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Appendix A1: Manure Production Per Space of Capacity[1]

Swine	Space	Daily		Yearly
		Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Nursery, 25 lb.	1 head	0.2 gal	0.7 gal	0.34 tons
Grow-finish, 150 lb.				
Formed storage*				
Dry feeders	1 head	1.2 gal		2.05 tons
Wet/dry feeders	1 head	0.9 gal		2.05 tons
Earthen storage**	1 head	1.2 gal		2.05 tons
Lagoon***	1 head		4.1 gal	2.05 tons
Gestation, 400 lb.	1 head	3.0 gal	3.7 gal	2.77 tons
Sow & Litter, 450 lb	1 crate	3.5 gal	7.5 gal	6.16 tons
Farrow-nursery	Per sow in breeding herd	2.2 gal	5.4 gal	6.09 tons
Farrow-finish	Per sow in breeding herd	9.4 gal	30 gal	12.25 tons

Dairy, Confined	Space	Daily		Yearly
		Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Cows, 1200 & up lb.	1 head	18.0 gal	40.1 gal	14 tons
Heifers, 900 lb.	1 head	8.8 gal	29.9 gal	6.5 tons
Calves, 500 lb.	1 head	4.9 gal	16.5 gal	1.5 tons
Veal calves, 250 lb.	1 head	2.5 gal	8.2 gal	1.1 tons
Dairy herd	Per productive cow in herd	18.5 gal	59.8 gal	20 tons

Beef, Confined	Space	Daily		Yearly
		Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Mature cows, 1000 lb.	1 head	7.2 gal	15.7 gal	12.23 tons
Finishing, 900 lb.	1 head	6.5 gal	13.1 gal	11.00 tons
Feeder calves, 500 lb.	1 head	3.6 gal	7.3 gal	6.11 tons

Poultry	Space	Yearly Dry Manure
Layer, cages	1000 head	10.5 tons
Broiler, litter	1000 head	9.00 tons
Turkeys, litter	1000 head	35.00 tons

*Formed manure storage structure
**Earthen manure storage basin
***Anaerobic lagoon

[1] This table is from 567 IAC 65.1(2)“o”.

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Appendix A2: Annual Pounds of Nitrogen Per Space of Capacity[2]

Swine	Space	Daily		Yearly
		Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Nursery, 25 lb.	1 head	2	1	5
Grow-finish, 150 lb.				
Formed storage*				
Dry feeders	1 head	21		29
Wet/dry feeders	1 head	19		29
Earthen storage**	1 head	14		29
Lagoon***	1 head		6	29
Gestation, 400 lb.	1 head	27	5	39
Sow & Litter, 450 lb	1 crate	32	11	86
Farrow-nursery	Per sow in breeding herd	22	8	85
Farrow-finish	Per sow in breeding herd	150	44	172

Dairy, Confined	Space	Daily		Yearly
		Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Cows, 1200 & up lb.	1 head	164	59	140
Heifers, 900 lb.	1 head	81	44	65
Calves, 500 lb.	1 head	45	24	15
Veal calves, 250 lb.	1 head	22	12	10
Dairy herd	Per productive cow in herd	169	87	180

Beef, Confined	Space	Daily		Yearly
		Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Mature cows, 1000 lb.	1 head	105	23	147
Finishing, 900 lb.	1 head	95	19	132
Feeder calves, 500 lb.	1 head	53	11	73

Poultry	Space	Yearly
		Dry Manure
Layer, cages	1000 head	367
Broiler, litter	1000 head	585
Turkeys, litter	1000 head	1400

*Formed manure storage structure
**Earthen manure storage basin
***Anaerobic lagoon

[2] This table is from 567 IAC 65.1(2)“m”.

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Appendix A3: Annual Pounds of Phosphorus (as P_2O_5) per Space of Capacity[3]

Swine	Space	Daily		Yearly
		Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Nursery, 25 lb.	1 head	1	0.7	3
Grow-finish, 150 lb.				
Formed storage*				
Dry feeders	1 head	15		18
Wet/dry feeders	1 head	13		18
Earthen storage**	1 head	10		18
Lagoon***	1 head		5	18
Gestation, 400 lb.	1 head	27	4	25
Sow & Litter, 450 lb	1 crate	26	8	55
Farrow-nursery	Per sow in breeding herd	18	6	55
Farrow-finish	Per sow in breeding herd	109	33	110

Dairy, Confined	Space	Daily		Yearly
		Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Cows, 1200 & up lb.	1 head	78	44	42
Heifers, 900 lb.	1 head	38	33	20
Calves, 500 lb.	1 head	22	18	5
Veal calves, 250 lb.	1 head	10	9	3
Dairy herd	Per productive cow in herd	80	66	80

Beef, Confined	Space	Daily		Yearly
		Liquid, Pit* or Basin**	Liquid, Lagoon***	Solid Manure
Mature cows, 1000 lb.	1 head	66	17	73
Finishing, 900 lb.	1 head	59	14	66
Feeder calves, 500 lb.	1 head	33	8	37

Poultry	Space	Yearly
		Dry Manure
Layer, cages	1000 head	840
Broiler, litter	1000 head	585
Turkeys, litter	1000 head	1400

*Formed manure storage structure
**Earthen manure storage basin
***Anaerobic lagoon

[3] Source: This table is from 567 IAC 65.1(2)“m”.

