Efficiency and Livestock Production
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Introduction

The number of farms with a livestock enterprise has been declining for years. The number of farms in Kansas with cattle declined from 52,000 farms in 1980 to 33,000 farms in 2003 (Kansas Agricultural Statistical Service). Similarly, the number of farms in Kansas with swine or dairy declined from 14,000 and 5,900 farms in 1980 to 1,600 and 1,000 farms, respectively, in 2003 (Kansas Agricultural Statistical Service). The percent of farms in the Kansas Farm Management Association (KFMA) in 1980 with beef, swine, or dairy income in 1980 was 73.3, 30.2, and 12.1, respectively. In 2004, the percent of KFMA farms with beef, swine, or dairy was 62.9, 4.0, and 5.5, respectively.

Using KFMA data this paper examines the impact of a decline in livestock production on farm size, financial performance, and downside risk. The analysis will focus on farms that dropped a beef, swine, or dairy enterprise from 1995 to 2004. Given the dramatic changes that have taken place in the swine and dairy industries, it is particularly relevant to analyze the impact of dropping a swine or dairy enterprise. Historically, swine farms have had above average financial performance and dairy farms have had relatively stable financial performance. Moreover, both of these farm types typically utilize single purpose buildings. When a swine or dairy enterprise is dropped, these single purpose buildings are often unused having an adverse effect on the asset turnover ratio.

Methods

Farm size, financial performance, labor use, and downside risk were compared for various categories of farms with a beef, swine, or dairy enterprise. The first category for each livestock farm type represented farms with a particular livestock enterprise in both 1995 and 2004. The second category for each livestock farm type represented farms with a particular livestock enterprise in 1995, but not in 2004. The third category of farms for each livestock farm type represented farms that did not have a particular livestock enterprise in 1995, but had the livestock enterprise in 2004. These farms added the livestock enterprise some time during the 1996 to 2004 period. The fourth category of farms represented farms that did not have a particular livestock enterprise in 1995 or 2004.

Farm size measures used in the comparisons across farm categories included value of farm production, total acres, total crop acres, and total assets. Financial performance measures included the operating profit margin ratio, the asset turnover ratio, the current ratio, and the debt to asset ratio. The operating profit margin ratio was computed by dividing net farm income plus interest minus unpaid labor by value of farm production. The asset turnover ratio was computed by dividing value of farm production by average total assets. Labor utilization was examined using the percent of labor used for crop production. Downside risk was measured using the percent of farms not covering unpaid labor. Farms that can not cover cash expenses, depreciation, and unpaid labor with their value of farm production would need to sell assets or utilize non-farm income to cover these items.

In addition to examining differences among livestock farm type categories, the change in farm size, financial performance, labor use, and downside risk for all of the farms and for farms that dropped a livestock enterprise was examined. To accomplish this, five-year averages for 1995-1999 and 2000-2004 were computed and compared.

Kansas Farm Management Association Data

Data for 924 farms in the Kansas Farm Management Association (KFMA) with continuous data from 1995 to 2004 were used in this study. These 924 farms represent approximately 50% of the farms with analysis data in 2004. Income, expense, and balance sheet data were available for each farm. Income was expressed on an accrual basis. Livestock income was expressed on a value-added basis. Specifically, accrual livestock purchases were subtracted from accrual livestock sales to arrive at accrual livestock income.

Table 1 presents the summary statistics for the 924 farms. Value of farm production and net farm income averaged $211,355 and $43,496, respectively. Average beef income was $43,066. Average accrual swine and dairy income was $8,145 and $15,474, respectively. Approximately 67% of the farms had beef income during the ten-year period. In contrast, less than 8% of the farms had either swine or dairy income during the ten-year period. On average, the farms had 1,739 total acres and 1,108 crop acres. The average operating profit margin ratio was 10.91% and the average asset turnover ratio was 0.2882. On average, the percent of labor used for crops was 76.01%. Approximately 53% of farms did not cover unpaid labor during the ten-year period. Farms with financial stress did not cover unpaid labor and had a debt to asset ratio above 0.70. The percent of farms financially stressed was 7.4%.

Results

Average farm size, financial performance, labor use, and downside risk for the four categories of beef, swine, and dairy farms are summarized in Tables 2-4. There were not any farms that added a dairy enterprise from 1995 to 2004 so information for the third category is not available for this farm type.

