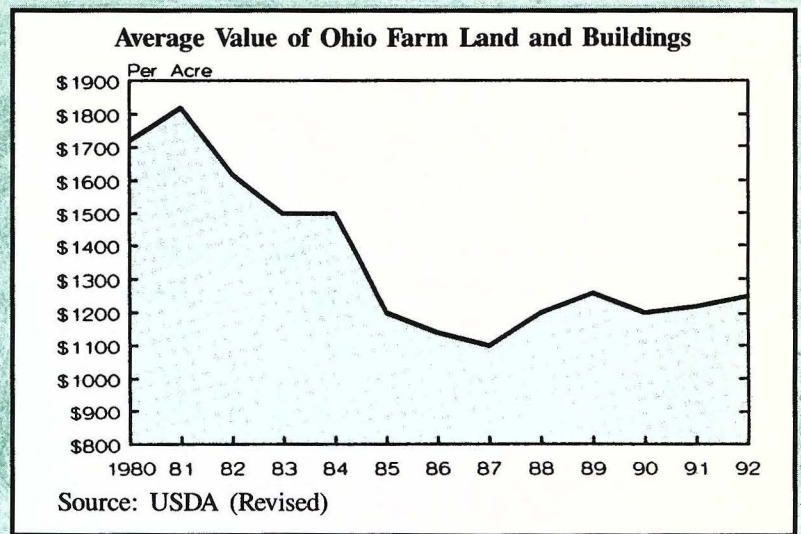
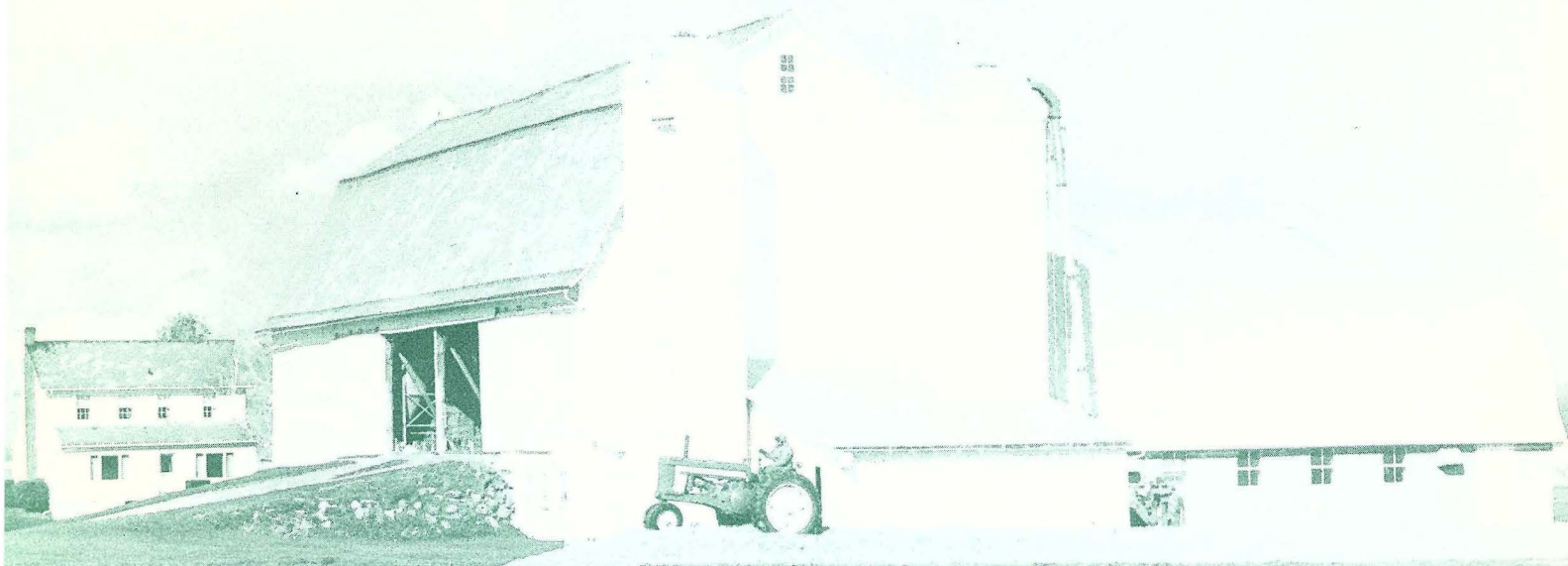


# Organization and Performance of Ohio Farm Operations in 1990



The Ohio State University  
Ohio Agricultural Research and Development Center  
Wooster, Ohio



**AUTHORS:**

**Thomas T. Stout**

**D. Lynn Forster**

**Gail E. Edgington**

**Department of Agricultural Economics and Rural Sociology**

**OARDC**

**James H. Brown**

**Acting Director**

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# ORGANIZATION AND PERFORMANCE OF OHIO FARM OPERATIONS IN 1990

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# ORGANIZATION AND PERFORMANCE OF OHIO FARM OPERATIONS IN 1990<sup>1</sup>

Thomas T. Stout, D. Lynn Forster, and Gail E. Edgington<sup>2</sup>

## INTRODUCTION

This bulletin reports financial and managerial profiles for farm operator households in Ohio in 1990 and changes in those profiles since 1986. The need was prompted by the financial stress in agriculture in the 1980s. Measuring its magnitude and consequences and monitoring its recovery have been the principal objectives of the investigation reported here.

The information was gathered in telephone interviews with a sample of 1,016 households during the winter of 1991. The sample was stratified by size (gross farm sales) to be representative of the total state population. Notice that the sample was drawn from the population of farm operator households. This has two important implications. First, the observation unit is the household rather than the individual or farm business, and results include all farm and nonfarm management, employment, income and community activity by all members of the household. Second, these are households with primary responsibilities for farm operations; hence, households that represent only farm ownership or only supervised farm labor are excluded from these interviews.

<sup>1</sup>This publication reports results of research under OARDC research project SS-434, funded by the Ohio Agricultural Research and Development Center, Ohio State University Extension, and the United States Department of Agriculture. The intended audience is participants in agricultural industries, including farming, and their supporting infrastructure. The publication has benefited from review and suggestions by professors Marvin Batte, Richard Duvick and David Hahn in the Department of Agricultural Economics and Rural Sociology at The Ohio State University and OARDC; by Professor John Kadlec at Purdue University; and by one anonymous reviewer outside Ohio.

<sup>2</sup>The authors are professors and graduate student, respectively, the Department of Agricultural Economics and Rural Sociology. They wish to express their appreciation to personnel at the Ohio Agricultural Statistics Service, Columbus, for sampling and interview assistance, to the many respondents who have participated in one or more interviews as this study proceeds, to the reviewers for corrections and helpful insights, and to Janice DiCarolis, Margaret Larason, and Karlene Robison for graphics and typing.

This is the second in a series of bulletins reporting these results. This is a longitudinal study, meaning that this is part of a continuing series of annual or biennial interviews with the sampled respondents. While additions must, of course, be made to the respondent pool to replace households that leave farming or withdraw from the study, there is a core of respondents included in these results that has provided financial and managerial information for 1986, 1987, 1988 and 1990. The next interviews will gather 1992 information during the winter of 1993.

### OARDC Bulletin 1185

This bulletin follows the format employed in OARDC Research Bulletin 1185, which reported 1986 data for this study in December 1989. Hence, comparisons may be made directly between tables in that publication and identical tables in this one reporting 1990 data.<sup>3</sup> Also, graphics shown here provide some direct comparisons between 1986 and 1990. In a few matters that were of special interest in only one year or the other, comparisons are not available.

The farm household population, the sampling procedure, and tests for 1990 sample reliability are set forth below. But the background for this study, details concerning objectives, and references to methodology and parallel studies are cited in Bulletin 1185 and are not repeated here. References cited at the end of this publication are further analyses of these 1986-1990 data reported by the respondent Ohio farm operator households.

## THE CENSUS POPULATION AND THE SAMPLE

The 1987 Census of Agriculture defined a farm as any enterprise that would realize \$1,000 or more from sales of farm products in a normal year. Using this definition, the

<sup>3</sup>Single copies of Research Bulletin 1185, *Organization and Performance of Ohio Farm Operations in 1986*, may be obtained by contacting the Department of Agricultural Economics and Rural Sociology at The Ohio State University, Columbus, OH 43210.

census identified 79,277 farms in Ohio in 1987. Addresses for most of these farms, together with annual enterprise and acreage estimates, are maintained as a confidential record by the Ohio Agricultural Statistics Service (OASS). That record contained 70,074 addresses in 1987 and 65,113 in 1991. This address list was treated as the population from which OASS first prepared the stratified random sample for this study in 1987.<sup>4</sup>

Accepting the budget limits and class intervals of farm size specified by the authors, OASS prepared a stratified list of 3,000 contacts from which it judged that telephone interviewers could complete 1,000 questionnaires before the list was exhausted. In the winter and spring of 1987, 2,263 contacts produced 940 completed questionnaires by the time interviewing was terminated because spring farm work had begun (see RB 1185, Table 1).

By 1991, 80 percent of the respondent core had participated in at least one previous interview. OASS added the necessary replacements for each size interval from its lists and also conducted the 1991 telephone interviews reported in this bulletin. From 1,480 telephone contacts, OASS produced 1,016 completed questionnaires for households distributed through the seven farm size categories shown in Tables 1 and 2.

Notice that Tables 1 and 2 show two different distributions of these households. Table 1 shows the *expected* distribution based on farm sales (size categories) indicated in the OASS records. But interviews revealed some slippage from expected farm sales to *actual* sales, producing the household distribution that appears in Table 2. This second distribution was the actual sample that was tested for sample reliability.

### Sample Reliability

Sample reliability tests determine whether the sample is an accurate and adequate representation of the population from which it is drawn. It is measured by the statistical probability that averages found in the sample

<sup>4</sup>Any differences between the Census enumeration and the OASS list that might induce errors of fact were assumed to be randomly distributed.

