

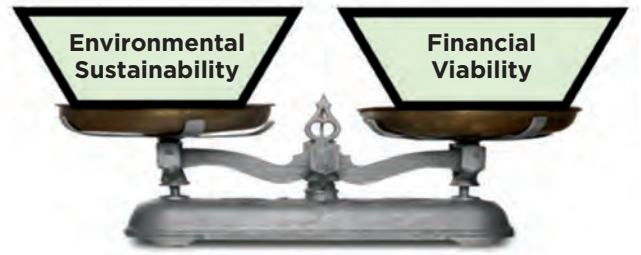
# INFLUENCE OF INTENSIFIED ENVIRONMENTAL PRACTICES ON FARM PROFITABILITY



APRIL | 2023



# EXPLORING THE IMPACT OF SELECTED PRACTICES ON FARM ECONOMICS



## Farmer Balancing Act

There are costs and benefits from implementing farm practices that exceed normal practices to provide greater support in environmental sustainability. Decisions to implement new practices are impacted by the balancing act of Environmental Sustainability and Financial Viability, as shown to the right.

### ***A Closer Look and new Understandings***

This report is now in its 4th year. Last year, data from a pre and post-study comparison showed that the farmers in the Environmental Cohort, who had analysis data for six continuous years, had a financial advantage over the FBM Database Average before this study began. This suggests that becoming water quality certified did not result in greater income, but rather recognizes that those producers who achieve water quality certification have a management style that enhances profitability. It is important to recognize that a comparison of farmers who are new to this dataset, or have not had continuous data in the database, may provide a modified view of the pre and post-study data. Therefore this data does have limitations due to the sample size and the difficulty of placing a value on its generalizability up to this point. This report moves forward with those understandings and expands to a 4-year, side-by-side comparison of demographics, financial indicators, and enterprise data for these two groups.

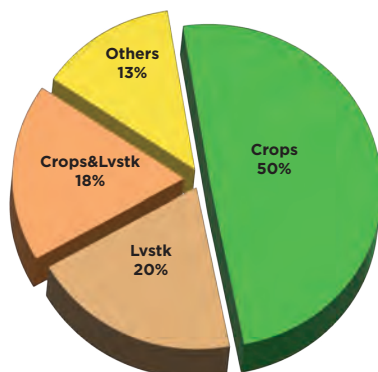
### ***Demographics***

The 2022 MN FBM state database includes data from 2,154 producers who participate in the Minnesota State Farm Business Management Education (FBM) program. The Environmental Cohort consists of 101 of those producers in 2022, up from 94 in 2021. The chart below illustrates that the Environmental

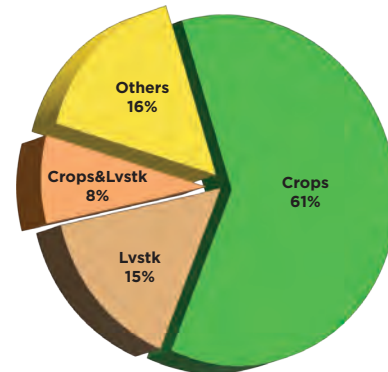
Cohort continues to represent a similar demographic to that found in the FBM state database, but this cohort does include more livestock enterprises. Even with that difference, it suggests that the decision to seek Water Quality Certification is more likely a management decision than a situational decision.

<b><u>Demographics</u></b>	<b>2019</b>		<b>2020</b>		<b>2021</b>		<b>2022</b>	
	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.
Number of Farms	53	2167	64	2246	94	2293	101	2154
Total Crop Acres per Farm	666	775	774	786	742	781	831	808
Total Crop Acres/Cohort	35,298	1,679,425	49,536	1,765,356	69,748	1,790,833	83,931	1,740,432
Age of Operator	49.0	47.1	48.1	46.9	46.9	47.0	48.3	47.2
Years Farming	24.8	23.0	23.3	22.7	21.7	22.8	23.3	23.0
Beginning Farmers (<10 yrs)	7	629	12	669	24	698	23	623

