



Production and Farm Management Report

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OPERATOR AND OPERATION CHARACTERISTICS: A COMPARISON OF LOW-SALES, MEDIUM-SALES, AND LARGE FAMILY FARM OPERATIONS IN THE UNITED STATES

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Introduction – Questions raised about the challenges facing small and mid-sized farming operations in the United States gave rise to this analysis of data from the 2008 Agricultural Resource Management Survey (ARMS) conducted by USDA's Economic Research Service (ERS) and National Agricultural Statistics Service (NASS).³ This paper⁴ explores operator and operation characteristics of

- (1) low-sales farms (gross sales <\$100,000);
- (2) medium-sales farms (gross sales between \$100,000 and \$249,999); and
- (3) large family farms (gross sales between \$250,000 and \$499,999)

where operators reported farming as their major occupation. This analysis excludes small family farms with less than \$500,000 in gross sales whose operators report that they are either retired or have a major occupation other than farming. It also excludes very large family farms with gross sales of \$500,000 or more and nonfamily farms. The paper analyzes operator and operation characteristics for the smaller and midsized farms such as regional influences, age, and educational backgrounds of the operators and their spouses according to their return on assets (ROA).⁵ These farms were categorized by size based on gross sales and ranked in quartiles according to the ROA.

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³ For 2008, the full Phase III sample from the Agricultural Resource Management Survey (ARMS) was 34,000 farm operations. These operations returned 21,816 usable surveys. Specific information is found at the ARMS Websites: <http://www.ers.usda.gov/Data/ARMS/GlobalDocumentation.htm> and <http://www.ers.usda.gov/DATA/ARMS/FarmsDocumentation.htm>.

⁴ This fact sheet is published as part of a three part series. An Executive Summary (<http://dare.colostate.edu/pubs/PFMR11-01.pdf>) and two additional fact sheets titled *Production Resources and Management* (<http://dare.colostate.edu/pubs/PFMR11-03.pdf>) and *Profitability Measures and Financial Structure* (<http://dare.colostate.edu/pubs/PFMR11-04.pdf>) and are available at the listed websites.

⁵ Rate of return on assets is defined as net farm income plus interest expenses minus estimated charges for operator labor and management, divided by total assets. This ratio reveals the returns received by the farm operator for both debt and equity capital invested.

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Regional Characteristics – The Corn Belt is the region that hosts the largest proportion of operations in the highest return quartile across all farm sizes (Table 1).

These percentages also increase from low-sales farms to large family farms, from 19.5 percent to 33.7 percent.

Table 1. Production Region⁶ of Farm, by Farm Sales and Quartile.

Region	Highest Return Quartile	Lowest Return Quartile	
Low-sales, <\$100,000			
Northeast	4.6		12.2
Lake States	7.3		7.4
Corn Belt	19.5		12.1
Northern Plains	15.5		5.5
Appalachia	16.5		13.8
Southeast	6.2		4.9
Delta	2.9		6.4
Southern Plains	11.0		21.4
Mountain	6.8		8.0
Pacific	9.6		8.3
Total	100.0		100.0
Medium sales, \$100,000-\$249,999			
Northeast	4.0		16.1
Lake States	14.0		16.0
Corn Belt	28.0		19.6
Northern Plains	18.2		18.2
Appalachia	5.7		4.7
Southeast	5.3		1.4
Delta	1.8		1.7
Southern Plains	5.7		8.3
Mountain	10.5		9.9
Pacific	6.7		4.1
Total	100.0		100.0
Large family, \$250,000-\$499,999			
Northeast	3.2		11.0
Lake States	10.8		12.6
Corn Belt	33.7		23.5
Northern Plains	21.0		14.4
Appalachia	4.8		7.1
Southeast	3.1		3.7
Delta	3.4		7.6
Southern Plains	9.5		6.4
Mountain	3.6		7.9
Pacific	6.9		5.7
Total	100.0		100.0

NOTE: Percentages may not sum to 100 rounding.

⁶ Northeast = CT,DE,ME,MD,MA,NH,NJ,NY,PA,RI,VT; Lake States = MI,MN,WI; Corn Belt = IL,IN,IA,MO,OH; Northern Plains = KS,NE,ND,SD; Appalachia = KY,NC,TN,VA,WV; Southeast = AL,FL,GA,SC; Delta = AR,LA,MS; Southern Plains = OK,TX; Mountain = AZ,CO,ID,MT,NV,NM,UT,WY; Pacific = CA,OR,WA AK and HI are excluded from ARMS.

