FARM STRUCTURE GRAPHICS*

ESO 2256
1995

Farm Size and Numbers

Industrialization of Agriculture

Concentration in Agribusiness

Farm Financial Structure

Farm Structure and Environment

Farm Succession

*Graphics prepared by Renée Drury and Luther Tweeten for American Farm Bureau Federation.

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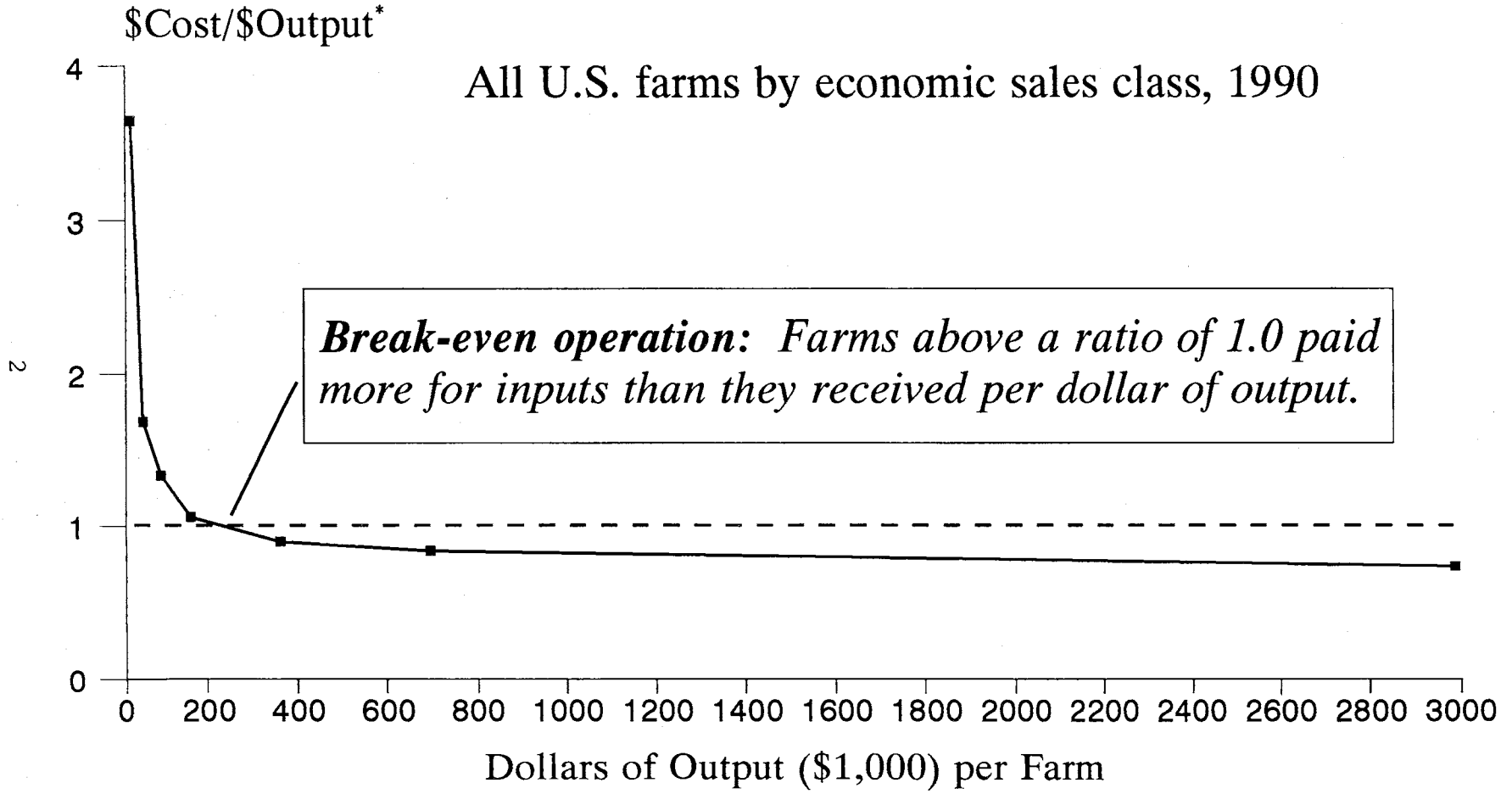
FARM SIZE AND NUMBERS

1. Driven by technology and market forces, farms continue to get fewer and larger.

2. Trends to a dual agriculture continue:

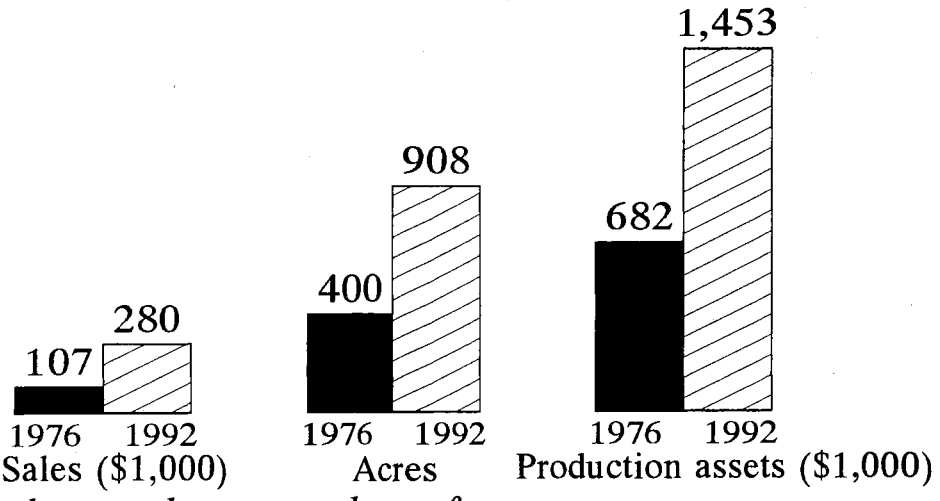
   - A few large farms account for most output.
   - Small operations account for most farm numbers.
   - Middle size operations are being squeezed.

Larger farms produce at lower cost per dollar of output.

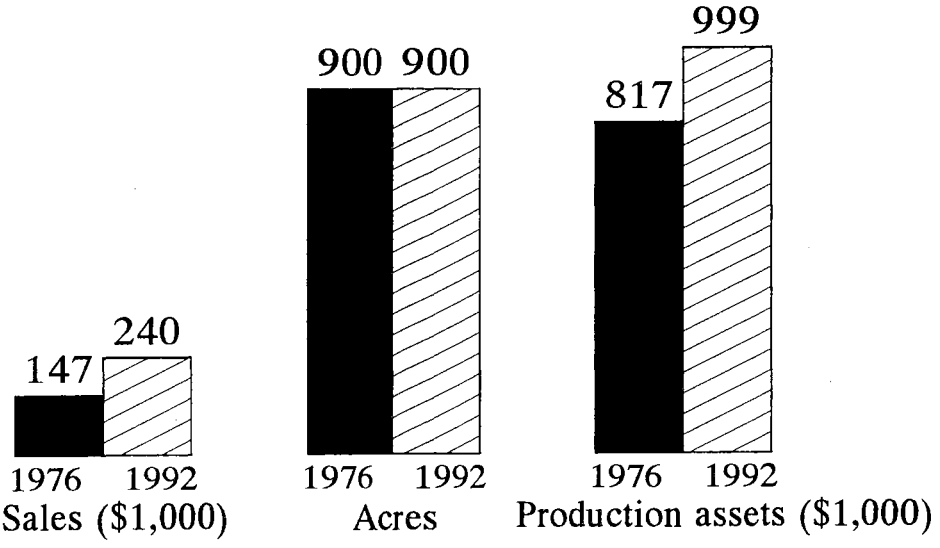


Source: Data adapted from USDA
*Economic costs include operating expenses plus operator and family labor (hired wage rate), management (5% of net receipts), and equity cost (5% on real estate, 7% non-real estate).

