

Appendices

Appendix 1: Nitrogen and phosphorus applied as fertilizer in Canada 1981-1996. N and P data from Agriculture and Agri-Food Canada 1998. Area of application data from Statistics Canada 19997a.

Province	Year	Area of Application (ha)	N Applied (t)	P Applied (t)
Newfoundland	1981	4,414		
	1986	4,757		
	1991	5,434		
	1996	6,464		
PEI	1981	107,442		
	1986	113,297		
	1991	102,117		
	1996	119,541		
Nova Scotia	1981	88,537		
	1986	85,043		
	1991	82,267		
	1996	88,552		
New Brunswick	1981	75,997		
	1986	84,048		
	1991	78,136		
	1996	90,740		
Atlantic	1981	276,390	19,000	9,159
	1986	287,145	21,157	8,694
	1991	267,954	23,336	9,177
	1996	305,297	26,229	9,909
Quebec	1981	1,105,401	61,400	26,230
	1986	1,189,233	89,443	33,175
	1991	996,722	91,760	28,263
	1996	991,062	88,207	25,302
Ontario	1981	2,533,823	205,600	65,833
	1986	2,591,126	213,916	58,432
	1991	2,273,448	174,860	43,913
	1996	2,407,516	173,884	43,132
Manitoba	1981	3,196,455	154,448	39,526
	1986	3,726,374	235,960	45,334
	1991	3,688,335	259,890	44,554
	1996	3,830,391	312,350	51,838
Saskatchewan	1981	5,525,854	167,734	60,223
	1986	8,125,031	317,800	79,781
	1991	7,654,551	247,346	57,491
	1996	10,015,619	517,829	93,058
Alberta	1981	5,505,172	302,154	66,488
	1986	6,854,875	308,908	66,478
	1991	6,349,884	337,094	60,277
	1996	7,031,430	430,782	69,327
Prairies	1981	14,227,481	624,336	166,237
	1986	18,706,280	862,668	191,593
	1991	17,692,770	844,330	162,322
	1996	20,877,440	1,260,961	214,223
British Columbia	1981	362,105	27,485	5,654
	1986	374,186	33,537	7,003
	1991	330,937	23,477	4,950
	1996	361,320	26,922	4,706
Canada	1981	18,505,200	937,821	273,113
	1986	23,147,970	1,220,721	298,897
	1991	21,561,831	1,157,763	248,626
	1996	24,942,635	1,576,203	297,272

Appendix 2: Manure nitrogen and phosphorus production coefficients per animal type by province.

		NF ¹	PEI ¹	NS ²	NB ³	QC ⁴	ON ⁵	MB ⁶	SK ⁷	AB ⁸	BC ⁹
N	(kg/animal/yr)										
Dairy	Bulls	-	-	-	-	32.1	-	-	93.1	106.5	112.0
	Cows	88.7	88.7	88.7	98.4	55.7	64	98.6	93.1	106.5	116.0
	Heifers	40.7	40.7	40.7	-	21.4	-	46.4	69.8	32.0	42.0
	Steers	-	-	-	-	8.6	-	11.7	21.0	2.2	20.0
	Calves	-	-	-	-	-	-	-	-	-	1.7
Beef	Bulls	-	-	-	-	23.6	-	58.4	58.4	23.2	112.0
	Cows	65.0	65.0	65.0	67.0	32.1	32	58.4	58.4	23.2	78.0
	Heifers	40.1	40.1	40.1	44.6	19.3	-	55.9	43.4	11.8	44.0
	Steers	-	-	-	-	21.4	-	55.8	55.8	11.8	50.0
	Calves	-	-	-	-	7.5	-	31.0	15.7	4.6	20.0
Swine	Boars	3.3	3.3	3.3	11.4	5.5	11	12.8	12.0	16.4	24.3
	Sows	14.6	14.6	14.6	14.6	14.8	16	21.6	12.0	22	18.3
Poultry	Chickens	0.31	0.31	0.31	0.60	0.98	0.35	0.53	0.60	0.30	0.60
	Turkeys	0.75	0.75	0.75	0.77	2.70	-	0.75	0.82	0.43	0.86
	Layers	0.51	0.51	0.51	0.51	1.49	0.53	0.73	-	0.98	0.80
	Pullets	0.15	0.15	0.15	0.15	-	-	0.24	-	0.34	0.34
P	(kg/animal/yr)										
Dairy	Bulls	-	-	-	-	9.0	-	-	16.0	21.3	20.1
	Cows	13.1	13.1	13.1	13.1	15.7	12.9	21.1	16.0	21.3	13.1
	Heifers	5.3	5.3	5.3	5.3	6.0	-	7.1	12.0	6.4	47.2
	Steers	-	-	-	-	2.4	-	2.4	3.6	0.4	21.9
	Calves	-	-	-	-	-	-	-	-	-	1.0
Beef	Bulls	-	-	-	-	6.6	-	19.5	19.5	6.6	20.1
	Cows	21.7	21.7	21.7	21.7	9.0	6.5	19.5	19.5	6.6	13.5
	Heifers	13.4	13.4	13.4	13.4	5.4	-	14.8	11.5	3.3	14.4
	Steers	-	-	-	-	6.0	-	14.8	14.8	3.3	16.2
	Calves	-	-	-	-	2.1	-	8.2	4.1	1.3	21.9
Swine	Boars	1.1	1.1	1.1	1.1	1.7	2.6	4.2	4.1	4.2	7.5
	Sows	4.8	4.8	4.8	4.8	5.4	3.9	7.1	4.1	6.0	5.6
Poultry	Chickens	0.10	0.10	0.10	0.10	0.19	0.07	0.15	0.07	0.09	0.23
	Turkeys	0.28	0.28	0.28	0.28	0.51	-	0.24	0.11	0.14	0.27
	Layers	0.19	0.19	0.19	0.19	0.28	0.18	0.17	-	0.44	0.23
	Pullets	0.06	0.06	0.06	0.06	-	-	0.06	-	0.09	0.10

