

COMMERCIAL NITROGEN APPLICATION PRACTICES

Here, we are looking at how nitrogen from commercial fertilizer is being applied, how timing and methods are changing and how those adjustments tie into nutrient-loss goals. Managing nitrogen is a key part of the Nutrient Reduction Strategy since excess nitrogen contributes to water quality challenges. The “4Rs” approach (right rate, right source, right time, right place) guides this effort. Survey data shows nitrogen rates holding steady, which suggests farmers are applying

responsibly and following best practices. Even small year-to-year changes can point to larger factors, such as fertilizer price swings, yield expectations, soil nitrogen levels or weather challenges like wet or dry springs. Nitrification inhibitor adoption is strong, protecting fall applied nitrogen from loss. Timing can vary with weather and fertilizer prices but spring is the most widely used application time with a variety of combinations of fall, spring and in-season timing used.

Commercial Nitrogen Application Practices Percentage	2017	2018	2019	2020	2021	2022	2023	2024	Average
Fall anhydrous ammonia applied	38.9%	24.1%	23.5%	28.9%	43.1%	50.3%	49.5%	42.0%	37.5%
EPA-labeled inhibitor with fall anhydrous ammonia	-	-	-	-	-	-	63.1%	62.0%	62.6%
Nitrapyrin inhibitor with fall anhydrous ammonia	72.6%	73.9%	84.8%	83.8%	86.0%	64.7%	-	-	77.6%
Fall only	NA	NA	14.0%	17.4%	22.4%	27.8%	34.7%	23.9%	23.4%
Spring pre-plant only	42.1%	56.3%	50.9%	46.7%	40.3%	33.8%	36.5%	41.9%	43.6%
Spring pre-plant & in-season	9.9%	15.4%	16.9%	13.8%	13.2%	14.5%	10.5%	12.3%	13.3%
In-season only	2.1%	1.1%	1.1%	3.8%	1.7%	1.0%	2.5%	1.8%	1.9%
Fall & spring pre-plant	NA	NA	11.6%	9.7%	14.3%	14.4%	10.2%	10.7%	11.8%
Fall & in-season	NA	NA	3.2%	5.4%	4.7%	6.1%	3.7%	8.0%	5.2%
Fall & spring & in-season	NA	NA	2.3%	3.2%	3.4%	2.3%	2.0%	1.4%	2.4%
Variable rate applied	NA	NA	8.7%	10.1%	16.1%	9.8%	15.2%	12.2%	12.0%

Commercial Nitrogen Application Practices Acres*	2017	2018	2019	2020	2021	2022	2023	2024	Average
Fall anhydrous ammonia applied	5,139,823	3,135,942	3,207,397	3,986,410	5,528,388	6,381,504	6,338,492	5,494,538	4,901,562
EPA-labeled inhibitor with fall anhydrous ammonia	-	-	-	-	-	-	3,999,588	3,406,614	3,703,101
Nitrapyrin inhibitor with fall anhydrous ammonia	3,731,512	2,317,461	2,719,872	3,340,611	4,754,414	4,128,833	-	-	3,498,784
Fall only	NA	NA	1,910,790	2,400,122	2,873,222	3,526,954	4,443,347	3,126,654	3,046,848
Spring pre-plant only	5,562,636	7,325,873	6,947,085	6,441,707	5,169,235	4,288,167	4,673,837	5,481,456	5,736,250
Spring pre-plant & in-season	1,308,078	2,003,880	2,306,596	1,903,545	1,693,149	1,839,598	1,344,529	1,609,115	1,751,061
In-season only	277,471	143,134	150,133	524,165	219,340	126,869	320,126	235,480	249,590
Fall & spring pre-plant	NA	NA	1,583,226	1,337,999	1,834,245	1,826,912	1,306,113	1,399,799	1,548,049
Fall & in-season	NA	NA	436,752	744,865	602,864	773,900	473,786	1,046,579	679,791
Fall & spring & in-season	NA	NA	313,915	441,402	436,114	291,798	256,101	183,151	320,414
Variable rate applied	NA	NA	1,187,419	1,393,174	2,065,129	1,243,315	1,946,365	1,596,033	1,571,906

PHOSPHORUS APPLICATION PRACTICES

When we look at this category, we see the methods of application, the use of soil testing and how practices have evolved over time.

