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Financial performance of beginning dairy farmers in Minnesota

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Introduction

Demand and supply drive markets for goods and services. The demand for dairy products has been rising for the past four and a half decades with U.S. per capita consumption of dairy products increasing from 539 to 655 pounds between 1975 and 2020 (USDA-ERS, 2021). To match this growing demand, the supply of dairy products can be increased through different avenues such as increasing herd size, increasing productivity per cow, or having new dairy farmers enter the industry. This research focuses on increasing the number of dairy farmers within the industry to sustainably uphold the supply of dairy products by comparing the farm finances and characteristics of beginning and established farmers.

The number of licensed dairy farms in Minnesota has decreased by over 50% from 4,567 farms in January 2010 to 2,171 farms in January 2022 (MDA, 2022). Many of the remaining farmers are nearing retirement as 36% of principal operators are over the age of 65 (USDA Census, 2017). While some farms transition to the next generation, others are exiting the industry, creating a gap in the number of operating dairy farms. This problem is magnified as only 19% of all U.S principal operators are categorized as beginning farmers with farmers not entering the industry at the same rate that they are leaving the industry. (USDA Census, 2017).

This research aims to compare difference in financial performance across four farmer groups (beginning farmers, established farmers, second-generation beginning farmers, and transitioned to established farmers). It also identifies characteristics that drive profitability as a farmer's experience grows and uses FINBIN (finbin.umn.edu) data from Minnesota dairy farms from 1997-2021. This research project is made possible through the USDA-ERS Coop Agreement grant number USDA-ERS 58-6000-0-0074.

Recently, there has been a large focus on beginning farmers with many state and federal programs being made available to assist those entering the farming profession. Specifically, at a federal level, the USDA-FSA provides farm ownership loans, direct and guaranteed loan programs, and operating loans for beginning farmers (USDA-FSA, 2022). The United States Department of Agriculture (USDA) defines a beginning farmer as an individual or entity who has operated a farm for 10 years or less, and an established farmer is an individual or entity who has operated a farm for more than 10 years (USDA-FSA, 2022). These loan programs available offer a lower interest rate than industry banks to assist farmers that are starting operations. Additionally, the National Institute of Food and Agriculture (NIFA) provides grants through the Beginning Farmer and Rancher Development Program (BFRDP) that provide education, mentoring, and technical assistance to beginning farmers (USDA-NIFA, 2022). At a state level, Minnesota offers the Minnesota State Farm Business Management (FBM) program. In this program, eight colleges and universities offer one-on-one student-led programs where the student-farmer and farm business management instructor collaborate to help the farmer meet their business goals (AgCentric, 2022). This program offers a scholarship that covers 25-50% of the tuition cost for beginning farmers enrolled in the FBM program. Enrolling in this program

helps beginning farmers become more efficient to enhance their financial viability. An additional benefit of this program is that the participating farmers contribute farm data to FINBIN.

Data & Methods

Data for this research was collected from FINBIN, which is a farm financial data source with participants from 12 states across the nation. This research uses FINBIN data from Minnesota dairy farms from 1997-2021. Beginning in 2014, the data includes an indicator for farms receiving a scholarship through the FBM Beginning Farmer Program.[3]

FINBIN data used in this research consists of whole farm data and enterprise level data. Whole farm data includes operator characteristics, farm characteristics, and financial measures. The dairy enterprise data contained herd size measures, dairy expenses, and cow milk production characteristics.

Farms were required to have a minimum of 3 years of data to be considered for this analysis. The final dataset used in the analysis contained 12,556 observations across 3,157 farms. However, not every farm has an observation for each variable considered. The descriptive analysis was performed using Stata Statistical Software, release 17 (StataCorp, 2021).

Farm Experience Classification

Principal operator and farm characteristic data from FINBIN were used to generate four exclusive groups of beginning, established, second-generation beginning, and transitioned to established farmers.

Beginning farmers are defined as farmers with 10 years of experience or less, which is consistent with the USDA-FSA beginning farmer definition (USDA-FSA, 2022). Two common options for starting a farming operation are (1) through purchasing or leasing dairy cows and/or a dairy barn and the associated facilities or (2) transitioning into a principal operator role on an already existing dairy farm. The former are considered beginning farmers in the context of this research, while the latter are considered to be second-generation beginning farmers. In some instances, farmers in the second-generation beginning farmer group may be a third or fourth generation farmer, but for the purpose of this research, any farmer taking over an already existing farm has collectively been termed a second-generation beginning farmer.

Farmers with more than 10 years of experience are established farmers. Due to the unique panel structure of this dataset, some farmers are in the dataset as they make the transition from a beginning to an established farmer. These farmers are categorized as transitioned to established farmers since they have more than 10 years of experience and were in the dataset as a beginning farmer.

[3] In FINBIN reports, the indicator variable for beginning farmer participants is located in the Special Sort items and is labeled as MN MDA Beg Farm Scholar.

The dataset contained 1,748 beginning farmer observations (14%), 9,145 established farmers observations (73%), 350 second-generation beginning farmers observations (3%) and, 1,313 transitioned to established farmers observations (10%).

Statistical implications for the farmer groups

In this research, the goal is to analyze relationships rather than determine causality or correlations and this is accomplished by (1) ensuring the farmer groups are statistically different and (2) analyzing factors that impact these groups. To determine whether the four farmer groups (beginning, established, second-generation beginning, and transitioned to established farmers) are statistically different from one another, t-tests are performed. In Stata, the "ttest" command is used for the pairwise tests (Stata-Corp, 2021). In each pairwise comparison, the farmer groups were statistically different. Therefore, conclusions can be made based on farmer groups.

Profitability

The goal of an operation is to maximize profit. Profitability measures a farm's ability to generate more revenues than expenses on the operation. The operating profit margin and rate of return on assets are the two measures of profitability used in this analysis. The operating profit margin (OPM) analyzes short-term profits, and the rate of return on assets (RROA) measures long-term profitability as a farmer's asset base does not change quickly over time.

The OPM and RROA are winsorized at the 1% and 99% levels, meaning that observations with a value below the 1% level were replaced with the 1% value and observations with a value above the 99% value were replaced with the 99% value to eliminate extreme outliers (Hastings et al., 1947; Ludwig-Mayerhofer, 2020). Both the original and winsorized variables are considered for comparison of summary statistics, but beyond the summary statistics, the results only show the winsorized data.

Over the 25-year time-period, the average operating profit margin was 12.42%, and 12.40% for the full sample non-winsorized and winsorized respectively (Table 1). In the non-winsorized sample, beginning farmers have the lowest OPM at 7.47%. However, once winsorized, their OPM is 11.42%, which indicates that there are several beginning farmers with low operating profit margins that impacted the average. Additionally, the median OPM for beginning farmers is 16.64% further demonstrating the many farmers with very low OPM. Transitioned to established farmers have the highest OPM at 14.30% and 14.77% for the non-winsorized and winsorized samples. This demonstrates that as beginning farmers gain experience, they are able to generate short-run profit with increased OPM for transitioned to established farmers.

The full sample of farmers in the dataset are generating an average of 6.41% return on investments on the farm as measured by the rate of return on assets (Table 2). Second-generation beginning farmers have the lowest average return over the 25-year time-period at 4.83% and

4.77% for the non-winsorized and winsorized samples. Beginning farmers have the highest RROA which is likely driven by the different asset base they have compared with the other groups of farmers. The average value of assets for beginning farmers is approximately $640,000 and for the remaining three farmer groups the average asset base is over $1,000,000.