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Appendix A4: Nutrients in Animal Manure

Management System	N	P_2O_5	K_2O
	Lbs./1,000 gallon		
Liquid, Pit			
Swine			
Nursery, 25 lb.	35	20	20
Grow-finish, 150 lb. (wet /dry)	58	40	45
Grow-finish, 150 lb. (dry feed)	50	42	30
Grow-finish, 150 lb. (earthen)	32	22	20
Gestation, 400 lb.	25	25	25
Sow and litter[1], 450 lb.	25	20	15
Farrow-nursery[2]	27	23	22
Farrow-finish[3]	44	32	24
Wean-finish (dry feed0	49	40	
Wean-finish (wet/dry)	56	38	
Dairy-confined			
Cows, 1,200 lb. or more	25	12	11
Heifers, 900 lb.	25	12	11
Calves, 500 lb.	25	12	11
Veal calves, 250 lb.	25	12	11
Dairy herd[4]	25	12	11
Beef-confined			
Mature cows, 1,000 lb.	40	25	35
Finishing, 900 lb.	40	25	35
Feeder calves, 500 lb.	40	25	35
Lagoon[5]			
(all animals)	4	3	4
Open Lot Runoff			
Earthen lots (liquids)			
Beef, 400 sq ft/hd	3	1	6
Dairy, 1,000 sq ft/hd	3	1	6
Swine, 50 sq ft/hd	3	1	6
Concrete lots (liquids)			
Beef, 400 sq ft/hd	6	2	7
Dairy, 1,000 sq ft/hd	6	2	7
Swine, 50 sq ft/hd	15	5	10

Management System	N	P_2O_5	K_2O
	Lbs./ton		
Solid Manure (Bedded)			
Swine-confined			
Nursery, 25 lb.	14	9	11
Grow-finish, 150 lb.	14	9	11
Gestation, 400 lb.	14	9	11
Sow and litter, 450 lb.	14	9	11
Farrow-nursery	14	9	11
Farrow finish	14	9	11
Dairy-confined			
Cows, 1,200 lb. or more	12	6	12
Heifers, 900 lb.	12	6	12
Calves, 500 lb.	12	6	12
Veal calves, 250 lb.	12	6	12
Dairy herd[4]	12	6	12
Beef-confined			
Mature cows, 1,000 lb.	12	6	12
Finishing, 900 lb.	12	6	12
Feeder calves, 500 lb.	12	6	12
Poultry			
Layer, caged, 4 lb.[6]	35	80	50
Broiler, litter, 2 lb.	65	65	45
Turkey, litter, 10 lb.	40	40	25
Open lot (solids, scraped)			
Beef, 400 sq ft/hd	22	16	14
Dairy, 1,000 sq ft/hd	11	6	11
Swine, 50 sq ft/hd	15	14	9

[1]Sow and litter figures are per farrowing crate

[2]Farrow-nursery figures are per sow in the breeding herd and include one farrowing sow, five gestation sows, and nine nursery pig spaces.

[3] Farrow-finish figures are per sow in the breeding herd and include one farrowing sow, five gestation sows, nine nursery pigs, and 36 finishing pig spaces.

[4] Per productive cow in the herd; includes lactating cow, 330 days; dry cow, 35 days; heifer, 222 days; and calf, 165 days.

[5] Weights assumed: beef, 1,000 pounds; dairy, 1,200 pounds; swine, 150 pounds.

[6] Wet basis at 41 percent moisture.

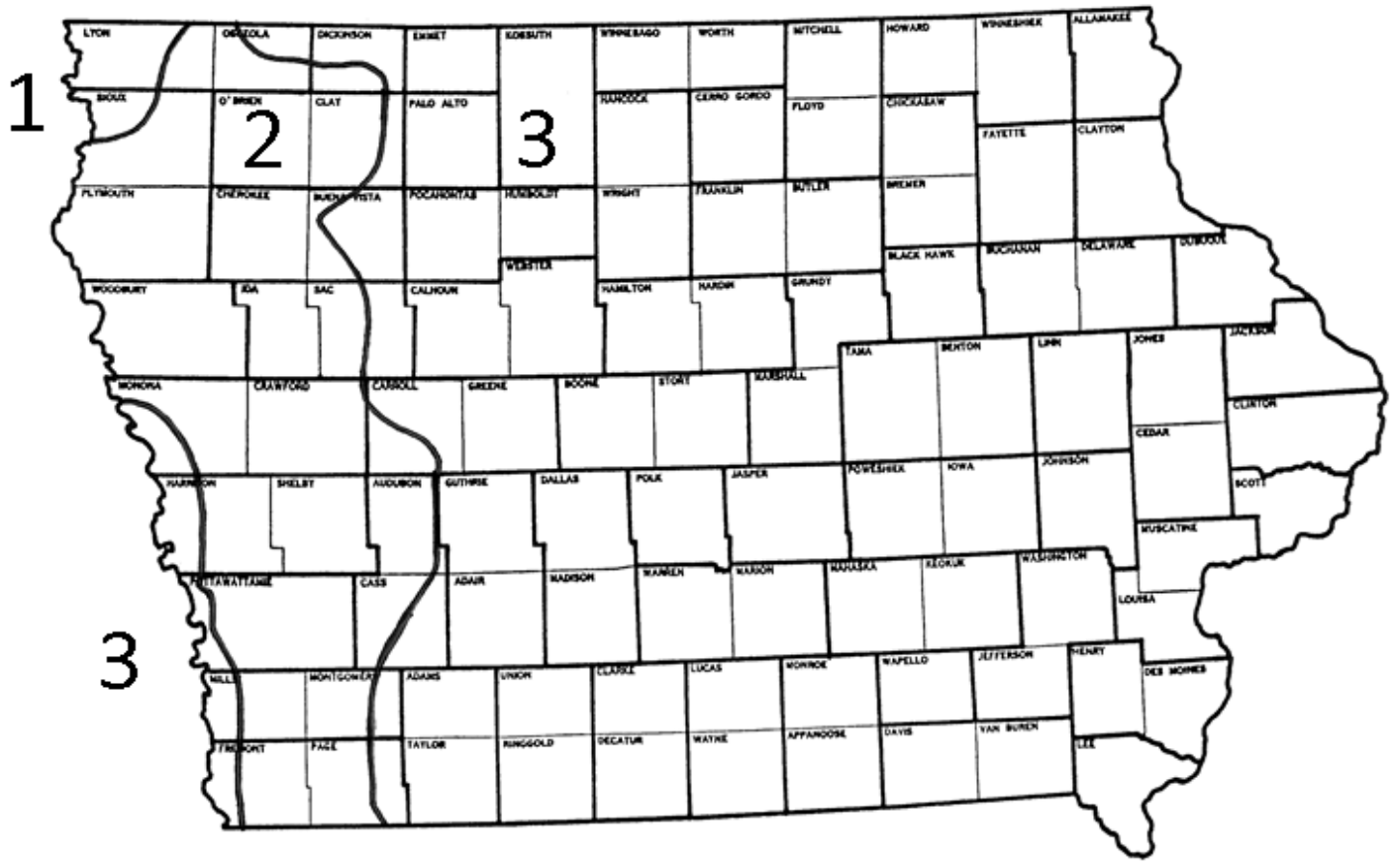
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Appendix A5: Crop Nitrogen Usage Rate Factors for Various Crops[4]