**Table 1: Percentage Distribution of Telephone Contacts in Developing the 1,016 Farm Operator Household Samples, 1990**

Farm Size (Sales) <sup>1</sup>	Contacts Attempted	Not Reached <sup>2</sup>	Former Farmer's <sup>3</sup>	Refused	Sample Completed <sup>4</sup>	
					Pct.	No.
	Number		Percent			
Under \$10,000	232	3.9	15.1	12.5	68.5	159
\$10-19,999	157	3.8	12.1	12.1	72.0	113
\$20-39,999	190	6.3	9.5	14.2	70.1	133
\$40-99,999	347	6.3	8.6	20.5	64.6	224
\$100-249,999	360	8.3	4.4	18.1	69.2	249
\$250-499,999	139	5.0	2.2	20.1	72.7	101
\$500,000+	55	7.3	1.8	23.6	67.3	37
Number	1,480	90	122	252	—	1,016
Percent	100	6.1	8.2	17.0	68.7	—

<sup>1</sup>Including government payments, but excluding imputed value of household residence.

<sup>2</sup>No answer, no phone, moved, wrong address, etc.

<sup>3</sup>Deceased, retired, or quit. Typically, the land was farmed by an operator at another address.

<sup>4</sup>Completed by expected size categories. Actual size distribution of these households appears in Table 2.

Source: Ohio Agricultural Statistics Service and survey data.

**Table 2: Ohio Farms and Farm Operator Households, by Sales Class: Population, Mean Sales, and Operator Sample, 1990**

Farm Size (Sales)	Farm Population		Operator Population		Operator Sample		Population Households per Sample Household
	OAS Address List	Mean Sales in Thousands <sup>1,2</sup>	Operators as a % of OAS List <sup>3</sup>	Projected Number of Operators <sup>4</sup>	Number of Operator Households <sup>5</sup>	Mean Sales in Thousands <sup>2</sup>	
Under \$10,000	27,641	3.3	0.843	23,303	214	4.6	108.9
\$10-19,999	8,113	14.5	0.874	7,092	118	14.6	60.1
\$20-39,999	8,022	28.9	0.899	7,211	141	28.6	51.1
\$40-99,999	10,455	65.2	0.908	9,490	194	67.3	48.9
\$100-249,999	8,110	156.3	0.952	7,717	235	162.0	32.8
\$250-499,999	2,302	333.8	0.977	2,251	79	340.4	28.5
\$500,000+	469	817.9	0.980	460	35	737.8	13.1
Total	65,113	—	—	57,523	1,016	—	56.6

<sup>1</sup>From Ohio Agricultural Statistics Service.

<sup>2</sup>Mean sales for the population are for farms, while mean sales for the sample are for farm operator households. Thus, census farms under \$10,000 in sales, and averaging \$3,300 in income, often were rented out to operators who consolidated larger units; hence, farm operators under \$10,000 averaged \$4,600 in sales. Conversely, the largest operations, those over \$500,000 in sales, typically required more than one household for their operation; here, the interviewed household reported only its share of total farm sales.

<sup>3</sup>Computed from Table 1: (Sample Completed plus Refused) divided by (Contacts attempted minus Not Reached). Note that this column reflects the fact that a core of continuing respondents (hence pre-selected) is included in 1991 interviews here, and their presence will bias the numbers that result from this calculation. For example, operators as a share of farms under \$10,000 in sales were only 482 when initial interview contacts were made in 1987, and this produced an operator estimate in that sales class of 14,621 at that time (see RB 1185, Table 2).

<sup>4</sup>Product of "OAS Address List" and "Operators as Percent of OAS List."

<sup>5</sup>Sample distribution in Table 1, corrected for size errors in OAS List.

Source: Ohio Agricultural Statistics Service and Table 1.

lie within a specified range of true averages in the population. This probability is affected by the range of variation in the population and by the sample size. As variability in the population rises, sample size (as a share of the population) must rise also. For example, farms with gross sales under \$10,000 have a size variation that cannot exceed \$9,000 (the census farm definition requires a minimum of \$1,000), but as farm size increases and the interval widens, so does the variability, from \$9,000 for the smallest farms to an open-ended interval of \$500,000-plus for the largest operations. So the sampling rate rises. Note in the last column of Table 2 that more than 100 households with the smallest operations are represented by each sampled household, but only 13 of the largest (and most variable) operations are represented by each sample household.

How reliable is this sample? The probability that mean gross sales in the population lie within 5 or 10 percent of the mean gross sales of the sample for each interval appears in the next column of this page. Hence, a way of regarding reliability

is to say that of 100 samples of this kind, 99 would produce results within 5 to 10 percent of the means reported here, except in the smallest and largest operations where other probabilities are shown.

Size (Sales) Interval	Within 5 %	Within 10 %
Under \$10,000	.68 <sup>1</sup>	.95 <sup>1</sup>
\$10-19,999	.99	.99
\$20-39,999	.99	.99
\$40-99,999	.99	.99
\$100-249,999	.99	.99
\$250-499,999	.99	.99
\$500,000+	.60	.88
Total Sample	.99	.99

<sup>1</sup>Note in Table 2, footnote 3, that the operator population may have been overestimated. If so, probabilities may be higher than these shown here.

every enterprise that will generate \$1,000 in farm product sales in a normal year means that most farms make little contribution to total farm output. Table 3 provides illustrations. Notice that in the U.S., nearly half the farms are in the smallest category of gross sales, yet they contribute only 2.6 percent of total U.S. farm product sales. In contrast, only 1.5 percent of U.S. farms have farm product sales exceeding \$500,000, but these few farms account for 38.2 percent of total farm output (columns 1 and 2). Further, the three largest U.S. farm sales categories (all those exceeding 100,000 in sales) account for only 14.1 percent of all farms, but 76.3 percent of total sales, while all those farms with sales under \$40,000 account for 72.2 percent of the farms and 9.9 percent of sales.<sup>5</sup>

<sup>5</sup>The contribution to output by farms with sales under \$40,000 is so modest that even 100 percent sample reliability about their financial and managerial character would not contribute much to an understanding of commercial agriculture and the factors that affect its interests and welfare. From the vantage point of commercial agriculture, their role is little more than that of rural residences.

## FARM SIZE AND NONFARM INCOME

The Census definition of "farm" is intended to be all-inclusive. Including

**Table 3: Percentage of Farms, Farm Sales, and Farm Operators, by Sales Class, 1990<sup>1</sup>**

Farm Size (Sales) <sup>2</sup>	U.S. Farms (2.087 mil.) <sup>3</sup>	U.S. Farm Sales <sup>3</sup>	U.S. Farm Operators <sup>4</sup>	Ohio Farm Operators <sup>4</sup>	Ohio Farm Operator Sales <sup>4,5</sup>
Under \$10,000	49.4	2.6	46.9	42.4	3.5
\$10-19,999	12.0	2.6	11.8	12.5	3.3
\$20-39,999	10.8	4.7	12.4	12.3	6.3
\$40-99,999	13.7	13.8	14.0	16.1	19.4
\$100-249,999	9.7	22.9	9.7	12.5	36.2
\$250-499,999	2.9	15.2	3.4	3.5	21.7
\$500,000 +	1.5	38.2	1.8	0.7	9.6
Total	100.0	100.0	100.0	100.0	100.0

<sup>1</sup>The difference between farms and farm operators is the difference between ownership, which includes inactive owners who rent, and the actual management and risk acceptance of a farm operation. This study was confined to farm operators. Landlords who merely rented land were not interviewed.

<sup>2</sup>Including government payments.

<sup>3</sup>1987 Census.

<sup>4</sup>USDA (1987) and survey data.

<sup>5</sup>Not sales per farm, but per farm operator household. This tends to understate the importance of the largest farms because they typically support more than one household.

Source: U.S. Census, USDA, and survey data.

**Table 4: Average Farm Operator Income per Household, U.S. and Ohio Estimates, 1990**

Farm Size (Sales) <sup>1</sup>	U.S. Farm Operators			Ohio Farm Operators		
	Non-Farm	Net Farm	Total	Non-Farm	Net Farm	Total
	\$1,000					
Under \$10,000	35.6	-0.4	35.1	26.4	-5.9	20.5
\$10-19,999	33.1	1.0	34.1	26.6	-8.0	18.6
\$20-39,999	32.2	4.2	36.3	27.4	-1.0	26.4
\$40-99,999	24.7	12.0	36.7	23.0	7.2	30.2
\$100-249,999	19.1	34.1	53.2	13.0	30.5	43.5
\$250-499,999	24.0	72.5	96.5	12.7	59.0	71.7
\$500,000+	27.9	207.2	235.1	11.7	207.6	219.3
All Farms	30.9	13.5	44.4	23.7	8.0	31.7

<sup>1</sup>Including government payments.

Source: USDA and survey data.

Notice also that when Table 3 is examined for characteristics of farm operators (as opposed to farms) the distribution is much the same in both the U.S. and in Ohio, although it is clear that there is some consolidation of small farms for operating purposes, and that farms con-

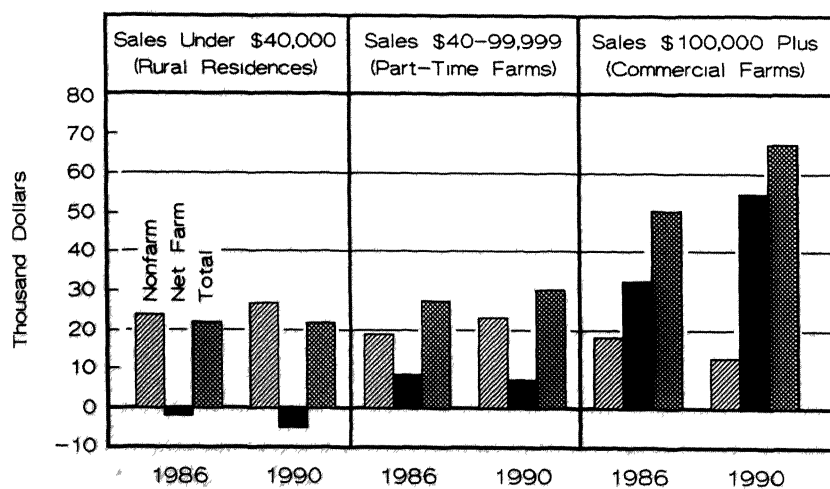
tributing the greatest bulk of sales are somewhat smaller in Ohio than the average for the U.S. Still, in Ohio as in the U.S., most farm operations are so small as to be inconsequential to total output, and the great majority of output is concentrated in a small number of large operations.