Table 1: Non-winsorized and winsorized operating profit margin by farmer groups, 1997-2021

		OPM (%)			OPM^{+4} (%)		
Sample	Obs	Mean	Std. dev.	Median	Mean	Std. dev.	Median
Full Sample	12,033	12.42	138.08	15.99	12.40	22.88	15.99
BF	1,701	7.47	112.48	16.64	11.42	27.56	16.64
EF	8,740	13.22	153.78	15.76	12.36	22.00	15.76
SGBF	347	9.95	27.24	13.51	9.58	22.74	13.51
TEF	1,240	14.30	26.90	18.06	14.77	21.76	18.06

Notes: OPM is the operating profit margin for the farm, and OPM^{+} is the operating profit margin for the farm, winsorized at the 1% and 99% levels. Any value below the 1% level is replaced with the 1% value, and any value above the 99% level is replaced with the 99% value. BF=beginning farmer, EF=established farmer, SGBF=second-generation beginning farmer, TEF= transitioned to established farmer. Observations included had a minimum of 3 years of data in the dataset.

Table 2: Rate of return on assets by farmer groups, 1997-2021

		RROA (%)			$RROA^{+}$ (%)		
Sample	Obs	Mean	Std. dev.	Median	Mean	Std. dev.	Median
Full Sample	12,000	6.41	13.69	6.18	6.43	9.19	6.18
BF	1,692	8.21	17.43	7.35	7.81	12.09	7.35
EF	8,717	6.06	13.42	6.00	6.16	8.55	6.00
SGBF	347	4.83	9.69	4.76	4.77	8.74	4.76
TEF	1,239	6.87	10.01	6.64	6.89	8.87	6.64

Notes: RROA is the rate of return on assets for the farm, and $RROA^{+}$ is the rate of return on assets for the farm, winsorized at the 1% and 99% levels. Any value below the 1% level is replaced with the 1% value, and any value above the 99% level is replaced with the 99% value. BF=beginning farmer, EF=established farmer, SGBF=second-generation beginning farmer, TEF= transitioned to established farmer. Observations included had a minimum of 3 years of data in the dataset.

[4] The "+" superscript indicates the variable was winsorized at the 1% and 99% levels.

The Kolmogorov-Smirnov (KS) test is used to analyze the distribution of the profitability measure. The KS test is a pairwise test, analyzing the equality in distributions with the null hypothesis that the two distributions are equal. Rejecting the null hypothesis indicates that the two distributions are not equal and their underlying distributions differ. The D-statistic represents the maximum vertical difference between the two cumulative density functions of the groups being analyzed. Results indicated that distributions for beginning farmers were statistically different than the other three farmer groups at the 1% level in pairwise comparisons across both profitability measures (Table 3). This means that beginning farmers' and established farmers' OPM are derived from different probability distributions. Each pairwise comparison was significant at the 1% level, except the OPM for established and second-generation beginning farmers was significant at the 10% level and the RROA for established and transitioned to established farmers was significant at the 5% level. Based on these results, the OPM and RROA for each pairwise group are drawn from different distributions.

Table 3: Kolmogorov-Smirnov Test Results for OPM and RROA

	OPM^{+}		$RROA^{+}$	
Pairwise Group	D	P-value	D	P-value
BF/EF	0.0626	0.000***	0.1201	0.000***
BF/SGBF	0.1205	0.000***	0.1956	0.000***
BF/TEF	0.0739	0.001***	0.1067	0.000***
EF/SGBF	0.0727	0.058*	0.1020	0.002***
EF/TEF	0.0690	0.000***	0.0457	0.022**
SGBF/TEF	0.1292	0.000***	0.1325	0.000***

Note: *=Significant at the 10% level, **=Significant at the 5% level, ***=Significant at the 1% level BF=beginning farmer, EF=established farmer, SGBF=second-generation beginning farmer, TEF= transitioned to established farmer. Observations included had a minimum of 3 years of data in the dataset.

Operator, Farm, Herd, and Financial Characteristics

To further understand what is impacting differences in the farmer groups' financial performance, farm operator characteristics, farm characteristics, herd characteristics, and farm financial characteristics are considered. Operator characteristics include the number of operators on the farm and an indicator for whether or not the farmer is working off-farm. Farm characteristics include herd size, total acres, and the percent of acres owned. Herd characteristics include milk yield, and feed cost per hundredweight of milk. Farm financial characteristics include interest expense per head, depreciation expense per head, government payments as a percentage of total revenue, the current ratio, and the debt-to-asset ratio. Interest expense per head and depreciation expense per head are nominal values and therefore, these are inflated to 2021 base dollars (Federal Reserve Bank of Minneapolis, 2022). The current ratio and debt-to-asset ratio are winsorized at the 1% and 99% levels.

On average, farms in the dataset had 1.38 operators (Table 4). Second-generation beginning farmers had the highest number of operators at 1.66 which is consistent with second-generation beginning farmers are transitioning into the operator role on an existing farm. In terms of off-farm income, 71% of beginning and established farms reported off-farm income, while only 56% of second-generation beginning farmers work off-farm.

Table 4: Summary Statistics for Operator Characteristics, 1997-2021

	Number of operators			Off-farm income indicator		
Sample	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.
Full Sample	12,025	1.38	0.72	12,033	0.71	0.45
BF	1,698	1.21	0.62	1,701	0.71	0.46
EF	8,735	1.42	0.74	8,740	0.71	0.45
SGBF	347	1.66	0.79	347	0.56	0.50
TEF	1,240	1.25	0.60	1,240	0.73	0.44

Notes: Number of operators are the number of principal operators on the farm. The off-farm income indicator is a binary variable indicating whether or not off-farm income was reported. BF=beginning farmer, EF=established farmer, SGBF=second-generation beginning farmer, TEF= transitioned to established farmer. Observations included had a minimum of 3 years of data in the dataset.

Previous research has found that beginning farmers tend to have smaller farms than established farmers (Ahearn & Newton, 2009). In this study, beginning farmers have 94 cows, and 196 acres on average, which are the smallest among the four farmer groups (Table 5). Meanwhile, second-generation beginning farmers have the largest herd size and acreage of the four farmer groups, indicating that these farmers are taking over an existing operation and expanding the farm business. Finally, beginning farmers own the lowest proportion of their land at 38% and established farmers own the highest proportion at 52%.

Table 5: Summary Statistics for Farm Characteristics, 1997-2021

	Herd Size			Acreage			Percent of Acreage Owned		
Sample	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.
Full Sample	11,659	137.65	190.54	12,033	388.32	397.29	11,012	49.02	35.99
BF	1,573	93.59	95.89	1,701	196.24	220.18	1,285	37.52	38.01
EF	8,424	145.86	193.77	8,740	427.23	422.12	8,240	51.50	35.17
SGBF	324	175.34	175.98	347	442.12	339.02	328	43.14	37.29
TEF	1,243	135.15	249.89	1,240	360.50	335.46	1,154	45.81	36.23

Notes: Herd size is the number of cows in the herd. Acreage is the total number of acres operated on the farm. Percent of acreage owned is the percent of acres operated that are owned by the farmer. BF=beginning farmer, EF=established farmer, SGBF=second-generation beginning farmer, TEF= transitioned to established farmer. Observations included had a minimum of 3 years of data in the dataset.

A beginning farmer may have the lowest milk yield on average, but as they gain experience and shift to a transitioned to established farmer, their milk yield outpaces that of established farmers (Table 6). Second-generation beginning dairy farmers in Minnesota had the highest milk yield at over 21,000 pounds per cow. However, the second-generation beginning farmers were not as efficient considering feed cost per hundredweight of milk.

Table 6: Summary Statistics for Herd Characteristics, 1997-2021

	Milk Yield			Feed Cost Per Cwt of Milk		
Sample	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.
Full Sample	11,305	19,804.84	4,329.43	11,023	7.35	2.56
BF	1,526	19,063.44	4,040.40	1,492	7.47	2.59
EF	8,157	19,826.63	4,373.04	7,956	7.22	2.53
SGBF	322	21,284.75	4,676.13	309	8.51	2.74
TEF	1,217	20,349.90	4,123.91	1,183	7.88	2.55

Notes: Milk yield is the milk produced per cow. Feed cost per hundredweight of milk is the total feed cost incurred to produce 100 pounds of milk. BF=beginning farmer, EF=established farmer, SGBF=second-generation beginning farmer, TEF= transitioned to established farmer. Observations included had a minimum of 3 years of data in the dataset.