Crop		Nitrogen Usage Rate
Corn	Zone 1	0.9 lb/bu
	Zone 2	1.1 lb/bu
	Zone 3	1.2 lb/bu
Corn silage		7.5 lb/ton
Soybeans		3.8 lb/bu
Oats		0.75 lb/bu
Alfalfa		50.0 lb/ton
Wheat		1.3 lb/bu
Smooth bromegrass		40.0 lb/ton
Sorghum-sudan		40.0 lb/ton

Crop	Nitrogen Usage Rate
Orchardgrass	38.0 lb/ton
Tall fescue	38.0 lb/ton
Switchgrass	21.0 lb/ton
Vetch	56.0 lb/ton
Red clover	43.0 lb/ton
Perenial ryegrass	24.0 lb/ton
Timothy	25.0 lb/ton
Wheat straw	13.0 lb/ton
Oat straw	12.0 lb/ton

The following map outlines the three zones for the corn nitrogen usage rates indicated in the Table 4. Zone 1 corresponds to the Moody soil association. Zone 2 corresponds to the Marshall, Monona-Ida-Hamburg, and Galva-Primghar-Sac soil associations. Zone 3 corresponds to the remaining soil associations.



[4] Appendix A5 and the accompanying map are from 567 IAC 65.1(2)"n".

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Appendix A6: Nutrient Removal for Iowa Crops[5]

Crop	Unit of Yield and Moisture Basis		P_2O_5 Pounds/Unit	K_2O Pounds/Unit
Corn	bu.	15%	0.32	0.22
Corn Silage	bu grain equivalent	15%	0.44	1.10
Corn Silage	ton (65% H_2O)	65%	3.5	9.0
Corn stover	ton	15%	4.8	18
Soybean	bu.	13%	0.72	1.2
Soybean residue	ton	10%	4.7	23
Oat	bu.	13%	0.29	0.19
Oat straw	ton	10%	6.4	36
Wheat	bu.	12%	0.55	0.27
Wheat straw	ton	10%	3.7	23
Sunflower	100 lb.	10%	0.75	0.65
Alfalfa, alfalfa-grass	ton	15%	13	43
Red clover-grass	ton	15%	11	31
Trefoil-grass	ton	15%	11	31
Smooth bromegrass	ton	15%	7.9	41
Orchardgrass	ton	15%	12	60
Tall fescue	ton	15%	11	58
Timothy	ton	15%	7.9	28
Perennial ryegrass	ton	15%	11	30
Sorghum-sudan	ton	15%	11	33
Switchgrass	ton	15%	11	58
Reed Canarygrass	ton	15%	7.9	41

Appendix A7: Nitrogen Application Losses

Application Method	Application Loss Factor[6]
Knifed in or soil injection of liquid manure	0.98
Surface apply liquid or solid (dry manure with incorporation within 24 hours	0.95
Surface apply liquid or solid (dry manure with incorporation after 24 hours	0.80
Surface apply liquid manure with no incorporation	0.75
Surface apply solid (dry) manure with no incorporation	0.70
Irrigate liquid manure with no incorporation	0.60

[5] Appendix A6 is from PM 1688: General Guide for Crop Nutrient and Limestone Recommendations in Iowa (Revised February 2023)

[6] Percent of applied nitrogen remaining after deducting application losses

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Appendix A8: Iowa Ag Statistics County Corn and Soybean Yield Averages, 2021-2025

County	Corn			Soybeans		
	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)
Adair	193	212	200	58	64	61
Adams	193	213	204	59	64	61
Allamakee	205	226	210	59	65	61
Appanoose	181	199	189	54	60	58
Audubon	212	233	216	62	68	64
Benton	216	237	220	62	68	64
Black Hawk	202	222	204	59	65	61
Boone	213	234	216	65	72	67
Bremer	206	227	207	61	67	63
Buchanan	208	229	212	61	67	63
Buena Vista	206	226	208	61	67	62
Butler	204	225	209	59	65	61
Calhoun	213	234	216	62	68	63
Carroll	212	233	216	62	69	64
Cass	199	219	204	59	65	61
Cedar	217	239	220	65	72	66
Cerro Gordo	202	223	204	60	66	60
Cherokee	210	231	213	63	69	64
Chickasaw	209	230	211	60	66	62
Clarke	189	208	199	56	61	60
Clay	197	217	203	59	64	61
Clayton	211	232	215	61	67	63
Clinton	217	239	222	64	71	66
Crawford	212	234	219	62	68	64
Dallas	205	226	210	63	69	63
Davis	175	192	180	55	60	57
Decatur	183	201	191	52	58	56
Delaware	218	240	223	63	69	65
Des Moines	210	231	214	64	71	66
Dickinson	193	212	201	56	61	58
Dubuque	216	237	220	64	70	66
Emmet	206	226	211	60	67	61
Fayette	206	227	207	60	67	62
Floyd	206	227	210	59	65	61
Franklin	209	229	211	61	67	61
Fremont	207	228	211	60	66	61
Greene	212	234	216	61	67	62
Grundy	210	231	211	63	69	64

