

Marginal solvency and vulnerable farms also had the highest shares of farms reporting indebtedness to the FCS (25 percent and 16 percent, respectively) and reporting outstanding loans from banks (more than 60 percent). In addition, marginal solvency farms and vulnerable farms had the highest shares of farms reporting direct loans from FSA (22 percent of marginal solvency farms and 12 percent of vulnerable farms).

Farms with operators whose principal occupation was farming had the highest share of farms reporting any lender debt (60 percent) and the highest share of farms reporting loans from the Farm Credit System (16 percent). Farms with retired operators had the lowest share reporting lender debt (16 percent).

In like manner, the age category with the smallest share of operators reporting lender debt was the 65-years-or-older group (24.1 percent). The share of operators reporting lender debt generally rose as the age group got younger, with the share of operators under 35 years carrying debt three times the share of operators 65 or older. Bank debt followed the same pattern, with just 14 percent of operators 65 or over reporting bank debt compared with nearer 50 percent for operators age 44 or younger.

Characteristics of Farm Operators

Although responsibility for operation of a farm may be shared among two or more people, only one person is identified as the operator for ARMS data collection purposes. We define the operator as the person who makes most of the day-to-day decisions about the farm business, although management and work shares may be difficult to quantify and may lead to underestimation of the contributions of some participants in farming, especially women. It should be noted that ownership is not a factor in determining who operates the farm.

Demographic Characteristics

Assessing the characteristics of persons currently engaged in farming and the characteristics of their farms gives us some insight into the expectations and attitudes of those engaged in farming, and prospects for the future of resources currently devoted to farming. For example, operators whose principal occupation is something other than farming or who describe themselves as retired may have a different attitude toward assessing risk, adopting new technology, and maximizing income generated by the farm, compared with operators who identify themselves as primarily farmers.

Major Occupation

Less than half of farm operators reported farming as their major occupation (accounting for more than half of working hours) in 1995 (fig. 20). However, farms of operators whose principal occupation was farming averaged \$132,550 in gross cash farm income, while 'retired' and 'other' operators averaged less than \$16,000, likely too small to support a family without some off-farm source of income (table 11).

Farms of operators who reported farming as their major occupation averaged more than four times the acreage of farms of 'retired' and 'other' operators, and they controlled more than 70 percent of farmland acres, along with 79 percent of farm income and sales (fig. 21).

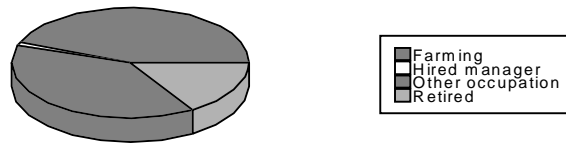
Age

Less than 10 percent of farm operators were under 35 years old in 1995. They were outnumbered three to one by operators 65 years or older. Although operators age 65 or older controlled about the same share of farmland as each of the three groups of operators age 35 to 64, they had a significantly smaller share of total gross farm income and sales (fig. 22). They also averaged less than half the income and sales per farm of the youngest group of operators.

Figure 20

Characteristics of farm operators, 1995

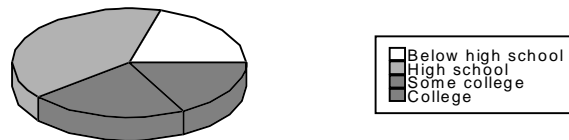
More than half of farm operators identified their primary occupation as 'other' or 'retired.'



About half of farm operators were under 55 years old.



Four out of five farm operators had at least a high school education.



Source: USDA, Economic Research Service, 1995 Agricultural Resource Management Study.

Table 11--Farms, acres operated, gross cash farm income, and gross value of sales, by operator characteristics, 1995

Item	Farms	Mean acres operated	Mean gross cash farm income	Mean gross value of sales
	<i>Number</i>	<i>Acres</i>	<i>Dollars</i>	<i>Dollars</i>
All farms	2,068,000	434	73,474	80,621
Operator major occupation:				
Farming	905,770	718	132,550	145,591
Hired manager	21,791	* 2,931	654,518	* 778,117
Other occupation	805,134	163	15,951	17,248
Retired	335,305	156	14,251	11,957
Operator age:				
Less than 35 years	171,256	407	82,400	88,668
35 to 44	418,049	467	104,883	118,870
45 to 54	485,732	489	84,488	102,179
55 to 64	474,100	432	67,378	68,300
65 years or older	518,863	367	40,481	38,225
Operator education:				
Less than high school	427,656	238	33,718	35,904
High school	831,251	387	65,507	73,500
Some college	450,334	524	87,391	95,469
College	358,759	665	121,856	131,788