For low-sales farms, a number of regions join the Corn Belt in claiming a higher percentage of operations in the highest return quartile than in the lowest return quartile – Appalachia (16.5 percent), the Northern Plains (15.5 percent), the Pacific (9.6 percent), and the Southeast (6.2 percent). For medium-sales farms, the Mountain (10.5 percent), the Pacific (6.7 percent), Appalachia (5.7 percent), the Southeast (5.3 percent) and the Delta (1.8 percent) regions together with the Corn Belt (28 percent) have a larger percentage of farms in the highest return quartile than in the lowest return quartile, although the percentages of farms located in these regions is not as high as for the low-sales farms. For large family farms, the Northern Plains (21 percent), the Southern Plains (9.5 percent), and the Pacific (6.9 percent) regions join the Corn Belt with higher percentages of operations in the highest return quartile than in the lowest return quartile. Across all three of the sales classes of farms included here, the Northeast saw a higher percentage of farms in the lowest return quartiles.

In past work, some regional economists have found that the proximity of the operation to metropolitan areas may affect the farm's financial viability. Farms closer to metropolitan areas may have increased market opportunities but also increased upward pressure on asset values due to development potential.

Table 2 shows there are some differences in the financial success of operations and their location. Metropolitan (metro) counties in America are classified according to their population size, while nonmetropolitan (nonmetro) counties are classified by degree of urbanization and adjacency to metro areas. There are 9 residential area classifications available to analyze trends in areas with different characteristics (Box 1).⁷

This fact sheet collapses the quartile results into the six categories shown in Table 2. Table 2 shows a relatively higher share of low-sales farms are in more populous areas. One explanation is that higher values and competition for land for other uses in metro and urban areas make a low-sales model more realistic. Another reason could be that employment in metro and urban areas complements the lower absolute returns from low-sales farms (an issue explored further in the financial fact sheet). In contrast, medium-sales and large family farms are more likely to be found in more rural areas. It should be noted, however, that the majority of all farms explored here are in what would be considered metro or metro-influenced areas.

In terms of financial performance, a few interesting trends are worth exploring. The areas where the best odds of finding strong performing operations (defined as the ratio of highest quartile return operations to

Table 2. Rural/Urban/Metro Category of Farm, by Farm Sales and Quartile.

	Low-sales, <\$100,000		Medium-sales, \$100,000-\$249,999		Large family, \$250,000-\$499,999	
	Highest Return Quartile	Lowest Return Quartile	Highest Return Quartile	Lowest Return Quartile	Highest Return Quartile	Lowest Return Quartile
Residential Area						
Metro Large and Metro Medium	29.4	34.3	22.8	23.8	15.3	21.2
Metro Small	14.7	8.9	12.6	11.3	15.2	9.4
Urban Large and Urban Medium, metro adjacent	22.4	32.4	26.8	30.8	29.6	31.7
Urban Large and Urban Medium, metro non-adjacent	17.6	13.2	21.9	17.7	20.3	20.9
Urban Small and Rural Small, metro adjacent	8.9	3.8	3.6	3.8	9.6	5.4
Urban Small and Rural Small, metro non-adjacent	7.0	7.5	12.2	12.5	10.1	11.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

NOTE: Percentages may not sum to 100 percent due to rounding.

⁷ Measuring Rurality: Rural-Urban Continuum Codes accessed at <http://www.ers.usda.gov/briefing/rurality/ruralurbcon/> on July 8, 2011.

Box 1. Residential Area Descriptions

Residential Area	Description
Metro Large	Counties in metro areas of 1 million population or more
Metro Medium	Counties in metro areas of 250,000 to 1 million population
Metro Small	Counties in metro areas of fewer than 250,000 population
Urban Large, metro adjacent	Urban population of 20,000 or more, adjacent to a metro area
Urban Large, metro non-adjacent	Urban population of 20,000 or more, not adjacent to a metro area
Urban Medium, metro adjacent	Urban population of 2,500 to 19,999, adjacent to a metro area
Urban Medium, metro non-adjacent	Urban population of 2,500 to 19,999, not adjacent to a metro area
Rural Small, metro adjacent	Completely rural or less than 2,500 urban population, adjacent to a metro area
Rural Small, metro non-adjacent	Completely rural or less than 2,500 urban population, not adjacent to a metro area

Lowest quartile operations) are in smaller metro and urban-influenced areas. This is fairly consistent across all sales classes. In contrast, at the extreme point (large metro and very rural areas), it seems less likely that an operation will perform strongly in terms of financial returns.

This is likely a case of balance. Being near more urban consumer markets may help diversify marketing efforts, cut costs of procuring inputs (explored below) and increase off-farm opportunities for households. However, land access, costs, and production-development tensions may be costly in the largest metro areas. The most rural areas may have the least expensive land values with few competitive sectors bidding up prices but also have either climatic or marketing challenges that limit financial returns.

Related to the operations' locations are the distances which operations travel to purchase inputs. Figures 1 through 3 illustrate the average distances traveled for

purchase of fuel, fertilizer/chemicals, and feed/seed. Overall, the shortest distances involve fuel purchases – up to 19.4 miles on average – and the largest distances feed and seed purchases – up to 31.8 miles on average. In each case, low-sales farms in the highest return quartile travel the shortest average distances to obtain their supplies relative to low-sales farms in quartiles with lower returns. For medium-sales and large family farms in the highest return quartile, the expenses of traveling farther to purchase inputs may be offset by lower prices on the larger quantities purchased, or quantity discounts may allow them to live farther from the distribution points for inputs.