County	Corn			Soybeans		
	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)
Guthrie	205	226	208	63	69	64
Hamilton	211	232	212	62	68	63
Hancock	205	226	207	61	67	61
Hardin	207	228	211	63	69	64
Harrison	192	211	197	59	65	60
Henry	191	210	197	63	69	64
Howard	211	232	218	58	64	60
Humboldt	203	223	205	59	65	59
Ida	220	242	225	64	70	65
Iowa	213	234	215	62	68	62
Jackson	208	229	213	63	70	64
Jasper	211	232	213	63	69	64
Jefferson	188	207	194	57	63	59
Johnson	209	230	210	62	69	64
Jones	212	233	218	63	69	65
Keokuk	195	214	201	61	67	63
Kossuth	199	219	202	59	65	60
Lee	193	212	201	62	68	64
Linn	209	230	216	60	66	63
Louisa	201	222	204	62	68	63
Lucas	174	191	182	53	58	56
Lyon	203	223	206	61	68	62
Madison	193	212	199	59	65	60
Mahaska	209	229	214	63	70	64
Marion	201	221	208	60	66	62
Marshall	214	236	216	63	70	64
Mills	201	221	204	58	64	60
Mitchell	204	225	212	60	66	63
Monona	185	204	190	56	61	57
Monroe	174	192	181	55	60	56
Montgomery	202	223	206	59	65	61
Muscatine	211	233	213	64	70	65
O'Brien	209	230	212	62	68	64
Osceola	209	230	212	61	67	62
Page	201	221	208	60	65	61
Palo Alto	198	218	202	58	64	60
Plymouth	194	214	200	59	65	62
Pocahontas	209	230	211	61	67	62
Polk	207	228	211	61	67	63
Pottawattamie	205	225	207	60	66	62
Poweshiek	208	229	212	62	68	62

County	Corn			Soybeans		
	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)
Ringgold	188	207	197	55	61	59
Sac	219	241	224	63	69	64
Scott	218	240	221	68	75	69
Shelby	204	225	207	60	66	62
Sioux	208	229	211	63	69	64
Story	208	229	210	63	69	64
Tama	206	226	208	61	68	63
Taylor	185	204	189	58	64	60
Union	190	209	200	57	62	60
Van Buren	183	202	191	56	62	59
Wapello	192	211	198	60	66	61
Warren	192	211	201	58	64	60
Washington	200	220	204	61	67	62
Wayne	190	209	195	57	62	59
Webster	211	232	213	61	67	61
Winnebago	203	223	208	60	66	62
Winneshiek	207	228	210	60	66	62
Woodbury	199	219	207	58	63	61
Worth	203	223	207	58	63	59
Wright	200	220	203	59	65	60

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Appendix A9: Chapter 567-65.110 and 567-65.111, Rules for Animal Feeding Operations

Disclaimer: Producers should consult Chapter 65 of the Iowa Administrative Code for more information and the actual wording of rules governing animal feeding operations. Consult Chapter 459 of the Iowa Code for actual wording of the laws governing animal feeding operations in Iowa.

567—65.110(455B,459,459B) Manure management plan (MMP) requirements.

65.110(1) In accordance with Iowa Code section 459.312, the following persons are required to submit MMPs to the department, including an original MMP and an updated MMP, as required by this rule:

a. An applicant for a construction permit for a confinement feeding operation. However, an MMP shall not be required of an applicant for an egg washwater storage structure or for a SAFO.

b. The owner of a confinement feeding operation, other than a SAFO, if one of the following applies:

(1) The confinement feeding operation was constructed or expanded after May 31, 1985, regardless of whether the confinement feeding operation structure was required to have a construction permit.

(2) The owner constructs a manure storage structure, regardless of whether the person is required to be issued a permit for the construction pursuant to Iowa Code section 459.303 or whether the person has submitted a prior MMP. If the new manure storage structure does not result in an increase in manure volume for the confinement feeding operation and there is no change in animal category for determining animal units, then a new MMP is not required to be submitted.

c. A person who applies manure in Iowa that was produced in a confinement feeding operation, other than a small operation, located outside of Iowa.

d. A new owner of a confinement feeding operation may apply manure under the most recent owner's MMP until the new owner develops and submits an original MMP. The new owner must develop and submit an original MMP within 60 days after acquiring the operation.

e. Exceptions.

(1) A research college is exempt from this subrule and the MMP requirements of rule 567—65.111(455B,459,459B) for research activities and experiments performed under the authority of the research college and related to confinement feeding operations.

(2) An AFO otherwise required to submit an updated MMP and pay an annual compliance fee may make an election to be considered a SAFO for purposes of filing updated MMPs and annual compliance fees if the confinement feeding operation maintains an animal unit capacity of 500 or fewer animal units. The election shall automatically terminate when more than 500 animal units are housed at the confinement feeding operation at any one time. If the confinement feeding operation exceeds more than 500 animal units, an MMP shall be submitted.

65.110(2) The owner of a proposed confinement feeding operation who is not required to obtain a construction permit pursuant to subrule 65.103(1) but who is required to file an MMP pursuant to paragraph 65.110(1)*"b"* shall file a construction design statement and provide the information required in subrule 65.104(2), including the confinement feeding operation's MMP, to the department at least 30 days before the construction of an AFO structure begins, as defined in subrules 65.6(1) and 65.6(2).

65.110(3) Scope of MMP; updated plans; annual compliance fee.

a. Each confinement feeding operation required to submit an MMP shall be covered by a separate MMP.

b. The owner of a confinement feeding operation who is required to submit an MMP under this rule shall submit an updated MMP on an annual basis to the department. The updated MMP may be submitted by hard copy or by electronic submittal. The updated plan must reflect all amendments made during the period of time since the previous MMP submission.

(1) If the plan is submitted by hard copy, the submittal process shall be as follows: The owner of the AFO shall also submit the updated MMP on an annual basis to the board of supervisors of each county where the confinement feeding operation is located and to the board of supervisors of each county where manure from the confinement feeding operation is land-applied. If the owner of the AFO has not previously submitted an MMP to the board of supervisors of each county where the confinement feeding operation is located and each county where manure is land-applied, the owner must submit a complete MMP to each required county. The county auditor or other county official or employee designated by the county board of supervisors may accept the updated plan on behalf of the board. The updated plan

shall include documentation that the county board of supervisors or other designated county official or employee received the MMP update.

(2) If the plan is submitted electronically, the submittal process shall be as follows: The owner of the AFO shall submit the updated MMP to the department through the department's electronic web application. Once the submittal has been completed, the department shall provide electronic access of the updated MMP to the board of supervisors of each county where the confinement feeding operation is located and each county where manure is land-applied.