**Nonfarm Income**

There is a second point of interest about this distribution by farm size, and that is the importance of nonfarm income (Table 4). Both in Ohio and in U.S. averages, there is nonfarm income in farm operator households of all farm sizes. Its importance is critical for smaller operations; indeed, nonfarm income not only supports the household, but contributes to the support of the farm as well.

There are interesting comparisons at this point between the income reported in Table 4 and those in the same table reporting 1986 data in RB 1185. They are summarized in Figure 1. For example, (a) among the smallest farms, there was higher nonfarm income but larger losses from farm operations in 1990 than in 1986; (b) among the largest farms, there was greatly improved net farm income and substantially less nonfarm income in 1990, and (c) there continued to be an inverse relationship between farm size and the importance of nonfarm income over the period of the study (Figure 1). Clearly, nonfarm jobs helped to ease the financial stress that characterized farming in the 1980s, and as the stress eased, by 1990, so did the importance of nonfarm jobs among the households with the largest farm operations.

**Figure 1: Income per Ohio Farm Operator Household, 1986 and 1990**



Source: Derived from Tables 3 and 4 and OARDC Research Bulletin 1185.



**Table 5: Nonfarm Income of Ohio Farm Operator Households, Percentage Distribution by Source, and Nonfarm as a Percent of Total Household Income, 1990**

Farm Size (Sales) <sup>1</sup>	Percent of Nonfarm Income Contributed by: <sup>2</sup>			Total Nonfarm Income	
	Operator	Spouse and Family	Other <sup>3</sup>	Dollars <sup>2</sup>	Pct. of all Income
<b>Rural Residences</b>					
Under \$10,000	49.2	21.0	29.9	26,363	128.8 <sup>4</sup>
\$10-19,999	52.3	17.0	30.8	26,640	143.0 <sup>4</sup>
\$20-39,999	47.4	24.8	27.8	27,356	103.8 <sup>4</sup>
<b>Part-time Farms</b>					
\$40-99,999	51.2	30.5	18.3	23,025	76.3
<b>Commercial Farms</b>					
\$100-249,999	19.6	43.0	37.4	13,014	24.1
\$250-499,999	34.3	27.2	38.5	12,706	14.2
\$500,000+	17.5	36.5	46.1	12,664	5.0
All Farms <sup>5</sup>	47.2	24.1	28.6	23,741	74.8

<sup>1</sup>Including government payments (these are counted as farm income).

<sup>2</sup>Column 4 (shown in dollars) equals 100 percent of nonfarm income.

<sup>3</sup>Includes savings, financial investments, nonfarm real estate, business earnings, etc.

<sup>4</sup>Percentages over 100 mean that nonfarm income was covering farm losses recorded in Table 4.

<sup>5</sup>In all estimates of averages for All Farms, averages are weighted arithmetic means.

Source: Survey data.

There is one last point: nonfarm income was higher in 1990 than in 1986 among households at all farm sizes up to \$100,000. But operating *losses* on small farms (under \$40,000) were also larger in 1990. Hence, net household income (after subtracting larger farm operating losses from higher nonfarm incomes) was smaller in 1990 for those households operating farms with gross sales under \$40,000 (Table 4 and Figure 1).

The role of nonfarm income as a contributor to total household income is highlighted again in Table 5. It is interesting to realize that, because there are so many small farm operations where the importance of nonfarm income is critical, that this importance carries through to the average for all households; nonfarm income accounted for nearly 75 percent of total income in the *average* farm operator household in 1990 (Table 5, bottom line).

#### Some Demographic Characteristics

Respondent age averaged 54 years and ranged from 47 to nearly 58 (Table 6).

**Table 6: Characteristics of Sample Farm Operator Households, 1990**

Sales Class	Farm Operator		Children at Home
	Years Age	Years Education	
Under \$10,000	57.7	12.5	0.7
\$10-19,999	56.7	12.7	1.1
\$20-39,999	53.9	12.8	1.4
\$40-99,999	49.1	12.7	1.5
\$100-249,999	48.8	12.7	1.6
\$250-499,999	47.0	13.3	1.9
\$500,000+	50.1	13.1	1.6
All Farms	54.2	12.6	1.1

Source: Survey data.

Smaller farms tended to have older operators. Small farms also had fewer children still living at home. By contrast, large farms had more children at home who, judging by the age of the operator, could have been young adults who were finding workable prospects for a future in farming.

The relationship of age to education showed a high school education to be the norm (Table 6). Departures from this norm were age-related (Table 7). Operators with less than a high school education were scarce (less than 10 percent) and most of these were found among operators who

**Table 7: Number of Farm Operators, by Age and Education, 1990**

Years of Education	Years of Age				Total
	21-34	35-49	50-64	65+	
Under 12	1	13	26	48	88
12	40	197	258	90	585
13-15	14	73	48	25	160
16 or more	13	79	40	17	149
<b>Total</b>	<b>68</b>	<b>362</b>	<b>372</b>	<b>180</b>	<b>982</b>

Source: Survey data.

were 65 or older. Operators with enough years of education to be college graduates also were a minority (15 percent of the sample) and most of these were clustered in age groups below 50.

These characteristics were also found in the 1986 interviews, although some aging of the population during 1986-1990 was apparent. This aging suggests a reluctance by farmers to retire and/or slow rates of entry into farming by young operators. This aging also reflects continued consolidation of farms into fewer but larger operating units.

## OHIO FARM OPERATOR HOUSEHOLD BALANCE SHEETS

The assets and liabilities of U.S. and sampled Ohio farmers on December 31, 1990, are summarized in Table 8. The average balance sheet for Ohio operator households in each sales class on that date appears in Table 9. These data are reconstructed as percentages in Table 10.

Figure 2 summarizes differences between 1986 and 1990. Household assets

grew at the most rapid rate (about 62 percent) among small farms (sales under \$40,000). Perhaps continuing farm consolidation was driving land prices up faster on smaller units more easily acquired and financed. (Also, small units often sell more briskly in the nonfarm market as country homes and housing sites.) Assets rose about 33 percent (current dollars) among operations with sales between \$40,000 and \$100,000 and about 21 percent for operations with sales over \$100,000 (calculated from Table 8 in each publication). Assets among the largest operations rose over 35 percent

**Table 8: Farm Operator Household Balance Sheet, U.S. and Ohio Estimates, December 31, 1990**

Farm Size (Sales) <sup>1</sup>	U.S. Farm Operators <sup>1</sup>			Ohio Farm Operators <sup>1</sup>		
	Assets	Liabilities	Equity	Assets	Liabilities	Equity
	\$1,000					
Under \$10,000	NA	NA	NA	312	18	295
\$10-19,999	229	20	209	402	29	373
\$20-39,999	399	45	354	435	39	396
\$40-99,999	572	83	489	474	53	421
\$100-249,999	913	156	757	688	118	570
\$250-499,999	1,400	292	1,018	1,098	254	844
\$500,000+	1,671	349	1,322	1,907	344	1,564
<b>All Farms</b>	<b>464</b>	<b>56</b>	<b>408</b>	<b>451</b>	<b>51</b>	<b>400</b>

<sup>1</sup>May not always add to proper totals due to rounding error. Ohio figures are detailed in Table 9.

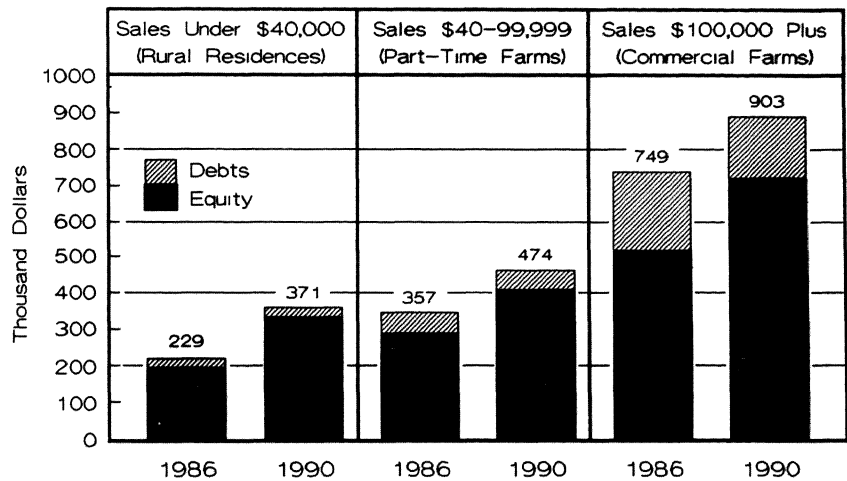
Source: Ohio survey data and USDA, Economic Indicators of the Farm Sector, National Financial Summary for 1990. ECIFS A-A, December 1991.

from under \$1.4 million in 1986, to over \$1.9 million by 1990.

Most assets are farm real estate, although non-real estate assets (principally equipment) are also important (Tables 9 and 10). Generally, nonfarm assets (securities, rental units, etc.) decline in comparative importance as farm size increases, and the value of equipment (as a share of total assets) tends to rise, from around 20 percent of assets for small units to over 40 percent for commercial operations with annual sales above \$100,000 (see Table 10). This is consistent with the focus of small operator households on a variety of income sources to complement farm income, and the focus on full-time farming among households that have large operations.

Most liabilities are associated with mortgage debt and farm operating costs. The distribution of debt among lenders is notable for its consistency across farm size, although there are some size-related lenders.

**Figure 2: Equity and Debt per Ohio Farm Operator Household, 1986 and 1990**



Source: Derived from Table 8 and OARDC Research Bulletin 1185.