The farm financial variables considered examine the cost structure, government program participation, liquidity, and solvency of each of the farmer groups. A farm's cost structure will differ based on which phase of the farm business cycle it is in (entry, growth, consolidation, exit). Interest expense per head was highest for established farmers at $352.50 per cow; however

these measures have a large standard deviation, and this result is similar for the depreciation expense per head (Table 7). Second-generation beginning farmers receive nearly 5.6% of their revenue from government payments, and beginning farmers receive approximately 4.0% of their revenue from government payments. Each of the farms are liquid as measured by the current ratio. This is common for dairy farms as feed inventory is a current asset. Finally, creditors owned nearly 62% of the assets on beginning farms. It is not surprising that beginning farmers have the highest debt-to-asset ratio because these farms tend to be highly leveraged early on with large sunk costs to start operation.

Table 7: Summary Statistics for Farm Financial Characteristics, 1997-2021

	Interest Expense Per Head			Depreciation Expense Per Head			Government Payments as a Percent of Total Revenue			Current Ratio+			Debt-to-Asset Ratio+		
Sample	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.
Full Sample	11,021	334.90	282.31	11,009	370.43	288.42	12,027	4.81	4.75	11,494	3.78	7.77	12,032	51.49	32.15
BF	1,525	278.96	240.16	1,523	270.44	226.01	1,700	4.03	4.93	1,641	2.80	6.25	1,700	62.09	31.01
EF	8,006	352.50	299.95	7,997	389.32	301.06	8,735	4.95	4.70	8,317	3.89	7.86	8,740	49.24	32.16
SGBF	321	272.45	209.43	321	378.70	261.15	347	5.59	5.04	339	4.51	9.75	347	46.68	25.08
TEF	1,166	303.07	191.35	1,165	368.33	250.37	1,240	4.73	4.68	1,192	4.10	8.19	1,240	54.14	32.08

Notes: Interest expense per head is the total interest expense per cow in the herd, inflated to 2021 dollars. Depreciation expense per head is the total depreciation expense per cow in the herd, inflated to 2021 dollars. Government payments as a percent of total revenue is the total government payments received by the farm divided by total farm revenue. The current ratio and debt-to-asset ratio are winsorized at the 1% and 99% levels. BF=beginning farmer, EF=established farmer, SGBF=second-generation beginning farmer, TEF= transitioned to established farmer. Observations included had a minimum of 3 years of data in the dataset.

Results

In the previous section, summary statistics were presented for the 25-year time-period. To understand how some of these variables change from 1997-2021, annual data is presented in Figures overtime.

Profitability

Figure 1 displays the operating profit margin for each of the four farmer groups. The operating profit margin is highly correlated with market conditions. Prior to 2007, beginning farmers tended to have lower operating profit margins on average compared to the other three groups. In 2009, milk prices were historically low, which impacted a farm's profitability. Interestingly, the second-generation beginning farmers were not impacted as much in 2009 as established and transitioned to established farmers, but in 2013 when similar trends of low milk prices were present, the second-generation beginning farmers had much lower operating profit margins.

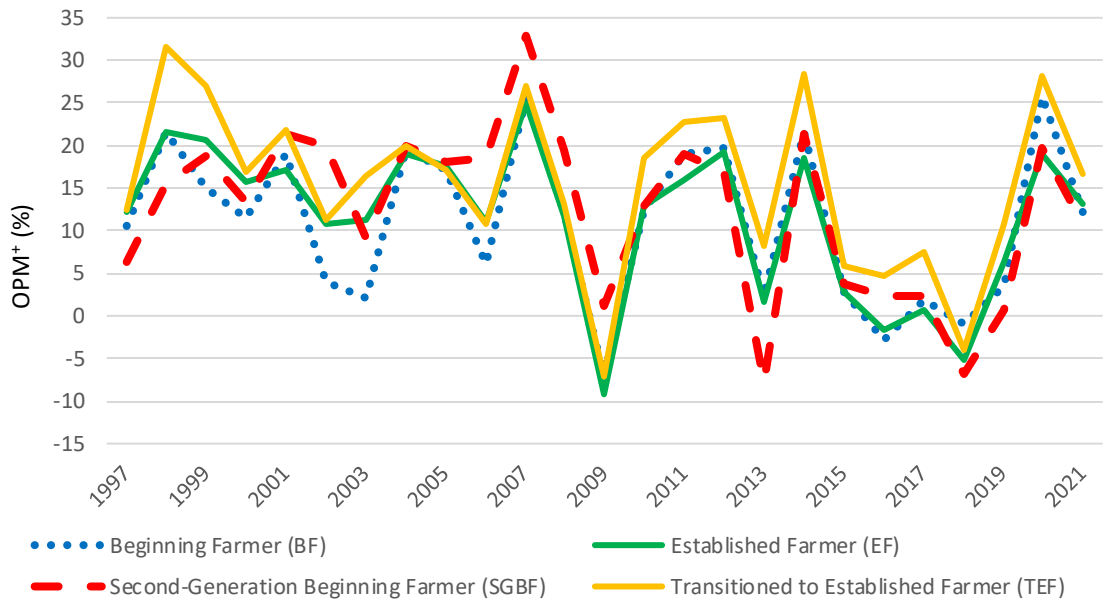

Figure 1: Operating Profit Margin+, by farmer type, 1997-2021

The rate of return on assets is a long-term profitability measure as farmer's asset bases tend to be fairly consistent overtime. However, this measure is still impacted by market conditions. Over the 25-year period, established farmers earned a lower return on assets compared to beginning and transitioned to established farmers (Figure 2). Overtime, the rate of return on assets commonly ranges from 5-10%, except in years of abnormally high or low milk prices.