(3) The department will stagger the dates by which the updated MMPs are due and will notify each confinement feeding operation owner of the date on which the updated MMP is due. To satisfy the requirements of an updated MMP, an owner of a confinement feeding operation must submit one of the following:

1. A complete MMP;
2. A department-approved document stating that the MMP submitted in the prior year has not changed; or
3. A department-approved document listing all the changes made since the previous MMP was submitted and approved.

c. An annual compliance fee of $0.15 per animal unit at the AFO shall accompany an annual MMP update submitted to the department for approval. The annual compliance fee is based on the animal unit capacity of the confinement feeding operation stated in the updated annual MMP submission. If the person submitting the MMP is a contract producer, as provided in Iowa Code chapter 202, the active contractor shall pay the annual compliance fee.

65.110(4) The department shall review and approve or disapprove all complete MMPs within 60 days of the date they are received.

65.110(5) Manure shall not be removed from a manure storage structure which is part of a confinement feeding operation required to submit an MMP until the department has approved the plan. Manure shall be applied in compliance with rule 567—65.100(455B,459,459B).

65.110(6) Manure storage indemnity fee. All persons required to submit an MMP to the department shall also pay to the department an indemnity fee as required in Iowa Code section 459.503 except those operations constructed prior to May 31, 1995, which were not required to obtain a construction permit.

65.110(7) Filing fee. Any person submitting an original MMP must also pay to the department an MMP filing fee of $250. This fee shall be included with each original MMP being submitted. If the confinement feeding operation is required to obtain a construction permit and to submit an original MMP as part of the construction permit requirements, the applicant must pay the MMP filing fee together with the construction permit application fee, which total $500.

[**ARC 7965C**, IAB 5/15/24, effective 6/19/24]

567—65.111(455B,459,459B) MMP content requirements. All MMPs are to be submitted on forms or electronically as prescribed by the department. The plans shall include all of the information specified in Iowa Code section 459.312 and as described below.

65.111(1) *General.*

a. A confinement feeding operation that is required to submit an MMP to the department shall not apply manure in excess of the nitrogen use levels necessary to obtain optimum crop yields. A confinement feeding operation shall not apply manure in excess of the rates determined in conjunction with the phosphorus index. Information to complete the required calculations may be obtained from the tables in this chapter, actual testing samples or from other credible sources reviewed and approved by the department including but not limited to Iowa State University, the United States Department of Agriculture (USDA), a licensed PE, or an individual certified as a crop consultant under the American Registry of Certified Professionals in Agronomy, Crops, and Soils program, the Certified Crop Advisors program, or the Registry of Environmental and Agricultural Professionals program.

b. MMPs shall include all of the following:

(1) The name of the owner and the name of the confinement feeding operation, including mailing address and telephone number.

(2) The name of the contact person for the confinement feeding operation, including mailing address and telephone number.

(3) The location of the confinement feeding operation identified by county, township, section, ¼ section and, if available, the 911 address.

(4) The animal unit capacity of the confinement feeding operation and, if applicable, the animal weight capacity.

c. A person who submits an MMP shall include a phosphorus index as part of the MMP as required in subrule 65.111(12).

d. A new owner of a confinement feeding operation may apply manure under the most recent owner's MMP until the new owner develops and submits an original MMP. The new owner must develop and submit an original MMP within 60 days after acquiring the confinement feeding operation.

e. A research college is exempt from this subrule for research activities and experiments performed under the authority of the research college and related to confinement feeding operations.

65.111(2) *MMP contents.* Confinement feeding operations that will not sell all of their manure shall submit the following for that portion of the manure which will not be sold:

a. The name of the owner and the name of the confinement feeding operation, including mailing address and telephone number.

b. The name of the contact person for the confinement feeding operation, including mailing address and telephone number.

c. The location of the confinement feeding operation identified by county, township, section, ¼ section and, if available, the 911 address.

d. An estimate of the nitrogen and phosphorus concentration of the manure and estimate of annual manure production.

e. Application rate calculations based on regulations in subrule 65.111(12).

f. The location of manure application.

g. Soil loss calculations using methods specified for Iowa phosphorus index.

h. A phosphorus index of each field in the MMP, as defined in paragraph 65.111(12)*"a,"* including the factors used in the calculation. A copy of the NRCS phosphorus index detailed report shall satisfy the requirement to include the factors used in the calculation.

65.111(3) *Estimate of manure concentration and production.* An MMP must include an estimate of nitrogen and phosphorus concentration and an estimate of annual manure production by one of the following methods.

a. Table values in Table 4 located at iowadnr.gov/afo/rules or other credible sources.

b. Actual concentration and production values from the operation or a similar operation. If an actual sample is used to represent the nutrient content of manure, the sample shall be taken in accordance with Iowa State University Extension and Outreach publication AE 3550, "How to Sample Manure for Nutrient Analysis." The department may require documentation of the manure sampling protocol or take a split sample to verify the nutrient content of the operation's manure. If actual nitrogen and phosphorus are used for concentration in the MMP, actual manure production must also be used. Any sample used to estimate the concentration of manure must be less than four years old.

65.111(4) *Optimum crop yield and crop schedule.*

a. To determine the optimum crop yield, the applicant may either exclude the lowest crop yield for the period of the crop schedule in the determination or allow for a crop yield increase of 10 percent. In using these methods, adjustment to update yield averages to current yield levels may be made if it can be shown that the available yield data is not representative of current yields. The optimum crop yield shall be determined using any of the following methods for the cropland where the manure is to be applied:

(1) Soil survey interpretation record. The plan shall include a map showing soil map units for the fields where manure will be applied. The optimum crop yield for each field shall be determined by using the weighted average of the soil interpretation record yields for the soils on the cropland where the manure is to be applied. Soil interpretation records from NRCS shall be used to determine yields based on soil map units.

(2) USDA county crop yields. The plan shall use the county yield data from the USDA Iowa Agricultural Statistics Service.