**Table 9: Balance Sheet per Farm Operator Household, by Farm Size, December 31, 1990<sup>1</sup>**

Balance Sheet Item	Farm Size (Sales) Class							
	All Farms (average)	Under \$10,000	\$10,000-19,999	\$20,000-39,999	\$40,000-99,999	\$100,000-249,999	\$250,000-499,999	\$500,000 and up
<b>Assets</b>								
Farm Real Estate	255,721	180,847	260,984	247,068	277,421	353,229	577,762	968,816
Other Farm	132,463	63,332	77,833	126,388	144,873	277,939	460,929	846,468
Nonfarm	57,769	68,141	63,154	61,707	22,014	56,792	59,295	91,884
Total Assets <sup>2</sup>	450,771	312,319	401,971	435,163	474,308	687,960	1,097,986	1,907,168
<b>Liabilities (owed to)</b>								
<b>Farm</b>								
Commercial Banks	18,600	4,715	10,091	14,793	18,877	45,772	103,567	155,153
Farm Credit System <sup>3</sup>	17,396	4,920	7,229	11,933	15,415	49,192	85,481	181,383
Farmers Home Admin.	5,766	2,472	4,085	4,491	6,881	13,952	20,769	10,525
Savings and Loans	2,172	2,668	184	1,941	2,649	978	2,911	17,618
Insurance Companies	1,635	218	864	68	2,707	3,978	2,128	58,472
Individuals & Others <sup>4</sup>	6,375	693	3,445	3,223	6,053	21,474	38,744	32,641
Nonfarm <sup>5</sup>	5,074	4,549	5,312	3,378	6,468	3,582	15,667	3,474
Total Liabilities	50,626	17,783	28,847	39,195	53,053	117,840	253,565	343,654
Net Worth	400,145	294,536	373,124	395,967	421,255	570,120	844,421	1,563,515

<sup>1</sup>Excludes CCC loans.

<sup>2</sup>See Table 8.

<sup>3</sup>Includes Federal Land Bank and Production Credit Associations.

<sup>4</sup>Includes mercantile credit, i.e., outstanding operating expenses such as feed, seed, chemicals, fertilizer, fuel, etc., and individually financed transactions.

<sup>5</sup>Includes consumer credit for autos, household goods, personal items, credit cards, and liabilities associated with nonfarm assets.

Source: Survey data.

For example, insurance companies are notable for their preference for larger loans and are associated more often with larger farm operations. Farmers Home Administration is, by contrast, uncommon among

the largest borrowers (Tables 9 and 10). Also, Farmers Home, primarily functioning as a lender of last resort during the financial stress of the 1980s, was much less active as a lender to interviewed operators by 1990.

Commercial banks and the Farm Credit System, however, were the principal lenders to farm operations in both 1986 and 1990. "Individuals and Others" is a credit source usually associated with merchant credit

**Table 10: Percentage Distribution of Balance Sheet Items per Farm Operator Household, by Farm Size, December 31, 1990**

Balance Sheet Item	Farm Size (Sales) Class							
	All Farms (average)	Under \$10,000	\$10,000-19,999	\$20,000-39,999	\$40,000-99,999	\$100,000-249,999	\$250,000-499,999	\$500,000 and up
<b>Assets</b>								
Farm Real Estate	56.7	57.9	64.9	56.8	58.5	51.3	52.6	50.8
Other Farm	29.4	20.3	19.4	29.0	30.5	40.4	42.0	44.4
Nonfarm	12.8	21.8	15.7	14.2	4.6	8.3	5.4	4.8
Total Assets	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Liabilities</b>								
Farm								
Commercial Banks	32.6	23.3	32.3	37.1	32.0	32.9	38.5	33.8
Farm Credit System	30.5	24.3	23.2	30.0	26.1	35.4	31.7	39.5
Farmers Home Admin.	10.1	12.2	13.1	11.3	11.7	10.0	7.7	2.3
Savings and Loans	3.8	13.2	0.6	4.9	4.5	0.7	1.1	3.8
Insurance Companies	2.9	1.1	2.8	0.2	4.6	2.9	0.8	12.7
Individuals & Others	11.2	3.4	11.0	8.1	10.3	15.5	14.4	7.1
Nonfarm								
Total Liabilities	8.9	22.5	17.0	8.5	11.0	2.6	5.8	0.8
Total Liabilities (as % of assets)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	11.2	5.7	7.2	9.0	11.2	17.1	23.1	18.0
<b>Net Worth</b>								
(as % of assets)	88.8	94.3	92.8	91.0	88.8	82.9	76.9	82.0

Source: Table 9.

**Table 11: Debt as a Percent of Assets: Percentage Distribution of Farm Operator Households, by Debt/Asset Ratio and Farm Size, December 31, 1990**

Farm Size	Debt/Asset Ratio					
	No Debt	0.01-0.10	0.11-0.40	0.41-0.70	0.71-1.0	Over 1.0
Under \$10,000	54.0	24.9	15.3	5.8	0.0	0.0
\$10-19,999	45.8	23.7	25.4	3.4	1.7	0.0
\$20-39,999	33.3	27.0	31.9	6.4	1.4	0.0
\$40-99,999	20.6	29.9	37.2	10.8	1.0	0.5
\$100-249,999	15.3	23.8	44.3	13.6	2.1	0.9
\$250-499,999	8.9	20.3	48.0	17.7	1.3	3.8
\$500,000+	20.6	17.7	47.0	11.8	2.9	0.0
All Farms	29.6	25.2	33.7	9.6	1.3	0.6

Source: Survey data.

(for purchased production inputs) and with family members (for operating costs or land transfers). Their importance appears to be more closely related to particular circumstances than to farm size, and there was no apparent pattern of difference between 1986 and 1990.

**Debt/Asset Ratios**

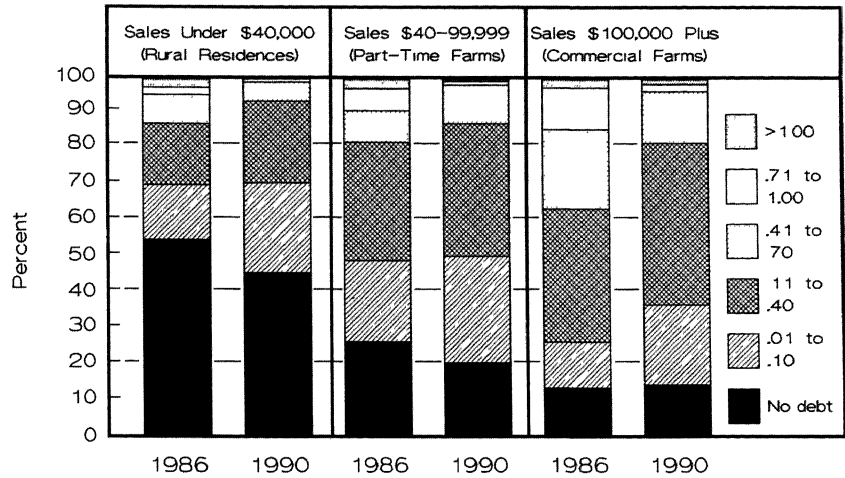
Using debt for financial leverage is more prevalent as farm size increases (Table 10, bottom row). This pattern was much more pronounced, however, in 1986 than appears here in 1990, testifying to a substantial improvement in financial circumstances during the intervening years, particularly among the largest operations.

Also, farming operations in all size categories showed substantial progress in reducing debt/asset ratios during the 1986-1990 period. For example, while fewer operations were completely debt free, there was a reduction in debt/asset ratios above .4 (or 40 percent of assets) and a corresponding increase, therefore, in the percent of all operations with debt burdens below 40 percent (Table 11 and Figure 3). The percentage of all operations with debt burdens at 10 percent of assets or less was highest for operations with sales under \$40,000. Approximately 70 percent of these smallest farms were essentially debt free in both 1986 and 1990. Farms with this debt load accounted for about 50 percent of all firms with sales of \$40-99,999 in both years, also. The percent of large operations (sales over \$100,000) with this modest debt load increased from about 26 percent in 1986 to nearly 37 percent in 1990. Debt loads exceeding 1.0 (insolvent) were reduced to 1.4 percent of the total in these large farms and had virtually disappeared among smaller operations.

**Variation in Debt/Asset Ratios**

When debt/asset ratios were sorted by age, education and farm enterprise, some expected relationships were evident, reflecting the life cycle of the household itself (Table 12). Indebtedness was highest in households with operators under 50 years of age, tapered off significantly during ages 50-64, and dropped to the

**Figure 3: Percentage Distribution of Debt as a Percent of Assets per Ohio Farm Operator Household, 1986 and 1990**



Source: Derived from Table 11 and OARDC Research Bulletin 1185.

**Table 12: Percentage Distribution of Debt/Asset Ratios, by Age, Education, and Farm Enterprise, December 31, 1990**

Item	Ratio of Debt to Asset				Total
	Under 0.10	0.11-0.40	0.41-0.70	0.71 and up	
<b>Age (N=1,010)</b>					
21-34	38	46	14	1	100
35-49	37	46	14	3	100
50-64	60	30	9	2	100
65 and over	88	11	1	1	100
<b>Education (N=990)</b>					
Under 12 years	70	20	9	0	100
12 years	55	34	9	2	100
13-15 years	51	36	12	1	100
16 and over	49	39	10	2	100
<b>Enterprise (N=871)<sup>1</sup></b>					
189 Dairy farms	48	40	9	3	100
70 Hog farms	47	37	10	6	100
122 Beef farms	74	19	7	0	100
490 Grain farms <sup>2</sup>	50	37	11	2	100
<b>Total Sample<sup>3</sup></b>	<b>55</b>	<b>34</b>	<b>10</b>	<b>2</b>	<b>100</b>

<sup>1</sup>Operations identified by the enterprise that provides over half the gross farm income to the operation.

<sup>2</sup>Corn, beans, wheat, oats.

<sup>3</sup>From Table 11.

Source: Survey data.

lowest levels in households where the operator was 65 or over. Willingness to incur debt (and its risks) was noticeably higher among operators with more education but, inasmuch as age and education are themselves inversely related (see Table 7), the apparent education relationship may just be the other side of the age coin. There is, however, the possibility that since long-range planning involves confronting uncertainty, those with more youth and education may display more audacity about their personal abilities for reducing uncertainties to manageable risks.

Among selected types of enterprises that could be separately identified in the sample, beef farms had the lowest debt burden (Table 12). Perhaps this is related to lower capital requirements for beef than for hogs or dairy. But it is also true that Ohio cow/calf operations tend to be associated with smaller operations, so this low indebtedness may be less a commentary on the merits of the beef enterprise than on the operator age and farm size circumstances in which it is most frequently found (Table 13).