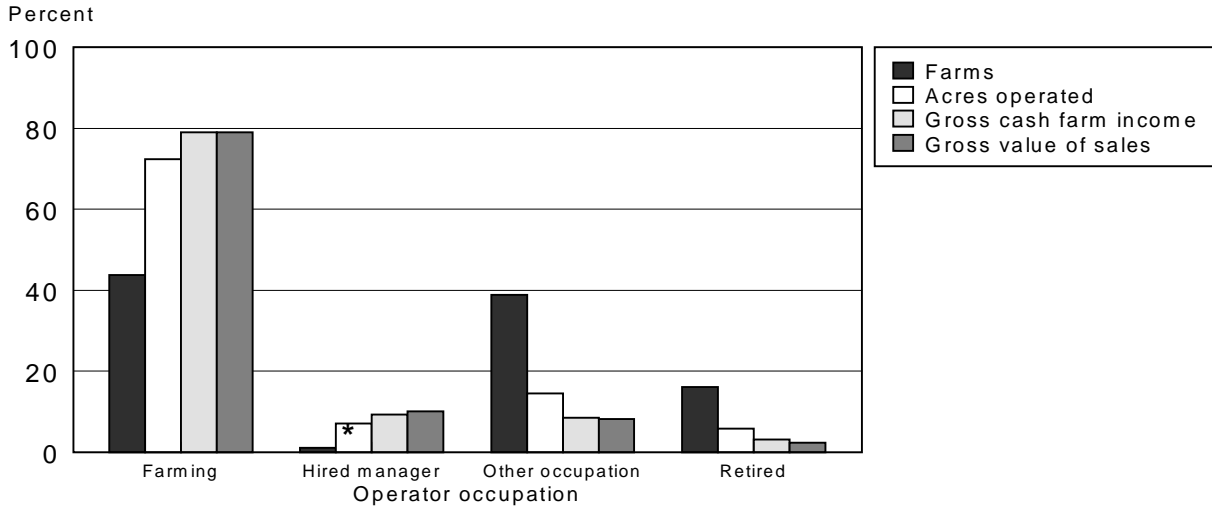
* = The relative standard error (RSE) of the estimate exceeds 25 percent, but is no more than 50 percent. The RSE provides a means of evaluating the survey results. A smaller RSE indicates greater reliability of the data. Estimates with RSE's of 25 percent or less are not marked.

Source: USDA, Economic Research Service, 1995 Agricultural Resource Management Study, all versions.

Figure 21

Distribution of farms, acres operated, gross cash farm income, and gross value of sales, by operator occupation, 1995

Farm operators whose primary occupation is farming accounted for about three-fourths of farm acres, income, and sales



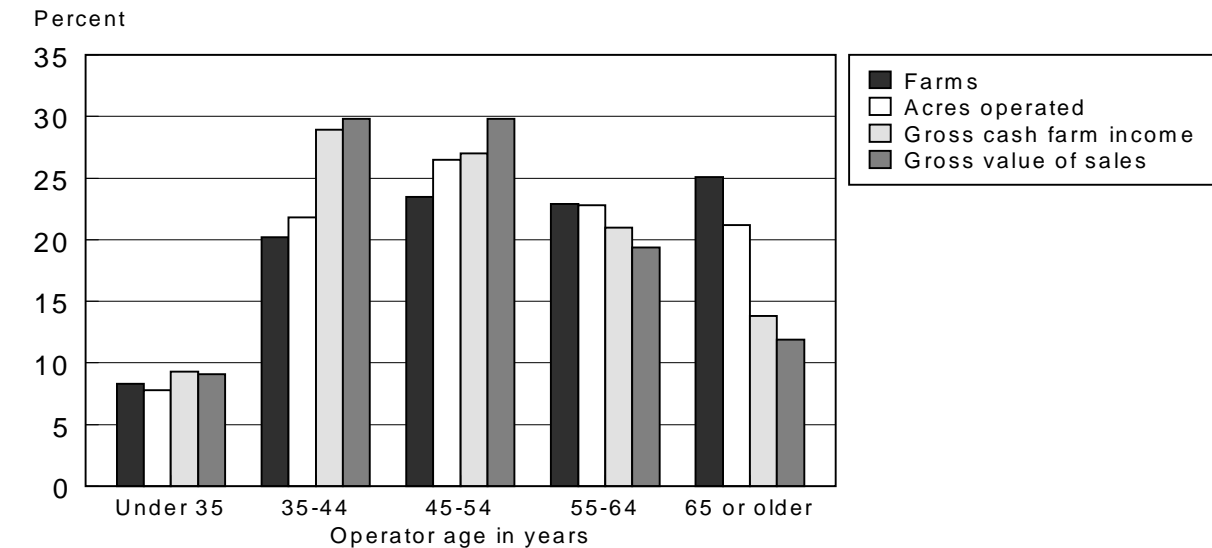
* The relative standard error exceeds 25 percent but is no more than 50 percent.

Source: USDA, Economic Research Service, 1995 Agricultural Resource Management Study, Farm Operator Resources version only.

Figure 22

Distribution of farms, acres operated, gross cash farm income, and gross value of sales, by operator age, 1995

Operators 65 years or older outnumbered those under 35 years by 3 to 1.



Source: USDA, Economic Research Service, 1995 Agricultural Resource Management Study.

Nationwide, operators with the highest average gross cash farm income and sales were those 35 to 44 years old, who averaged more than \$100,000 per farm. However, in the Northeast and Southeast farm production regions, operators under age 35 had higher average sales than the other age groups (app. table 2).

Younger operators were the most likely to use contracting as a risk management strategy. Operators 65 years or older were the least likely to engage in contracting as a risk management strategy and operators under age 45 the most likely (fig. 23). While 13 percent of operators nationwide had production and/or marketing contracts, 6 percent of operators in the oldest age group, compared with 19 percent of operators age 35 to 44 and 17 percent of operators under 35, were contractees.

Education

Nearly 80 percent of farm operators had at least a high school education and half of those had some college. Of the 20 percent of operators with less than a high school education, nearly half were 65 years or older and thus were more likely to be retired (fig. 24). Operators with less than a high school education had the lowest average farm income and sales of operators grouped by educational attainment, and their farms were the smallest in acreage, on average. In contrast, college-educated operators had the highest average gross cash farm income and gross value of sales as well as the largest acreage, more than half again as large as the U.S. average.