Type of Farm  
Environmental Cohort



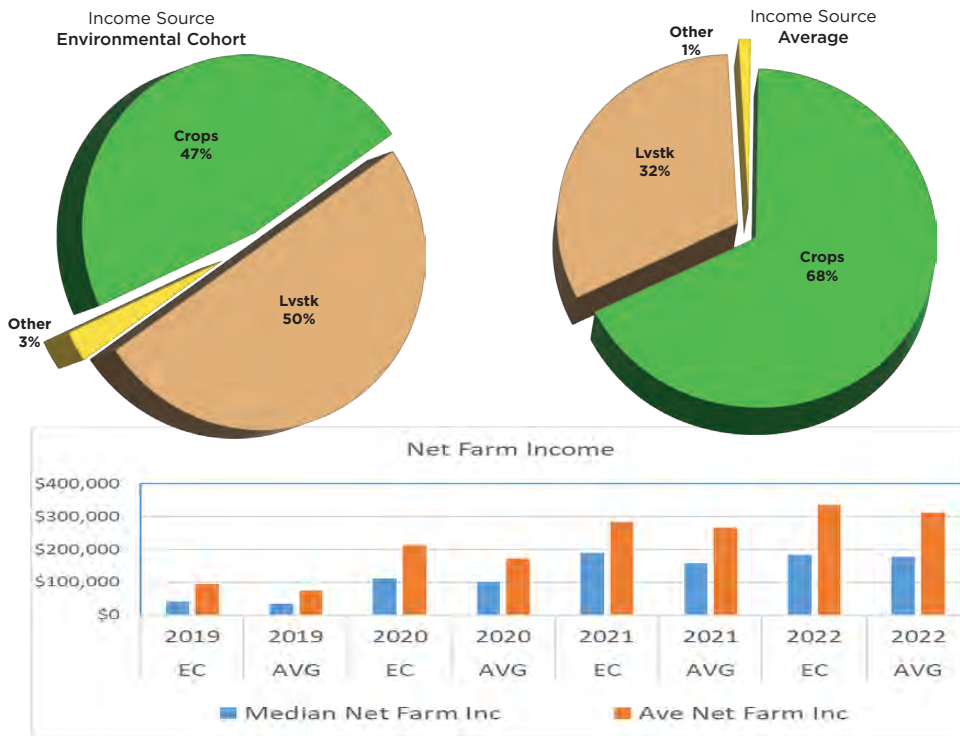
Type of Farm  
Average



**Financials At-A-Glance**

A limited number of factors were selected to provide a brief financial overview for this report. On the income side, the data again shows that the Environmental Cohort generated more gross cash farm income than the State FBM database average. The data also shows that the Environmental Cohort farms generated more income from livestock.

Income Statement	2019		2020		2021		2022	
	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.
Gross Cash Farm Income	\$801,282	\$744,078	\$997,573	\$834,622	\$1,186,121	\$960,023	\$1,397,679	\$1,092,140
<i>Gross Crop Income</i>	\$288,110	\$339,431	\$271,276	\$351,453	\$418,556	\$468,446	\$663,282	\$737,713
<i>Gross Livestock Income</i>	\$342,249	\$257,226	\$497,272	\$273,958	\$580,741	\$310,291	\$694,317	\$345,456
<i>Other Income</i>	\$170,923	\$147,421	\$229,025	\$209,211	\$186,824	\$181,286	\$40,080	\$8,971
Total Cash Farm Expense	\$658,545	\$645,752	\$751,565	\$697,094	\$978,394	\$777,556	\$1,138,814	\$893,176
Net Cash Income	\$142,737	\$98,326	\$246,008	\$137,529	\$207,727	\$182,467	\$258,866	\$198,964
Inv Chg, Deprec, Cap Sales	-\$49,916	-\$24,683	-\$33,116	\$35,158	\$76,449	\$84,912	\$75,926	\$112,288
Average Net Farm Income	\$92,821	\$73,643	\$212,892	\$172,687	\$284,176	\$267,379	\$334,792	\$311,252
Median Net Farm Income	\$40,008	\$33,377	\$111,406	\$100,684	\$190,142	\$158,294	\$183,787	\$176,616