Operator Characteristics - Overall, the average age of the primary operator ranges from 50.5 to 62.5 years old across all quartiles and farm sizes (Figure 4). The highest and lowest return quartiles have the youngest average age of primary operators for all three farm sales classes included suggesting both benefits and disadvantages to youth.



Figure 1. Miles to Buy Fuel, by Farm Sales and Quartile.

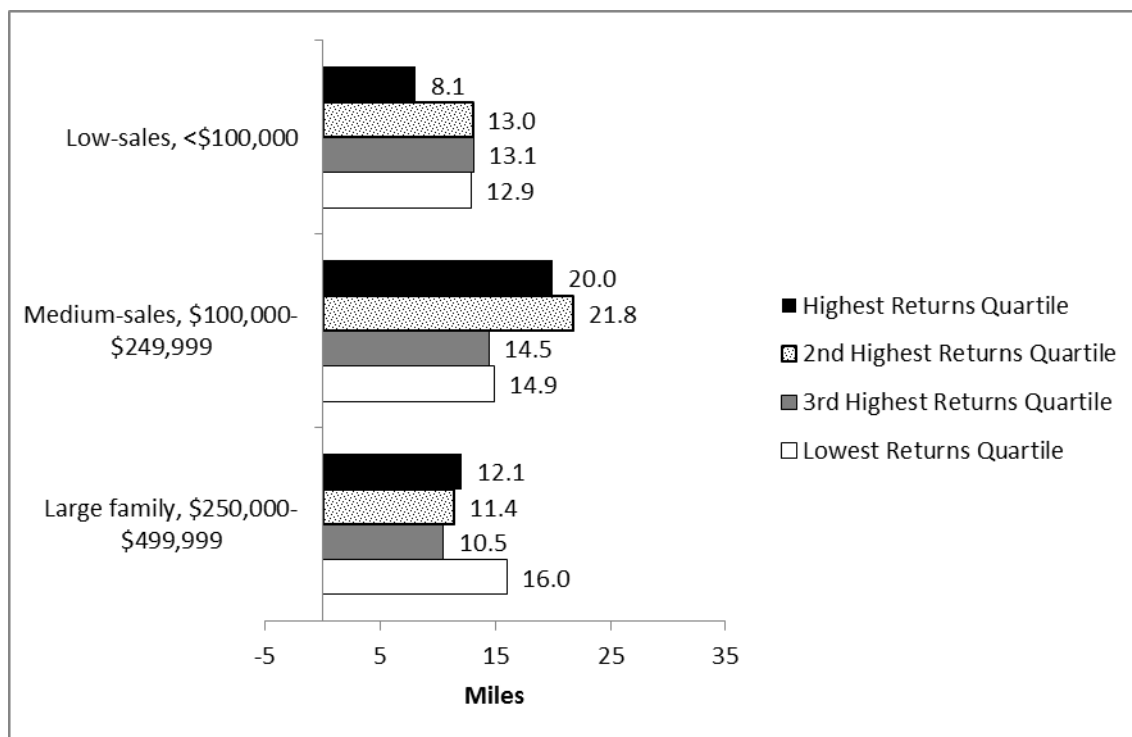


Figure 2. Miles to Buy Fertilizer/chemicals, by Farm Sales and Quartile.



Figure 3. Miles to Buy Feed and Seed, by Farm Sales and Quartile.