Operators with less than a high school education accounted for half their proportional share of acres operated, farm income, and sales, whereas operators who had completed college accounted for more than their proportional share (fig. 25).

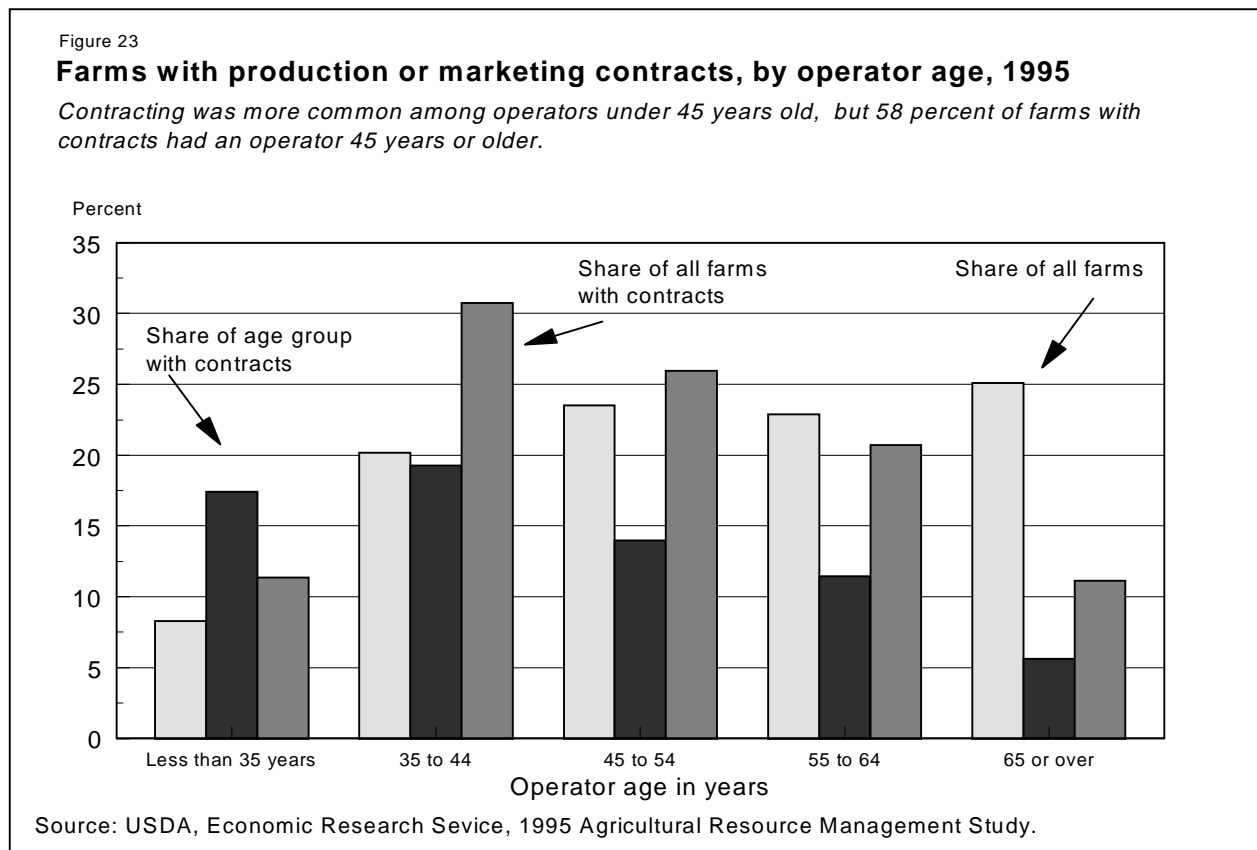
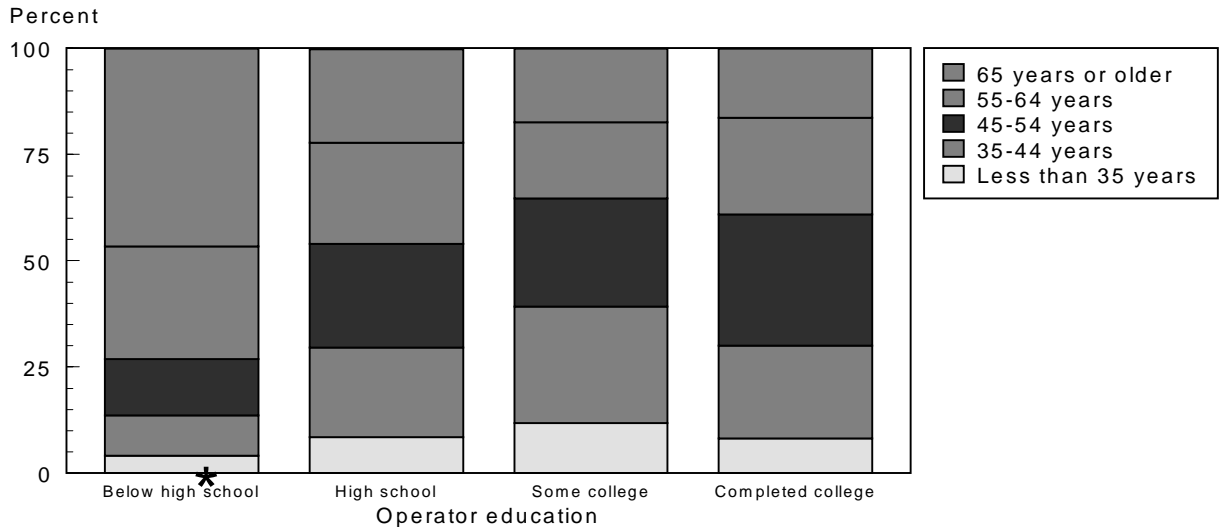


Figure 24

Age distribution of farm operators, by education level, 1995

Almost half of farm operators with less than a high school education were at least 65 years old.