(3) Proven yield methods. Proven yield methods may only be used if a minimum of the most recent three years of yield data for the crop is used. These yields can be proven on a field-by-field or farm-by-farm basis. To be considered a farm-by-farm basis, the fields must be owned, rented or leased for crop production by the person required to keep records pursuant to subrule 65.111(8) or included in a manure application agreement in that person's MMP. Crop disaster years may be excluded when there is a 30 percent or more reduction in yield for a particular field or farm from the average yield over the most recent five years. Excluded years shall be replaced by the most recent nondisaster years. Proven yield data used to determine application rates shall be maintained with the current MMP. Any of the following proven yield methods may be used:

1. Proven yields for USDA Farm Service Agency. The plan shall use proven yield data or verified yield data for Farm Service Agency programs.

2. Proven yields for multiperil crop insurance. Yields established for the purpose of purchasing multiperil crop insurance shall be used as proven yield data.

3. Proven yields from other methods. The plan shall use the proven yield data and indicate the method used in determining the proven yield.

b. Crop schedule. Crop schedules shall include the name and total acres of the planned crop on a field-by-field or farm-by-farm basis where manure application will be made. A map may be used to indicate crop schedules by field or farm. The planned crop schedule shall name the crop(s) planned to be grown for the length of the crop rotation beginning with the crop planned or actually grown during the year this plan is submitted or the first year manure will be applied. The confinement feeding operation owner shall not be penalized for exceeding the nitrogen or phosphorus application rate for an unplanned crop if crop schedules are altered because of weather, farm program changes, market factor changes, or other unforeseeable circumstances. However, the penalty preclusion in the previous sentence does not apply to a confinement feeding operation owner subject to the NPDES permit program.

65.111(5) *Location of manure application.*

a. The MMP shall identify each field where the manure will be applied, the number of acres that will be available for the application of manure from the confinement feeding operation, and the basis under which the land is available.

b. A copy of each written agreement executed with the owner of the land where manure will be applied shall be maintained with the current MMP. The written agreement shall indicate the number of acres on which manure from the confinement feeding operation may be applied and the length of the agreement. A written agreement is not required if the land is owned or rented for crop production by the owner of the confinement feeding operation. Owners of dry bedded confinement feeding operations required to have an MMP may execute a written agreement with the landowner or the person renting the land for crop production where the dry bedded manure will be applied.

65.111(6) *Soil loss calculations for phosphorus index.* The MMP shall indicate for each field in the plan the crop rotation, tillage practices and supporting practices used to calculate sheet and rill erosion for the phosphorus index. A copy of an NRCS RUSLE2 erosion calculation record shall satisfy this requirement. The plan shall also identify the highly erodible cropland where manure will be applied.

65.111(7) *Current MMP.* The owner of a confinement feeding operation who is required to submit an MMP shall maintain a current MMP at the site of the confinement feeding operation or at a residence or office of the owner or operator of the operation within 30 miles of the site. The MMP may be an electronic or hard copy. The MMP should include completed manure sales forms if the manure is sold. If manure management practices change, a person required to submit an MMP shall make appropriate changes consistent with this chapter. If values other than the standard table values are used for MMP calculations, the source of the values used shall be identified.

65.111(8) *Recordkeeping.* Records shall be maintained by the owner of a confinement feeding operation who is required to submit an MMP. Records shall be maintained for five years following the year of application or for the length of the crop rotation, whichever is greater. Records shall be maintained at the site of the confinement feeding operation or at a residence or office of the owner or operator of the facility within 30 miles of the site. Electronic records are acceptable in lieu of paper records at the facility or the office. Records to demonstrate compliance with the MMP shall include the following:

a. Factors used to calculate the manure application rate:

(1) Optimum yield for the planned crop.

(2) Types of nitrogen credits and amounts.

(3) Remaining crop nitrogen needed.

(4) Nitrogen and phosphorus concentration and first-year nitrogen availability of the manure. If an actual sample is used, documentation shall be provided.

b. If phosphorus-based application rates are used, the following shall be included:

(1) Crop rotation.

(2) Phosphorus removed by crop harvest of that crop rotation.

c. Maximum allowable manure application rate.

d. Actual manure application information:

(1) Methods of application when manure from the confinement feeding operation was applied.

(2) Date(s) when the manure from the confinement feeding operation was applied.

(3) Location of the field where the manure from the confinement feeding operation was applied, including the number of acres.

(4) The manure application rate.

e. The date(s) and application rate(s) of commercial nitrogen and phosphorus on fields that received manure. However, if the date and application rate information is for fields that are not owned for crop production or that are not rented or leased for crop production by the person required to keep records pursuant to this subrule, an enforcement action for noncompliance with an MMP or the requirements of this subrule shall not be pursued against the person required to keep records pursuant to this subrule or against any other person who relied on the date and application rate in records required to be kept pursuant to this subrule, unless that person knew or should have known that nitrogen or phosphorus would be applied in excess of maximum levels set forth in paragraph 65.111(1)*"a."* If manure is applied to fields not owned, rented or leased for crop production by the person required to keep records pursuant to this subrule, that person shall obtain from the person who owns, rents or leases those fields a statement specifying the planned commercial nitrogen and phosphorus fertilizer rates to be applied to each field receiving the manure.

f. A copy of the current soil test lab results for each field in the MMP.

g. For sales of manure under paragraph 65.111(15)*"b,"* recordkeeping requirements of subparagraph 65.111(15)*"b"*(7) shall be followed.

h. The name and certification number of the certified manure applicator.

65.111(9) *Record inspection.* The department may inspect a confinement feeding operation at any time during normal working hours and may inspect the MMP and any records required to be maintained. As required in Iowa Code section 459.312(12), Iowa Code chapter 22 shall not apply to the records which shall be kept confidential by the department and its agents and employees. The contents of the records are not subject to disclosure except as follows:

a. Upon waiver by the owner of the confinement feeding operation.

b. In an action or administrative proceeding commenced under this chapter. Any hearing related to the action or proceeding shall be closed.

c. When required by subpoena or court order.

65.111(10) *Enforcement action.* An owner required to provide the department an MMP pursuant to this rule who fails to provide the department an MMP or who is found in violation of the terms and conditions of the MMP shall not be subject to an enforcement action other than assessment of a civil penalty pursuant to Iowa Code section 455B.191.