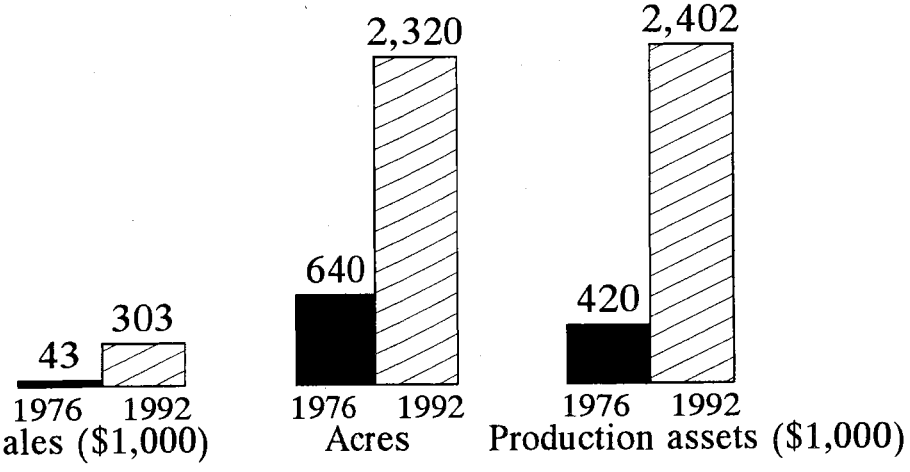
*Sales, acres, and production assets needed to earn median U.S. income from 1976 to 1992.**



Northcentral corn-soybean farm



Mississippi Delta cotton

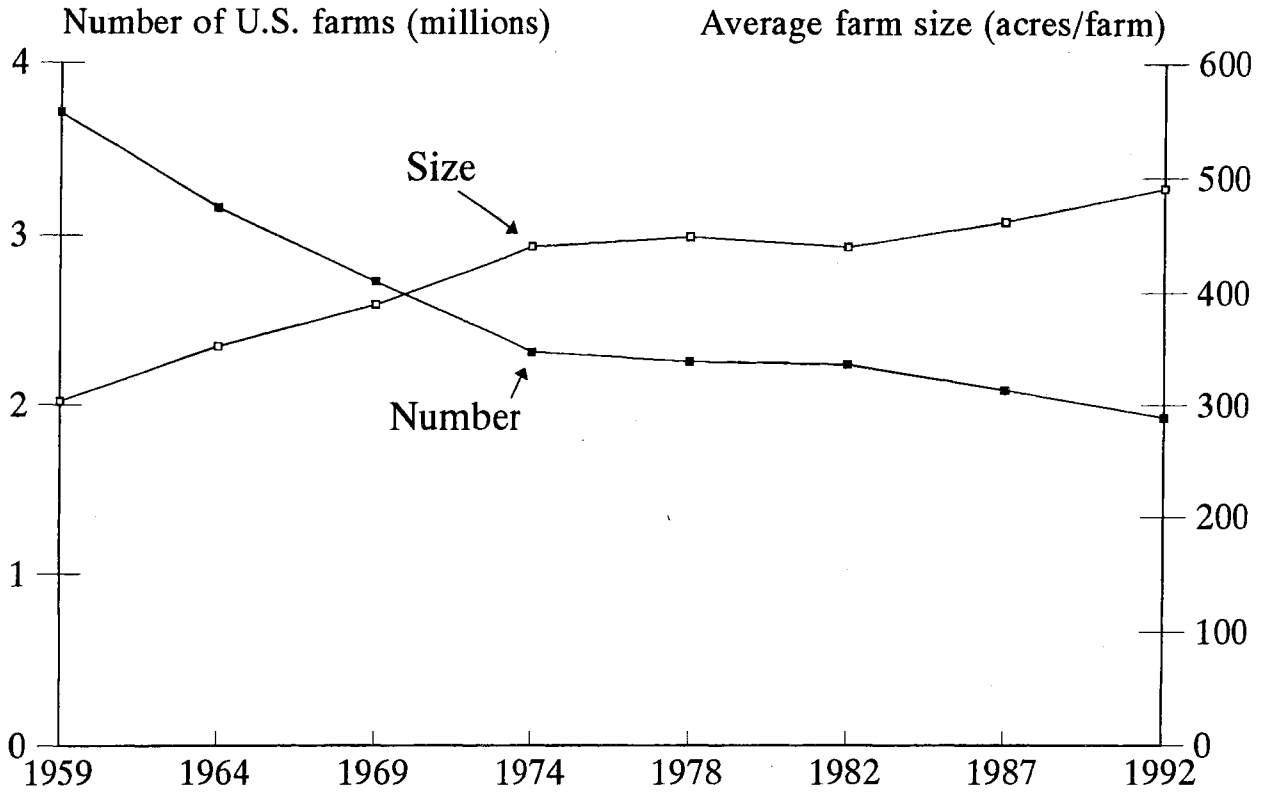


Central Plains wheat

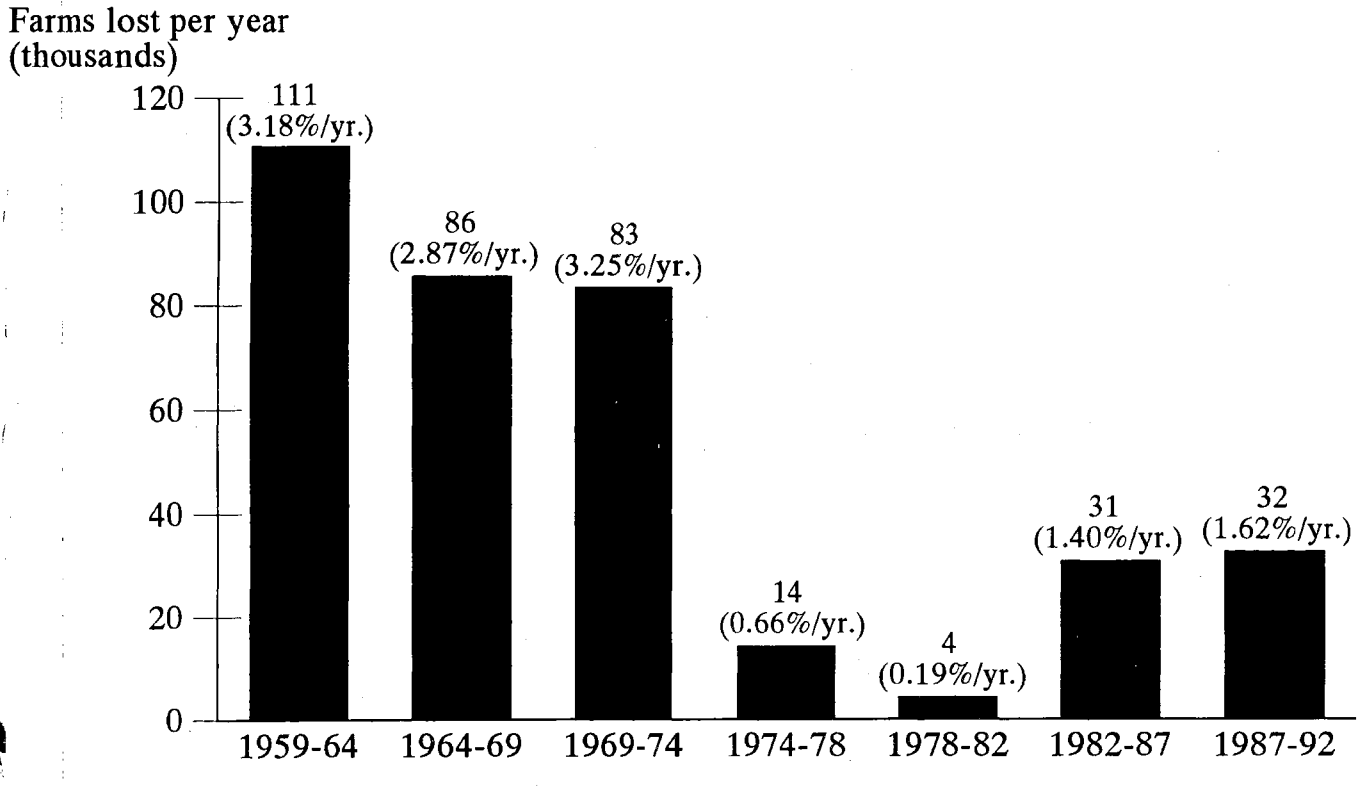
Source: Basic data from USDA

***Economic farming** unit requiring 2,000 hrs. of operator and family labor. Income from labor-management only. Net income may be higher including operator's equity capital. All data are in current, not deflated dollars.