Along with the greater gross farm income, the Environmental Cohort farms incurred more cash farm expenses than the Average farm in all four years. The Net Farm Income for the Environmental Cohort again increased significantly to \$334,792 in 2022, slightly above the \$311,252 for the Average farm. Median Net Farm Income, however, was down slightly at \$183,787, compared to an increase for the average to \$176,616. This is the first year of a lower income level in either the Average or the Median since the beginning of this study in 2019.

Based on the first four years of data, the Environmental Cohort farms have a larger asset value and have a larger net worth on the Market Value Balance Sheet. The owned and lender supported portion of total assets is shown below.

Balance Sheet (Market)	2019		2020		2021		2022	
	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.
Total Assets	\$3,293,907	\$2,232,039	\$3,614,299	\$3,059,297	\$3,687,907	\$3,361,681	\$4,018,685	\$3,791,346
Total Liabilities	\$1,293,840	\$998,798	\$1,258,005	\$1,293,631	\$1,404,700	\$1,399,648	\$1,508,376	\$1,552,675
Net Worth	\$2,000,067	\$1,233,241	\$2,356,294	\$1,765,666	\$2,283,207	\$1,962,033	\$2,510,309	\$2,238,671

The Working Capital as a % of Gross Farm Expense has been higher for the Environmental Cohort until 2022 when the Average was slightly stronger. Farms in the Environmental Cohort continue to have a slightly stronger Debt to Asset Ratio, at 40% in 2022, compared to the database average of 43%. The Debt Coverage

<b>Selected Measures</b>	<b>2019</b>		<b>2020</b>		<b>2021</b>		<b>2022</b>	
	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.
Working Capital as % of Exp.	-	-	63.3%	43.8%	63.1%	50.3%	67.8%	68.1%
Farm Debt to Asset Ratio	43.0%	46.0%	37.0%	45.0%	41.0%	44.0%	40.0%	43.0%
Debt Coverage Ratio	-	-	3.00	2.22	3.41	2.51	3.48	3.35
Operating Expense Ratio	75.3%	79.3%	68.5%	71.0%	70.8%	67.0%	71.4%	67.5%

Ratio has increased steadily since 2020, with the Environmental Cohort ratio being slightly stronger each year. Operating Expense Ratio weakened for both cohorts in 2022, with the overall Average ratio being slightly stronger.



### **Crop Production Costs At-A-Glance**

There are four production costs that would be expected to have a higher correlation to the addition of the intensified environmental practices used by the Environmental Cohort. Those costs are listed in the Selected Costs table to illustrate differences. On a per

acre basis, since 2019, each group had costs that were lower and higher in a given year. This trend continues in 2022, where the Environmental Cohort continued to have a lower fertilizer and chemical cost per acre, while the FBM database average continued to show a lower fuel & oil and seed cost.

<b>Selected Costs</b>	<b>2019</b>		<b>2020</b>		<b>2021</b>		<b>2022</b>	
	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.	Environ. Cohort	Database Avg.
Seed Cost / crop acre	\$74.50	\$73.05	\$72.64	\$79.41	\$85.08	\$79.45	\$87.80	\$86.72
Fertilizer Cost / crop acre	\$70.26	\$73.75	\$69.58	\$81.28	\$111.53	\$111.65	\$129.44	\$145.59
Chemical Cost / crop acre	\$32.64	\$37.87	\$32.45	\$42.73	\$46.01	\$48.51	\$59.41	\$63.29
Fuel and Oil Cost / crop acre	\$33.29	\$32.68	\$30.24	\$29.09	\$50.81	\$36.12	\$58.81	\$53.18