65.111(11) *Soil sampling requirements for fields where the phosphorus index must be used.* Soil samples shall be obtained from each field in the MMP, and the soil samples shall be four years old or less. Each soil sample shall be analyzed for phosphorus and pH. The soil sampling protocol shall meet all of the following requirements:

a. Acceptable soil sampling strategies include but are not limited to grid sampling, management zone sampling, and soil type sampling. Procedural details can be taken from Iowa State University Extension and Outreach publication CROP 31-8, "Take a Good Soil Sample to Help Make Good Fertilization Decisions," NCR-13 Report 348, "Soil Sampling for Variable-Rate Fertilizer and Lime Application," effective January 1, 2001, or other credible soil sampling publications.

b. Each soil sample must be a composite of at least ten soil cores from the sampling area, with each core containing soil from the top six inches of the soil profile.

c. Each soil sample shall represent no more than ten acres. For fields less than or equal to 15 acres, only one soil sample is necessary.

d. Soil analysis must be performed by a lab enrolled in the Iowa department of agriculture and land stewardship (IDALS) soil testing certification program.

e. The soil phosphorus test method must be an appropriate method for use with the phosphorus index. If soil pH is greater than or equal to 7.4, soil phosphorus data from the Bray-1 extraction method is not acceptable for use with the phosphorus index.

f. If manure is applied as phosphorus-based rates within soil sampling periods, each soil sample may represent up to 20 acres for the next required soil sampling.

65.111(12) *Use of the phosphorus index.* Manure application rates shall be determined in conjunction with the use of the Iowa Phosphorus Index as specified by NRCS Iowa Technical Note No. 25 Iowa Phosphorus Index.

a. When sheet and rill erosion is calculated for the Iowa Phosphorus Index, the soil map unit used for the calculation shall be the predominant soil map unit of the steepest slope class that comprises at least 10 percent of the total field area. For fields less than 25 acres in size, the predominant soil map unit of the steepest slope class that comprises at least 20 percent of the total field area shall be used. In all MMPs submitted to the department for approval, the soil map unit used for the sheet and rill erosion calculation will be consistent with NRCS Iowa Agronomy

Technical Note No. 29 Dominant Critical Area. For the calculations of ephemeral gullies, the provisions of NRCS Iowa Technical Note No. 25 Iowa Phosphorus Index with in-field measurement or estimates from review of at least four aerial photographs shall be used. If aerial photographs are used for the evaluation, aerial photography from the spring prior to crop canopy or fall after harvest must be included in the evaluation when available.

b. When sheet and rill erosion is calculated for the phosphorus index, the soil map unit used for the calculation shall be the predominant highly erodible soil map unit when planning for a highly erodible field and the predominant non-highly erodible soil map unit when planning for a non-highly erodible field. For the calculations of ephemeral gullies, the provisions of NRCS Iowa Technical Note No. 25 Iowa Phosphorus Index shall be used with: (1) supporting documents and spreadsheets or (2) aerial photographs from at least four separate years, with at least one of the photographs being from the most vulnerable time of the year.

c. The average (arithmetic mean) soil phosphorus concentration of a field shall be used in the phosphorus index.

d. Soil phosphorus concentration data is considered valid for use in the phosphorus index if the data is four years old or less and meets the requirements of subrule 65.111(11).

e. For an original MMP, previous soil sampling data that does not meet the requirements of subrule 65.111(11) may be used in the phosphorus index if the data is four years old or less. In the case of fields for which soil sampling data is used that does not meet the requirements of subrule 65.111(11), the fields must be soil-sampled according to the requirements of subrule 65.111(11) no more than one year after the original MMP is approved and an updated original MMP shall be submitted with the results of the new samples at the time of the next MMP update.

f. The following are the manure application rate requirements for fields that are assigned the phosphorus index site vulnerability ratings below as determined by the NRCS Iowa Technical Note No. 25 Iowa Phosphorus Index to the NRCS 590 standard rounded to the nearest one-hundredth:

(1) Very Low or Low (0-2). Manure shall not be applied in excess of a nitrogen-based rate in accordance with subrule 65.111(13).

(2) Medium (>2-5). Manure shall not be applied (1) in excess of two times the phosphorus removed with crop harvest over the period of the crop rotation or (2) to exceed the nitrogen-based rate of the planned crop receiving the particular manure application.

(3) High or Very High (>5). Manure shall not be applied on a field with a rating greater than 5.

g. Additional commercial fertilizer may be applied as follows on fields receiving manure:

(1) Phosphorus fertilizer may be applied in addition to phosphorus provided by the manure up to amounts recommended by soil tests and Iowa State University Extension and Outreach publication PM 1688, "A General Guide for Crop Nutrient and Limestone Recommendations in Iowa."

(2) Nitrogen fertilizer may be applied in addition to nitrogen provided by the manure to meet the remaining nitrogen need of the crop as calculated in the current MMP. Additional nitrogen fertilizer may be applied up to the amounts indicated by soil test nitrogen results or crop nitrogen test results as necessary to obtain the optimum crop yield.

h. Updating the phosphorus index.

(1) When any inputs to the phosphorus index change, an operation shall recalculate the phosphorus index and adjust the application rates if necessary.

(2) If additional land becomes available for manure application, the phosphorus index shall be calculated to determine the manure application rate before manure is applied.

(3) An operation must submit a complete MMP using a new phosphorus index, including soil sampling as required in subrule 65.111(11), for each field in the MMP a minimum of once every four years.

65.111(13) *Requirements for application of a nitrogen-based manure rate to a field.*

a. Nitrogen-based application rates shall be based on the total nitrogen content of the manure unless the calculations are submitted to show that nitrogen crop usage rates based on plant-available nitrogen have not been exceeded for the crop schedule submitted.

b. The correction factor for nitrogen losses shall be determined for the method of application by the following or from other credible sources for nitrogen volatilization correction factors.