The number of farms with a beef enterprise in both 1995 and 2004 was 539. The number of farms with a swine or dairy enterprise in both 1995 and 2004 was 35 and 46, respectively. The second column of Tables 2-4 depicts information for the farms that dropped a particular livestock enterprise. The number of farms that dropped a beef, swine, or dairy enterprise was 98, 96, and 46, respectively. The number of farms that dropped a swine or dairy enterprise was relatively large compared to the number of farms with a swine or dairy enterprise in both 1995 and 2004. This result is not surprising given the structural change that has occurred in these industries during the last ten years. The number of farms without a beef, swine, or dairy enterprise in both 1995 and 2004 was 247, 789, and 832, respectively.

Farms with a beef or dairy enterprise in both 1995 and 2004 had similar operating profit margin ratios to that of farms without a beef or dairy enterprise in either year. In contrast, farms with a swine enterprise in both years had a relatively higher operating profit margin ratio than farms without a swine enterprise. Farms with a beef enterprise (swine or dairy enterprise) in both 1995 and 2004 had a lower (higher) asset turnover ratio than farms without a beef enterprise (swine or dairy enterprise) in either year.

Farms that dropped a beef, swine, or dairy enterprise exhibited lower operating profit margins than farms with a livestock enterprise in both 1995 and 2004. This result

is consistent with the notion that relatively inefficient farms leave an industry before relatively efficient operations. There is not as discernable of a trend with respect to the asset turnover ratio. Unlike the farms that dropped a beef enterprise, the farms that dropped a swine or dairy enterprise had relatively lower asset turnover ratios suggesting that it was relatively difficult for these farms to fully utilize assets previously devoted to a swine or dairy enterprise. A lower percent of the farms that dropped a beef enterprise had trouble covering unpaid labor than the farms with a beef enterprise in both 1995 and 2004. In contrast, the farms that dropped a swine or dairy enterprise clearly had more difficulty, on average, covering unpaid labor. Farms that dropped a swine or dairy enterprise also had substantially lower current ratios than farms that had a swine or dairy enterprise in both 1995 and 2004.

Table 5 illustrates the change in farm size, financial performance, labor use, and downside risk for farms that dropped a beef enterprise, farms that dropped a swine enterprise, farms that dropped a dairy enterprise, and for all of the farms in the sample. For the average farm (last column in Table 5), accrual beef income increased, and accrual swine and dairy incomes decreased. Of course, accrual beef income declined for the farms that dropped a beef enterprise. The average decline in accrual beef income for these farms was $16,726. The average decline in accrual swine income for the farms that dropped a swine enterprise was $27,380 while the average decline in accrual dairy income for the farms that dropped a dairy enterprise was $41,671. Thus, farms that dropped a swine or dairy enterprise realized larger drops in accrual income than farms that dropped a beef enterprise. However, if you compare accrual swine income or accrual dairy income between farms with a swine or dairy enterprise in both years and farms that

dropped a swine or dairy enterprise, it appears that the farms that dropped a swine or dairy enterprise had considerably smaller swine or dairy enterprises than the farms that remained in the respective industries. This does not imply that all of the farms that dropped a swine or dairy enterprise were necessarily small swine or dairy producers. It simply means that on average the farms that dropped a swine or dairy enterprise tended to be smaller than the farms that retained these enterprises.

On average, total acres and crop acres were 82 and 62 acres higher in the last five years than they were in the first five years (Table 5). Average crop acres and the amount of labor used for crops increased for the farms that dropped a livestock enterprise. These farms increased crop production to offset the loss of income resulting from the elimination of a livestock enterprise.

On average, the operating profit margin ratio, asset turnover ratio, and current ratio were all lower during the second five-year period. The largest drop in the operating profit margin ratio occurred for the farms that dropped a beef enterprise. Based on a comparison of value of farm production and total crop acres between the five-year periods, it does not appear that the farms that dropped a beef enterprise made as large of an adjustment to their output mix as the farms that dropped a swine or dairy enterprise. This could partially explain the relatively large drop in the operating profit margin ratio for this farm category. Relatively higher beef prices in the 2000 to 2004 period also contributed to the lower operating profit margin ratio. On average, the percent of farms that could not cover unpaid labor increased for all of the farm categories in Table 5.