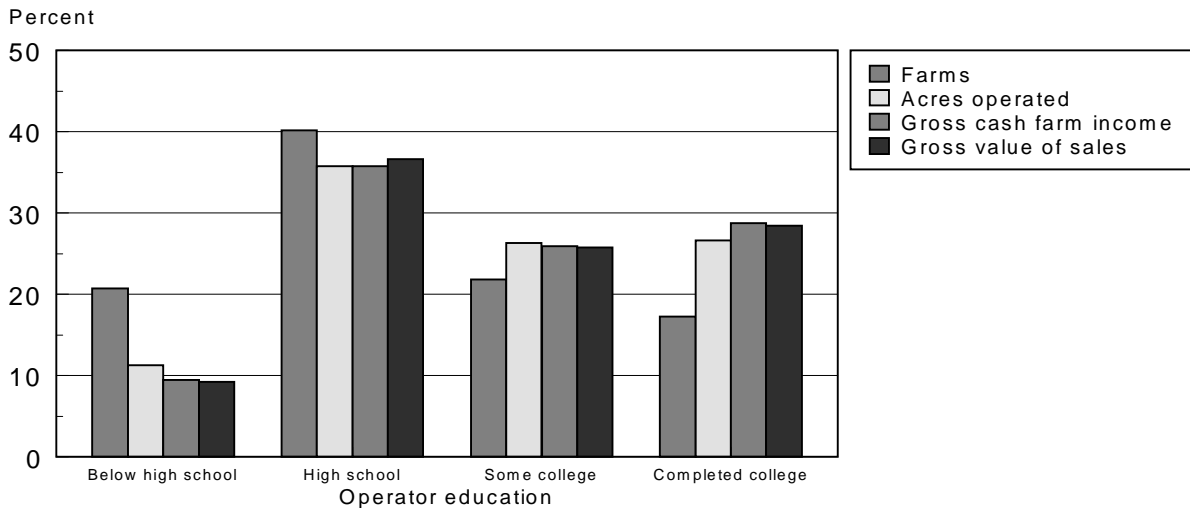


* The relative standard error exceeds 25 percent but is no more than 50 percent.
 Source: USDA, Economic Research Service, 1995 Agricultural Resource Management Study.

Figure 25

Distribution of farms, acres operated, gross cash farm income, and gross value of sales, by operator education level, 1995

Operators who continued their education beyond high school accounted for more than their proportional share of gross farm income and sales.



Source: USDA, Economic Research Service, 1995 Agricultural Resource Management Study.

Minority Operators

We examine the characteristics of several groups of minority farm operators in order to assess how they differ from the larger population of farmers, because minority operators may be affected disproportionately by policy changes. For example, a proposed change in the census of agriculture definition of a farm from a minimum of \$1,000 of annual sales to a minimum of \$10,000 of annual sales would result in a 47-percent decrease in the number of U.S. farms, but black-operated farms would decrease 76 percent and female-operated farms would decrease by 65 percent.

In this report, the minority status of farm operators is determined by race, ethnicity, or gender. Some operators may be in more than one minority category. For example, a female farm operator may also be black and Hispanic. Given that race, ethnicity, and gender may overlap, but that information released by the Bureau of the Census does not indicate the extent of overlap, calculating a single figure that represents the total number of minority farmers is not possible from census of agriculture data. Instead, we discuss several groups of minority operators separately, and the groups are not mutually exclusive.

Although the ARMS sample includes farms run by minority operators, the small minority sample size presents disclosure problems for analysis with ARMS data. Therefore, in this section, we use data from the census of agriculture. Because the agricultural census collects data for the entire population of farms, census data provide reliable statistics for even very small farm operator minorities across the Nation.

Racial Minorities

According to the 1992 Census of Agriculture, 43,500 farm operators were nonwhite, including 18,800 blacks (table 12). Other nonwhite operators included American Indians (8,300), Asians or Pacific Islanders (8,100), and 'other races' (8,200). Members of these racial groups accounted for 2.3 percent of the 1.9 million farm operators in the United States in 1992.

Black Farmers. The number of black farmers peaked at 925,700 in 1920, when they accounted for 14.3 percent of all U.S. farm operators (fig. 26). By 1992, the 18,800 black farmers in the United States accounted for just 1 percent of all farmers.

Some factors that affected the long-term decline in the number of black farmers are (1) the predominance of tenant farming among black operators in the early part of the century, (2) black farmers' historic dependence on cotton, and (3) the small size of black-owned farms [2]. Many tenant farmers lost their opportunity to farm when cotton production was mechanized and relocated to the irrigated West. With cutbacks in cotton production, landowners shifted to commodities that were not as well suited to small-scale sharecropping. For blacks who owned their own farms, the small size of their farms often made adoption of new technology prohibitively expensive.

Farms operated by blacks in 1992 were small relative to other minority groups or the U.S. average. Black-run farms averaged 123 acres and less than \$20,000 per farm in gross sales, compared with the U.S. average of 491 acres and \$84,459 in gross sales. The largest share (35 percent) of black-operated farms was in the \$2,500-\$9,999 sales class, and 12 percent had sales greater than \$25,000, compared with 37 percent of U.S. farms.