Targeted applications, such as commercial phosphorus incorporated with the planter, knifed bands or liquid injection, are less common but show modest adoption, with variability by year and field conditions. Some type of incorporation

is the best practice to reduce soil erosion and phosphorus loss. Soil testing remains central to phosphorus management, with nearly 80% of fields tested for phosphorus, and most applications occurring when soil-test levels are at or below optimum, ensuring efficient use of nutrients and minimizing environmental impact.

Phosphorus Application Practices Percentage	2017	2018	2019	2020	2021	2022	2023	2024	Average
Commercial P incorporated with planter	11.0%	3.8%	1.2%	2.7%	0.6%	0.7%	1.6%	0.9%	2.8%
Commercial P applied in knifed bands	2.9%	2.7%	2.7%	2.3%	2.7%	1.1%	4.0%	6.6%	3.1%
Commercial P broadcast & incorporated in 1 week	47.0%	70.3%	69.1%	40.4%	43.2%	37.9%	31.4%	31.6%	46.4%
Liquid P (commercial/manure) injected	1.8%	3.8%	8.9%	7.8%	5.0%	6.8%	5.6%	1.8%	5.2%
Other P application type (unincorporated)	37.4%	19.5%	18.1%	46.0%	48.4%	53.5%	57.4%	59.2%	42.4%
Variable rate applied	NA	NA	49.6%	45.7%	57.0%	52.8%	61.5%	58.3%	54.2%
Soil testing for P	81.2%	72.1%	85.5%	80.6%	81.2%	79.6%	82.2%	77.1%	79.9%
P application when at or below optimum levels	74.3%	94.4%	94.3%	99.1%	98.2%	95.4%	91.0%	94.9%	92.7%

Phosphorus Application Practices Acres*	2017	2018	2019	2020	2021	2022	2023	2024	Average
Commercial P incorporated with planter	2,529,464	872,820	275,084	630,389	137,863	159,133	362,482	208,898	647,017
Commercial P applied in knifed bands	666,859	620,161	618,940	536,998	620,385	250,066	906,206	1,531,917	718,941
Commercial P broadcast & incorporated in 1 week	10,807,710	16,147,166	15,840,270	9,432,484	9,926,155	8,615,897	7,113,713	7,334,631	10,652,253
Liquid P (commercial/manure) injected	413,912	872,820	2,040,208	1,821,123	1,148,861	1,545,860	1,268,688	417,795	1,191,158
Other P application type (unincorporated)	8,600,178	4,478,943	4,149,188	10,739,957	11,120,970	12,162,282	13,004,049	13,740,827	9,749,549
Variable rate applied	NA	NA	11,370,150	10,669,914	13,097,010	12,003,149	13,932,910	13,531,930	12,434,177
Soil testing for P	18,672,044	16,560,606	19,599,755	18,818,273	18,657,495	18,095,657	18,622,523	17,895,571	18,365,241
P application when at or below optimum levels	13,873,329	15,633,212	18,482,569	18,648,908	18,321,660	17,263,256	16,946,496	16,982,897	17,019,041

Data Notes:

* These numbers are extrapolated using USDA's corn and soybean acre numbers across Iowa.

** Years without data reflect how survey questions evolve with the NRS science assessment as practices are added or refined.

Out of the 600+ agricultural retailers in Iowa, 150 retail locations are selected at random and stratified across eight major land resource areas based on the percentage of row crops each year. About 1,000 of the potential 1,500 surveys are completed, ensuring oversampling of Iowa State University's target of 500 surveys for statistical significance. INREC aggregates the data to ensure confidentiality, and the Iowa State University Center of Survey Statistics Methodology extrapolates the data for statewide adoption. Iowa State University models nutrient load reduction based on performances documented in the NRS science assessment.

MANURE PRACTICES

These numbers reflect how manure is being used, including how many acres receive it, what types are applied and when applications occur. Manure remains a key nutrient source for Iowa farmers, providing nitrogen, phosphorus and organic matter that feed the soil.