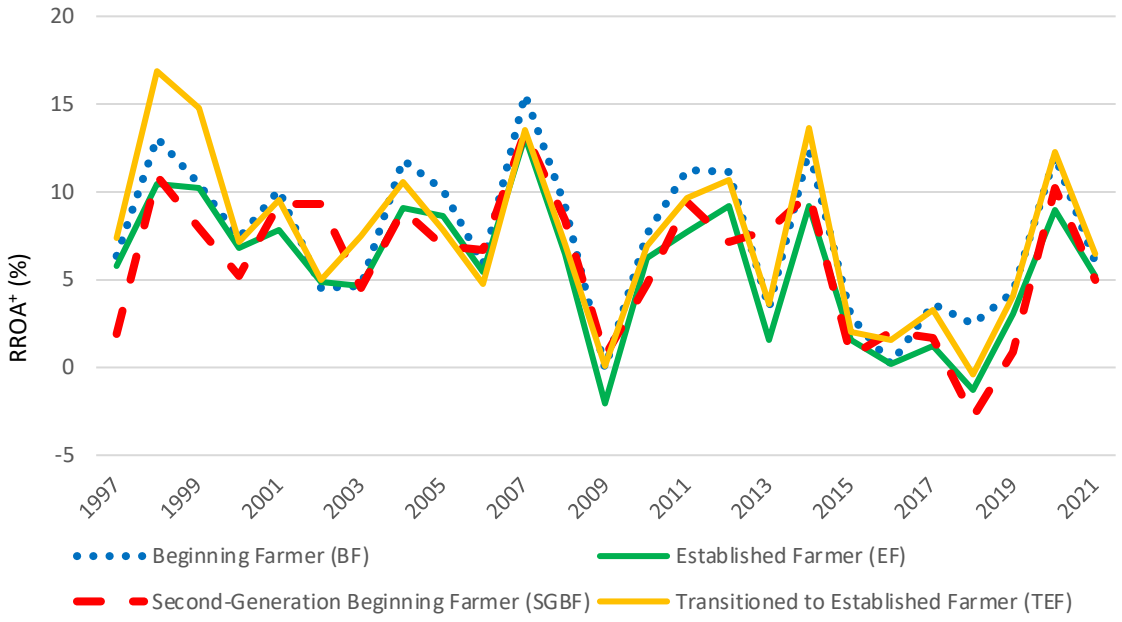

Figure 2: Rate of Return on Assets⁺, by farmer type, 1997-2021

Increasing the number of decision makers has been found to be positively associated with financial performance (Mishra et al., 2009; Adhikari et al., 2009). The addition of an operator on a farm allows for specialization between the operators which in turn results in increased efficiencies. Second-generation beginning farmers tend to have more operators on average than the other three groups, which again is consistent with the hypothesis that these farmers are working with an older generation that is likely still participating on the farm (Figure 3). Overtime, there has been a steady increase in the average number of operators for established farms, going from approximates 1.2 to 1.6 operators. Finally, over this period, beginning farmers commonly had the lowest number of operators on the farm.

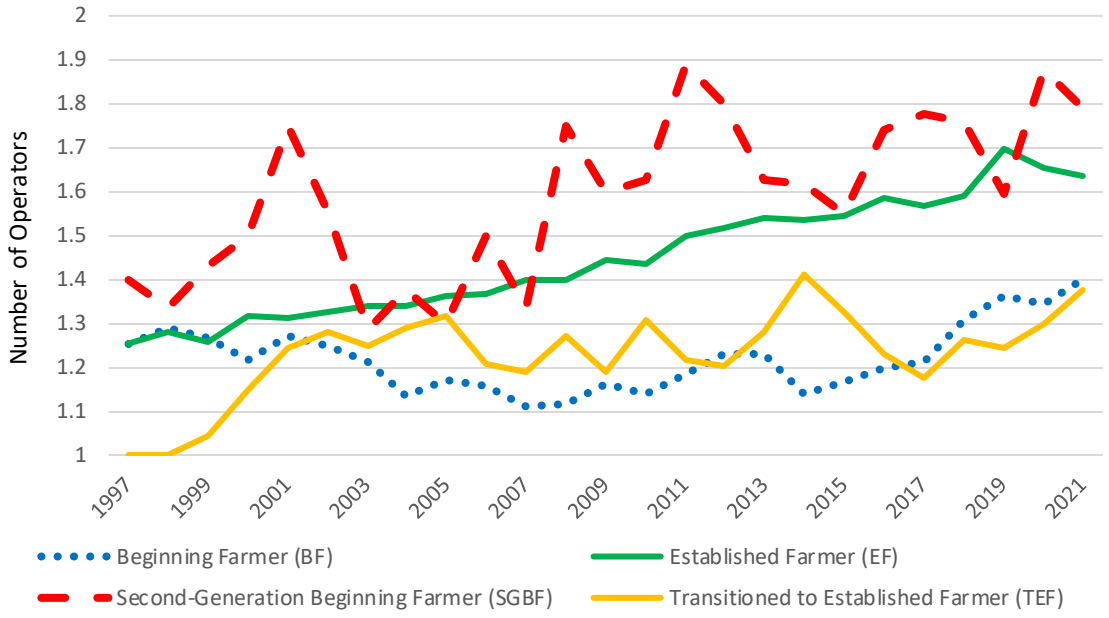

Figure 3: Number of Operators, by farmer type, 1997-2021

Due to the higher return expectation for off-farm work, many beginning farmers will work off-farm, suggesting their goal is to maximize total household income rather than farm income (Detre et al., 2011; Mishra et al., 2009; Mishra et al., 2007; Adhikari et al., 2009; Ahearn & Newton, 2009). Working off-farm takes time and resources away from the farming operation and may lower farm profitability and performance (Detre et al., 2011; Mishra et al., 2009; Mishra et al., 2007; Adhikari et al., 2009; Key & Lyons, 2019). The percent of established farms reporting off-farm income has declined linearly over this time (Figure 4). Second-generation beginning farmers had the highest variability from 1997-2021.

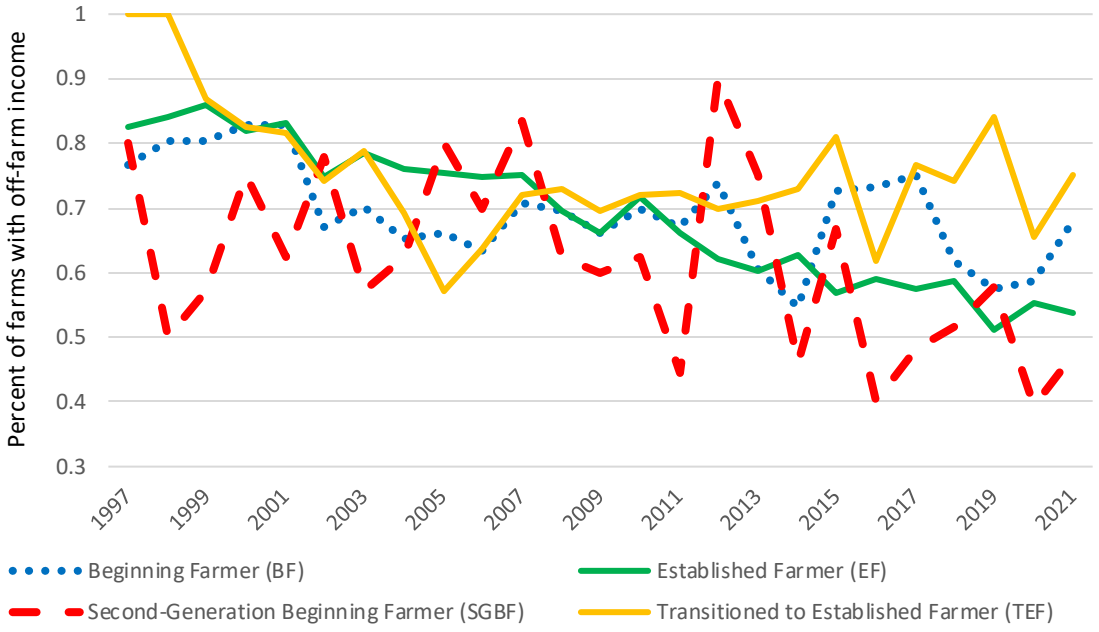

Figure 4: Off-Farm Income Indicator, by farmer type, 1997-2021

Beginning farmers tend to operate smaller farms than established farmers in terms of both herd size and acreage. Overtime, farmers tend to expand their operations. Established farmers have increased their herds from an average of approximately 75 cows in 1997 to nearly 300 cows in 2021 (Figure 5). Meanwhile, beginning farmers herd sizes increased from approximately 60 cows to 140 cows during the same time-period. Figure 5 shows that the gap between these farmers grew from 1997-2021, and therefore, it is likely that farm revenues also diverged because, as noted by Kropp and Katchova (2011), farm size is highly correlated with gross revenue. Transitioned to established farmers have substantially increased herd sizes compared to beginning farmers. Lastly, second-generation beginning farmers have herd sizes similar to those of established farmers for the most recent years.