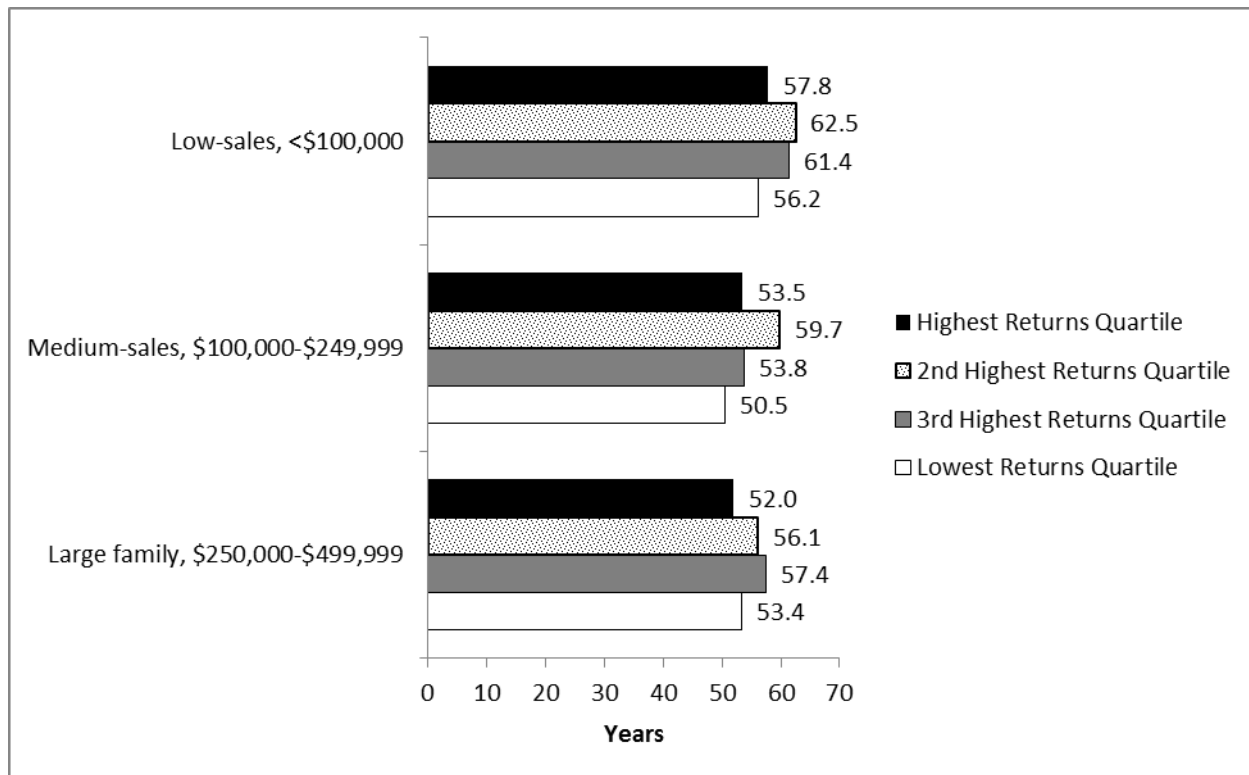


Figure 4. Age of Primary Operator, by Farm Sales and Quartile.

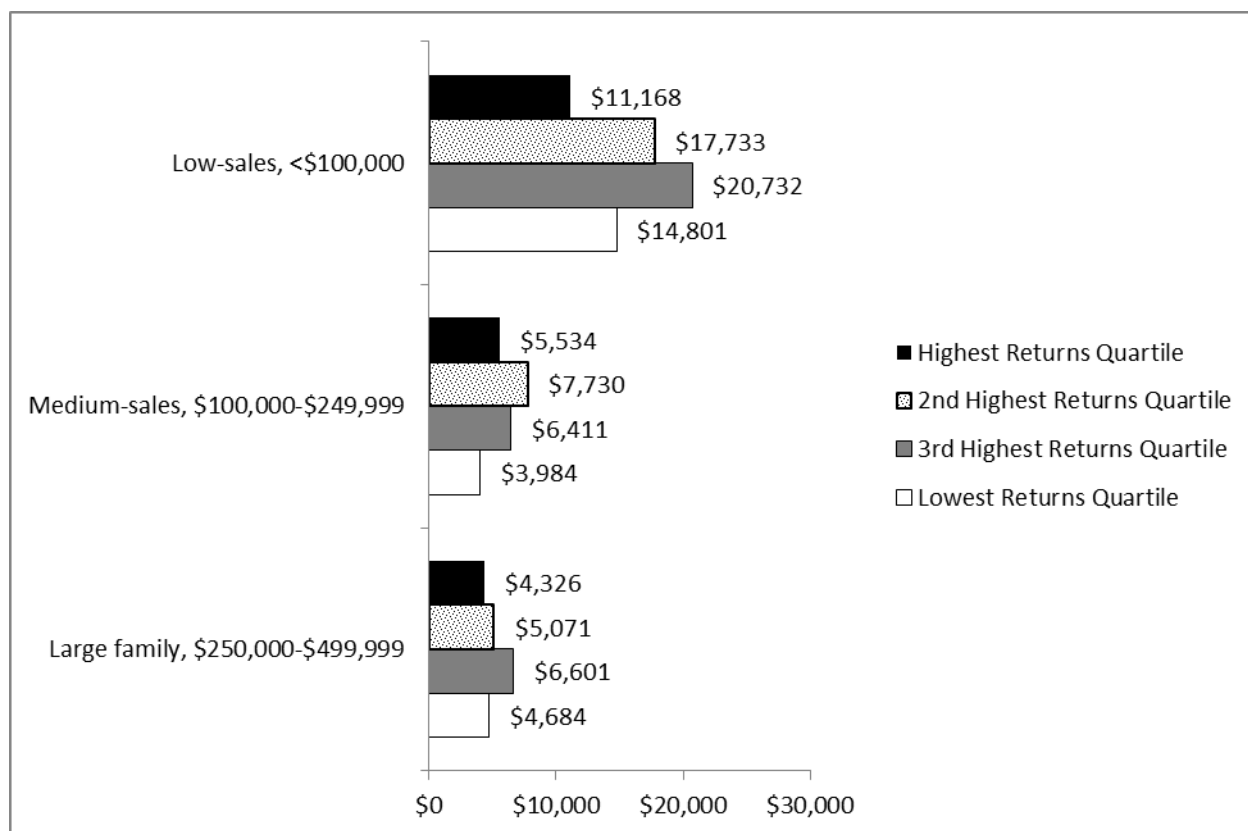


Figure 5. Social Security and Other Public Assistance, Earned by Operator Household, by Farm Sales and Quartile.