### **Crop Enterprises At-A-Glance**

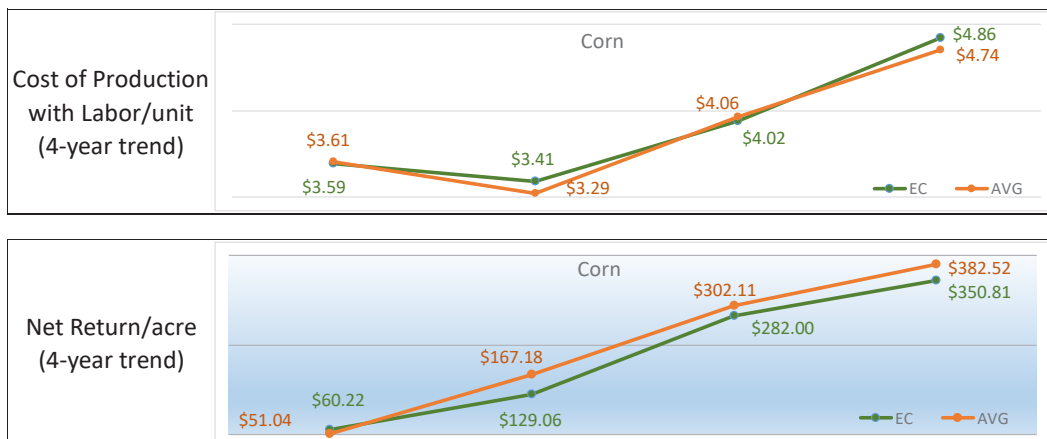
Four traditional crop enterprises were again selected from those raised by producers in each group: Corn, Soybeans, Corn Silage, and Alfalfa Hay. Selected expenses and management factors from each crop

enterprise table are listed in the 4-year summary table for each crop. Below each table is a 4-year trend comparison of the Net Return per acre and the Cost of Production with Labor per unit.

<b>Crop Enterprises</b>	<b>Corn</b>							
	<b>2019</b>		<b>2020</b>		<b>2021</b>		<b>2022</b>	
	<b>EC</b>	<b>AVG</b>	<b>EC</b>	<b>AVG</b>	<b>EC</b>	<b>AVG</b>	<b>EC</b>	<b>AVG</b>
Owned & Rented Acres Combined								
Number of Farms	37	1,394	45	1,447	50	1,435	70	1,425
Yield per acre	184.2	178.8	190.9	199.6	190.2	186.2	198.0	203.8
Seed Expense/acre	\$98.08	\$107.65	\$99.96	\$104.28	\$111.44	\$105.37	\$109.44	\$111.81
Fertilizer Expense/acre	\$118.70	\$128.31	\$125.10	\$125.76	\$156.01	\$137.97	\$208.12	\$217.74
Chemical Expense/acre	\$37.05	\$35.76	\$37.17	\$35.77	\$42.11	\$38.93	\$51.96	\$52.25
Fuel & Oil Expense/acre	\$23.66	\$25.63	\$17.74	\$21.48	\$26.82	\$26.61	\$39.82	\$39.89
Total dir & ovhd exp/ac	\$736.01	\$702.43	\$695.88	\$697.03	\$737.28	\$730.85	\$902.91	\$905.46
Net Return/acre	\$60.22	\$51.04	\$129.06	\$167.18	\$282.00	\$302.11	\$350.81	\$382.52
Machinery Cost/acre	\$149.90	\$136.66	\$156.59	\$140.19	\$165.99	\$152.98	\$197.61	\$185.71
Cost of Prod w Lbr/unit	\$3.59	\$3.61	\$3.41	\$3.29	\$4.02	\$4.06	\$4.86	\$4.74