The largest specialization for black-run farms was beef cattle (40 percent). Blacks were more likely to specialize in tobacco than the other groups, but tobacco farms accounted for only 10 percent of all farms run by blacks.

Black operators tended to be older than operators in other minority groups and U.S. farm operators in general. Their average age was 59 years, and 38 percent were 65 years old or older. Only 44 percent of black farm operators reported farming as their principal occupation, which is related to black farmers' heavy specialization in beef cattle. Beef cattle production often has relatively flexible labor requirements that fit well with an off-farm job. Approximately 93 percent of black farmers lived in the South.

Table 12--Selected characteristics of minority operators and their farms, 1992

Item	Unit	Farms operated by nonwhite racial groups					Hispanic operators ¹	Female operators ²	All U.S. farms
		Black	American Indian	Asian or Pacific Islander	Other ³	Total			
Farms	Number	18,816	8,346	8,096	8,229	43,487	20,956	145,156	1,925,300
Share of all U.S. farms	Percent	1.0	0.4	0.4	0.4	2.3	1.1	7.5	100.0
Market value of sales	\$/farm	19,431	49,338	192,156	89,887	70,659	115,200	35,281	84,459
Land per farm	Acres	123	5,791	140	421	1,270	591	309	491
Farms by value of sales:									
Less than \$1,000 ⁴	Percent	18.9	18.3	11.7	20.3	17.7	18.4	19.0	11.0
\$1,000 to \$2,499	do.	21.5	15.8	9.7	16.8	17.3	14.8	15.5	10.9
\$2,500 to \$9,999	do.	35.3	30.3	19.5	27.3	29.9	26.6	30.8	25.1
\$10,000 to \$19,999	do.	10.1	11.1	10.7	10.5	10.5	10.3	11.7	12.1
\$20,000 to \$24,999	do.	2.3	3.0	3.4	2.9	2.8	2.9	3.1	3.6
\$25,000 or more	do.	11.9	21.5	45.0	22.2	21.8	27.0	19.8	37.2
Farms by specialization:									
Cash grains	Percent	13.3	8.8	3.1	4.1	8.8	6.7	10.3	21.0
Field crops, except cash grains	do.	18.9	11.4	6.8	11.2	13.8	11.2	13.2	13.0
Cotton	do.	2.6	0.5	0.3	2.6	1.8	2.3	0.6	1.1
Tobacco	do.	10.4	3.3	0.2	0.1	5.2	1.1	5.3	4.7
Other	do.	5.9	7.6	6.3	8.4	6.8	7.8	7.3	7.2
High-value crops ⁵	do.	6.5	6.6	75.6	27.5	23.3	23.5	11.6	8.2
General farms, primarily crops	do.	2.8	2.5	1.1	2.5	2.4	2.3	2.5	2.5
Beef cattle, except feed lots	do.	40.0	50.1	6.4	40.0	35.7	38.9	34.0	31.8
Other livestock	do.	17.7	18.7	6.7	13.5	15.0	16.1	26.5	22.1
General farms, primarily livestock	do.	0.9	1.9	0.3	1.2	1.1	1.3	2.0	1.3
Tenure:									
Full owner	do.	61.5	60.4	61.9	61.2	61.3	61.7	77.8	57.7
Part owner	do.	27.6	27.9	13.9	23.8	24.4	25.1	15.0	31.0
Tenant	do.	10.9	11.7	24.2	15.0	14.3	13.2	7.2	11.3
Average age of operator:	Years	59	52	55	51	55	53	58	53
Operator at least 65 years old	Percent	38.0	20.0	29.8	17.3	29.1	21.5	36.0	24.8
Operators by principal occupation:									
Farming	do.	44.0	45.9	62.0	45.7	48.1	49.7	50.6	54.7
Other	do.	56.0	54.1	38.0	54.3	51.9	50.3	49.4	45.3

¹ Hispanic operators may be of any race.

² Female operators may be any race or Hispanic or both.

³ This category is primarily limited to persons native to or of ancestry from Mexico, the Caribbean, and Central and South America.

⁴ These are point farms. See Appendix A: Glossary.

⁵ Includes farms that specialize in vegetables and melons, fruits and tree nuts, or horticultural specialties.

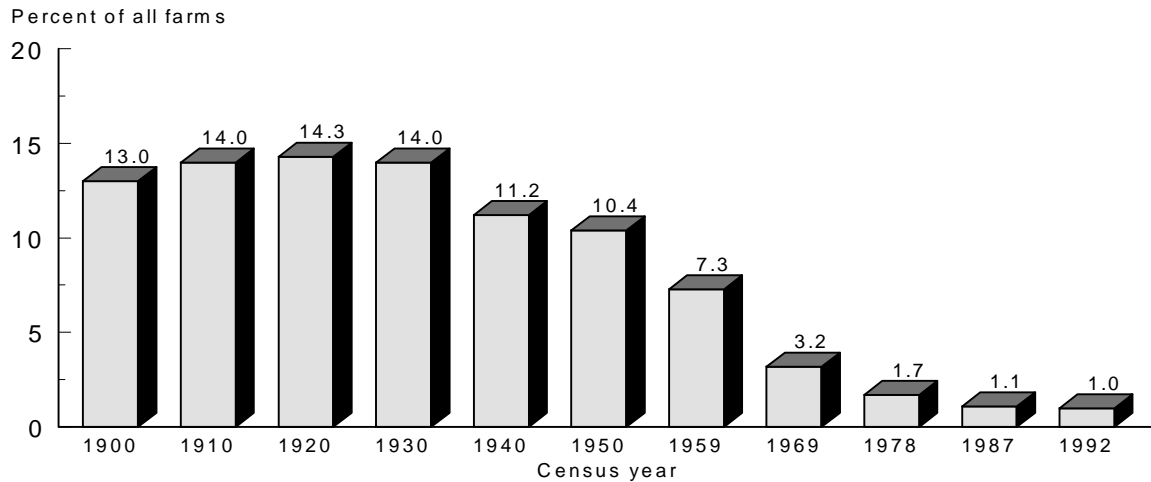
Source: Economic Research Service, compiled from the 1992 Census of Agriculture.