The distribution of social security and other public assistance benefits mirror the average age distribution for each of the sales classes of farms included (Figure 5) and represents all farm households that responded. Low-sales farms in the second and third highest quartiles receive markedly more in benefits since their average age are nearest the minimum age requirements for receiving social security.

The majority of primary operators for all farm sales classes have graduated from high school or attended some college (Table 3). Primary operators on large family farms in the highest quartile are more likely to complete college or attend graduate school, when compared with low-sales and medium-sales farms. The relationship between education and returns is negative for operators of medium-sales and low-sales operations.

Family Characteristics - The average number of household members, including all persons dependent on the household for financial support, whether they live in

the household or not, lies within a fairly limited range from 2 to 4 over all quartiles and farm sizes (Figure 6). This was expected based on the age of the primary operators and their nearness to retirement.

Consistent with historical trends and previous research, primary operators are mostly male for all farm sizes and quartiles (Table 4). Primary operators in the lowest return quartile for low-sales farms are more likely to be female. Table 5 shows that primary operators in the highest quartile for the farm sales classes are more likely to report having no spouse compared with the lowest quartile.

Over all quartiles and the three included farm sales classes, the average age of the primary operator's spouse ranges from 46.2 to 59.4 years old (Figure 7). Every quartile for all farm sizes has spouses younger than the primary operator. Similar to the age distribution for primary operators, the highest and lowest return quartiles have the youngest average age of primary operator's spouses for all farm sizes.

Table 3. Education Level of Primary Operator, by Farm Sales and Quartile.

Education Level	Highest Return Quartile	2nd Highest Return Quartile	3rd Highest Return Quartile	Lowest Return Quartile
	<u>Low-sales, <\$100,000</u>			
Some high school or less	7.4	7.4	8.5	14.5
Completed high school	59.2	52.0	46.9	40.3
Some college	20.7	21.0	23.3	22.3
4 year college graduate and beyond	12.6	19.6	21.2	23.0
	<u>Medium-sales, \$100,000-\$249,999</u>			
Some high school or less	12.8	7.9	11.7	13.4
Completed high school	42.9	45.0	38.1	41.3
Some college	25.4	25.4	29.3	25.1
4 year college graduate and beyond	18.9	21.7	21.0	20.2
	<u>Large family, \$250,000-\$499,999</u>			
Some high school or less	3.7	9.6	8.4	8.2
Completed high school	32.8	44.3	47.6	39.5
Some college	33.1	26.8	25.3	28.4
4 year college graduate and beyond	30.3	19.4	18.8	24.0

NOTE: Percentages may not sum to 100 percent due to rounding.

