	0.4606	0.0150	0.0150
New York	0.0173	0.0173	0.0918	0.0168	0.2126	0.2119	0.0476	0.0150	0.0150
North Carolina	0.0182	0.0182	0.0656	0.0175	0.5841	0.5824	0.3209	0.0150	0.0150
North Dakota	0.0164	0.0164	0.0675	0.0161	0.2615	0.2618	0.0277	0.0150	0.0150
Ohio	0.0166	0.0166	0.1021	0.0163	0.3032	0.3034	0.0150	0.0150	0.0150
Oklahoma	0.0166	0.0166	0.3603	0.0162	0.5767	0.5811	0.4671	0.0150	0.0150
Oregon	0.0178	0.0178	0.2611	0.0172	0.1098	0.1096	0.1676	0.0150	0.0150
Pennsylvania	0.0175	0.0176	0.0603	0.0170	0.3196	0.3187	0.0150	0.0150	0.0150
Rhode Island	0.0176	0.0176	0.0394	0.0171	0.1953	0.1953	0.0143	0.0150	0.0150
South Carolina	0.0198	0.0198	0.1051	0.0187	0.5174	0.5149	0.4696	0.0150	0.0150
South Dakota	0.0165	0.0165	0.0949	0.0163	0.3058	0.3060	0.0285	0.0150	0.0150
Tennessee	0.0182	0.0182	0.0551	0.0176	0.0025	0.4238	0.0513	0.0150	0.0150
Texas	0.0167	0.0167	0.5148	0.0163	0.5367	0.5362	0.1075	0.0150	0.0150
Utah	0.0160	0.0160	0.3811	0.0158	0.3313	0.3290	0.4377	0.0150	0.0150
Vermont	0.0172	0.0172	0.0837	0.0167	0.0150	0.0150	0.0458	0.0150	0.0150
Virginia	0.0178	0.0177	0.0525	0.0172	0.4896	0.4901	0.0497	0.0150	0.0150
Washington	0.0178	0.0180	0.3206	0.0172	0.2133	0.2097	0.0888	0.0150	0.0150
West Virginia	0.0176	0.0176	0.0689	0.0171	0.2068	0.2062	0.0493	0.0150	0.0150
Wisconsin	0.0164	0.0164	0.1002	0.0162	0.2757	0.2753	0.0281	0.0150	0.0150
Wyoming	0.0159	0.0159	0.2385	0.0157	0.2863	0.2848	0.3997	0.0150	0.0150

Source: EPA (2003a).

Appendix Table A-21 Nitrogen in livestock waste deposited in pasture, range, and paddock

<u>Pasture, range, and paddock</u>	
	<i>Gg</i>
1990	4,148
1991	4,167
1992	4,256
1993	4,304
1994	4,412
1995	4,474
1996	4,467
1997	4,331
1998	4,244
1999	4,199
2000	4,136
2001	4,100

Source: EPA (2003a).

Appendix Table A-22 Definition of regions in the enteric fermentation model

Region	State	
California	California	
Midwest	Illinois	
	Indiana	
	Iowa	
	Michigan	
	Minnesota	
	Missouri	
	Ohio	
	Wisconsin	
	Northeast	Connecticut
		Delaware
Maine		
Maryland		
Massachusetts		
New Hampshire		
New Jersey		
New York		
Pennsylvania		
Rhode Island		
Vermont		
West Virginia		
Northern Great Plains		Colorado
	Kansas	
	Montana	
	Nebraska	
	North Dakota	
	South Dakota	
	Wyoming	
South Central	Arkansas	
	Louisiana	
	Oklahoma	
	Texas	
Southeast	Alabama	
	Florida	
	Georgia	
	Kentucky	
	Mississippi	
	North Carolina	
	South Carolina	
	Tennessee	
	Virginia	
West	Alaska	
	Arizona	
	Hawaii	
	Idaho	
	Nevada	
	New Mexico	
	Oregon	
	Utah	
	Washington	

Source: EPA (2003b).