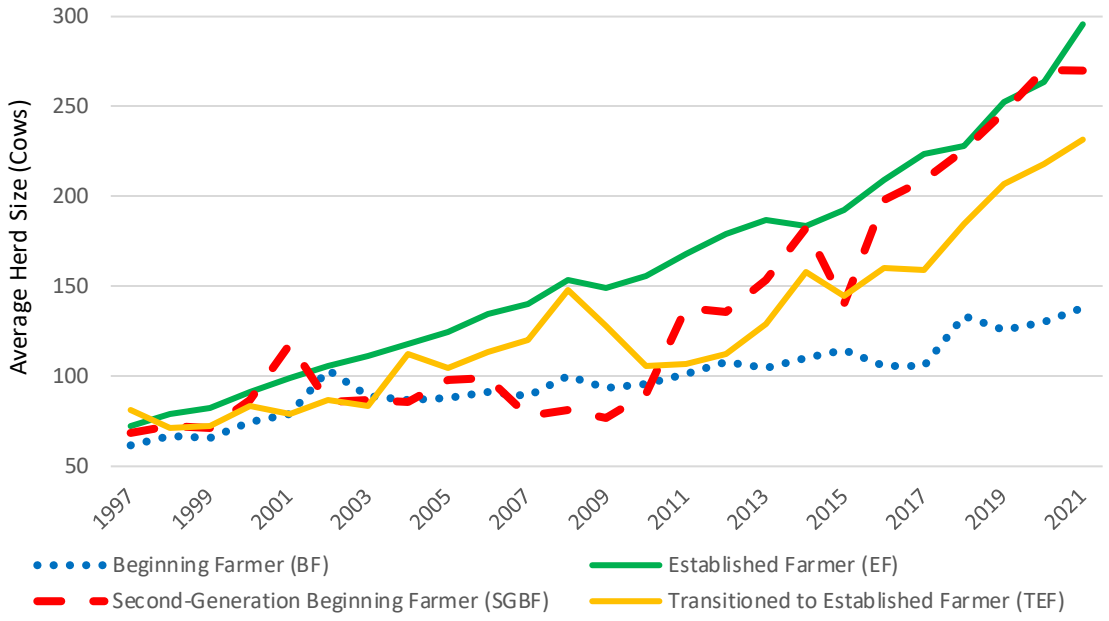

Figure 5: Average Herd Size, by farmer type, 1997-2021

The second measure of farm size analyzed is the average operated acreage. The results presented in Figure 6 are similar to those of herd size, in which beginning farmers have smaller farms, established farmers have larger farms, and farm size has increased overtime. However, unlike herd size, at the start of the study period, the farms had a difference in acres operated. This difference maintained throughout the 25-year time-period, only increasing slightly. The percent of operated acreage that is owned by the farmer has decreased overtime (Figure 6). This may be due to farms increasing their acreage throughout the time-period (Figure 6). In 1997 established farmers owned approximately 60% of their operated land. Meanwhile, over the time-period this has decreased to about 45%, indicating these farmers are now renting a larger portion of their operated land. Beginning farmers own less of their acreage than established, second-generation beginning and transitioned to established farmers. This is consistent with the fact that beginning farmers are starting their farming endeavors and likely took out loans to gain access to land and other resources necessary to start farming.

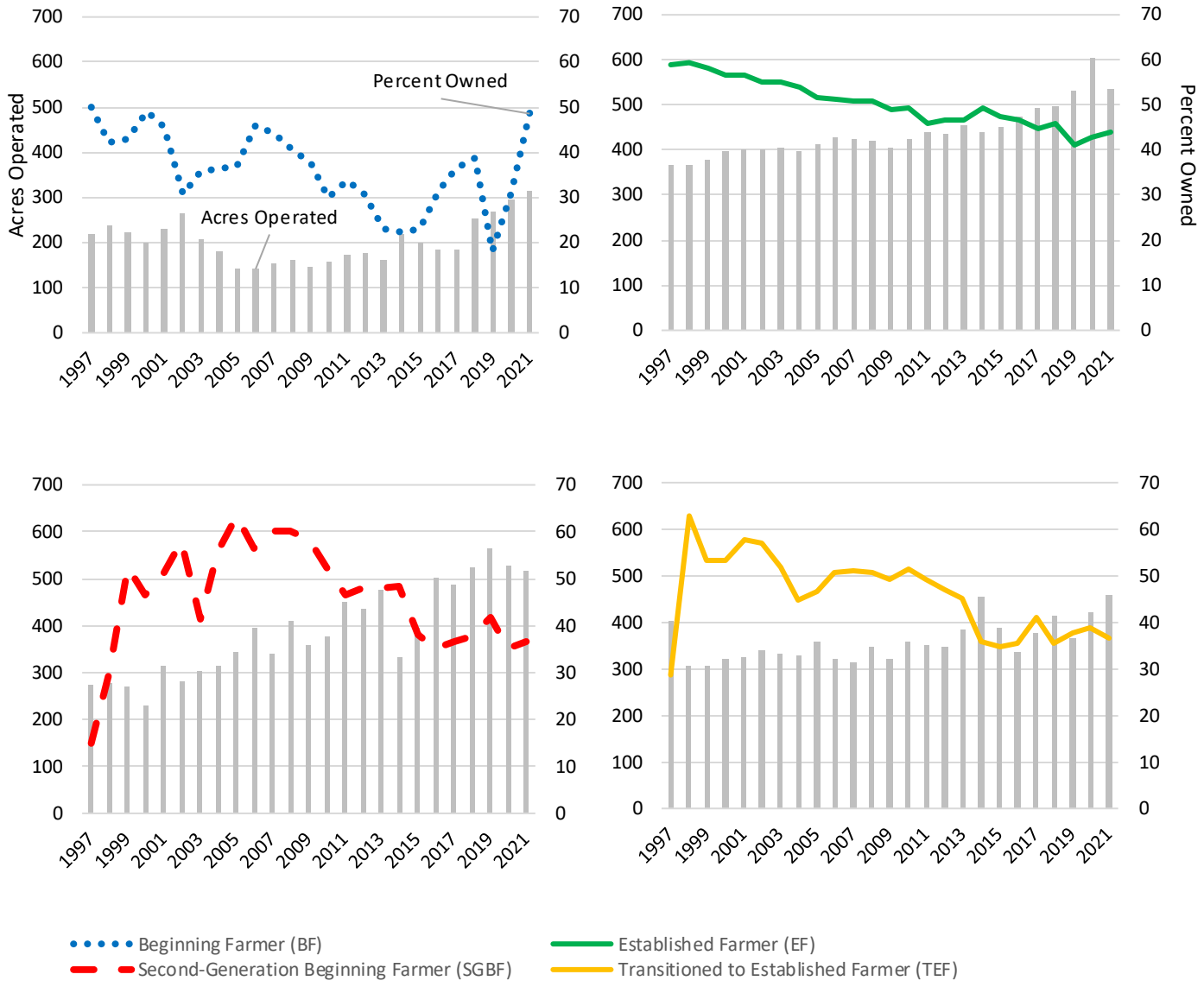

Figure 6: Average Operated Acres and Percent Owned, by farmer type, 1997-2021

Cows have increased their milk yield, or production, over time, producing more milk on average (Figure 7). Second-generation beginning dairy farmers experience large variation in their milk yield, but in the past couple years their milk yield has been similar to that of established farmers, which is increased linearly since 1997. Transitioned to established farmers also have a milk yield that is fairly like that of established farmers, but beginning farmers tend to be less efficient producing less milk per cow in the operation.