American Indian Farmers. The 8,346 farms operated by American Indians in 1992 include reservation-owned farms, which can be extensive. Therefore, in terms of acres, the average Indian-run farm was very large, 5,791 acres. In terms of sales, however, farms run by Indians averaged \$49,300, substantially less than the \$84,500 national average. Barely one farm in five realized sales of \$25,000 or more.

Figure 26

Share of farms operated by blacks, selected census years, 1910-1992

Black-run farms declined from 14 percent of U.S. farms in 1920 to 1 percent in 1992.



Source: U.S. Dept. of Commerce, Bureau of the Census, Census of Agriculture, various years.

More than 50 percent of American Indian farms specialized in beef cattle production and another 21 percent were highly dependent on some combination of livestock production. Most American Indian operators (81 percent) lived west of the Mississippi River. Oklahoma alone had 2,507 farms operated by American Indian, the largest concentration in the United States. However, North Carolina had 600 American Indian operators (mostly Lumbee), many of whom specialized in tobacco.

American Indian operators, on average, were slightly younger than the U.S. average in 1992. Twenty percent were 65 years or older, compared with 25 percent of all U.S. operators. Forty-six percent of Indian operators reported farming as their principal occupation, about 9 percentage points less than the U.S. average.

Asian and Pacific Islander Farmers. Although farms operated by Asians and Pacific Islanders were relatively small in terms of acreage (140 acres, on average), they tended to be large in terms of sales in 1992. These farms averaged \$192,200 in sales, more than double the U.S. average. About 45 percent of farms operated by Asians and Pacific Islanders had sales greater than \$25,000, compared with 37 percent of all U.S. farms.

About three-fourths of farms operated by Asians and Pacific Islanders specialized in high-value crops, which helps explain the high average sales per farm. Four Pacific States--California, Hawaii, Oregon, and Washington--accounted for 84 percent of Asian and Pacific Islander operators. Census of population data suggest that farm operators of Japanese descent were the largest single group among Asian and Pacific Islander farm operators.

Asian and Pacific Islander operators tended to be older than U.S. farm operators in 1992. They averaged 55 years of age, compared with 53 years for all operators, and about 30 percent were at least 65 years of age, compared with 25 percent of all U.S. operators. Asian and Pacific Islanders were more likely to report farming as their major occupation than the other minority groups or U.S. operators in general.

'Other Races' Farmers. According to the Census Bureau, the 'other races' category of operators in the census of agriculture "... is primarily limited to persons native to or of ancestry from Mexico, the Caribbean, and Central and South America" [17]. The 'other races' category is largely Hispanics who do not regard themselves as white, black, or American Indian. In 1992, 82 percent of farms in this group were located in California, Colorado, New Mexico, and

Texas. A portion of this group of operators descended from the original settlers who moved from Mexico during the Spanish colonial period. This group has characteristics similar to the total Hispanic group discussed below, but with somewhat smaller operations.

Hispanic Operators

About 21,000 Hispanics operated farms in the United States in 1992. Some of the Hispanic operators, however, were also included in the nonwhite count, since Hispanics may be of any race.

On average, farms with an Hispanic operator were 20 percent larger than U.S. farms (591 acres v. 491 acres), and their sales were 36 percent higher (\$115,200, on average, v. \$84,459). The share of Hispanic farms with sales of \$25,000 or more was 27 percent, compared with 37 percent for all U.S. farms.

Beef cattle was the most common production specialty (39 percent) of Hispanic farms. Farms that specialized in high-value crops accounted for 24 percent of Hispanic farms, three times the share for all U.S. farms, which helps explain the relatively high sales per farm.

Average age of Hispanic operators was 53 years in 1992, about the same as the U.S. average. However, 22 percent of Hispanic operators were at least 65 years old, less than the 25 percent for all operators. About half of Hispanic operators reported farming as their principal occupation, less than the 55-percent U.S. average. Approximately 72 percent of Hispanic operators lived in five States: California, Colorado, Florida, New Mexico, and Texas.

Female Farm Operators

Regardless of how many persons share work and responsibility for operating a farm, only one person is designated the operator for census of agriculture and ARMS data collection purposes. In the case of a “traditional family farm” operated by a married couple, historically it has been the male who was usually identified as the operator. Thus, women who had primary responsibility for running farms may have been undercounted.

In 1992, the 145,200 female farm operators in the United States accounted for 7.5 percent of all farm operators, an increase from the 6.3-percent share in 1987. In 1992, their farms were small in terms of acres and sales, compared with U.S. averages. One in five female-operated farms generated sales of \$25,000 or more, compared with more than one in three farms nationwide.

Like operators in other minority groups, female farm operators were highly dependent on sales of livestock, especially beef cattle. Ten percent of female-operated farms specialized in cash grains, compared with 21 percent of all operators. More than three-fourths of female operators were full owners of their farms, the highest share compared with all other minority groupings and all U.S. farms.