## Corn

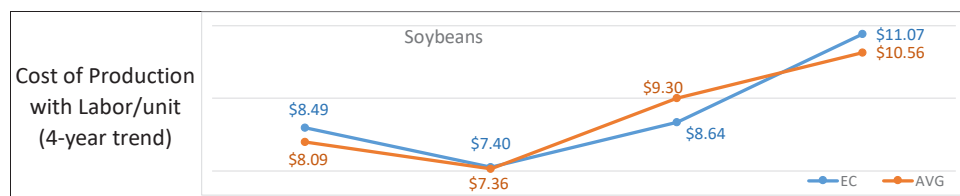
The data for Corn on the previous page shows that yields and direct expenses are higher for the Environmental Cohort in some years and higher for the FBM Database Average in other years, suggesting that there is generally no ongoing cost-saving benefit to one set of practices vs the other. The Cost of Production chart illustrates this situation. The one factor that shows a consistent 4-year trend is the Machinery Cost per acre, where the FBM Database Average is lower than the Environmental Cohort. For 2020-2022, the FBM Database Average has the advantage of a higher Net Return per acre, as shown on the Net Return chart.



## Soybeans

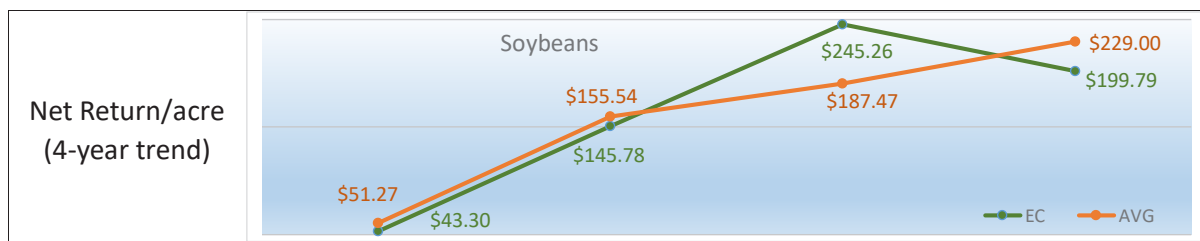
The data for Soybeans below again shows that yields and direct expenses are higher for the Environmental Cohort in some years and higher for the FBM Database Average in other years, suggesting that there is generally no ongoing cost-saving benefit to one set of practices vs the other for Soybeans as well. The one factor that shows a consistent 4-year trend is Total Direct and Overhead Costs per acre, where the FBM Database Average is slightly lower than the Environmental Cohort.

Crop Enterprises Owned & Rented Acres Combined	Soybeans							
	2019		2020		2021		2022	
	EC	AVG	EC	AVG	EC	AVG	EC	AVG
Number of Farms	31	1,286	38	1,313	49	1,344	59	1,342
Yield per acre	50.9	46.3	53.5	52.6	56.4	49.1	51.2	53.0
Seed Expense/acre	\$50.73	\$57.05	\$54.72	\$53.69	\$52.47	\$54.29	\$55.19	\$56.60
Fertilizer Expense/acre	\$25.12	\$22.19	\$28.29	\$20.53	\$37.76	\$24.49	\$38.73	\$34.07
Chemical Expense/acre	\$46.71	\$40.33	\$45.83	\$43.09	\$55.00	\$47.28	\$61.49	\$61.88
Fuel & Oil Expense/acre	\$16.00	\$16.03	\$10.99	\$13.46	\$16.01	\$16.13	\$22.71	\$24.39
Total dir & ovhd exp/ac	\$489.06	\$426.28	\$454.33	\$430.48	\$475.63	\$452.07	\$529.83	\$528.25
Net Return/acre	\$43.30	\$51.27	\$145.78	\$155.54	\$245.26	\$187.47	\$199.79	\$229.00
Machinery Cost/acre	\$102.49	\$87.68	\$97.99	\$89.39	\$105.40	\$95.22	\$113.22	\$114.42
Cost of Prod w Lbr/unit	\$8.49	\$8.09	\$7.40	\$7.36	\$8.64	\$9.30	\$11.07	\$10.56