Summary and Implications

This study examined the impact of dropping a livestock enterprise on farm size, financial performance, labor use, and downside risk. Farms that dropped a swine or dairy enterprise exhibited a larger decline in enterprise income than farms that dropped a beef enterprise. In response to the decline in livestock income, farms that dropped a livestock enterprise increased total acres, total crop acres, and the percent of labor used for crop production. In a sense, these farms rebalanced their output mix to maintain farm size and financial performance, and to mitigate downside risk.

Table 1. Summary Statistics for 924 KFMA Farms with Continuous Data from 1995-2004.

Item	Average
Value of Farm Production	$211,355
Accrual Beef Income	$43,066
Accrual Swine Income	$8,145
Accrual Dairy Income	$15,474
Percent of Farms with Beef Income	66.69%
Percent of Farms with Swine Income	7.82%
Percent of Farms with Dairy Income	7.71%
Total Acres	1,739
Total Crop Acres	1,108
Total Assets	$733,429
Net Farm Income	$43,496
Operating Profit Margin Ratio	0.1091
Asset Turnover Ratio	0.2882
Current Ratio	2.50
Debt to Asset Ratio	0.2853
Percent of Labor Used for Crops	76.01%
Percent of Farms Not Covering Unpaid Labor	52.90%
Percent of Farms with High Debt	10.85%
Percent of Farms Financially Stressed	7.40%

Source: Kansas Farm Management Association 2004 Databank.

Table 2. Summary Statistics for Beef Categories.[a]

Item	b1=1 b10=1	b1=1 b10=0	b1=0 b10=1	b1=0 b10=0
Number of Farms	539	98	40	247
Value of Farm Production	$208,344	$204,829	$212,614	$220,310
Accrual Beef Income	$69,700	$14,933	$15,948	$497
Accrual Swine Income	$8,150	$4,113	$4,454	$10,330
Accrual Dairy Income	$4,239	$23,908	$48,283	$31,333
Total Acres	1,983	1,587	1,412	1,321
Total Crop Acres	1,054	1,176	1,117	1,198
Total Assets	$768,338	$754,284	$717,432	$651,567
Net Farm Income	$42,249	$42,105	$44,412	$46,622
Operating Profit Margin Ratio	0.1120	0.0942	0.0798	0.1130
Asset Turnover Ratio	0.2712	0.2716	0.2964	0.3381
Current Ratio	2.45	2.86	3.40	2.41
Debt to Asset Ratio	0.2947	0.2246	0.2613	0.2931
Percent of Labor Used for Crops	67.96%	85.20%	76.97%	89.78%
Percent of Farms Not Covering Unpaid Labor	54.17%	51.02%	52.50%	44.94%
Percent of Farms with High Debt	9.28%	11.22%	12.50%	11.34%
Percent of Farms Financially Stressed	6.68%	6.12%	12.50%	7.29%

[a] If b1=1, the farms had beef income in 1995. If b10=1, the farms had beef income in 2004.

Table 3. Summary Statistics for Swine Categories.[a]

Item	s1=1 s10=1	s1=1 s10=0	s1=0 s10=1	s1=0 s10=0
Number of Farms	35	96	4	789
Value of Farm Production	$267,826	$199,353	$262,289	$210,052
Accrual Beef Income	$57,127	$50,267	$31,852	$41,622
Accrual Swine Income	$156,445	$19,459	$46,279	$0
Accrual Dairy Income	$102	$10,153	$117,488	$16,287
Total Acres	1,661	1,530	1,797	1,768
Total Crop Acres	1,096	914	932	1,133
Total Assets	$855,720	$690,111	$743,843	$733,222
Net Farm Income	$72,560	$34,680	$65,773	$43,167
Operating Profit Margin Ratio	0.1525	0.0794	0.1353	0.1099
Asset Turnover Ratio	0.3130	0.2889	0.3526	0.2865
Current Ratio	2.92	1.95	2.38	2.57
Debt to Asset Ratio	0.2683	0.3677	0.2574	0.2769
Percent of Labor Used for Crops	59.96%	70.41%	49.52%	77.54%
Percent of Farms Not Covering Unpaid Labor	48.57%	59.38%	25.00%	50.57%
Percent of Farms with High Debt	14.29%	15.62%	0.00%	9.38%
Percent of Farms Financially Stressed	14.29%	13.54%	0.00%	5.96%

[a] If s1=1, the farms had swine income in 1995. If s10=1, the farms had swine income in 2004.