Fall application is still the most common, although spring application is slowly increasing as farmers look to better match nutrient release with crop needs. While Iowa is a large producer of livestock, approximately 80% of the corn acres receive no manure.

Manure Practices Percentage	2017	2018	2019	2020	2021	2022	2023	2024	Average
No manure used	81.5%	81.4%	80.8%	82.0%	79.7%	78.8%	76.5%	77.5%	79.8%
Beef manure used	6.8%	10.3%	8.8%	6.3%	9.5%	9.0%	11.8%	10.2%	9.1%
Beef & liquid swine manure used	0.0%	0.0%	0.3%	0.1%	0.1%	0.2%	0.4%	0.1%	0.2%
Liquid swine manure used	7.6%	5.4%	7.4%	8.1%	8.1%	8.9%	8.3%	7.9%	7.7%
Poultry manure used	1.6%	1.7%	1.9%	1.2%	1.6%	1.4%	1.7%	0.9%	1.5%
Dairy manure used	2.5%	1.1%	0.8%	2.1%	1.1%	1.7%	1.5%	3.3%	1.8%
Liquid swine manure fall applied	94.7%	84.2%	78.5%	87.3%	82.4%	91.8%	83.1%	91.2%	86.7%
Liquid swine manure spring applied	1.8%	2.5%	11.7%	3.4%	7.0%	4.7%	5.6%	0.0%	4.6%
Liquid swine manure fall & spring applied	3.5%	13.3%	9.9%	9.4%	10.6%	3.6%	11.3%	8.8%	8.8%

Manure Practices Acres*	2017	2018	2019	2020	2021	2022	2023	2024	Average
No manure used	10,768,524	10,591,936	11,027,986	11,310,920	10,223,028	9,997,266	9,795,851	10,138,731	10,481,780
Beef manure used	898,478	1,340,257	1,201,068	869,010	1,218,554	1,141,820	1,510,994	1,334,388	1,189,321
Beef & liquid swine manure used	0	0	40,945	13,794	12,827	25,374	51,220	13,082	19,655
Liquid swine manure used	1,004,181	702,659	1,009,989	1,117,298	1,038,978	1,129,133	1,062,818	1,033,496	1,012,319
Poultry manure used	211,407	221,208	259,321	165,526	205,230	177,616	217,686	117,740	196,967
Dairy manure used	330,323	143,134	109,188	289,670	141,096	215,677	192,076	431,714	231,610
Liquid swine manure fall applied	950,960	591,639	792,841	975,401	856,118	1,036,544	883,202	942,549	878,657
Liquid swine manure spring applied	18,075	17,566	118,169	37,988	72,728	53,069	59,518	0	47,139
Liquid swine manure fall & spring applied	35,146	93,454	99,989	105,026	110,132	40,649	120,098	90,948	86,930

COMMERCIAL ONLY NITROGEN RATES

When we look at commercial-only nitrogen rates, we're talking about fertilizer that comes strictly from commercial sources—no manure inputs. Since 2017, those rates have stayed fairly steady. That tells us farmers are applying what the crop needs, not more, not less. It also shows a good balance between increasing yields and protecting water quality.

Commercial Only Nitrogen Rates (lb/ac)	2017	2018	2019	2020	2021	2022	2023	2024	Average
Average N rate on corn following soy in rotation	170.0	172.3	177.5	183.4	170.9	173.4	166.6	179.2	174.2
Average N rate on continuous corn	200.4	201.9	200.4	208.9	199.9	192.6	185.7	205.0	199.4

SOIL TEST P LEVELS

This section shows the statewide average of soil test phosphorus levels across the three most common soil testing methods. Monitoring soil-test phosphorus helps ensure fertilizer is applied only where needed, supporting both yield and environmental goals.

Soil Test P Levels	2022	2023	2024	Average
Average Bray-P1 (ppm)	31.2	34.4	33.7	33.1
Average Olsen (ppm)		20.9	28.8	24.9
Average Melich-3 (ppm)	36.1	34.1	41.9	37.4

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