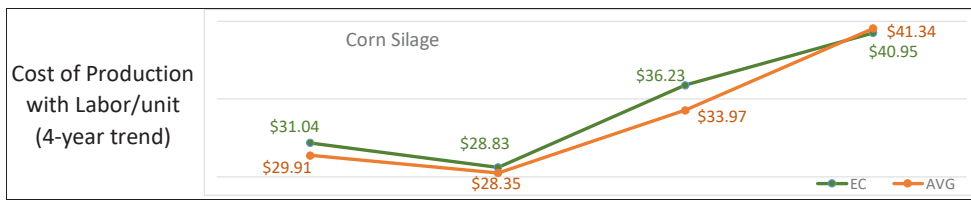
This Cost of Production chart illustrates that production practices for these two groups result in total Costs of Production that are very similar over time.

For the 4-year comparison, the FBM Database Average has the advantage of a higher Net Return per acre, for three out of four years. The largest single year advantage, however, was for 2021 when the Environmental Cohort had greater Net Return per acre.

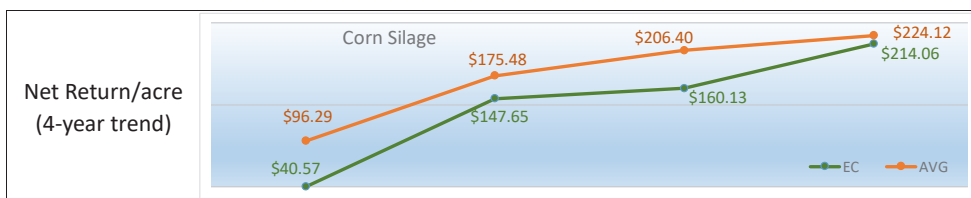


In the table below, yields for corn silage were similar each year while selected expenses and returns varied by group and by year. For the four selected direct expenses, other than 2020, the Environmental Cohort shows less chemical and fuel & oil expense per acre. The Database Average generally has the advantage in most factors and a greater net return each year.

Crop Enterprises Owned & Rented Acres Combined	Corn Silage							
	2019		2020		2021		2022	
	EC	AVG	EC	AVG	EC	AVG	EC	AVG
Number of Farms	16	354	17	369	27	384	26	339
Yield per acre	20.4	20.5	21.8	22.8	17.6	18.3	22.0	21.2
Seed Expense/acre	\$97.54	\$109.86	\$105.57	\$100.75	\$101.34	\$99.84	\$109.68	\$109.40
Fertilizer Expense/ac	\$76.66	\$96.76	\$85.51	\$92.25	\$91.90	\$106.03	\$161.52	\$152.72
Chemical Expense/ac	\$35.88	\$38.50	\$37.15	\$36.38	\$38.19	\$40.63	\$51.17	\$53.58
Fuel & Oil Expense/ac	\$30.64	\$38.55	\$32.43	\$28.65	\$30.43	\$32.59	\$48.56	\$52.28
Total dir & ovhd exp/ac	\$651.96	\$652.35	\$647.34	\$680.07	\$705.10	\$691.16	\$870.39	\$840.01
Net Return/acre	\$40.57	\$96.29	\$147.65	\$175.48	\$160.13	\$206.40	\$214.06	\$224.12
Machinery Cost/acre	\$198.66	\$204.39	\$231.14	\$211.97	\$262.86	\$214.90	\$296.18	\$258.77
Cost of Prod w Lbr/unit	\$31.04	\$29.91	\$28.83	\$28.35	\$36.23	\$33.97	\$40.95	\$41.34



The Environmental Cohort had less Cost of Production per unit in 2022 while the Database Average was less in the three prior years.