Farms have gotten fewer and larger



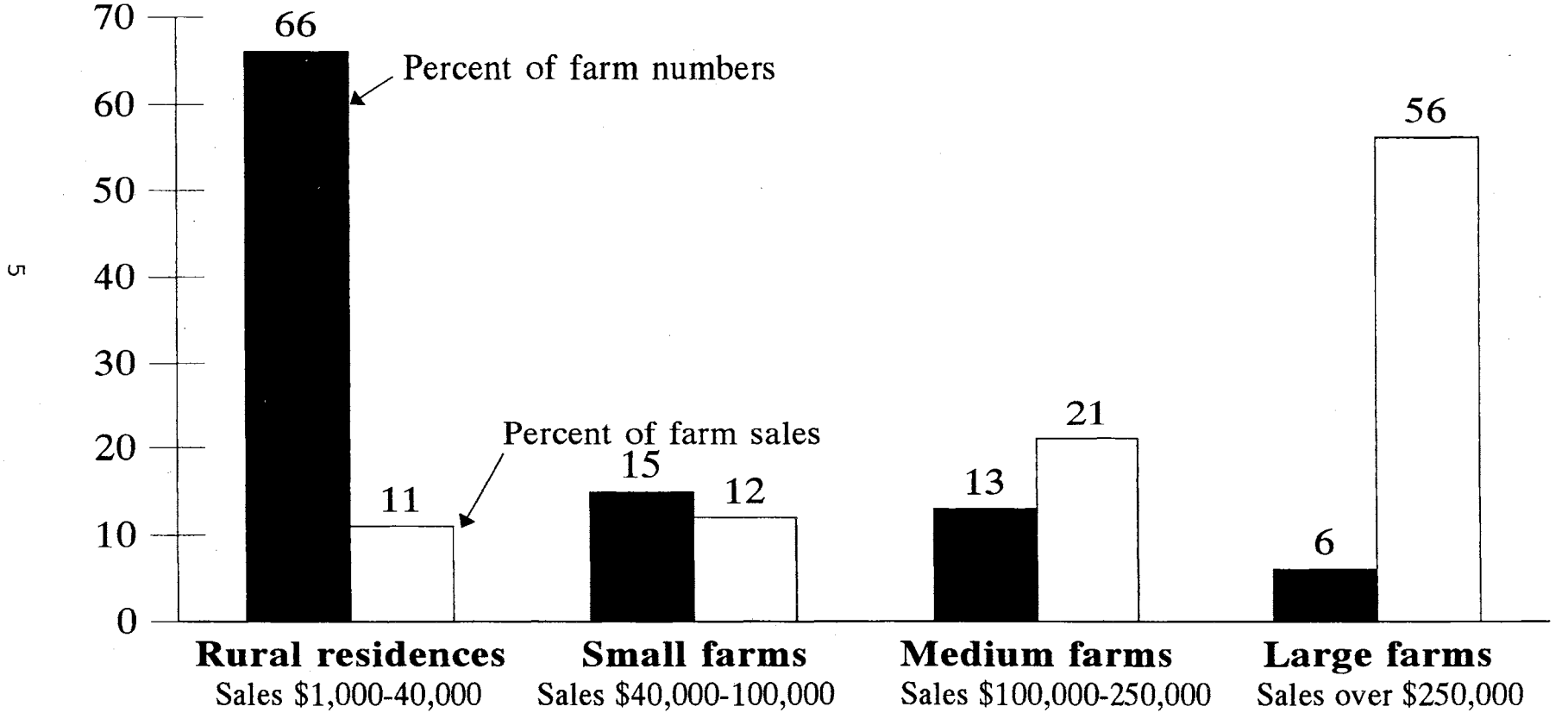
... but the annual rate of farm loss slowed, especially in the 1974-1982 period.



Source: Census of Agriculture

Smaller operations accounted for most farms whereas larger operations accounted for most farm sales in 1993.

Shares of U.S. farm numbers and farm sales in 1993.
(Percent)

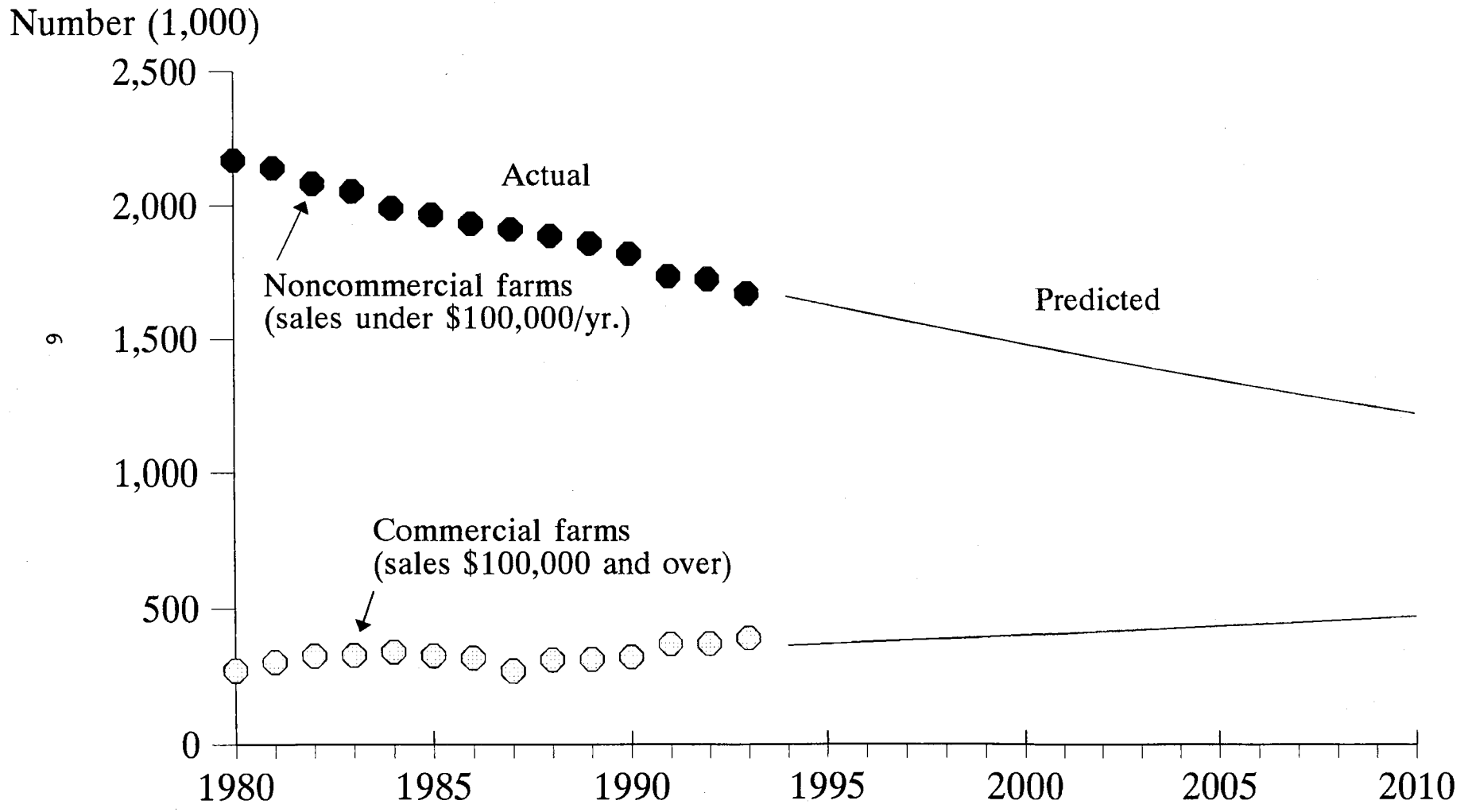


Note that farms closely follow the popular 80:20 rule:

Non-commercial farms	*Commercial farms*
81% of farm numbers	19% of farm numbers
23% of farm sales	77% of farm sales