Female operators' average age was 58 years in 1992, about 5 years more than the U.S. average. About 36 percent of female operators were at least 65 years old, 11 percentage points higher than the U.S. average. Like Hispanic operators, female operators were evenly divided between farming and other occupations.

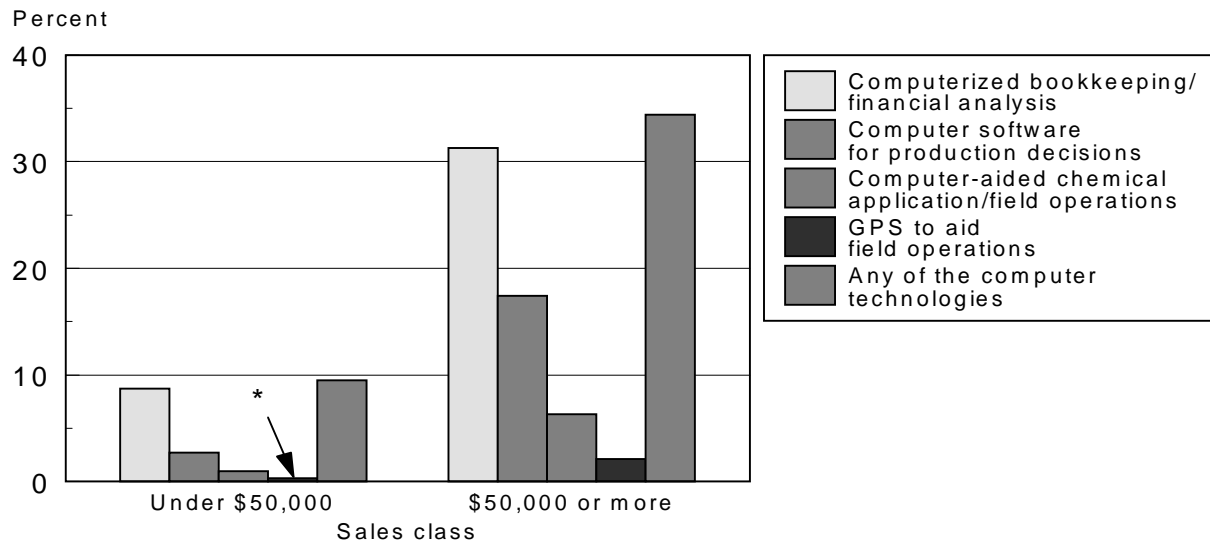
Use of Computer Technology

At the same time that farming has become more complex and capital-intensive, computer hardware and software have become more user-friendly and affordable. The need for detailed analysis to make financial and production decisions has provided the impetus for farmers to add computer technology to their stock of business tools. In 1995, more than 30 percent of commercial farm operators and nearly 10 percent of noncommercial farm operators used computer applications for some facet of their business (fig. 27).

Figure 27

Farm operator use of computer technology, by sales class, 1995

Operators of commercial farms (sales \$50,000 or more) were more likely to use computer technology.



* The relative standard error exceeds 25 percent but is no more than 50 percent.

Source: USDA, Economic Research Service, 1995 Agricultural Resource Management Study.

Computerized Bookkeeping and Financial Analysis

The operator of any business needs to keep accurate, detailed records for such purposes as applying for a bank loan, filing a tax return, and assessing the firm's financial condition. In 1995, nearly one-sixth of all operators of farm businesses, but well over one-half of operators of farms with sales of at least \$500,000, used computers for recordkeeping and financial analysis (table 13). Forty-six percent of farmers of operations organized as corporations and 29 percent of operators of farms organized as partnerships used computers for recordkeeping, compared with 13 percent of operators of individually operated farms. Operators whose farms were in a marginal solvency or vulnerable financial position also showed a high level of computerized recordkeeping, perhaps because those farms tended to be larger or because high levels of debt might require more detailed financial reporting.

Computer usage for bookkeeping was highest among operators whose primary occupation was farming, who were younger, and who were more highly educated. While one in five operators whose principal occupation was farming used computerized recordkeeping, the figure was one in eight for those whose occupation was "other." Twenty percent of operators under 55 used computers for financial records compared with 8 percent of those 55 and over. Finally, compared with the rate of computer usage for recordkeeping for high school graduates (10 percent), the rate was double for those who had some college (20 percent), and triple for those who completed college (33 percent).

Computer-Assisted Production Decisions

About half as many operators used computer software to help make production decisions as used computers for recordkeeping (6.5 percent v. 14.6 percent), but the pattern of usage based on farm and operator characteristics was similar. Software usage for analyzing production choices increased with farm size, and farms organized as corporations used software more than partnerships or sole proprietorships. Farms in a marginal solvency or vulnerable financial position (debt-to-asset ratio greater than 0.40, regardless of net farm income) used computers in production decisionmaking more often than farms with lower debt-to-asset ratios. In like manner, operators whose primary occupation was farming, who were younger, and who were more highly educated were more likely to get information from analysis based on computer software.