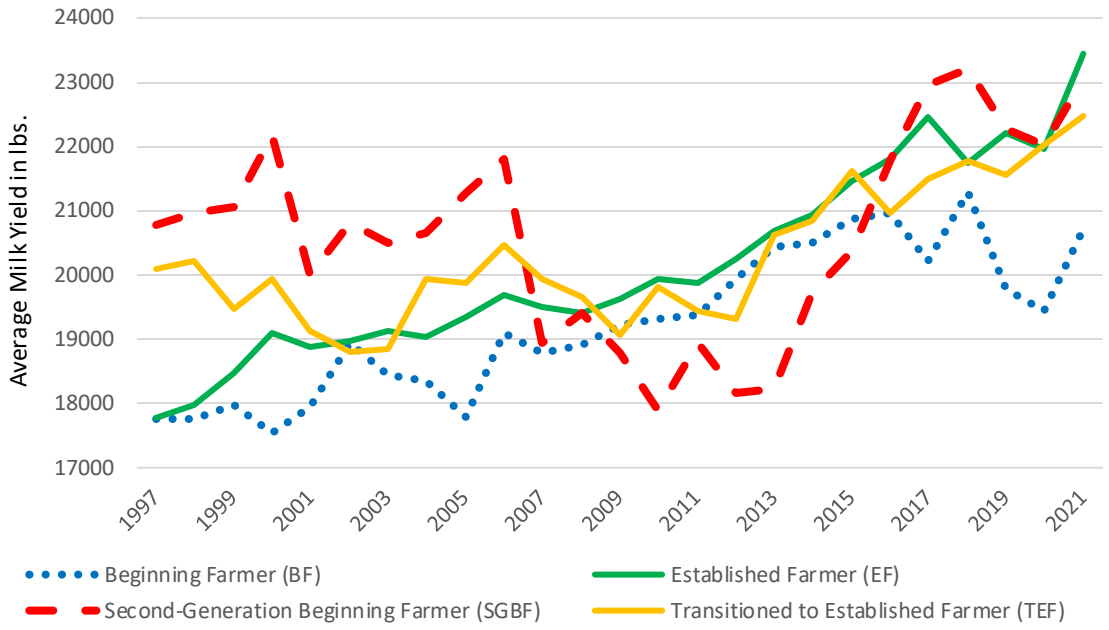

Figure 7: Average Milk Yield in lbs., by farmer type, 1997-2021

A farmer's goal is to be efficient with their resources, this means maximizing production while minimizing costs. The average feed cost per hundredweight of milk has very little difference across each of the groups (Figure 8). Until 2014, there was no deviation between groups, but after 2014, beginning and second-generation beginning farmers have experienced higher average feed costs per hundredweight of milk compared to established and transitioned to established farmers.

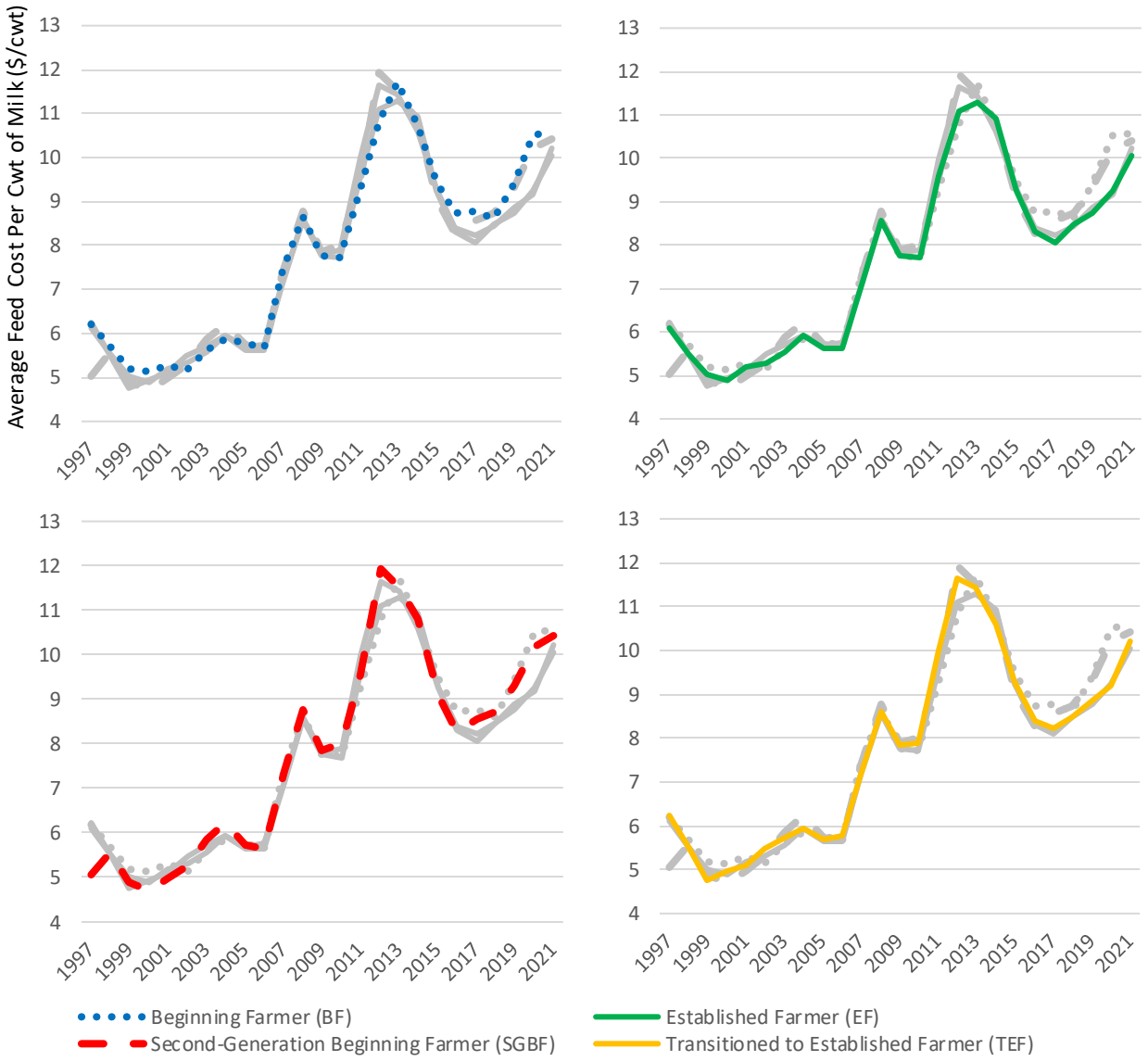

Figure 8: Average Feed Cost Per Cwt of Milk, by farmer type, 1997-2021

Beginning farmers typically have a shorter credit history than an established farmer. Because of their shortened credit history, beginning farmers may receive higher interest rates or even be denied access to credit. The average interest expense per head is contingent on the loan's interest rate and the debt level financed. From 2004-2020, beginning farmers had the lowest interest expense per head (except in 2016 in which TEF had an interest expense per head slightly lower) which could be due to less credit availability (Figure 9). Meanwhile, established farmers and transitioned to established farmers had similar interest expense per head, which decreased from 1997-2021.