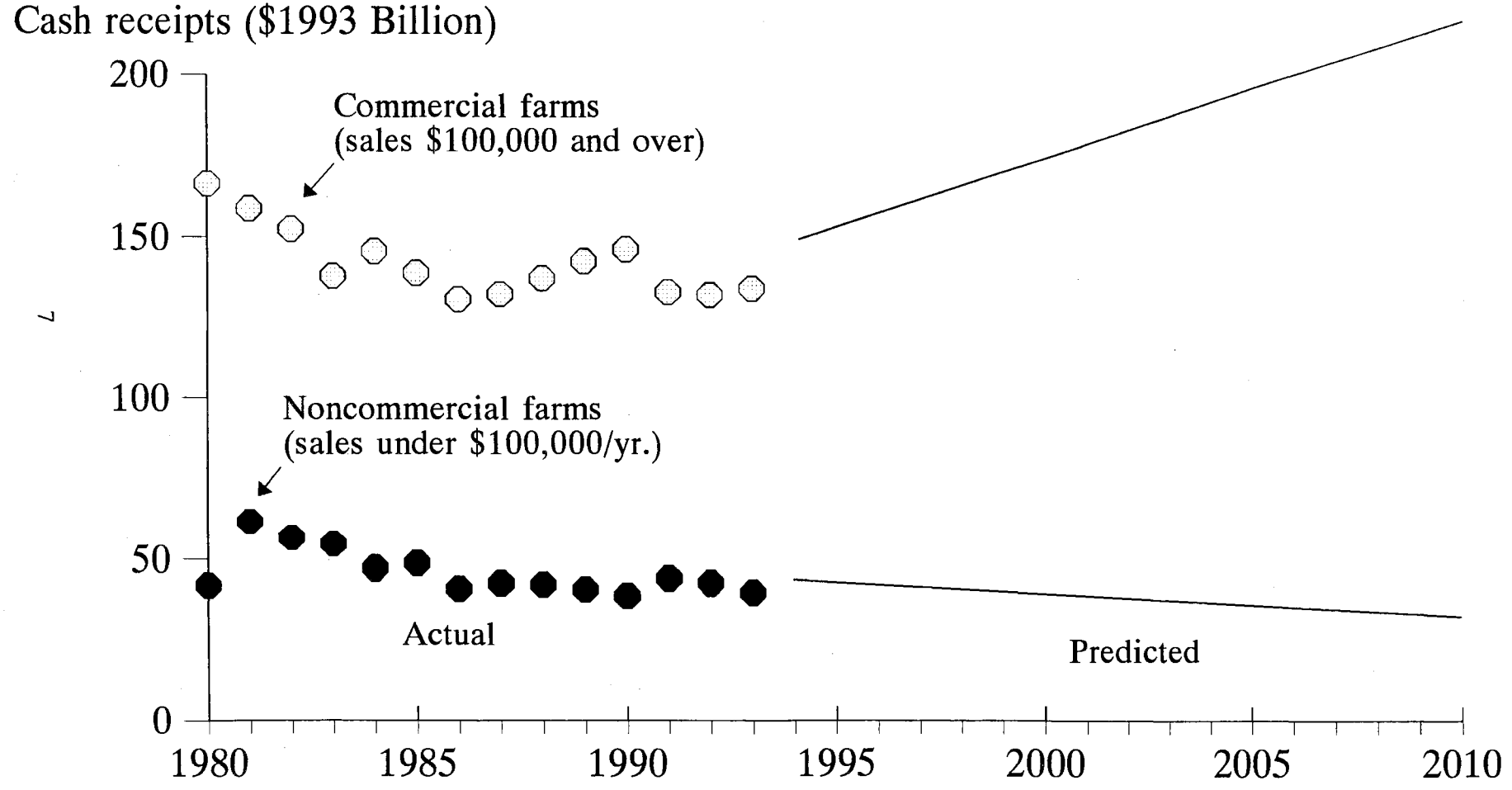
Source: USDA

Numbers of commercial farms are growing and of noncommercial farms are falling -- a trend predicted to continue.



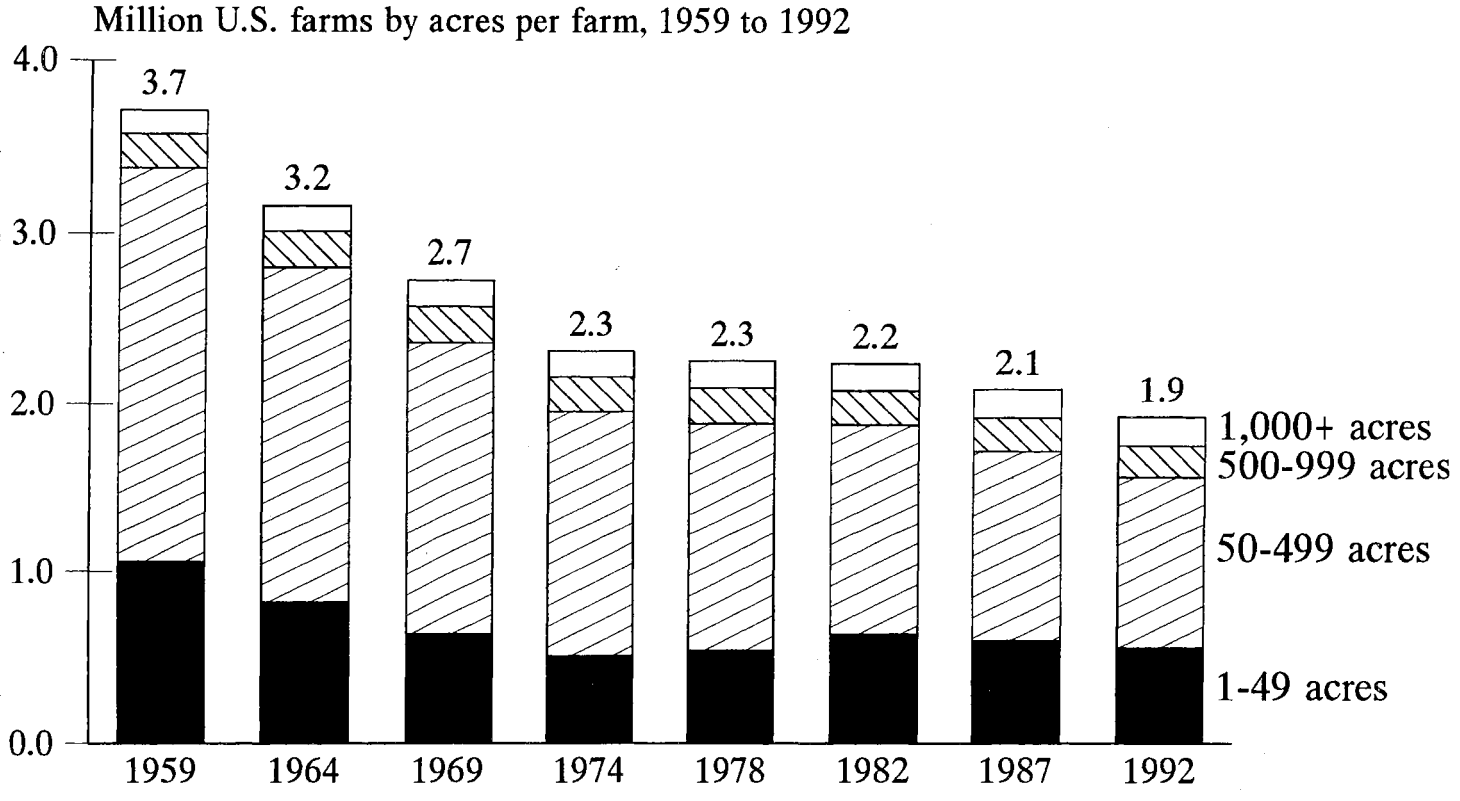
Source: 1980-93 actual data from USDA's *National Financial Summary*, prediction by Tweeten

Commercial farms are predicted to account for 87 percent of all receipts and 28 percent of all farms in 2010. This compares with 77 percent of all receipts and 19 percent of all farms in 1993.