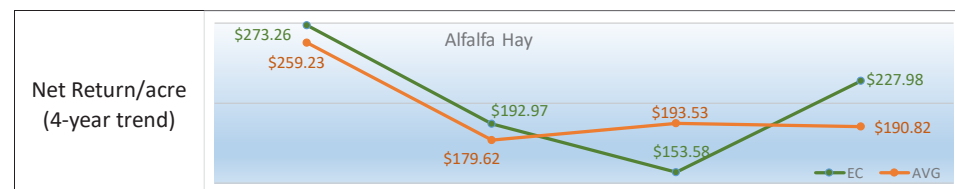
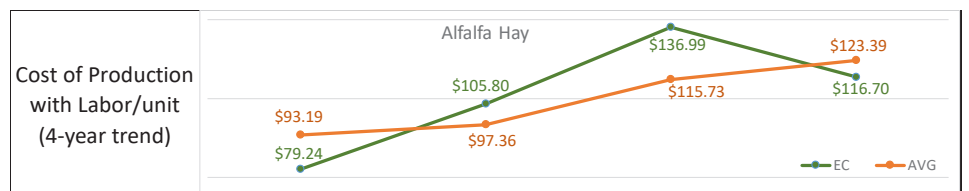


For the Net Return per acre, the Database Average was stronger each year.

Below, yields alfalfa hay were similar with the exception of 2021, where the Database Average had an edge. Selected expenses and returns also varied by group and by year. However, the Environmental Cohort does generally show less Chemical Expense per acre, with 2022 being very close to the Database Average.

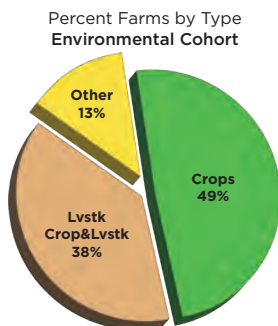
Crop Enterprises Owned & Rented Acres Combined	Alfalfa Hay							
	2019		2020		2021		2022	
	EC	AVG	EC	AVG	EC	AVG	EC	AVG
Number of Farms	16	294	18	331	24	336	23	317
Yield per acre	4.7	4.5	4.0	4.4	3.5	4.2	4.6	4.5
Seed Expense/acre	NA	NA	NA	NA	NA	NA	\$0.54	\$1.02
Fertilizer Expense/ac	\$42.44	\$51.22	\$53.05	\$50.42	\$55.14	\$54.34	\$82.55	\$75.97
Chemical Expense/ac	\$3.01	\$5.51	\$3.95	\$8.57	\$7.70	\$10.82	\$11.65	\$11.52
Fuel & Oil Expense/ac	\$28.30	\$37.53	\$23.26	\$23.66	\$31.94	\$31.29	\$45.58	\$47.33
Total dir & ovhd exp/ac	\$391.01	\$419.85	\$418.74	\$426.34	\$434.14	\$449.55	\$500.42	\$506.03
Net Return/acre	\$273.26	\$259.23	\$192.97	\$179.62	\$153.58	\$193.53	\$227.98	\$190.82
Machinery Cost/acre	\$158.05	\$166.55	\$174.95	\$167.15	\$186.77	\$172.92	\$192.01	\$199.98
Cost of Prod w Lbr/unit	\$79.24	\$93.19	\$105.80	\$97.36	\$136.99	\$115.73	\$116.70	\$123.39

The Cost of Production for each cohort was stronger two out of the four years



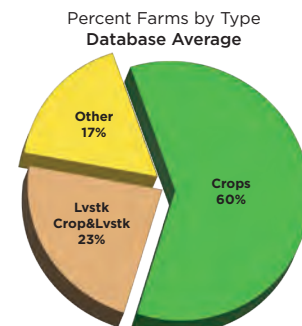
Net Return per acre was generally stronger for the Environmental Cohort, with the exception of 2021.

The Crop Enterprise tables continue to suggest that more annual data is necessary to provide information that can be used to make informed comparisons about cost benefits of intensified environmental crop production practices. This report will continue to add data annually to aid in understanding the overall implications of intensified practices on crop profitability.