## FARM INCOME AND EXPENSES

### Gross Farm Income<sup>6</sup>

Farm income sources for 1990 are summarized in Table 13 and Figure 4. There are some interesting parallels between the 1986 and the 1990 data.<sup>7</sup> The comparative importance of "other income" was highest for operations in the smallest income category and then declined into the largest category. The importance of dairy and hog enterprises tended to increase with increasing size, and the comparative importance of crops tended to decline. Beef enterprises in both years tended to appear most often among either

small or large operations and to be least important among small commercial farms. Beef enterprises on small farms tended to be cow/calf operations, and on large farms to be feedlots. Also, dairying in 1986 was most prominent to farm operations in the three size categories from \$40,000 to \$500,000. But by 1990, the continuing consolidation of the Ohio dairy industry into larger units had greatly increased the importance of dairying in the largest operations where sales exceeded \$500,000.<sup>8</sup>

Gross farm income increased only modestly between 1986 and 1990. For operations with sales below \$40,000, average gross income was unchanged. For farms with sales between \$40,000 and \$250,000, average income increased by only 1 to 3 percent, and for larger farms by 3 to 6 percent. Large changes for

<sup>6</sup>Although income sources reported here are the same as those reported in 1986, minor adjustments in accounting procedures (for example, inclusions under "other income") urge caution in making direct comparisons of the percentage distribution of gross income in 1986 and 1990.

<sup>7</sup>Recall that farms are classified by size according to sales, which is not the same as income. Income exceeds interval limits for some sales intervals.

<sup>8</sup>This is a real change in dairy size and not just an apparent change from 1986 caused by changes in dairy prices. Also, some shift occurred in the number of dairy operations represented in the sample of large farms.

**Table 13: Gross Income From Farming: Percentage Distribution of Income From Sales and Government Payments per Farm Operator Household, by Farm Size, 1990**

Farm Size (Sales)	Income From Sales of:					Government Payments	Other Income <sup>1</sup>	Gross Farm Income <sup>2</sup>
	Corn and Soybeans	Wheat	Dairy	Hogs	Beef			
Percent								
Under \$10,000	6.6	4.9	3.2	3.2	16.5	7.3	48.3	9,454
\$10-19,999	24.3	7.4	5.2	4.6	12.6	9.6	36.2	20,474
\$20-39,999	31.8	5.6	3.4	6.8	13.4	7.6	31.4	34,684
\$40-99,999	35.6	6.3	18.2	6.2	7.7	5.0	21.0	73,266
\$100-249,999	27.8	4.4	32.8	10.0	4.6	6.2	14.2	169,528
\$250-499,999	31.2	3.2	27.9	14.5	6.0	4.4	12.8	350,323
\$500,000+	13.5	1.9	36.1	14.1	16.3	3.1	15.0	751,627
All Farms	28.1	4.5	24.2	9.6	8.2	5.7	19.6	61,540

<sup>1</sup>Includes imputed rental value of residence, rentals, inventory change, and sales of other crops such as hay, orchard crops, other grains, other livestock, etc.

<sup>2</sup>Imputed values (footnote 1, above) make this column differ from the sales column in Table 2 and cause mean sales here to sometimes exceed the interval range.

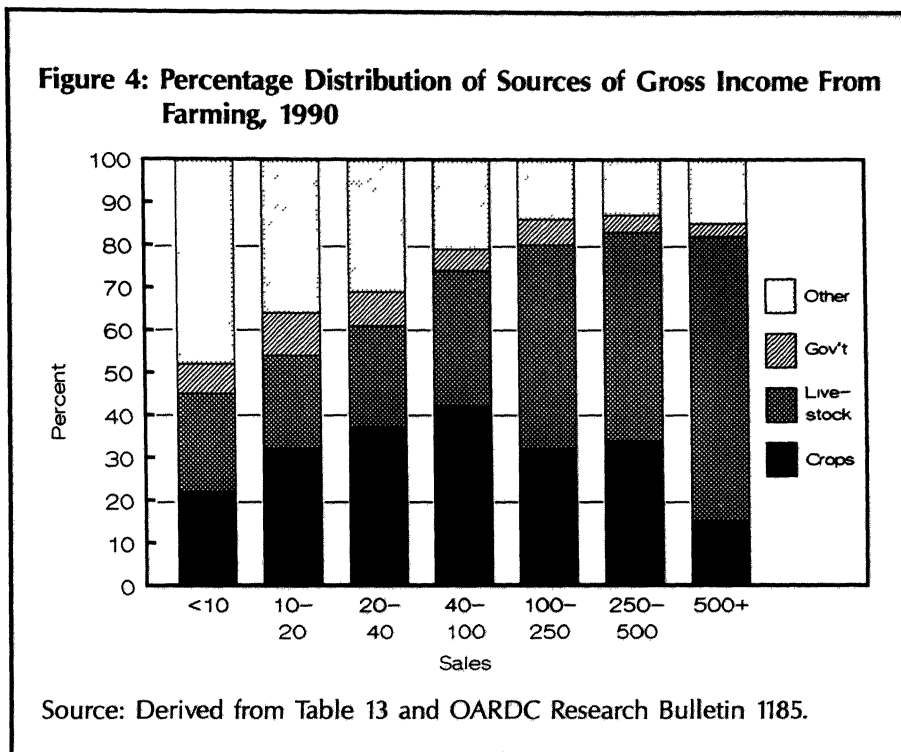
Source: Survey data.

individual cases would have moved respondents to other income intervals. For example, the biggest increases (averaging almost 6 percent) occurred among farms in the open-ended interval with 1990 sales exceeding \$500,000.

**Farm Expenses**

Farm expenses are summarized in Table 14 and Figure 5. Expense patterns in both 1986 and 1990 repeat the income record in showing changes in the comparative importance in crop and livestock enterprises as farm size increases. Expense patterns for buildings and equipment were similar in both years. Interesting changes included a modest increase in labor expense and a substantial decrease in expenses that included interest, probably as a result of lower interest rates. "Other" expenses were lower in 1990 than in 1986, particularly among larger farms. These expenses include professional services such as attorneys, accountants and consultants, and may reflect costs of managing financial urgencies that were higher in 1986 and/or budget retrenchments in 1990.

The effort to improve family income among farm operator households usually employs each of two possibilities. One is to increase income directly by nonfarm employment. The other is the more risky alternative of increasing net farm income



**Table 14: Total Farm Expenses: Percentage Distribution of Farm Expenses per Farm Operator Household, by Farm Size, 1990**

Farm Size (Sales)	Cash Expenses for:						Total Expenses
	Crops <sup>1</sup>	Livestock <sup>2</sup>	Bldgs. and Equipment <sup>3</sup>	Hired Labor	Depreciation Interest Taxes, Rent <sup>4</sup>	Other <sup>5</sup>	
	Percent						-Dollars-
Under \$10,000	21.9	8.4	16.0	3.5	35.4	14.7	15,386
\$10-19,999	25.5	11.8	16.4	3.4	30.1	12.8	28,490
\$20-39,999	24.5	12.1	14.6	2.3	34.7	11.9	35,739
\$40-99,999	24.3	15.2	11.6	3.2	29.9	15.8	66,099
\$100-249,999	22.7	20.2	11.8	5.7	28.5	11.1	139,029
\$250-499,999	19.4	18.0	9.0	7.3	28.9	17.5	291,311
\$500,000+	13.9	31.6	7.7	10.4	22.9	13.5	544,060
All Farms	23.3	18.1	12.7	5.5	31.6	8.8	53,509

<sup>1</sup>Includes seed, chemicals, fertilizer, lime, etc.  
<sup>2</sup>Includes feeders, feed, salt, feed additives, etc.  
<sup>3</sup>Includes repairs, parts, fuel, etc. for productive assets. Excludes expenses on operator's house.  
<sup>4</sup>Includes only real estate taxes but all paid interest expenses.  
<sup>5</sup>Includes unallocated costs such as conservation expenses, professional services, utilities, etc.

Source: Survey data.

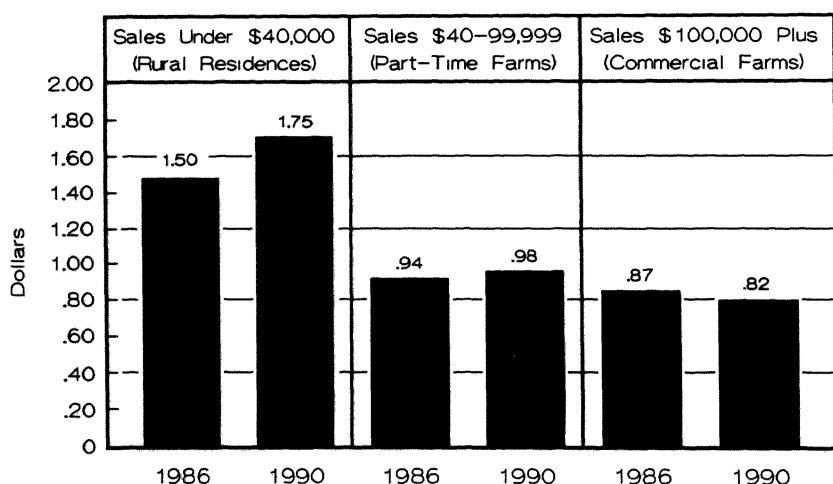
by lowering costs per dollar of sales. Most of this risk is associated with the search for cost economies of large size. While such economies exist, their risk lies in indebtedness and leverage that usually is required to realize them, which increases the management burden. The evidence reported here shows that operators of large Ohio farms successfully meet the imposed management burdens. Large farms suffered from the

financial stresses of the 1980s, not because of poor management, but because of rising interest rates and falling land values that were a consequence of global developments and public policies that were beyond the influence of individual management to affect.

Evidence presented in Figure 5 shows that costs were relatively high on smaller farm operations. Apparently, nonfarm income on these smaller farms was essential to

sustain them. Operationally, commercial farms were profitable in both 1986 and 1990. Part-time farms (annual sales between \$40,000 and \$100,000) also were profitable but, offered little reward for the households that managed them in either year. Small farms lost money in both years and the loss was greater in 1990 than in 1986. Overall, Figure 5 offers an impression of improved financial circumstance on farms of all sizes but of untenable economic prospects for small farms in the long run.

