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DEMOGRAPHICS, PRODUCTION CHARACTERISTICS AND FINANCIAL PERFORMANCE EXECUTIVE SUMMARY: A COMPARISON OF LOW-SALES, MEDIUM-SALES, AND LARGE FAMILY FARM OPERATIONS IN THE UNITED STATES

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The financial performance, resilience and long run sustainability of small and mid-sized farms and ranches are an important concern for agriculture's stakeholders and policy makers. A determined effort to uncover the ingredients of small operations' successes initiated this analysis of data from the 2008 Agricultural Resource Management Survey (ARMS)[3] that is conducted by USDA's Economic Research Service (ERS) and National Agricultural Statistics Service (NASS).

Much can be learned by comparing high performing operations to their contemporaries. To facilitate analysis, operations with less than $500,000 in gross sales were first divided into three typologies by gross sales – low-sales, medium-sales and large family farms. Operations were then categorized within those gross sales typologies according to their rate of return on assets (ROA). Cross category assessments shed light on the characteristics that promote sustainability, resilience, and successful performance.

Three performance areas are examined in particular– the characteristics of the operation and its managers, the production activities of the operation, and the operation's financial performance and structure. Initial findings are described in fact sheets titled:

- Operator and Operation Characteristics: A Comparison of Low-Sales, Medium-Sales, and Large Family Farm Operations in the United States Available at: http://dare.colostate.edu/pubs/PFMR11-02.pdf.
- Production Resources and Management: A Comparison of Low-Sales, Medium-Sales, and Large Family Farm Operations in the United States Available at: http://dare.colostate.edu/pubs/PFMR11-03.
- Profitability Measures and Financial Structure: A Comparison of Low-Sales, Medium-Sales, and Large Family Farm Operations in the United States Available at http://dare.colostate.edu/pubs/PFMR11-04.

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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.

This document is an executive summary of the findings from the three fact sheets, and it will detail the methods used to categorize operations from the 2008 ARMS data. Broad themes are summarized from results and opportunities for future research noted.

Methods of Categorization – The sample size of the 2008 ARMS included 21,816 usable surveys. For operators who identified their primary occupation as farming, three USDA Economic Research Service typologies were adopted. The three farm typologies were:

- Low-sales farms: Less than $100,000 in Gross Sales
- Medium-sales farms: $100,000 - $249,999 in Gross Sales
- Large family farms: $250,000 - $499,999 in Gross Sales

Low-sales farms, as defined above, account for 19 percent of all farms in the United States and 3 percent of the country's agricultural value of production. The medium-sales farm typology makes up 5 percent of farms and 6 percent of the US agricultural value of production. The large family farms constitute 4 percent of all US farms and contribute 12 percent of the value of production.

The ARMS survey also generates data on farm sizes not included in this summary or the aforementioned reports. Farms with sales less than $250,000 whose operators report a major occupation other than farming or report being retired are excluded from this analysis. These farms account for 65 percent of all farms and 9 percent of the value of production. Very large family farms and nonfamily farms account for 7 percent of farms and 70 percent of the value of production in the United States and these are also excluded.

Quartiles were calculated for the three sales typologies with return on assets (ROA[4]) used as the ranking measure. ROA indicates how assets are used as an input in creating net income, creating a broad efficiency measure evaluating use of all business resources. Table 1 reports the average ROA for each of the sales classes included in this report.

As indicated in Table 1, operational efficiency as measured by ROA varies significantly within a typology. As an example, the highest performing quartile among the low-sales typology generates an average ROA of 31.1 percent while the lowest return quartile averages -27.6 percent. Three quarters of the operations in the low-sales farms average a negative ROA. In contrast, half of the operations in the large family farms report a positive ROA with the highest performers averaging a remarkable 59.2 percent ROA. Interestingly, the medium-sales farms exhibits only a modest ROA in its highest quartile (12.1 percent).