### First Look at Livestock Enterprises

The first four years of this report has focused on the crop enterprises as an indicator of enhanced environmental practices. The previous data from the four major crop enterprises indicates that net returns have been generally higher for the Database Average. The Income Source data noted earlier in this report indicates that the Environmental Cohort generates more income from livestock than the Database Average. These two charts, based on the number of farms by type, show that the



Environmental Cohort has 15% more livestock and livestock & crop farm types than the Database Average, and 11% less crop farms. As the data moves into the fifth year, a greater focus will be made toward the livestock enterprises.

## FOUR-YEAR AVERAGE COMPARISON

### A Historical Perspective

In the 2022 report, which shared data for the 2021 crop year, a new perspective on this data was provided. That report stated, "Conclusions made based on data that does not include a historical perspective may have been made without all the information needed for a sound conclusion." This section of the report addresses the question of "How did the farms in the Environmental Cohort compare to the State FBM Database Average during the years prior to the start of the study?" or "If the current data shows a benefit, or a disadvantage; was that same tendency found in the data in prior years?" This study now has four years of pre and post data available from the same cohort of farms.

Selecting this unique group of farmers was accomplished using the FINBIN database which is managed by the University of Minnesota Center for Farm Financial Management. The data for the Environmental Cohort in the table below comes from **41** farmers who were: enrolled in FBM for all eight years, were Water Quality

Certified in 2022, and are included in the data from the 101 farms in this report. The Average group includes **797** farms that were: enrolled in FBM for all eight years, were NOT Water Quality Certified in 2022, and are included in the data from the 2154 farms in the State FBM Database.

To save space and reduce the quantity of numbers being shared, a 4-year average has again been used to illustrate the trend comparison, 2015 to 2018 and 2019 to 2022. This table shows a 4-year average for each cohort and a percentage comparison. The Environmental Cohort again shows similar advantages (In the form of a 100+%) over the state average in each 4-year category. Crop sales are less due to the higher level of livestock on the Environmental Cohort farms, while ROA and operating expense ratio were basically even between the two. This continues to indicate that producers who are able to obtain water quality certification have a management style that enhances profitability. The producers in the Environmental Cohort, with continuous involvement over this 8-year period, have shown greater income and business strength. A review of the 5-year trend data next year will generate an expanded view of the data and an enhanced understanding of these findings.

Financial Factors	Pre-Study 4-Year Average (2015 - 2018)			Post-Study 4-Year Average (2019 - 2022)		
	Environ. Cohort	State Avg.	EC as % of State Avg	Environ. Cohort	State Avg.	EC as % of State Avg
Gross Cash Farm Income	\$983,961	\$838,599	117%	\$1,280,370	\$1,083,280	118%
<i>Crop Sales</i>	\$329,804	\$442,881	74%	\$468,650	\$581,327	81%
<i>Livestock Sales</i>	\$508,627	\$266,233	191%	\$572,556	\$297,237	193%
Total Cash Farm Expense	\$813,789	\$715,156	114%	\$1,017,027	\$880,145	116%
Net Cash Income	\$170,172	\$123,443	138%	\$263,343	\$203,135	130%
Average Net Farm Income	\$102,590	\$65,147	157%	\$317,815	\$257,647	123%
Median Net Farm Income	\$43,960	\$38,630	114%	\$134,752	\$165,129	82%
Working Capital as % of OE	59.1%	37.3%	158%	76.1%	58.2%	131%
Farm Debt to Asset Ratio	37%	45%	121%	36%	43%	120%
Rate of return on assets	2.00%	2.03%	99%	8.15%	8.05%	101%
Debt Coverage Ratio	1.37	1.05	130%	3.62	2.67	135%
Operating Expense Ratio	79.9%	80.8%	99%	70.8%	69.9%	101%
Total net worth change	\$60,892	\$55,368	110%	\$257,465	\$242,074	106%