Table 13--Farm operator use of computer technology, by selected characteristics, 1995

Item	Computerized bookkeeping/ financial analysis	Computer software for production decisions	Computer-aided chemical application/ field operations	Global Positioning System to aid field operations
<i>Number</i>				
Farms using technology	290,485	129,947	47,540	15,611
Farms responding ¹	1,995,056	1,996,115	1,995,644	1,995,946
<i>Percent of responding farms</i>				
Farms using technology	14.6	6.5	2.4	0.8
Sales class:				
Less than \$50,000	8.7	2.7	1.0	* 0.3
\$50,000 or more	31.3	17.4	6.3	2.1
\$50,000 - \$99,999	20.1	11.5	* 3.7	** 1.6
\$100,000 - \$249,999	31.6	16.3	5.3	* 1.4
\$250,000 - \$499,999	43.5	22.7	10.5	3.7
\$500,000 - \$999,999	54.2	35.3	14.6	6.2
\$1,000,000 or more	71.2	51.6	20.3	* 4.2
Type of farm:				
Cash grains	21.8	11.7	6.6	2.0
Tobacco	* 1.0	* 1.0	* 0.1	0.0
Cotton	21.5	* 9.7	d	d
Other field crops	10.5	* 4.0	* 1.5	* 0.9
Vegetables, fruits, or tree nuts	25.4	11.0	d	d
Nursery or greenhouse	23.2	* 11.0	** 1.3	0.0
Beef, hogs, or sheep	11.0	3.7	0.8	** 0.4
Poultry	* 10.7	* 2.6	** 0.3	0.0
Dairy	23.1	13.2	3.4	* 0.3
Other livestock	* 13.2	* 8.6	d	d
Legal organization: ²				
Sole proprietorship	12.9	5.6	2.1	0.6
Partnership	29.1	13.8	5.3	** 2.6
Corporation	46.0	25.0	7.9	* 3.1
Farm financial position:				
Favorable ³	13.8	5.7	2.5	0.8
Marginal income ⁴	12.8	6.3	1.6	* 0.6
Marginal solvency ⁵	24.8	11.3	4.1	** 1.2
Vulnerable ⁶	21.5	10.4	* 3.7	** 1.1
Operator major occupation:				
Farming	19.7	10.4	3.7	1.0
Other occupation	12.2	4.4	* 1.4	* 0.5
Retired	* 6.1	** 0.9	** 1.1	** 0.8
Operator age:				
Less than 35 years	21.3	11.4	5.3	* 1.8
35 to 44	23.3	12.2	2.9	* 0.9
45 to 54	17.4	7.0	2.5	* 0.5
55 to 64	11.6	4.7	1.9	* 0.9
65 years or older	5.4	1.5	* 1.3	** 0.5

See footnotes at end of table.

Continued--

Table 13--Farm operator use of computer technology, by selected characteristics, 1995--continued

Item	Computerized bookkeeping/ financial analysis	Computer software for production decisions	Computer-aided chemical application/ field operations	Global Positioning System to aid field operations
	<i>Number</i>			
Farms using technology	290,485	129,947	47,540	15,611
Farms responding ¹	1,995,056	1,996,115	1,995,644	1,995,946
	<i>Percent of responding farms</i>			
Operator education:				
Less than high school	2.5	* 1.5	* 0.8	** 0.1
High school	9.6	4.1	1.5	* 0.5
Some college	20.2	9.1	3.8	* 1.4
College	33.3	14.8	4.5	* 1.4

¹ About 3.5 percent of farm operators refused to answer these questions.

² Excludes cooperative farms.

³ Debt-to-asset ratio 0.40 or less and positive net farm income.

⁴ Debt-to-asset ratio 0.40 or less and negative net farm income.

⁵ Debt-to-asset ratio greater than 0.40 and positive net farm income.

⁶ Debt-to-asset ratio greater than 0.40 and negative net farm income.

* = The relative standard error (RSE) of the estimate exceeds 25 percent, but is no more than 50 percent. The RSE provides a means of evaluating the survey results. A smaller RSE indicates greater reliability of the data. Estimates with RSE's of 25 percent or less are not marked.

** = The relative standard error of the estimate exceeds 50 percent, but is no more than 75 percent.

d = Data insufficient for disclosure.

Source: USDA, Economic Research Service, 1995 Agricultural Resource Management Study, Farm Operator Resources version only.

Computer-Aided Chemical Application and Field Operations

Farmers and ranchers may use computers to track information--such as crop yield, soil composition, moisture level and nutrient content, and pest infestation--in order to plan the application of chemicals and other field operations and to evaluate the results. Careful monitoring of the elements underlying agricultural production is sometimes referred to as 'precision farming,' and it is intended to enhance financial results as well as address ecological concerns.

A relatively small number of farmers (fewer than 50,000 operators) used such tracking systems in 1995. Nevertheless, the survey results show that, in general, the higher the farm sales, the more likely the operator would use such a system. In addition, farm operators who identified their primary occupation as farming, who were younger and had more education, and who operated farms organized as corporations or partnerships relied more than other operators on computer aids for field operations.

Global Positioning Systems

Global positioning systems (GPS) use satellite transmissions to determine the latitude and longitude of any location on earth. Measurements taken at various locations can be mapped to provide a profile of a farm or field, for example, fertility, moisture content, or crop yield. Other datasets can be merged with the mapped data to calculate elevations, evaluate runoff patterns, or estimate irrigation needs. With GPS, information can be plotted so that every square foot of a field can have a customized cropping plan tailored to specific needs. Thus, with GPS, farmers have the ability to practice "precision farming."

Because the technology was new and relatively expensive, few operators (less than 1 percent) used GPS in 1995. Although survey results were generally inconclusive with regard to the characteristics of farms or operators employing GPS, commercial farms, especially those with sales of \$250,000 - \$999,999, appeared more likely than noncommercial farms to have begun using GPS.