Factors that give rise to the variation in ROA include the location of the operation, the efficiency with which assets are used to generate sales, debt structure, marketing methods, and use of input contracts among others. Themes that distinguish performance based on these factors are summarized in the next section with additional detail found in the three fact sheets.

Table 1. Average Return on Assets, by Farm Sales and Quartile.

Farm Size	Highest Return Quartile	2nd Highest Return Quartile	3rd Highest Return Quartile	Lowest Return Quartile
Low-sales, <$100,000	31.1%	-1.1%	-4.5%	-27.6%
Medium-sales, $100,000-$249,999	12.1%	1.0%	-2.3%	-19.6%
Large Family Farm, $250,000-$499,999	59.2%	4.6%	-0.1%	-13.2%

[4] 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.

Operator and Operation Characteristics – Operator characteristics that might influence ROA include age, education, and non-farm household income. The 2008 ARMS data suggest that most primary operators are males aged between 50 and 59 years, and the operation provides income to 2 or 3 individuals per household. The large family farm is generally comprised of the highest educated primary operators and spouses. Spouses work off of the farm or ranch in all sales classes. Interestingly, a greater share of spouses work *off* the farm in the highest quartile of the large family farms, but a greater share of spouses work *on* the farm in the most profitable quartile of low-sales and medium-sales farms.

Operation characteristics include geographic location, proximity to urban areas, production specialty and distance traveled to acquire inputs among others. Geo-climatic characteristics and population density may play an important role in the operational efficiency. The Corn Belt offered the best opportunities for all three farm sizes, but multiple regions are represented among the low-sales farms with the highest returns, including Appalachia, the Northern Plains, the Pacific, and the Southeast. Large and medium-sales operations with livestock tend to appear in the lower ROA quartiles, but emphasis on grains and oilseeds is associated with the greatest ROAs. Shorter distances for inputs characterize low-sales farms that were in the highest ROA quartile, while medium-sales and large family farm sales encountered a tradeoff between the cost of distance traveled and discounts for larger purchases. It is interesting to note that all operations perform better when located near small metro areas.

Production Characteristics – Differences in managerial performance may arise from varying degrees of cost efficiency and labor productivity. It appears that large family farms may take advantage of a division of labor within their operations when purchasing inputs and using different marketing channels. Large family farms are more likely to contract inputs in the production process and the sale of their farm products. More diverse use of marketing channels may enhance labor productivity – large family farms generally have greater sales per labor full time equivalent (FTE) when compared to low-sales and medium-sales farms. Future research may uncover whether the large family farms tend to replace labor with investment in equipment/ machinery relative to smaller operations.

Interesting variation occurs within the sales classes as well. In the low-sales, medium-sales and large family farms, it is more difficult to argue that farms with the largest scale of operations are the best performers as high return quartiles do not control the largest share of acres or have the most beef cows. Yet, the high performers do tend to focus their effort on fewer enterprises, perhaps revealing a certain amount of benefits to specialization. These operations also tend to make greater use of marketing contracts in input and output markets, while working proportionally less in the operation relative to lower performing peers.

Financial Characteristics – Financial characteristics of low-sales, medium-sales and large family farms include their debt structure, asset efficiency and cost of debt financing. ROA variation within and between sales classes may result from differences in these factors.

The highest performing quartiles exhibit the greatest asset efficiency in all sales classes with the strongest performers having the highest asset turnover ratios. At the same time, substantial variation in asset efficiency is found within a sales class. As an example, the greatest return quartile averages an asset turnover ratio of 69.8 percent in the low-sales farms, but the lowest return quartile has an asset turnover ratio of 14 percent. Likewise the highest return quartile in the large family farms averages an asset turnover ratio of 158.4 percent, but the smallest return quartile has an asset turnover ratio of 38.3 percent.