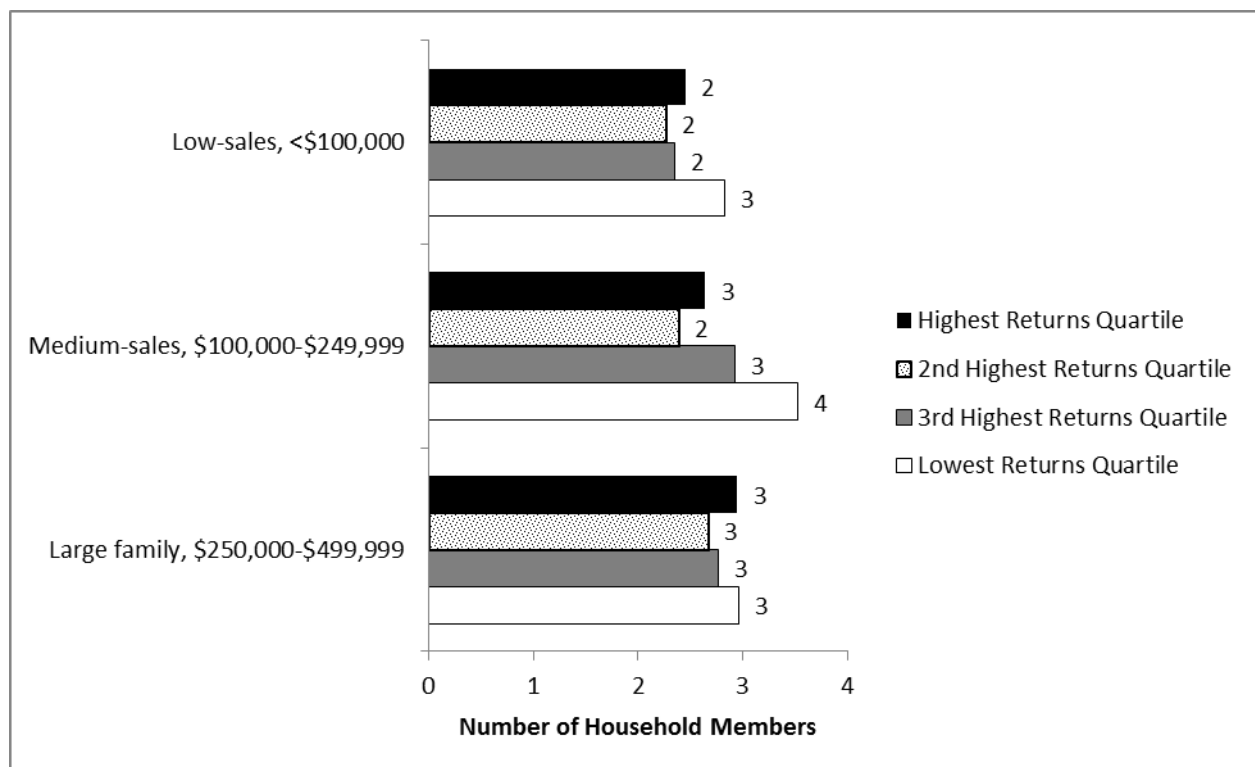


Figure 6. Average Number of Household Members, by Farm Sales and Quartile.

Table 4. Gender of Primary Operator, by Farm Sales and Quartile.

Gender	Highest Return Quartile	Lowest Return Quartile
	<u>Low-sales, <\$100,000</u>	
Male	94.4	81.5
Female	5.6	18.5
	<u>Medium-sales, \$100,000-\$249,999</u>	
Male	95.5	97.2
Female	4.5	2.8
	<u>Large family, \$250,000-\$499,999</u>	
Male	98.4	96.7
Female	1.6	3.3

Table 5. Gender of Primary Operator's Spouse, by Farm Sales and Quartile

Gender	Highest Return Quartile	Lowest Return Quartile
	<u>Low-sales, <\$100,000</u>	
Male	4.2	15.9
Female	72.2	71.1
No Spouse	23.6	13.0
	<u>Medium-sales, \$100,000-\$249,999</u>	
Male	1.8	2.1
Female	74.1	88.4
No Spouse	24.2	9.5
	<u>Large family, \$250,000-\$499,999</u>	
Male	0.8	2.0
Female	84.7	84.2
No Spouse	14.5	13.8

NOTE: Percentages may not sum to 100 percent due to rounding.

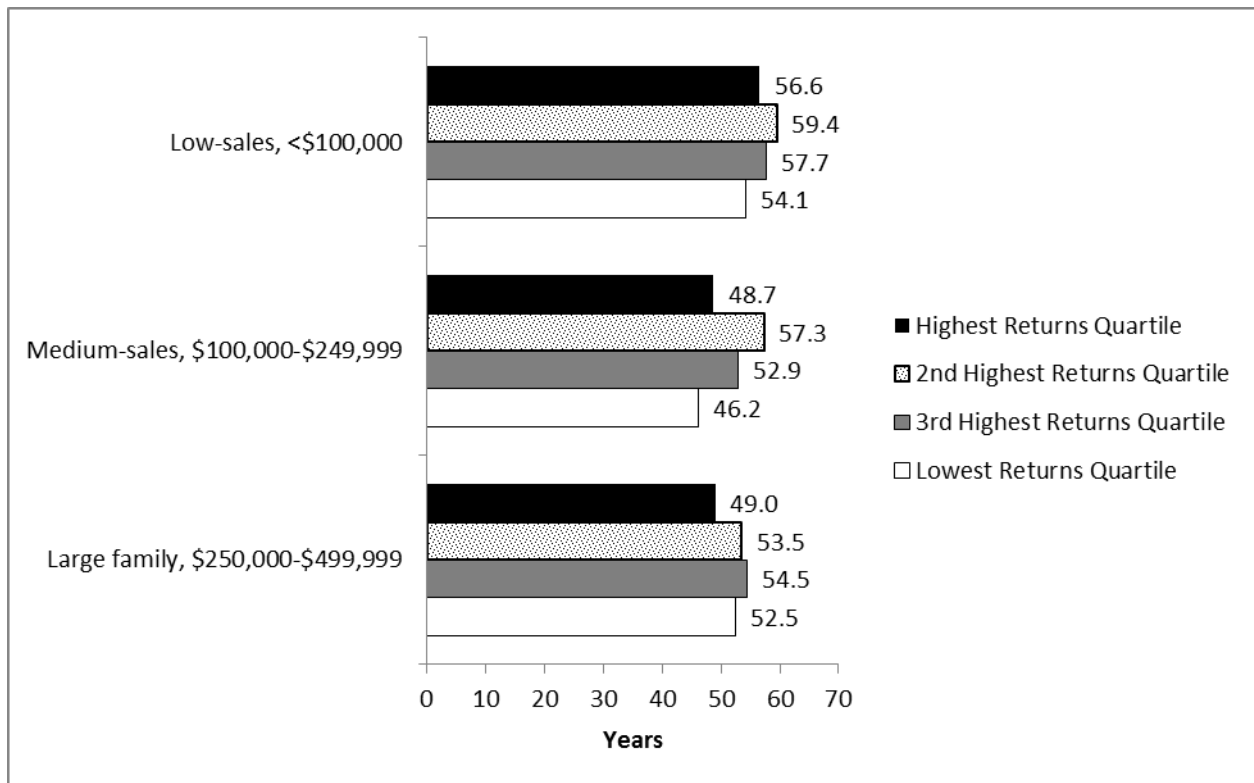


Figure 7. Average Age of Primary Operator's Spouse, by Farm Sales and Quartile.