Knifed in or soil injection of liquids	0.98
Surface-apply liquid or dry with incorporation within 24 hours	0.95
Surface-apply liquid or dry with incorporation after 24 hours	0.80
Surface-apply liquids with no incorporation	0.75

Surface-apply dry with no incorporation	0.70
Irrigated liquids with no incorporation	0.60

c. Nitrogen-based applications rates shall be based on the optimum crop yields as determined in subrule 65.111(4) and crop nitrogen usage rate factor values in Table 4 located at iowadnr.gov/afo/rules or other credible sources. The calculations of manure applied from the facility must account for fertilizer from all other manure and nonmanure sources. Liquid manure applied to land that is currently planted to soybeans or to land where the current crop has been harvested and that will be planted to soybeans the next crop season shall not exceed 100 pounds of available nitrogen per acre. Further, the 100-pounds-per-acre application limitation in the previous sentence does not apply on or after June 1 of each year; in that event, subrule 65.111(4) and Table 4 would apply as provided in the first sentence of this paragraph.

d. A nitrogen-based manure rate shall account for legume production in the year prior to growing corn or other grass crops and shall account for any planned commercial fertilizer application.

65.111(14) *Requirements for application of a phosphorus-based manure rate to a field.*

a. Phosphorus removal by harvest for each crop in the crop schedule shall be determined using the optimum crop yield as determined in subrule 65.111(4) and phosphorus removal rates of the harvested crop from Table 4a located at iowadnr.gov/afo/rules or other credible sources. Phosphorus crop removal shall be determined by multiplying optimum crop yield by the phosphorus removal rate of the harvested crop.

b. Phosphorus removal by the crop schedule shall be determined by summing the phosphorus crop removal values determined in paragraph 65.111(14)*"a"* for each crop in the crop schedule.

c. The phosphorus applied over the duration of the crop schedule shall be less than or equal to the phosphorus removed with harvest during that crop schedule as calculated in paragraph 65.111(14)*"b"* unless additional phosphorus is recommended by soil tests and Iowa State University Extension and Outreach publication PM 1688, "A General Guide for Crop Nutrient and Limestone Recommendations in Iowa."

d. Additional requirements for phosphorus-based rates.

(1) No single manure application shall exceed the nitrogen-based rate of the planned crop receiving the particular manure application.

(2) No single manure application shall exceed the rate that applies to the expected amount of phosphorus removed with harvest by the next four anticipated crops in the crop schedule.

e. If the actual crop schedule differs from the planned crop schedule, then any surplus or deficit of phosphorus shall be accounted for in the subsequent manure application.

f. Phosphorus in manure should be considered 100 percent available unless soil phosphorus concentrations are below optimum levels for crop production. If soil phosphorus concentrations are below optimum levels for crop production phosphorus availability, values suggested in Iowa State University Extension and Outreach publication PMR 1003, "Using Manure Nutrients for Crop Production" or other credible sources shall be used.

65.111(15) *MMPs for sales of manure.* Selling manure means the transfer of ownership of the manure for monetary or other valuable consideration. Selling manure does not include a transaction where the consideration is the value of the manure or where an easement, lease or other agreement granting the right to use the land only for manure application is executed.

a. Confinement feeding operations that will sell dry manure as a commercial fertilizer or soil conditioner regulated by IDALS under Iowa Code chapter 200 or bulk dry manure animal nutrient product regulated by IDALS under Iowa Code chapter 200A shall submit a copy of their site-specific IDALS license or documentation that manure will be sold pursuant to Iowa Code chapter 200 or 200A, along with the department-approved MMP form for sales of dry manure. Operations completely covered by this paragraph are not required to meet other MMP requirements in this rule.

b. A confinement feeding operation not fully covered by paragraph 65.111(15)*"a"* that has an established practice of selling manure, or a confinement feeding operation that contains an animal species for which selling manure is a common practice, shall submit an MMP that includes the following:

(1) An estimate of the number of acres required for manure application calculated by one of the following methods:

1. Dividing the total phosphorus (as P_2O_5) available to be applied from the confinement feeding operation by the corn crop removal of phosphorus. The corn crop removal of phosphorus may be estimated by using the phosphorus removal rate in Table 4a located at iowadnr.gov/afo/rules and an estimate of the optimum crop yield for the property in the vicinity of the operation.

2. Totaling the quantity of manure that can be applied to each available field based on application rates determined in conjunction with the phosphorus index in accordance with subrule 65.111(12), and ensuring that the total quantity that can be applied is equal to or exceeds the manure annually generated at the operation.

(2) The total nitrogen available to be applied from the confinement feeding operation.

(3) The total phosphorus (as P2O5) available to be applied from the confinement feeding operation if the phosphorus index is required in accordance with paragraph 65.111(1)*"c."*

(4) An estimate of the annual animal production and manure volume or weight produced.

(5) A manure sales form. If manure will be sold, the manure sales form shall include the following information:

1. A place for the name and address of the buyer of the manure.
2. A place for the quantity of manure purchased.
3. The planned crop schedule and optimum crop yields.
4. A place for the manure application methods and the timing of manure application.
5. A place for the location of the field, including the number of acres where the manure will be applied.
6. A place for the manure application rate.
7. A place for a phosphorus index of each field receiving manure, as defined in paragraph 65.111(12)*"a,"* including the factors used in the calculation. A copy of the NRCS phosphorus index detailed report shall satisfy the requirement to include the factors used in the calculation.

(6) Statements of intent if the manure will be sold. The number of acres indicated in the statements of intent shall be sufficient according to the MMP to apply the manure from the confinement feeding operation. The permit holder for an existing confinement feeding operation with a construction permit may submit past records of manure sales instead of statements of intent. The statements of intent shall include the following information:

1. The name and address of the person signing the statement.
2. A statement indicating the intent of the person to purchase the confinement feeding operation's manure.
3. The location of the farm where the manure can be applied, including the total number of acres available for manure application.
4. The signature of the person who may purchase the confinement feeding operation's manure.

(7) The owner shall maintain in the owner's records a current MMP and copies of all of the manure sales forms, the sales forms must be completed and signed by each buyer of the manure and the applicant, and the copies must be maintained in the owner's records for three years after each sale. The owner shall maintain in the owner's records copies of all of the manure sales forms for five years after each sale. An owner of a confinement feeding operation shall not be required to maintain current statements of intent as part of the MMP.

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