**Figure 5: Expenses per Dollar of Sales From Farming, 1986 and 1990**



Source: Derived from data in Table 14 and divided by Sales in Table 2 and OARDC Bulletin 1185.

**Table 15: Gross and Net Income per Farm Operator Household, by Farm Size, 1990**

Farm Size (Sales)	Gross Farm Income	Total Farm Expenses	Net Farm Income (Loss)
Under \$10,000	9,454	15,386	(5,932)
\$10-19,999	20,474	28,490	(8,016)
\$20-39,999	34,684	35,739	(1,055)
\$40-99,999	73,266	66,099	7,167
\$100-249,999	169,528	139,029	30,499
\$250-499,999	350,323	291,311	59,012
\$500,000+	751,627	544,060	207,567
All Farms	61,540	53,509	8,031

Source: Tables 13 and 14.

**Net Farm Income and Return on Assets**

Net income appears in Table 4 and again in the income and expense summary in Table 15. Return as a percent of assets appears in the calculations for return on assets shown in Figure 6. Financial conditions as of December 31, 1990, are summarized in Table 16.

The concept of return on assets contains two components: (1) operating return on assets, which may be interpreted as the earnings of or payments to capital,<sup>9</sup> and (2) total return on invested capital, which includes not only operating returns, but also changes in asset values, which are a consequence of market changes beyond the ability of management to affect.

Figure 6 includes only operating returns; the rates correspond to those appearing in the bottom line of Table 16. Both in 1986 and in 1990, capital invested in commercial farms was rewarded, but capital invested on smaller farms failed, on average, to earn a positive return. Economics of large size surely contributed to this outcome. Superior management also affects return on investment, and probably contributes to the profitability of commercial farms. These persistent negative returns are viable over the long run only as long as nonfarm household income is available to compensate for farm operating losses. No doubt there are mixed reasons for these negative returns. Perhaps there are emerging farms here that have not yet achieved

<sup>9</sup>Operating return on asset is computed by subtracting a charge for management and unpaid labor from net farm income, adding interest paid, and dividing the result by the value of farm assets.



sufficient size economies to break even. But perhaps, also, the majority of these farms are regarded as homes rather than businesses, and householders may be undisturbed if business accounting procedures identify negative returns.

## COPING WITH FINANCIAL STRESS

Coping with the financial stresses of the 1980s left an indelible impression in the minds of those who experienced it. Table 17 records responses from both 1986 and 1990 about this stressful experience. Clearly, the stress burden was eased substantially by declining interest rates and recovering farmland prices and collateral values. But problems were not over, and the experience had taken its toll. In most categories, responses indicated improvement. But notice in Column 1 of Table 17 that 22 percent of respondents still reported that finances were worse than five years ago and, in Column 3, that while the prospect of being forced out of farming had declined, stress levels and attitudes about farming were the same or worse than they were in 1986.

There is some possibility that these responses reflect differences in circumstances between 1986 and 1990 that are related to farm size. Recall that there are many small operations compared to the number of large ones. A re-examination of Table 11 and Figure 3 shows that although extreme indebtedness lessened, a debt burden from 1 to 40 percent of assets increased in all size categories. While the threat to the farm is small where nonfarm income is the mainstay, this 1 to 40 percent debt level could be simultaneously regarded as bad news by small operators (accustomed to low indebtedness or none at all) and good news by large operations recovering from even worse circumstances.

In any case, the responses reported that troubles with lenders had receded, household budgets were more manageable, and prospects for staying in farming were improved. But stress remained, and attitudes had soured about making a living on the farm.

**Table 16: Measures of Ohio Farm Household Financial Condition, December 31, 1990**

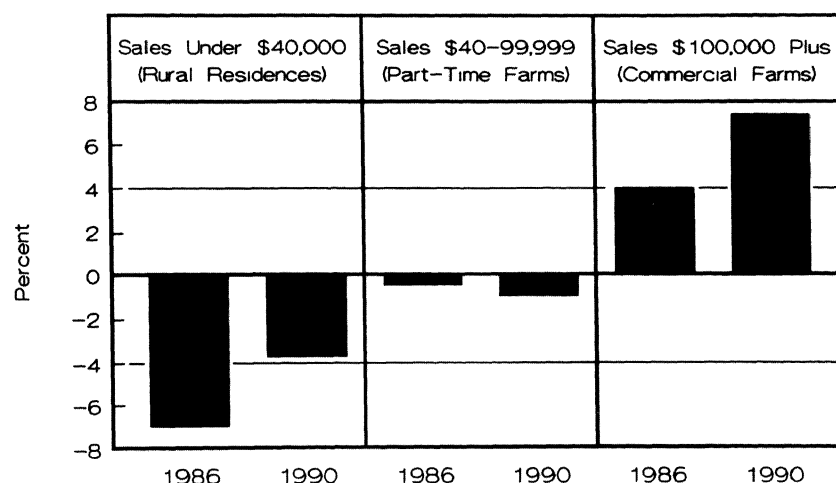
Item	All Farms	Commercial Farms (Sales over \$100,000)
Assets	451	823
Debt	51	154
Equity	400	668
Debt/Asset (%)	11	19
Share of farms in:		
financial stress (%) <sup>1</sup>	9	18
severe financial stress (%) <sup>2</sup>	2	3
Operating return on assets (%)	-1.5	7.4

<sup>1</sup>Financial stress is defined as a debt-to-asset ratio greater than 0.4.

<sup>2</sup>Severe financial stress is defined as a debt-to-asset ratio greater than 0.7.

Source: Tables 9-11, 13-15, and survey data.

**Figure 6: Operating Returns on Assets in Farming, 1986 and 1990**



Source: Derived from data in Tables 9-11 and 15-16 and OARDC Research Bulletin 1185.

## FARM OPERATIONS

### Acres Operated

Acres owned by Ohio farm operator households continued to increase between 1986 and 1990 (Table 18 and Figure 7).

Total acreage farmed also increased except among the largest operators where reductions may be a reflection of shifts in the type of farms making up the largest size class. Evidence suggests that crop farms made up a smaller share of the farms in the \$500,000 sales class. Corn, soybeans and

**Table 17: Stress: Percent Positive Responses to Questions About Financial Management and Stress Among Sampled Ohio Farm Operator Households, 1986 and 1990<sup>1</sup>**

Financial Condition		Coping With Expenses		Stress and Attitude	
Question	Percent Yes	Question	Percent Yes	Question	Percent Yes
1. Debt/asset ratio is over 40?		To meet expenses, have you:		1. Your long term stress level has worsened <i>greatly</i> ?	
1986	15.2	1. Used savings?		1986	15.8
1990	11.5	1986	49.5	1990	42.4
		1990	30.4		
2. Finances worse than 5 years ago?		2. Postponed major farm purchases?		2. Daily stress level is now <i>severe</i> ?	
1986	30.4	1986	65.4	1986	17.5
1990	22.0	1990	31.3	1990	16.6
3. Finances worse than other farmers?		3. Changed food consumption patterns?		3. Farming another 5 years now seems unlikely?	
1986	13.0	1986	28.9	1986	29.5
1990	7.7	1990	5.5	1990	9.0
4. Are there problems now with your loans?		4. Postponed medical care?		4. Would you advise your children or relatives against farming?	
1986	10.9	1986	17.7	1986	41.9
1990	3.0	1990	5.8	1990	52.8

<sup>1</sup>Questions here are abbreviated (for space and format) from the way they were originally stated in the survey, but their meaning and relationship to the response remain the same.

Source: Survey data.

wheat farms with larger acreages tended to be replaced in the 1990 sample by dairy farms that farmed less acreage. The percentage of total land that was owned remained about the same in each year, at about 67 percent among the smallest operations and about 40 to 42 percent for part-time and commercial operators.

#### Cropland Slope

One of the most interesting aspects of Table 19 is the significant change in crop-

land slope reported by the largest operators. Compared to 1986 responses, there is less level land and much more land reported as steep slope. Also, in the \$500,000 and above sales category, the proportion of income from sales of dairy products tripled from 13 to 36 percent. Clearly, shifts occurred in the respondent pool between the 1986 and 1990 interviews. Apparently, dairy farms seeking size economies (and with sales exceeding \$500,000) increased in number while crop farm operators

showed less inclination to expand farm size.

#### Crop Yields

Crop yields increased as farm size increased, suggesting improvements in technical efficiency as operations became larger (Table 20). But this trend was not apparent in soybean or wheat yields. Soybean yields varied by only four bushels per acre and, although wheat yields varied by 13 bushels, the variation was not related to size. Yields were slightly lower for corn

**Table 18: Average Acres Farmed per Operator Household, by Farm Size, 1990**

Farm Size (Sales)	Owned		Rented		Total Acres
	Acres	Percent	Acres	Percent	
Under \$10,000	114	76.0	36	24.0	150
\$10-19,999	149	71.9	58	28.1	207
\$20-39,999	168	56.7	128	43.3	296
\$40-99,999	188	40.3	277	59.7	465
\$100-249,999	296	40.6	433	59.4	729
\$250-499,999	392	41.8	548	58.2	940
\$500,000+	720	47.2	805	52.8	1525
All Farms	174	51.7	162	48.3	335

Source: Survey data.

and soybeans in 1990 than in 1986, but wheat yields increased from 46 bushels per acre in 1986 to 59 bushels per acre in 1990, perhaps reflecting differences in weather and wheat varieties in the two years. Average yields obtained from survey data were the same as those published by the Ohio Agricultural Statistics Service.