Most of primary operators' spouses for all farm sizes have graduated from high school or attended some college (Table 6). Primary operator's spouses on large family farms in the highest returns quartile are more likely to complete college or attend graduate school, when compared with low-sales and medium-sales farms. As a spouse's education level increases, it appears that the rates of return increase on large family farms, the same was not indicated for low-sales and medium-sales farms.

The majority of primary operators' spouses work, either on or off the farm (Table 7). Almost a quarter (23.1 percent) of primary operator's spouses have a major occupation that is off farm in the highest quartile for low-sales farms, increasing to nearly half (48.5 percent) for large family farms in the highest quartile. For both low-sales and medium-sales farms, the highest return quartile had a lower percentage of spouses working off the farm compared with other quartiles. In contrast, the highest return quartile for the large family farms, showed the highest percent of spouses working off the farm.

Figure 8 shows that the average distance the primary operator's spouse drives to work ranges from 3.2 to

10.9 miles. For all farm sales categories, spouses of primary operators in the lowest return quartile drove the farthest to work when compared to other quartiles in their sales category. The distances spouses of primary operators travel from home to work may be related to their rural/urban/metro classifications cited previously. Low-sales operations in the 3rd highest and lowest quartiles drove further to work, compared to medium-sales and large family farms in the 3rd highest and lowest quartiles.

Conclusion – When performance is measured as net returns per dollar of assets (ROA), the results suggest that the smallest farms successfully hold more live-stock in addition to producing grain and oilseeds than medium-sales and large family farms. Corn Belt operations account for the highest percentage of operations with the highest rates of return across all farm sizes, but small farms generate high returns in multiple regions, including Appalachia, the Northern Plains, the Pacific, and the Southeast. Low-sales, medium-sales, and large family farms also perform better in small metro areas. Distances traveled for purchase of inputs indicate that low-sales farms are most successful when limiting the distance traveled, while medium-sales and large family farms encounter a tradeoff between the

Table 6. Education Level of Primary Operator's Spouse, by Farm Sales and Quartile.

Education Level	Highest Return Quartile	2nd Highest Return Quartile	3rd Highest Return Quartile	Lowest Return Quartile
	<u>Low-sales, <\$100,000</u>			
Some high school or less	1.7	2.7	5.0	10.1
Completed high school	46.9	38.2	40.7	37.3
Some college	11.5	19.6	20.3	17.3
4 year college graduate and beyond	16.2	19.0	18.9	22.3
No spouse	23.6	20.6	15.2	13.0
	<u>Medium-sales, \$100,000-\$249,999</u>			
Some high school or less	7.8	4.9	8.2	10.4
Completed high school	29.0	35.8	29.8	33.6
Some college	20.4	23.3	21.7	22.4
4 year college graduate and beyond	18.6	22.1	25.1	24.1
No spouse	24.2	13.9	15.2	9.5
	<u>Large family, \$250,000-\$499,999</u>			
Some high school or less	1.3	2.7	5.0	3.8
Completed high school	25.5	34.9	32.3	30.0
Some college	30.5	25.1	26.5	26.8
4 year college graduate and beyond	28.2	22.5	22.7	25.5
No spouse	14.5	14.7	13.5	13.8

NOTE: Percentages may not sum to 100 percent due to rounding.

Table 7. Major Occupation of Primary Operator's Spouse, by Farm Size and Quartile.

Occupation	Highest Return Quartile	2nd Highest Return Quartile	3rd Highest Return Quartile	Lowest Return Quartile
	<u>Low-sales, <\$100,000</u>			
Farm or ranch work	36.9	34.4	29.8	33.1
Work other than farming or ranching	23.1	25.0	35.5	37.9
Currently not in the paid workforce	16.4	20.0	19.5	16.1
No Spouse	23.6	20.6	15.2	13.0
Total	100.0	100.0	100.0	100.0
	<u>Medium-sales, \$100,000-\$249,999</u>			
Farm or ranch work	27.5	33.3	41.5	41.3
Work other than farming or ranching	34.4	38.5	32.6	37.5
Currently not in the paid workforce	14.0	14.3	10.7	11.7
No Spouse	24.2	13.9	15.2	9.5
Total	100.0	100.0	100.0	100.0
	<u>Large family, \$250,000-\$499,999</u>			
Farm or ranch work	21.1	25.2	37.2	30.2
Work other than farming or ranching	48.5	41.2	33.8	40.7
Currently not in the paid workforce	15.8	18.8	15.5	15.3
No Spouse	14.5	14.7	13.5	13.8
Total	100.0	100.0	100.0	100.0

Note: Percentages may not sum to 100 percent due to rounding.