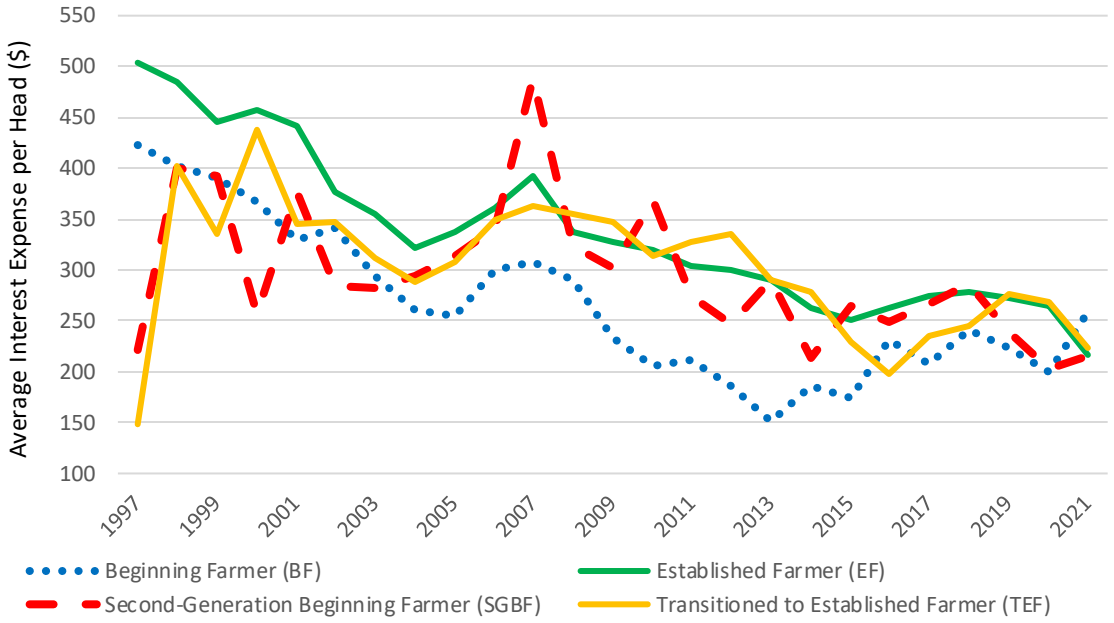

Figure 9: Average Interest Expense Per Head, by farmer type, 1997-2021

The average depreciation expense per head has been fairly consistent over time for established and transitioned to established farmers, commonly ranging from $350-400 in depreciation expense per head annually (Figure 10). Beginning farmers have the lowest average asset base of the farmer groups which causes them to have the lowest depreciation expense per head. Through the early 2000s the depreciation expense per head was highly variable and in recent years there has been little dispersion across groups.

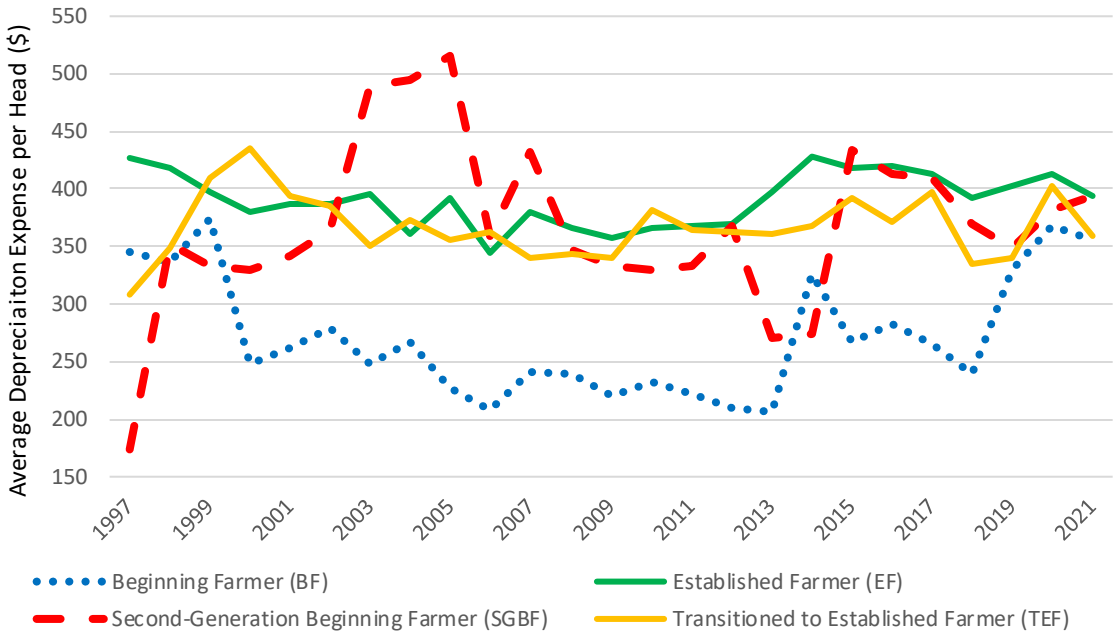

Figure 10: Average Depreciation Expense Per Head, by farmer type, 1997-2021

Government payments are typically received by farmers that participate government programs that lower a farmer's risk and assist with financial hardship as an additional revenue source, which may increase a farmer's financial performance (Mishra et al., 2009; Katchova, 2010; Mishra et al., 2007; Jablonski et al., 2022). Government payments tend to be tied to farm production, which is often correlated with farm size (USDA-FSA, 2022; Roberts & Key, 2003; Key & Roberts, 2007). So, rather than analyzing total government payments received, government payments as a percent of total revenue is analyzed. Overall, there is very little dispersion across groups from 1997-2021, but the average percent of revenue that is government payments has ranged from 0% in years with high milk prices for the dairy industry to 15% during COVID-19 with Coronavirus Food Assistance Program (CFAP) payments (Figure 11).

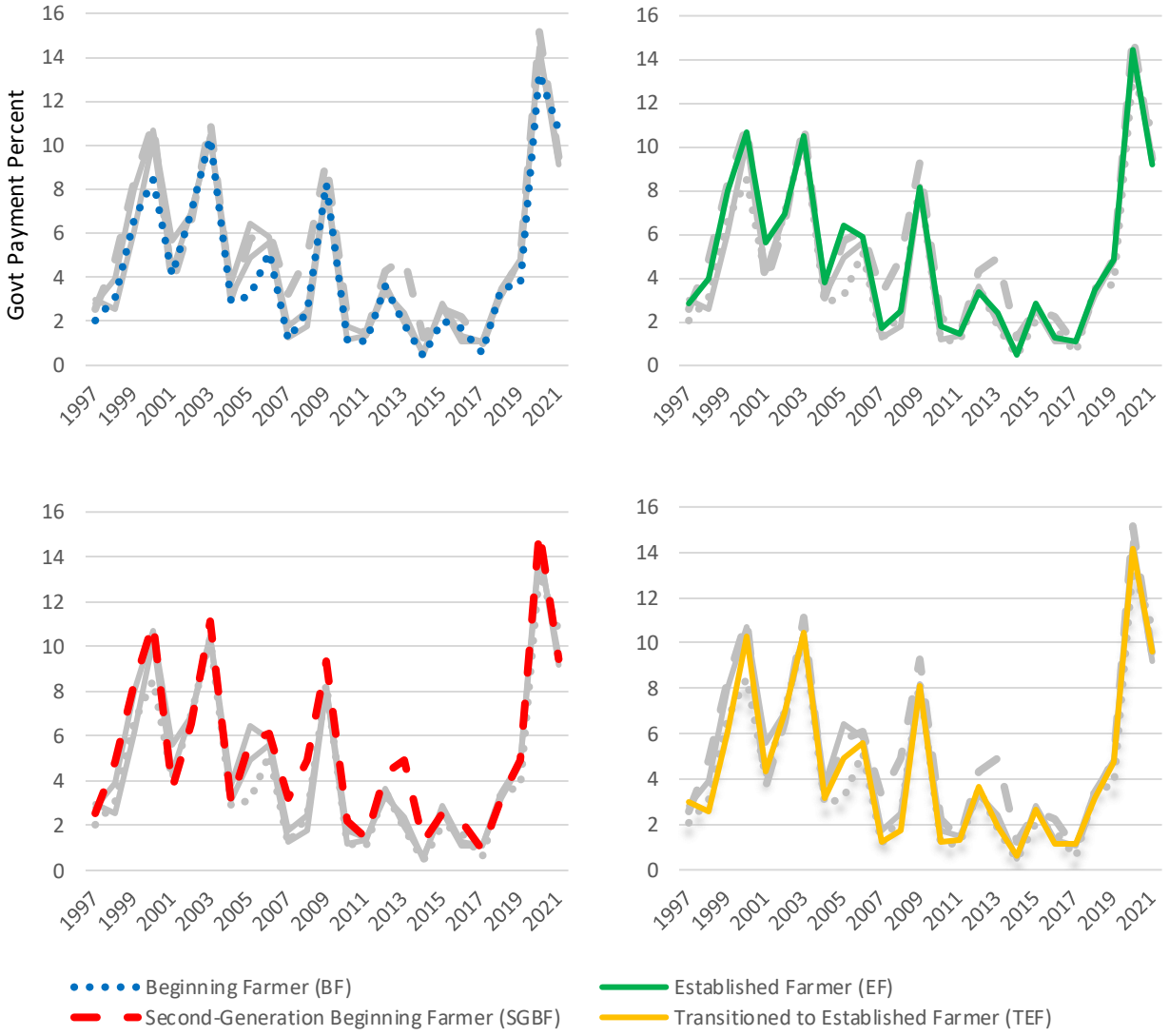

Figure 7: Government Payments as a Percent of Total Revenue, by farmer type, 1997-2021