Table 4. Summary Statistics for Dairy Categories.[a]

Item	d1=1 d10=1	d1=1 d10=0	d1=0 d10=0
Number of Farms	46	46	832
Value of Farm Production	$288,369	$197,562	$207,859
Accrual Beef Income	$10,069	$48,748	$44,576
Accrual Swine Income	$83	$8,691	$8,560
Total Acres	1,035	1,642	1,784
Total Crop Acres	678	945	1,141
Total Assets	$872,606	$694,126	$727,907
Net Farm Income	$64,118	$36,728	$42,730
Operating Profit Margin Ratio	0.1051	0.0743	0.1112
Asset Turnover Ratio	0.3305	0.2846	0.2856
Current Ratio	4.37	2.41	2.42
Debt to Asset Ratio	0.2560	0.3137	0.2858
Percent of Labor Used for Crops	32.63%	70.77%	78.70%
Percent of Farms Not Covering Unpaid Labor	47.83%	60.87%	50.96%
Percent of Farms With High Debt	4.35%	8.70%	10.58%
Percent of Farms Financially Stressed	4.35%	6.52%	7.21%

[a] If d1=1, the farms had dairy income in 1995. If d10=1, the farms had dairy income in 2004.

Table 5. Summary Statistics for Farms that Dropped a Livestock Enterprise.

Item	Drop Beef	Drop Swine	Drop Dairy	All Farms
Number of Farms	98	96	46	924
1995-1999 Averages				
Value of Farm Production	$204,725	$190,842	$192,679	$200,578
Accrual Beef Income	$23,296	$43,898	$40,994	$38,749
Accrual Swine Income	$4,267	$33,149	$7,827	$9,443
Accrual Dairy Income	$24,466	$13,083	$46,828	$16,764
Total Acres	1,609	1,492	1,572	1,698
Total Crop Acres	1,152	881	904	1,077
Total Assets	$714,067	$630,437	$665,395	$667,299
Net Farm Income	$47,224	$36,160	$36,163	$44,714
Operating Profit Margin Ratio	0.1311	0.0974	0.0906	0.1341
Asset Turnover Ratio	0.2867	0.3027	0.2896	0.3006
Current Ratio	2.95	2.16	2.50	2.60
Debt to Asset Ratio	0.2361	0.3509	0.3159	0.2864
Percent of Labor Used for Crops	80.11%	65.54%	64.63%	74.02%
Percent of Farms Not Covering Unpaid Labor	42.86%	56.25%	52.17%	46.65%
Percent of Farms with High Debt	10.20%	12.50%	6.52%	8.66%
Percent of Farms Financially Stressed	7.14%	11.46%	4.35%	6.06%
2000-2004 Averages				
Value of Farm Production	$204,932	$207,863	$202,445	$222,131
Accrual Beef Income	$6,570	$56,635	$56,501	$47,382
Accrual Swine Income	$3,959	$5,769	$9,556	$6,846
Accrual Dairy Income	$23,351	$7,222	$5,157	$14,185
Total Acres	1,565	1,567	1,712	1,780
Total Crop Acres	1,201	947	987	1,139
Total Assets	$794,501	$749,784	$722,856	$799,559
Net Farm Income	$36,987	$33,201	$37,293	$42,278
Operating Profit Margin Ratio	0.0575	0.0629	0.0587	0.0864
Asset Turnover Ratio	0.2579	0.2772	0.2801	0.2778
Current Ratio	2.77	1.79	2.32	2.42
Debt to Asset Ratio	0.2142	0.3819	0.3118	0.2844
Percent of Labor Used for Crops	90.28%	75.29%	76.90%	78.00%
Percent of Farms Not Covering Unpaid Labor	58.16%	67.71%	65.22%	56.39%
Percent of Farms with High Debt	13.27%	19.79%	10.87%	12.12%
Percent of Farms Financially Stressed	6.12%	16.67%	8.70%	8.55%