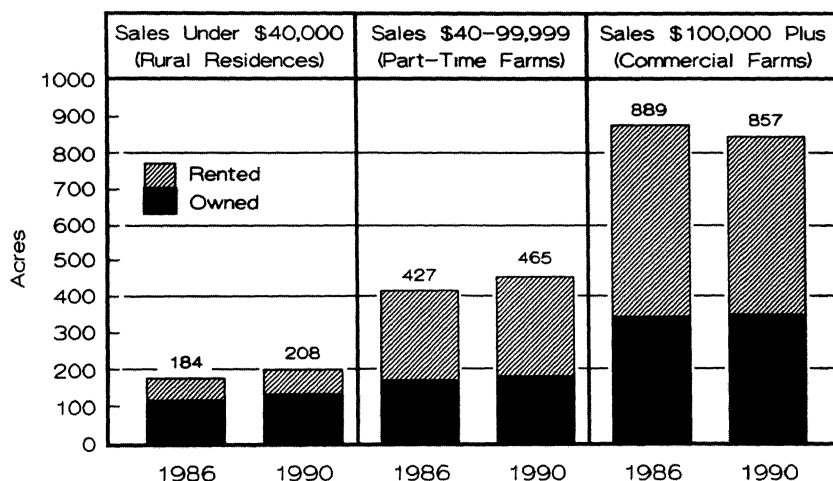
**Crop Rotations**

Crop rotations are summarized in Table 21 and Figure 8. Continuous row crops declined in importance between 1986 and 1990 in farming operations of all sizes. The decline was sharpest among the largest operations, where forage-based dairy operations grew in importance. Row crops rotated with small grains increased slightly and, although these two cropping systems together accounted for the majority of cropland use in both years, their popularity had decreased. The biggest change in cropland use was the substantial increase in row crop/small grain/pasture rotations. While this may in part reflect changes in livestock programs, these changes may also reflect an increased sensitivity to conservation issues.

**Tillage Practices**

Tillage practices are summarized in Table 22 and Figure 9. Commercial operations (\$100,000 annual sales) appear to be leaders in the adoption of alternatives to the moldboard plow. Comparisons

**Figure 7: Acres Operated per Ohio Farm Operator Household, 1986 and 1990**



Source: Derived from Table 18 and OARDC Research Bulletin 1185.

between Figure 8 and Figure 9 offer insights. Notice in 1986 that, while commercial operations did most of the continuous row cropping (Figure 8), they were also the leaders in conservation tillage (Figure 9). Most of the conventional tillage was associated with the smallest

operations. But there was a decrease in moldboard plow use from 1986 to 1990 in all size operations, with commercial operations appearing to lead the shift to alternatives. Either chisel plow or no till appeared to be favored over other conservation tillage methods.

**Table 19: Cropland Slope: Percentage Distribution of Cropland Slope Among Respondents, by Farm Size, 1990<sup>1</sup>**

Farm Size (Sales)	Level Under 2.0%	Moderate 2.0-5.9%	Steep 6.0% and up
Under \$10,000	36.1	56.1	7.8
\$10-19,999	50.0	45.6	4.4
\$10-39,999	50.0	44.2	5.8
\$40-99,999	43.7	54.7	1.6
\$100-249,999	48.3	49.6	2.2
\$250-499,999	46.8	53.2	0.0
\$500,000+	29.4	61.8	8.8
All Farms	44.8	51.3	3.9

<sup>1</sup>Slope is defined by the Soil Conservation Service (USDA) generally by the percentages shown here. These percentages may vary slightly from county to county due to varying performance characteristics of different soil types. "Steep" (6%) is easily imagined by a football field 18 feet higher at one goal than the other, or by a quarter-mile field at least 80 feet higher at one end than at the other.

Source: Survey data.

**Table 20: Productivity: Selected Crop Yields per Operator Household, by Farm Size, 1990**

Farm Size (Sales)	Corn (bu/Acre)	Soybeans (bu/Acre)	Wheat (bu/Acre)
Under \$10,000	100.7	42.8	61.8
\$10-19,999	111.7	38.4	60.1
\$20-39,999	115.8	42.8	54.0
\$40-99,999	116.1	39.8	54.2
\$100-249,999	122.5	41.0	60.4
\$250-499,999	124.5	41.4	67.1
\$500,000+	121.0	42.0	54.3
State Average <sup>1</sup>	121.0	41.4	59.0

<sup>1</sup>Computed by the Ohio Agricultural Statistics Service.

Source: Survey data and OASS.

were used by only 10 percent of commercial operators in 1990. Their use now parallels that of hedging on commercial farms.

### Management Services

Management services employed by farm operator households are summarized in Table 24 and Figure 11. Responses in 1990 generally were consistent with 1986 responses. Bookkeepers and accountants (including tax preparation) were the most commonly employed services in both years, followed in order by attorneys, consultants, and computers. The largest operations more readily employed these professional services. Some comparisons are instructive: It was not uncommon for even the smallest operations to employ accounting services; hence, the use of this service was less strongly related to farm size than others. The use of consultants was the most highly related to farm size. Responses concerning the use of attorneys were essentially the same in both years. The use of computers increased remarkably, tripling among small firms and doubling on commercial farms.

## SUMMARY

This is the second research bulletin reporting results of a continuing longitudinal study, which measures change over time. The research began during the financial crisis in agriculture during the 1980s. Its intent was to identify the magnitude of financial stress and the adjustments in agriculture that flowed from the pressures imposed by both financial and technological imperatives.

The unit of observation for this study is the farm operator household, rather than the farm or the individual farmer. There are two implications here: First, the study examines all household interests, not just those pertaining to the farm (nonfarm employment and income are major dimensions, for example). Second, households that represent only farm ownership or farm labor (but are not engaged in operating management) are excluded from the survey.

## MARKETING AND MANAGEMENT PRACTICES

### Grain Marketing Tools

Most Ohio grain producers sold grain at harvest for cash. A minority employed alternative marketing strategies. The simplest strategies were the most commonly used (Table 23 and Figure 10). The use of hedging or options was uncom-

mon, even among large operators (Figure 10). Unfamiliarity may be a factor, although there are economic reasons for choosing strategies other than futures markets. There was a tendency toward increased use of marketing tools among part-time and commercial operators between 1986 and 1990. Forward contracting and/or delayed pricing were used by a substantial proportion of commercial operations. The use of option contracts increased substantially, but still

Households were selected by a stratified random sample process to ensure adequate and accurate representation for Ohio farm operations of all sizes. The sample was drawn from a confidential list maintained by the Ohio Agricultural Statistics Service. Longitudinal studies designed to measure change over time not only employ a standardized questionnaire format, but seek also to interview the same respondents on a year-by-year basis. Results reported here are based on responses from 1,016 farm operator households. Sample size is approximately 900 to 1,000 households each year, so OASS annually draws from its record pool to replace households that leave farming over the years or elect to withdraw from the study. Approximately 80 percent of the respondents included in this survey of 1990 farm operations had participated in one or more previous interviews.

The format of this publication is designed to parallel that of OARDC Research Bulletin 1185, which was published in December 1989 as a report of 1986 farming operations gleaned from interviews that occurred in the winter of 1987. Hence, this publication provides 1990 results that are directly comparable to 1986 results reported in RB 1185. Further research bulletins are planned, reporting future interviews with this same core of farm operator households.

Useful insights are gained from these interviews and their longitudinal comparisons. The following items serve both to illustrate and summarize the progress of this study:

- The census definition of farms requires annual sales of farm products of at least \$1,000 in a normal year. Over 40 percent of Ohio farms are quite small, registering annual sales below \$10,000. About two-thirds of all farms have annual gross sales under \$40,000. Their contribution to Ohio farm output is modest, less than 15 percent, and many appear to be operated for family reasons that are not sharply profit-motivated. The study chose to identify these operations (below \$40,000) as "rural residences." By contrast, farms with annual sales over \$100,000, here labeled "commercial farms," accounted for only

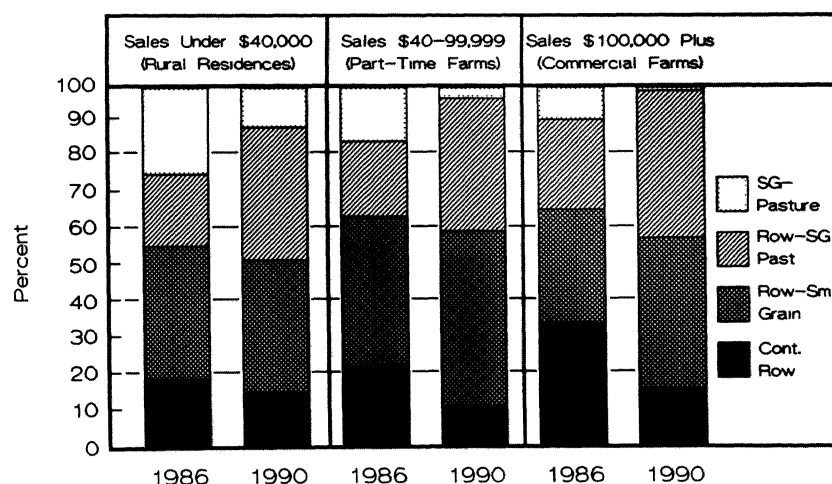
**Table 21: Percentage Distribution of Crop Rotations Used by Ohio Farm Operators, by Size, 1990**

Farm Size (Sales)	Continuous Row Crops	Row Crops/ Small Grains	Row Crops/ Small Grains/ Pasture <sup>1</sup>	Small Grains/ Pasture <sup>1</sup>
Under \$10,000	16	29	36	19
\$10-19,999	15	41	39	5
\$20-39,999	15	44	36	5
\$40-99,999	11	48	37	3
\$100-249,999	13	41	45	1
\$250-499,999	21	51	27	1
\$500,000+	21	32	47	0
All Farms	15	41	38	6

<sup>1</sup>"Pasture" includes harvested forage such as hay and silage.

Source: Survey data.

**Figure 8: Percentage Distribution of Crop Rotations Used in Ohio Farm Operations, 1986 and 1990**



Source: Derived from Table 21 and OARDC Research Bulletin 1185.

15 percent of the total number of farms, but for more than two-thirds of total farm output and for nearly all the operating profit.