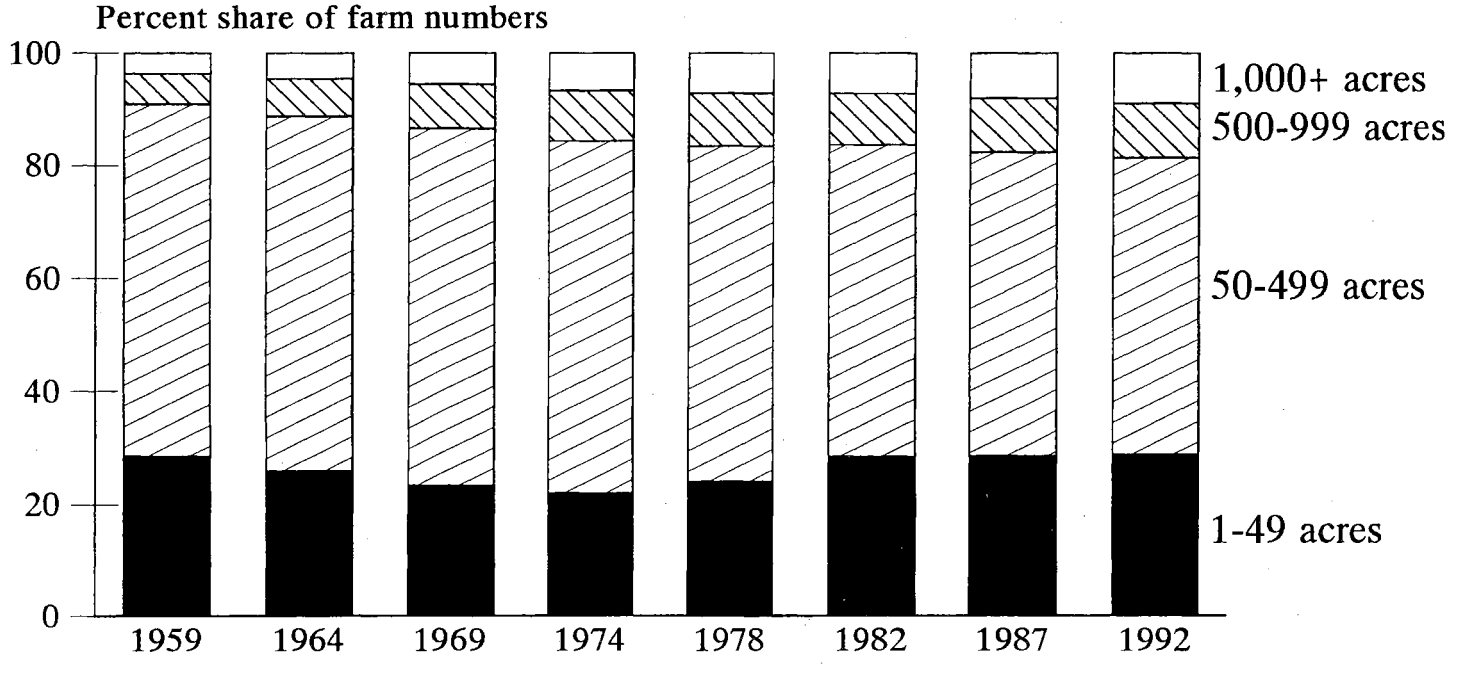


Source: 1980-93 actual data from USDA's *National Financial Summary*, prediction by Tweeten

U.S. farm numbers dropped from 3.7 million to 1.9 million



... while the number and share of large farms grew. The mid-size farm (50-499 acres) share fell from 62% in 1959 to 53% in 1992.



Source: Census of Agriculture

INDUSTRIALIZATION OF AGRICULTURE

1. Most farm operators are full owners but most farmland is operated by part owners.

   Full owners - operated only land they owned.
   Part owners - operated land they owned and also land they rented from others.
   Tenants - operated only land they rented from others or worked on share for others.

2. Larger-than-family corporations account for less than 1 percent of all farms and for 2 percent of farm acres. They account for approximately one-tenth of farm sales volume.

3. Vertical coordination is on the rise and is of broad types:
   a. Production contracts – Specifies prices, grade, etc. as in milk marketing orders but leaves most production and marketing decisions to producers.
   b. Production fee contracts – Producer or grower feeds hogs or broilers for a fee (often plus performance bonus) per unit of production and furnishes equipment, buildings, and labor; integrator pays fee (plus performance bonus) and provides feed, veterinary services, and market.
   c. Integrated ownership – Firm owns and operates two or more stages of food production process from input supply to farm production to processing and marketing as in many laying hen operations.

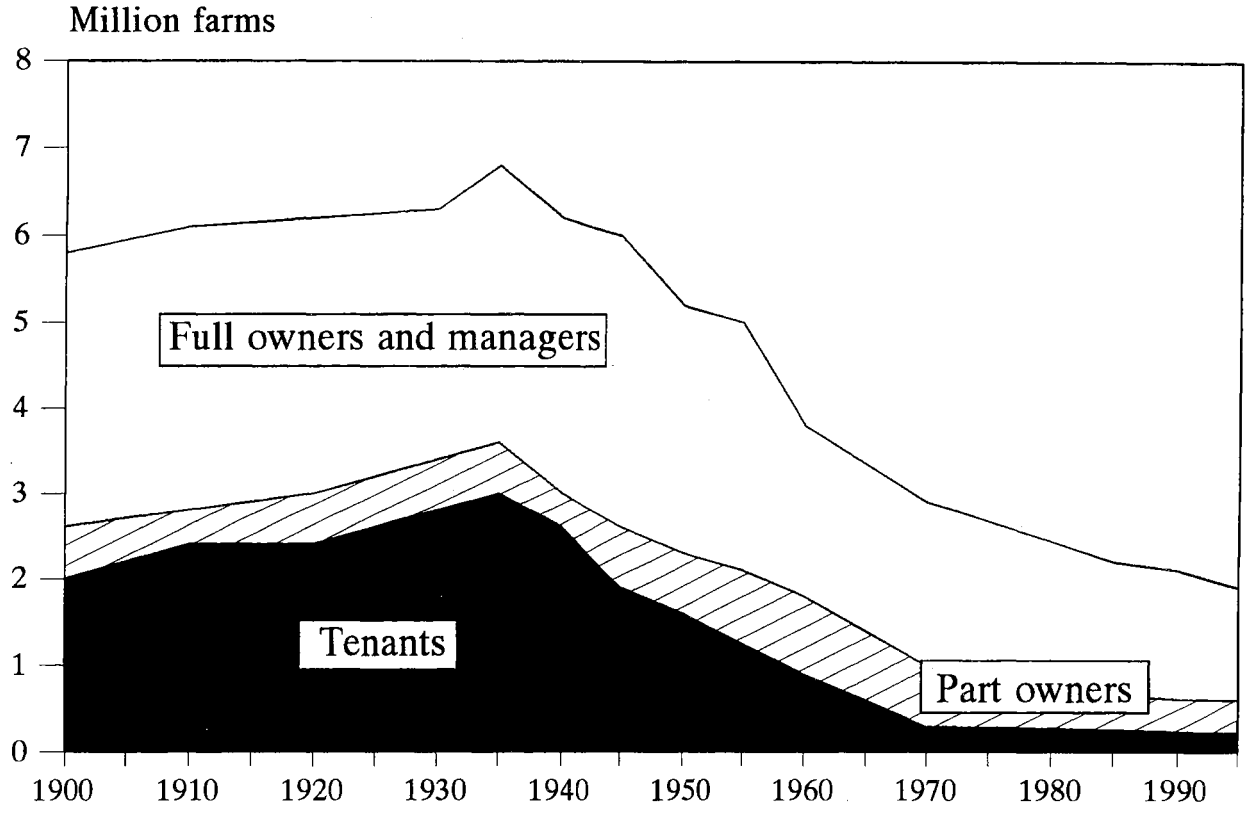
   Graphs herein combine a and b above as "production and marketing contracts" and keep c separate as "integrated ownership."

   The hog example:
   - Production costs average lower on larger operations.
   - Risk and capital requirements are less for producers.
   - Quality and quantity control is maintained.

4. Vertical coordination is:
   - Increasing in nearly all enterprises.
   - Is nearly complete in fluid grade milk, many fruits and vegetables, and poultry.
   - But remains modest in field crops.

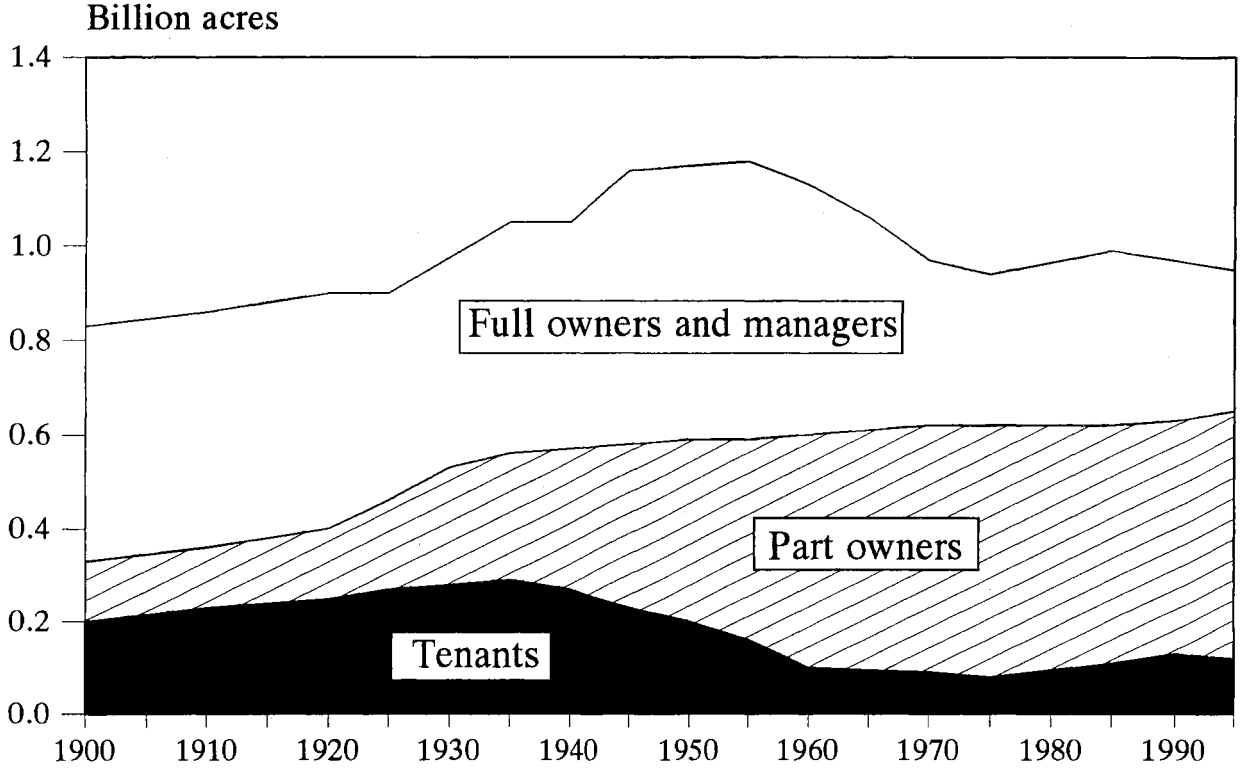
The majority (58 percent) of all operators were full owners in 1992