¹ USDA (1992)² Brenton and Mellish (1996)³ NB Agriculture and Rural Development (1997)⁴ Robert (1993)⁵ Fraser (1985)⁶ Manitoba Agriculture (1994)⁷ Saskatchewan Agriculture and Food (1997)⁸ AAFRD (2000)⁹ Brisbin (1995)

Appendix 3: Nitrogen and phosphorus applied as manure in Canada 1991-1996. N and P data calculated by multiplying the number of animals in each province (Statistics Canada 1997b) by the nitrogen and phosphorus content of manure for each province (from Appendix 2). Area of application data from Statistics Canada 1997a.

Province	Year	Area of Application (ha)	N Applied (t)	P Applied (t)
Newfoundland	1991	3,258	754	283
	1996	4,316	707	266
PEI	1991	26,028	3,542	1,172
	1996	32,453	3,484	1,130
Nova Scotia	1991	39,786	5,309	1,827
	1996	45,871	5,183	1,785
New Brunswick	1991	29,881	5,111	1,321
	1996	34,804	5,073	1,288
Atlantic	1991	98,953	14,716	4,602
	1996	117,444	14,446	4,469
Québec	1991	537,806	70,726	27,879
	1996	672,313	76,513	29,717
Ontario	1991	645,463	100,806	33,866
	1996	734,088	99,032	33,133
Manitoba	1991	162,337	63,096	15,015
	1996	208,796	45,468	18,450
Saskatchewan	1991	244,548	35,900	12,983
	1996	285,816	42,561	15,158
Alberta	1991	359,841	47,304	22,879
	1996	475,390	80,175	22,680
Prairies	1991	766,726	194,553	63,702
	1996	970,002	234,742	71,875
British Columbia	1991	78,208	23,866	15,106
	1996	85,133	25,612	15,696
Canada	1991	2,127,156	404,667	145,155
	1996	2,578,980	450,345	154,890

Appendix 4. Atmospheric N fixation rates for legumes and the amount of N removed with their harvest in Canada. Data from F. Selles and R. Lemke, Agriculture and Agri-Food Canada, personal communication.

Legume	N fixed (kg/ha/d)	N removed Eastern Canada (kg N/ t crop)	N removed Western Canada (kg N/ t crop)
Alfalfa			24
Soybeans	70	65	
Dry Beans	30	42	
Chickpeas	52.5		
Clover (various)	100		24
Sweet Clover	67		24
Fababean	80		37
Lentils	56		44
Peas	90		37
Legume Haylage	90	26	
Peas, Green		25	
Beans, Green		25	