Government payments and off-farm income both tend to stabilize cash flows to farms. All sales classes receive government payments, and government payments make up the largest share of net income for the poorest performing farms. Off-farm income contributes to all sales classes and may be a source of stability and health insurance/retirement benefits. These large payment inflows may be more important in explaining differences in performance than operational efficiency.

Access to capital, whether it is borrowed funds or equity financing, is an important element in determining the performance and resilience of agriculture operations. The low-sales farms tend to have the lowest proportion of its assets financed by debt, but these operations also tend to have the largest share of operating expenses comprised by interest expense. In

contrast, large family farms make the greatest use of debt to finance their asset base but pay a lower share of their operating expenses to interest. It is important to note that debt structure and debt management appear to be significant differences among sales classes, and this is an area that may justify further research on implications for smaller farm operations.

Conclusions and Opportunities for Future Research – The performance of small operations is related to the manner in which the farm/ranch uses its assets, acquires its inputs, and obtains its financing, as well as the demographic characteristics of the primary operator. Systematic review of the 2008 ARMS data by low-sales, medium-sales and large family farms suggest the following themes:

- Size Matters – Performance of the medium-sales farms lags the low-sales and large family farms in many areas including ROA. It may be that these operations are too large to adopt the successful small operation business model of specialized production, at the same time that these operations are too small to take advantage of the ample market access and economies of scale of large operations.

- Location Matters – Regional differences exist in ROA performance. All farms in the Corn Belt tend to fare better than other areas, but low-sales operations remain competitive in other regions as well. Adjacency to small and medium sized urban areas is correlated with better performance, but it is not clear if the urban proximity gives rise to more opportunities for agricultural operations, or if historical agricultural activity has created opportunities for small metro areas to succeed.

- Household Income and Net Worth – All operations report significant net worth and off-farm income. Income and equity may be sufficiently large to motivate an adjustment in targeting or delivering federal assistance. Operations with off-farm income generally appear in the higher ranked ROA quartiles, but all quartiles receive a notable amount of off farm income, on average.

- Livestock in the Operation – Livestock enterprises are frequently associated with poor relative performance in the 2008 ARMS. More specifically, beef cattle, dairy, and poultry and eggs were more prevalent in the lowest return quartile. However, small farms in the highest returns quartile had markedly greater percentages of beef cattle, sheep, goats, and equine sales than for the highest returns quartiles of medium-sales and large family farms.

Importantly, the scope of the ARMS data represents a cross section for a point in time, rather than a long-term trend. Livestock production in rural areas did not appear profitable in this sample, but the 2008 data may not be representative. Livestock returns should be judged in a trend over time and juxtaposed against other available agriculture alternatives for the region.

The 2008 ARMS is a valuable data source for uncovering financial performance, resilience and long term sustainability of small farms. Future examination using more than one year of data may yield additional insights. As an example, the current study is a snapshot of how operation performance is correlated with particular characteristics. Completing the same analysis across multiple ARMS phases that occur in different times in agricultural market cycles may depict underlying trends in asset, cost and financial efficiency that are of practical importance to agriculture stakeholders and policy makers. Also, if individual operations are tracked, then the pooled data set may reveal the relative sustainability of farm operations given different starting conditions, and may explain the conditions that encourage entry and exit within the industry.

Factors explaining ROA are treated in isolation in this report; indeed a joint, causal relationship among factors cannot be inferred from results. An opportunity is to explore the relative importance that some factors have in determining the ROA for farms by sales class. As an example, research might uncover if asset efficiency is more important than cost efficiency in determining the farm's ROA. In this way the performance related to technical and allocative efficiency of sales classes can be revealed. Moreover, the use of and expense implications of debt use can be tracked to determine how it is used as a tool to grow and provide capital to operations. Federal assistance might be more effectively targeted if the relative importance of factors is better understood. A limitation of the 2008 Agriculture Resource Management Survey (ARMS) data used in this analysis is that information are the averages of what is reported by producers. Richer results may be obtained by pursuing additional analysis with methodologies which examine the data on a more individual level.