Number of farms by tenure of operator



... but over half (56 percent) of farmland was operated by part owners.

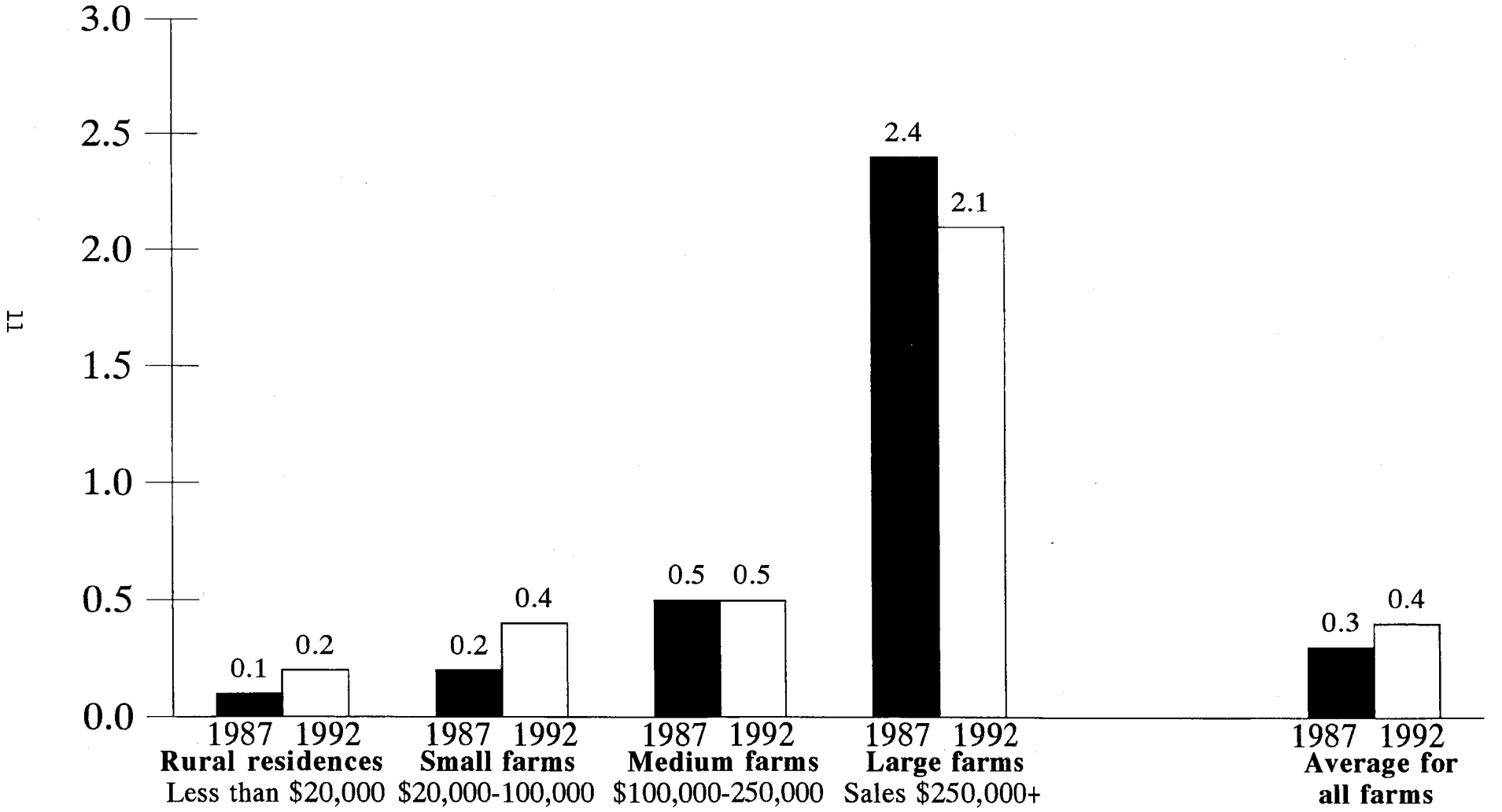
Land in farms by tenure of operators



Source: USDA and Census of Agriculture

Less than 1 percent of U.S. farms are other-than-family corporations, and their growth has been most prominent on smaller farms since 1987.

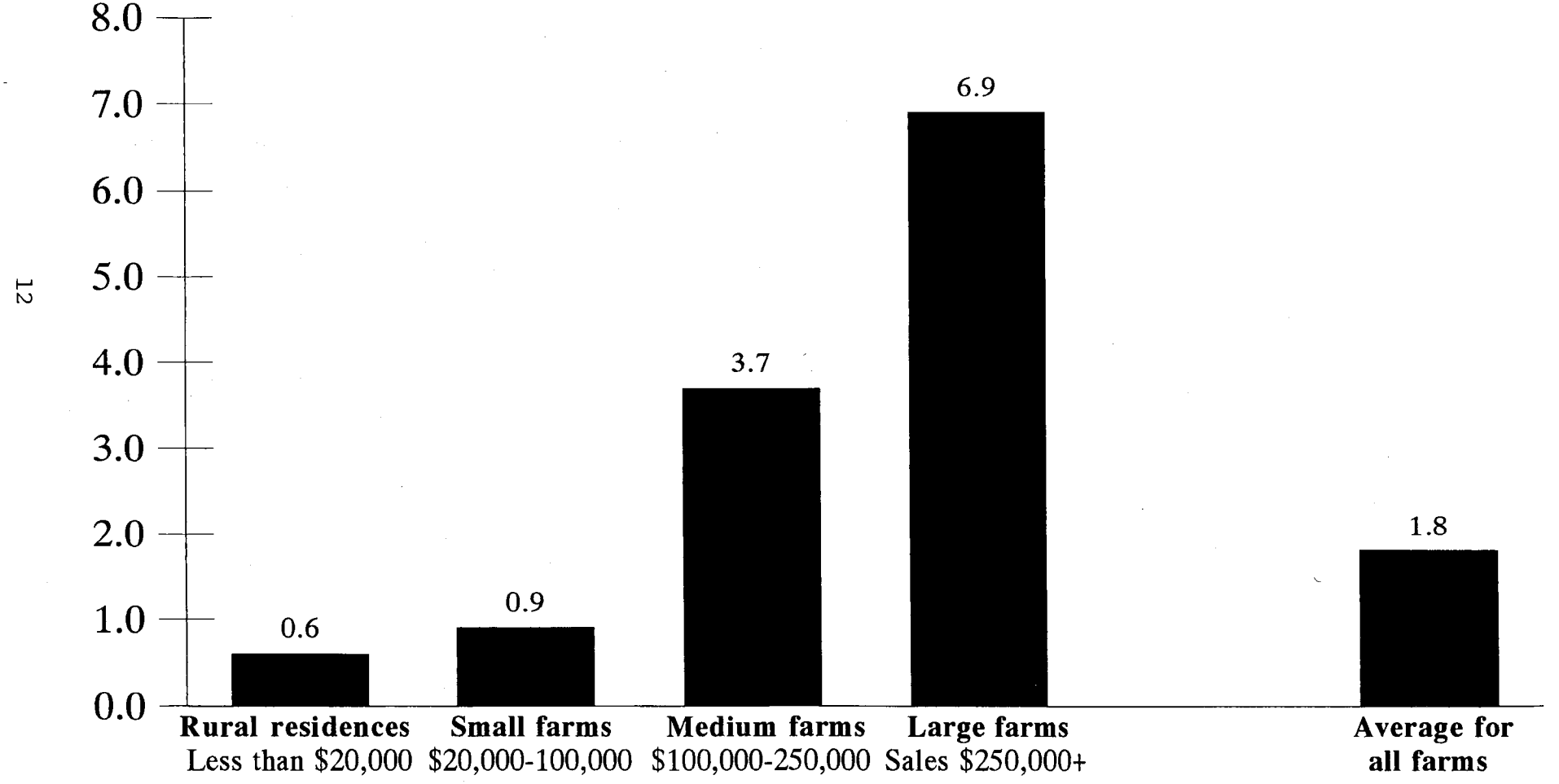
Corporate, other than family, percent of farm numbers in sales class, 1987 and 1992