- Nonfarm employment was an important source of household income to Ohio farm

operations of all sizes. Even the largest operations, with annual product sales exceeding \$500,000, had supplemental household income from nonfarm sources. The importance of nonfarm income is fundamental to an accurate understanding

**Table 22: Percentage Distribution of Predominant Tillage Practices Used by Ohio Farm Operators, by Size, 1990**

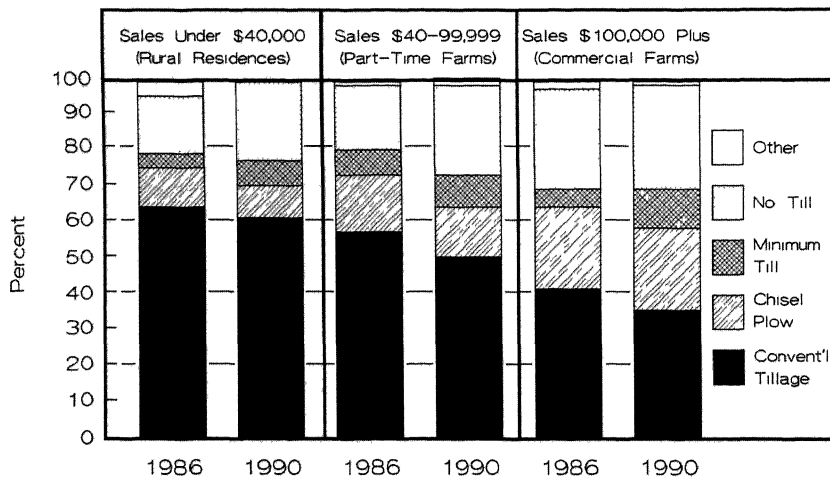
Farm Size (Sales)	Conventional Tillage <sup>1</sup>	Conservation Tillage			Other
		Chisel Plow	Minimum Till <sup>2</sup>	No Till	
Under \$10,000	67	6	5	21	1
\$10-19,999	54	15	10	21	0
\$20-39,999	60	8	9	23	0
\$40-99,999	51	14	9	25	2
\$100-249,999	39	19	11	30	1
\$250-499,999	32	27	14	27	0
\$500,000 +	19	44	3	31	3
All Farms	50	15	9	25	1

<sup>1</sup>Includes moldboard plowing systems (plowing and disking) as well as other tillage systems that leave less than a 30 percent ground cover.

<sup>2</sup>Minimum till includes all conservation tillage systems other than those using chisel plowing or no tillage.

Source: Survey data.

**Figure 9: Percentage Distribution of Tillage Practices Used in Ohio Farm Operations, 1986 and 1990**



Source: Derived from Table 22 and OARDC Research Bulletin 1185.

of how farm operator households function. Nonfarm income averaged nearly \$24,000 in 1990 and accounted for almost 75 percent of total income to the average farm operator household. For operations with annual product sales below \$40,000 (rural

residences), nonfarm income supported the farm as well as the household, being obliged to subsidize the recurring losses to farm operations that typified this size category. For commercial operations, those producing most of the farm output,

households clearly depended on the farm operation for nearly all the household income.

•The financial crisis of the 1980s was introduced primarily by economic and political changes beyond the capacity of individual operators to manage, mostly in the form of rapidly rising interest rates, rapidly falling farmland (collateral) values, and reduced export demand for grains. Households operating small farms and supported by nonfarm income anyway were only modestly affected. Large operations intensely focused on commercial agriculture and its income-producing prospects bore most of the burden of the financial crisis. Still, on the average, they consistently generated positive operating returns on assets throughout the period of the study.

•Though the severity of the financial stress had lessened, the effects of its burden remained. Although debt burdens had eased by 1990 and prospects for remaining in farming had improved, more people were concerned in 1990 than in 1986 about the burden of financial stress, and their attitude about the wisdom of farming for a living was even more negative in 1990 than in 1986.

•Farms increased in size between 1986 and 1990, meaning that as households left farming, there was a tendency among those remaining to consolidate farms into larger units. There was some evidence that this was occurring more rapidly (and imposing financial burdens more disproportionately) on the smaller farms that had been less affected by the financial difficulties of the 1980s.

•There is evidence of a trend toward more conserving land uses among units of all sizes. Smallest farms remained the most traditional, but tillage alternatives to the moldboard plow were apparent over time in all operations, including small farms. Also, continuous row cropping, and row crops rotated with small grains, were giving way to more conserving practices.

•Most operations continued to sell products for cash at harvest. Alternative marketing strategies were employed when they were simple, widely known, and did not represent much departure from customary practices. Forward pricing and delayed pricing provide examples. Still, even these were seldom used by small operators. Marketing strategies other than cash sale, therefore, were directly related to size and were used mostly by large operations. But even among these, strategies like hedging or options were uncommon. Among management services, accountants were most widely used, employed even by 40 percent of small operations and by nearly 90 percent of the largest. Other services, like attorneys, consultants or computers, were employed much more commonly by large operations.

•The overall impression of Ohio farming left by these interviews is of an industry populated primarily by households that appeared to regard the farm more as a home than as a business. But most of the annual output of Ohio farms comes from comparatively few operations that were sharply motivated by profit and annually demonstrated management skills that produced *operating* profits.

**Table 23: Percent of Ohio Farm Operators Using Selected Grain Marketing Tools, by Farm Size, 1990**

Farm Size (Sales)	Marketing Tools			
	Forward Pricing <sup>1</sup>	Delayed Pricing <sup>2</sup>	Hedging <sup>3</sup>	Options <sup>4</sup>
Under \$10,000	6.2	14.0	0.5	0.0
\$10-19,999	11.9	23.7	0.9	0.0
\$20-39,999	21.3	24.1	3.6	3.6
\$40-99,999	41.2	32.5	4.6	5.7
\$100-249,999	46.4	35.7	8.5	8.9
\$250-499,999	58.2	31.7	19.0	16.5
\$500,000+	47.1	29.4	20.6	8.8
All Farms	30.9	27.3	5.8	5.3

<sup>1</sup>Price agreed upon before delivery to a local merchant middleman.

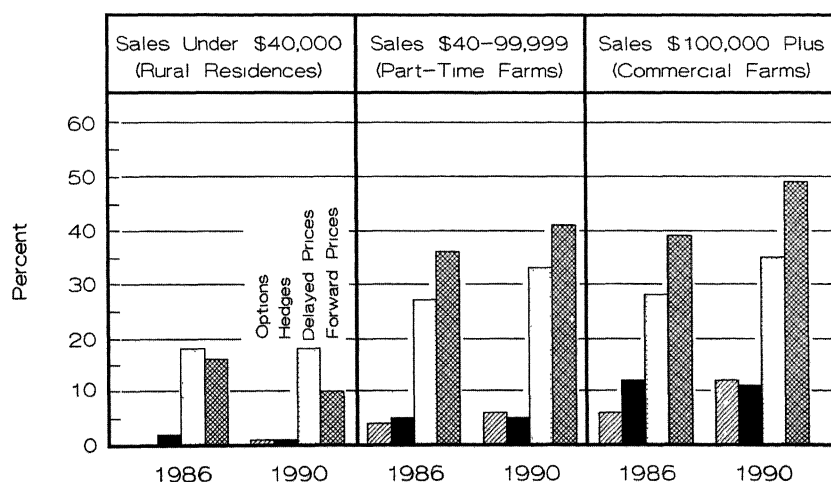
<sup>2</sup>Agreement to price after delivery at the option of the seller.

<sup>3</sup>Fixing a price by selling futures contracts on a commodity market.

<sup>4</sup>A method of pricing by placing "put" and "call" orders on a commodity market.

Source: Survey data.

**Figure 10: Percent Using Marketing Tools**



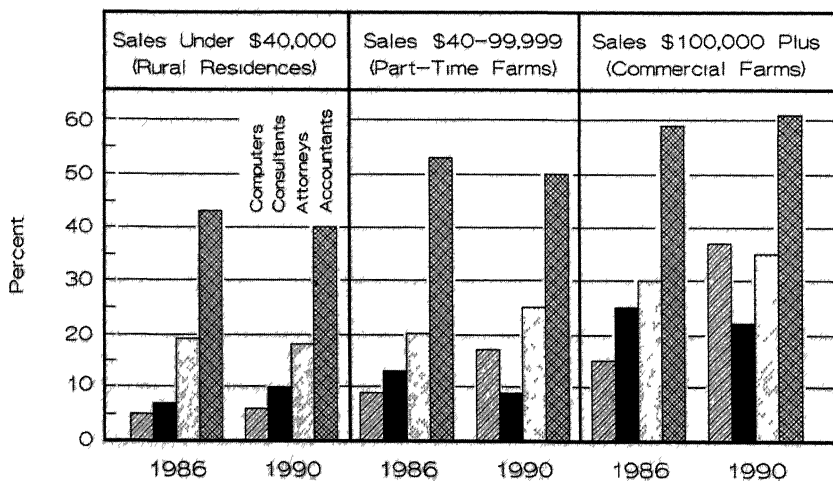
Source: Derived from Table 23 and OARDC Research Bulletin 1185.

**Table 24: Percent of Ohio Farm Operators Using Selected Professional Management Services, by Farm Size, 1990**

Farm Size (Sales)	Management Service			
	Bookkeepers and Accountants	Attorneys	Consultants <sup>1</sup>	Computers <sup>2</sup>
Under \$10,000	39.3	15.4	2.8	9.3
\$10-19,999	40.7	21.2	10.2	11.0
\$20-39,999	41.8	22.0	10.6	10.6
\$40-99,999	49.5	24.7	8.8	16.5
\$100-249,999	53.6	30.2	22.1	31.5
\$250-499,999	72.2	46.8	20.3	53.2
\$500,000+	85.7	54.3	25.7	62.9
All Farms	49.2	26.0	12.5	21.5

<sup>1</sup>Includes professional expertise in marketing, finance, fertility, pest control, etc.  
<sup>2</sup>Ranging from home computers and various program packages to computer services beyond accounting.  
 Source: Survey data.

**Figure 11: Percent Using Management Services**



Source: Derived from Table 24 and OARDC Research Bulletin 1185.

## OHIO FARM LONGITUDINAL STUDY PUBLICATIONS

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Forster, D.L. and T.T. Stout. "Commercial Agriculture Versus the Farm Home," *American Journal of Agricultural Economics*, 70(1988):1187.

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- Forster, D.L., R. Munoz, L. Reif and T. Stout. *Ohio Farm Household Income*, ESO 1501, Department of Agricultural Economics and Rural Sociology, The Ohio State University, August 1988.
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