Liquidity measures a farm's ability to meet its financial obligations as they come due without disrupting normal business operations. Previous work demonstrates that beginning farms tend to have a lower liquidity levels than established farms, which means they do not have cash readily available to pay off their short-term debt (Kropp & Katchova, 2011; Katchova, 2010; Katchova & Dinterman, 2018). The current ratio is a measure of the farm's liquidity, and a strong current ratio (CR>2), as determined by the Farm Financial Standards Council, was expected to positively impact profitability. As shown in Figure 12, the current ratio is variable across farmer types and years with no clear trend. Each of the farmer groups has a strong average current ratio for each of the years in the study, which is common for dairy farmers as feed inventory is included in their current assets.

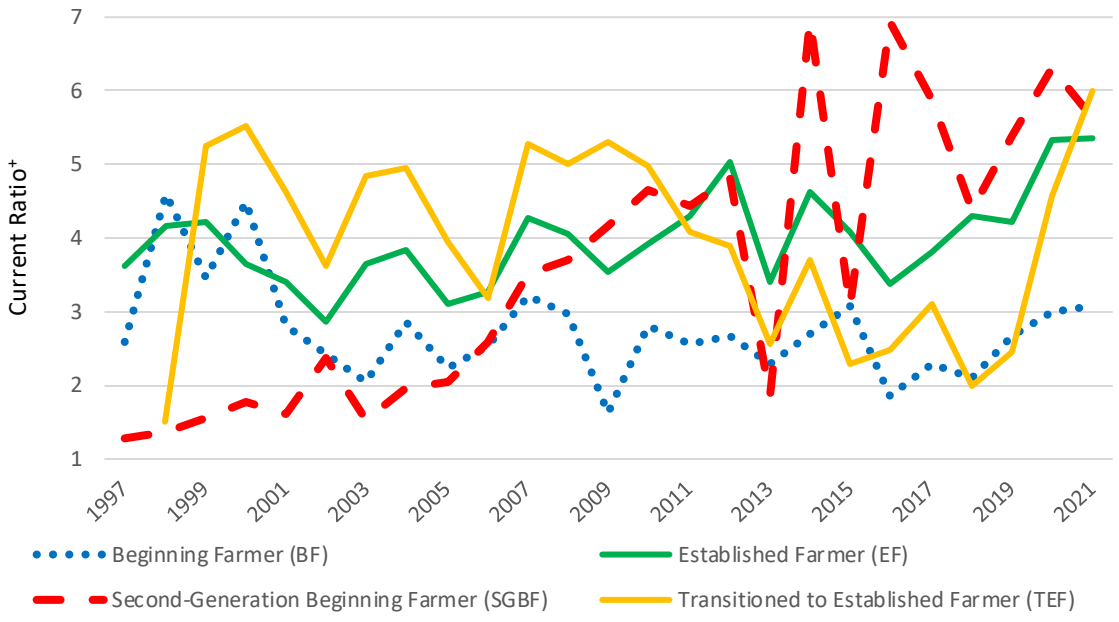

Figure 12: Current Ratio+, by farmer type, 1997-2021

Solvency evaluates the farm's ability to cover all of their debt with either assets or equity on their farm. Beginning farms tend to have lower solvency due to a high debt-to-asset ratio with more outstanding liabilities of farmland ownership loans and low asset levels (Ahearn & Newton, 2009; Kropp & Katchova, 2011; Mishra et. al., 2009; Key & Lyons, 2019; Mishra et al., 2007). Beginning farmers had a higher debt-to-asset ratio than the other three groups of farmers (Figure 13). The debt-to-asset ratio for beginning and established farmers has been decreasing overtime as a lower percentage of the assets on the farm are owned by a creditor.

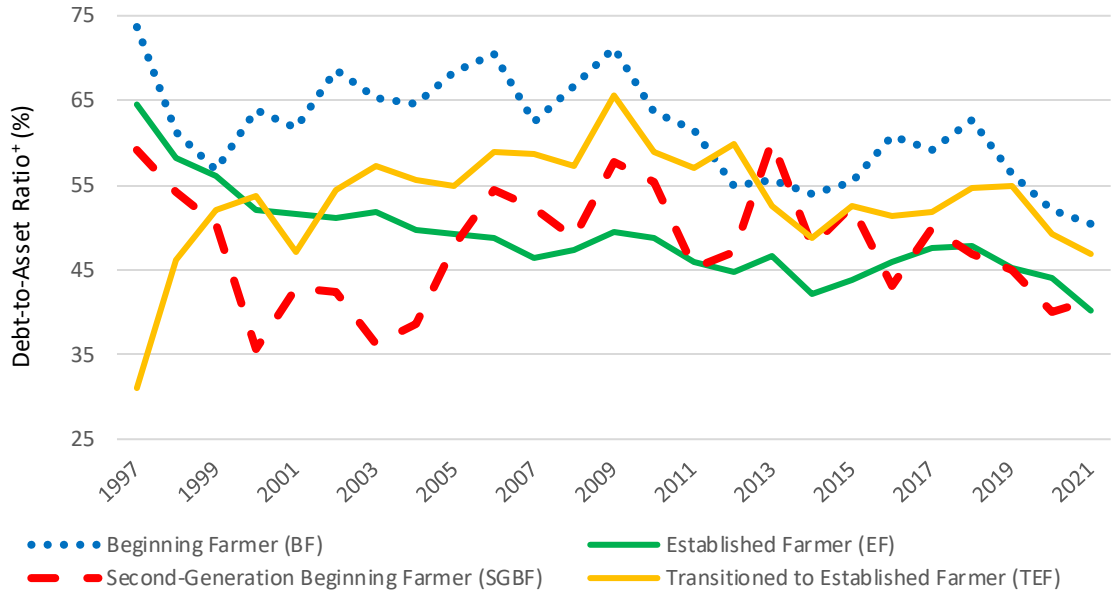

Figure 8: Debt-to-Asset Ratio⁺, by farmer type, 1997-2021

Conclusions

This study showed that beginning, established, second-generation beginning and transitioned to established farmers are statistically different from one another, analyzing Minnesota dairy farms from 1997-2021. Profitability, operator, farm, herd, and farm financial characteristics differed across all four farmer groups. Beginning farmers had the smallest herds and operated the least number of acres, while established farmers had the largest herds and operated the greatest number of acres across farmer types. Second-generation farmers had highly variable performance across different measures. Additionally, beginning farmers owned the least portion of their land, had the lowest milk yield, and the lowest debt-to-asset ratio compared with the other three groups of farmers.

Beginning farmers and second-generation beginning farmers have different performance and characteristics. For example, second-generation beginning farmers are operating farms with larger herds and acreage than beginning farmers. State and federal programs for beginning farmers are available regardless of generational status, however, this research shows that beginning and second-generation beginning farmers are statistically different, and they commonly have different profitability as well as operator, farm, herd, and financial characteristics. Therefore, this research demonstrates a potential for policy modification. Using funds in a more targeted approach may decrease total government expense while simultaneously increasing a beginning dairy farmer's success in the industry.

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