Source: Census of Agriculture

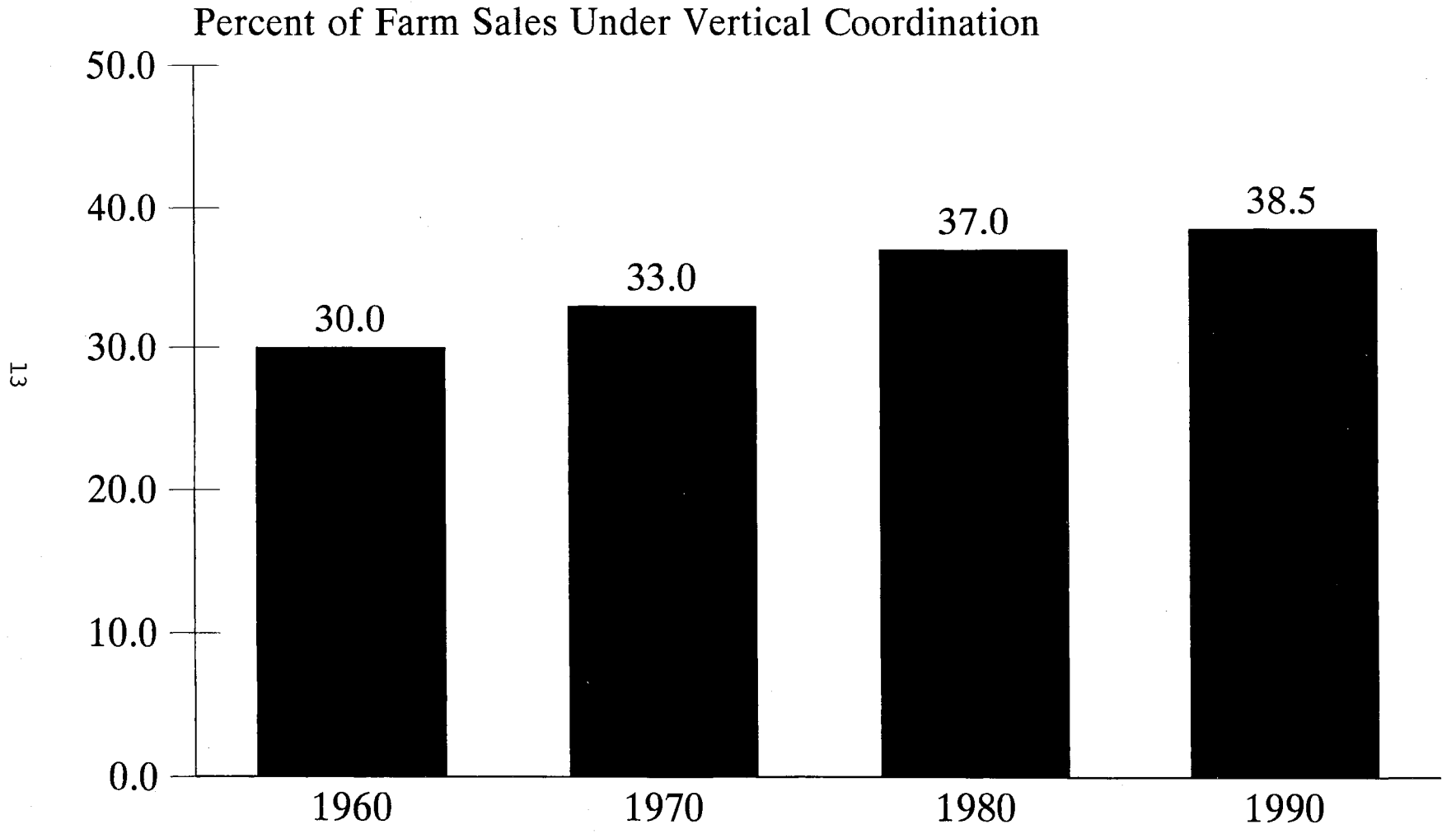
Less than 2 percent of U.S. farmland is in other-than-family corporations, but the share on larger farms is higher.

Corporate, other than family, percent of farm acres in sales class, 1992



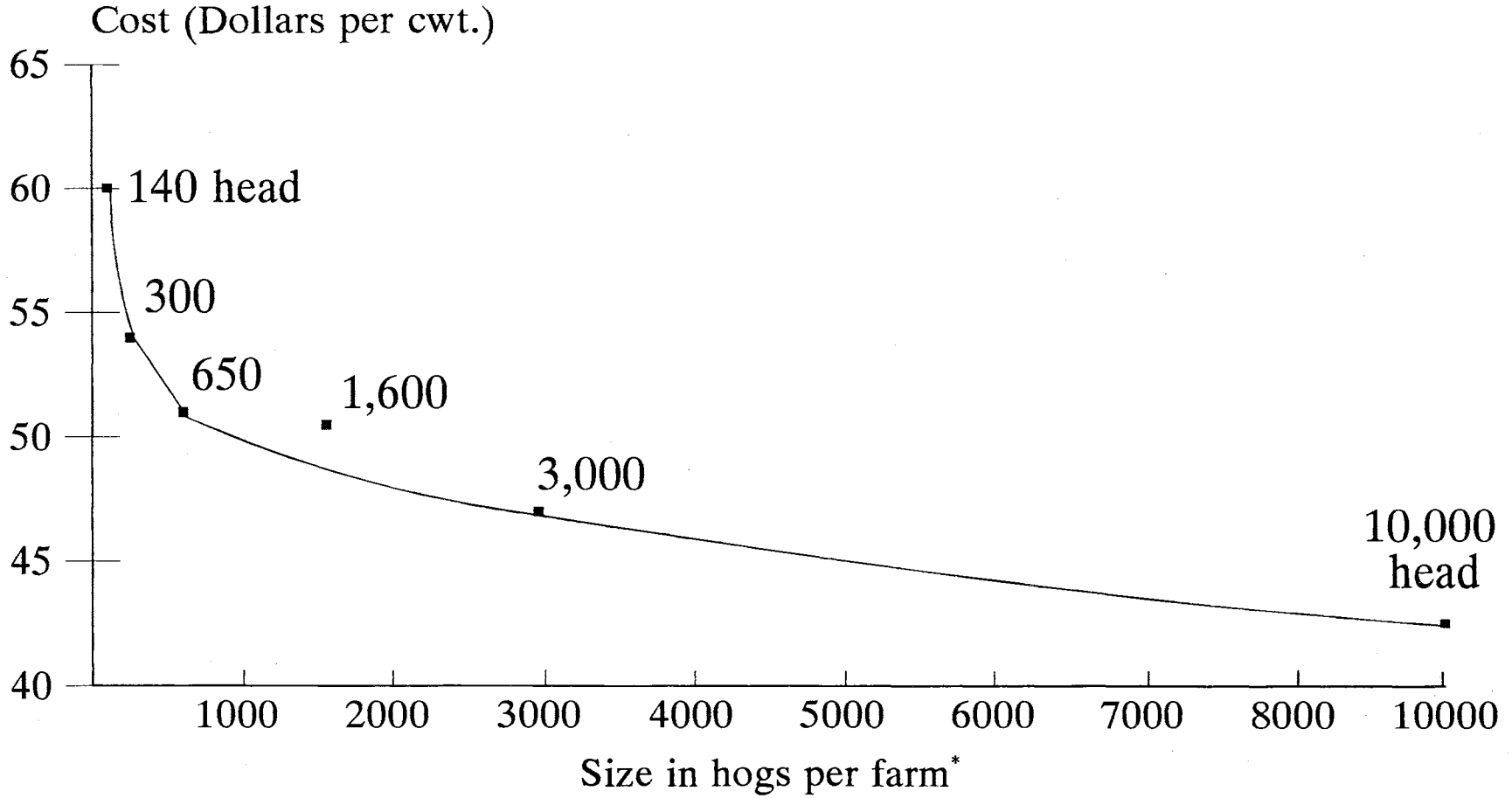
Source: Census of Agriculture

Vertical coordination continues to rise, but rate of increase is slowing.