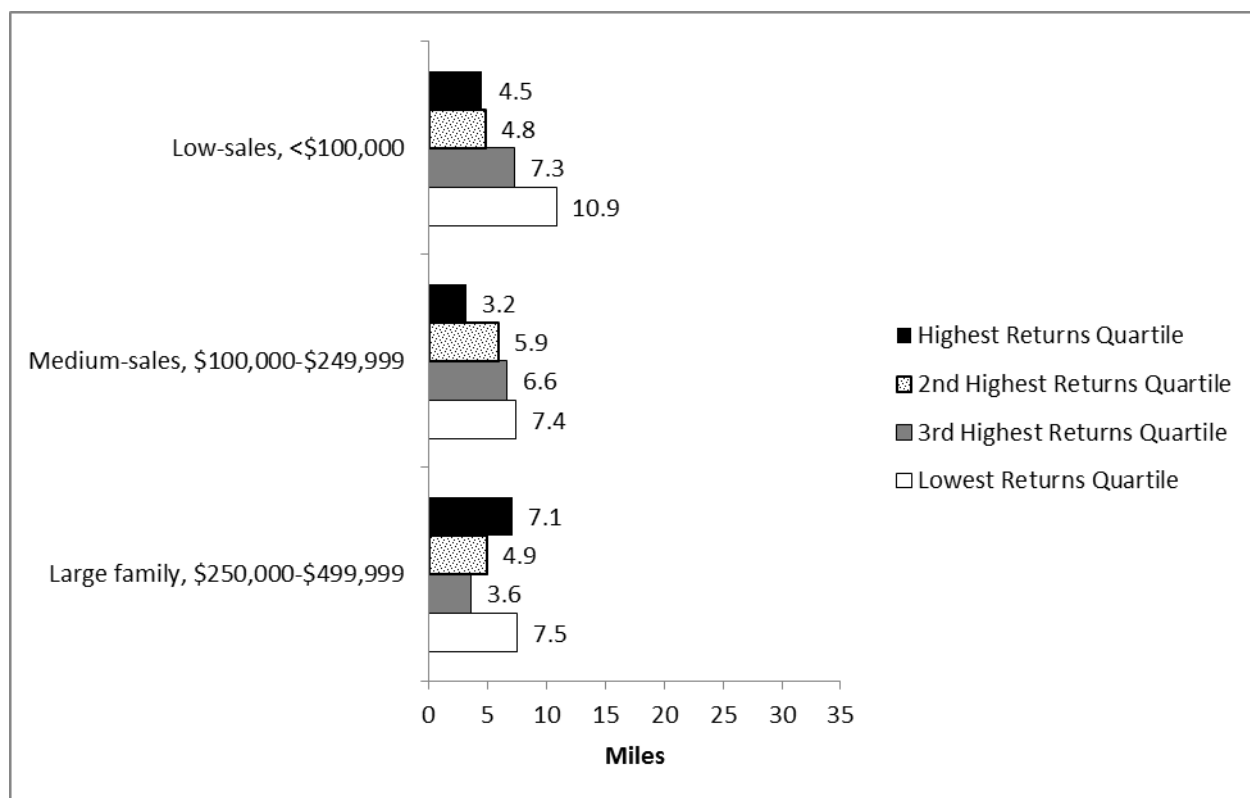


Figure 8. Primary Operator Spouse Distance from Home to Work, by Farm Sales and Quartile.

costs of distance traveled and discounts for larger purchases.

The highest and lowest return quartiles have the youngest average age of primary operators for the three farm sales classes included. It appears that the higher the education levels of primary operators, the higher the rates of return for low-sales and large family farms, while medium-sales farms do not show this same benefit to increased education. In terms of returns, the lowest returns quartiles have only a slightly higher number of household members than the other three returns quartiles. Primary operators in the lowest return quartile for low-sales farms are more likely to be female when compared to medium-sales and large family farms. Primary operators in the highest returns quartile for the farm sales classes are more likely to report having no spouse compared with the lowest quartile. While as a spouse's education level increases, it appears that the rates of return increases on large family farms, the same was not indicated for low-sales and medium-sales farms. For both low-sales and

medium-sales farms, the highest return quartile had a lower percentage of spouses working off the farm compared with other quartiles. In contrast, the highest return quartile for the large family farms, showed the highest percent of spouses working off the farm. In all farm sales classes, spouses of primary operators in the lowest return quartile drove the farthest in order to reach their off farm employment.

Overall the results suggested targeting of measures to improve the performance of these small and mid-sized farms as the challenges they face are not necessarily common even to each of the sales classes included in this paper.

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