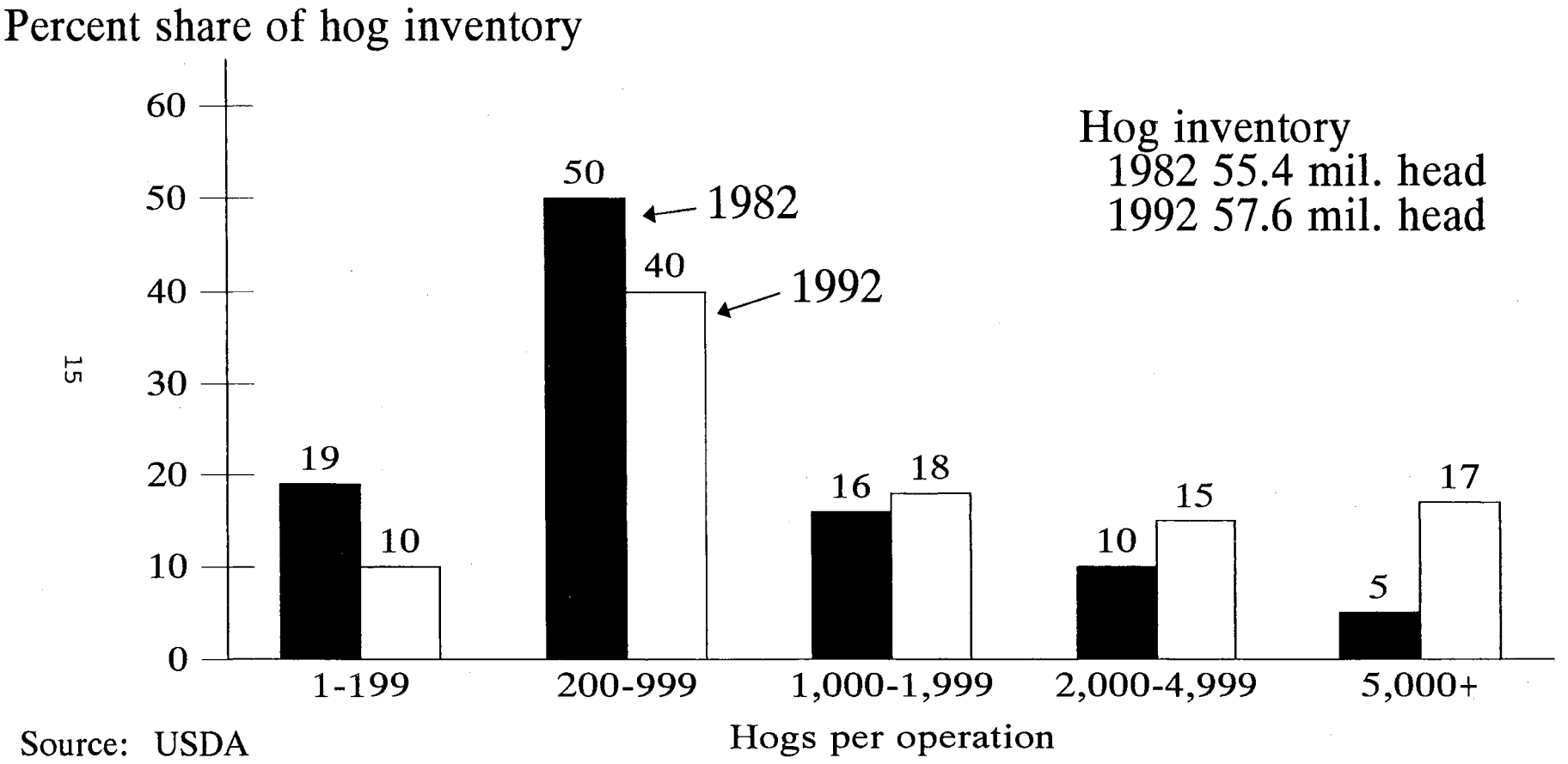
Source: Economic Research Service, USDA

U.S. hog production costs averaging 30% lower on larger farms in 1990 encourage size expansion.



*Farms range from "stand alone" sole proprietorships to integrated operations. For integrated operations, size of "farm" is only that on farm of producers but costs reflect economies of size of inegrator supplying low cost feed
No data are available on very large units ranging up to 500,000 hogs per operation.
Source: USDA

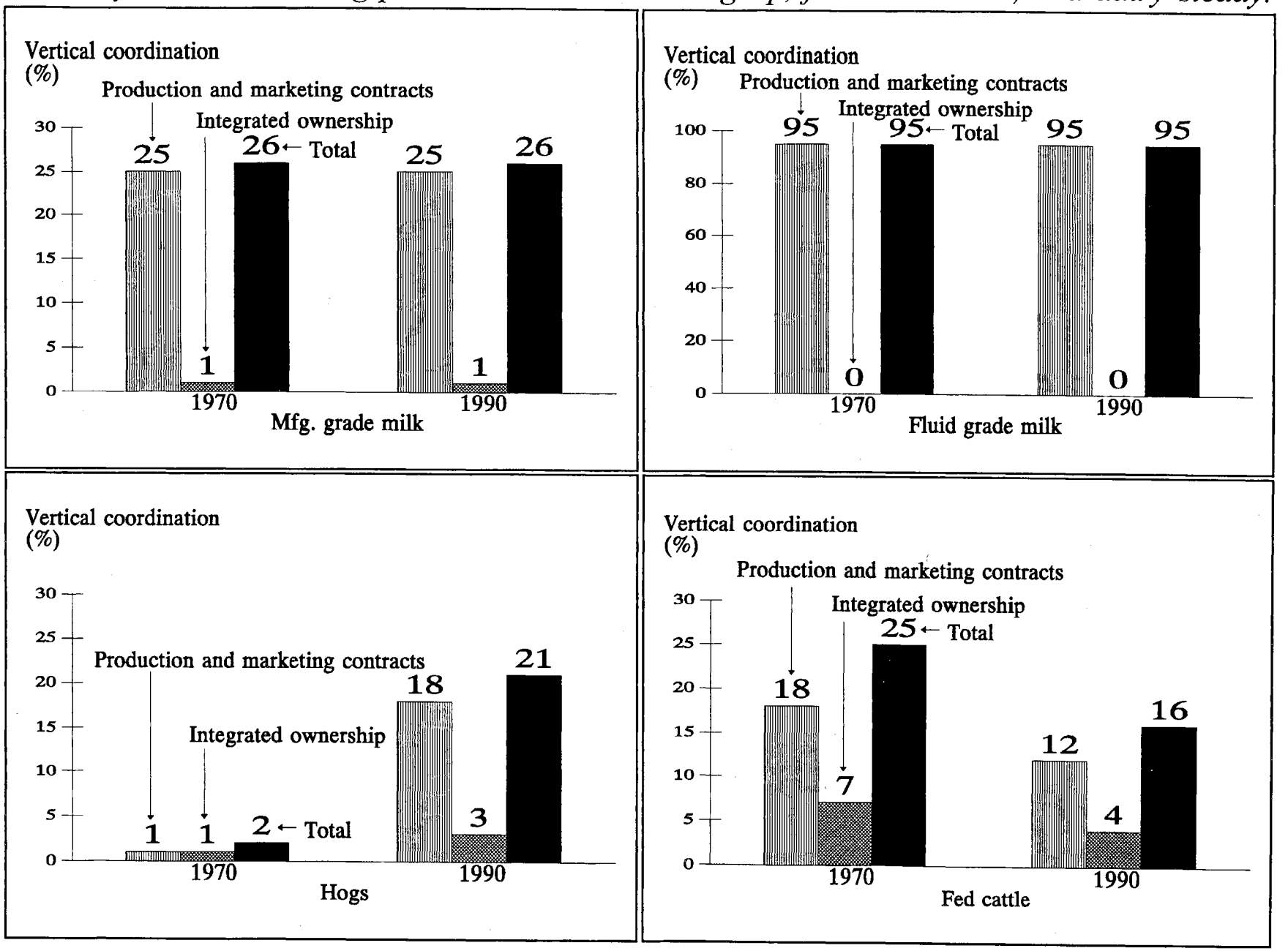
Share of U.S. hog inventory in 1,000+ head operations is expanding, and in smaller operations is declining.



Source: USDA

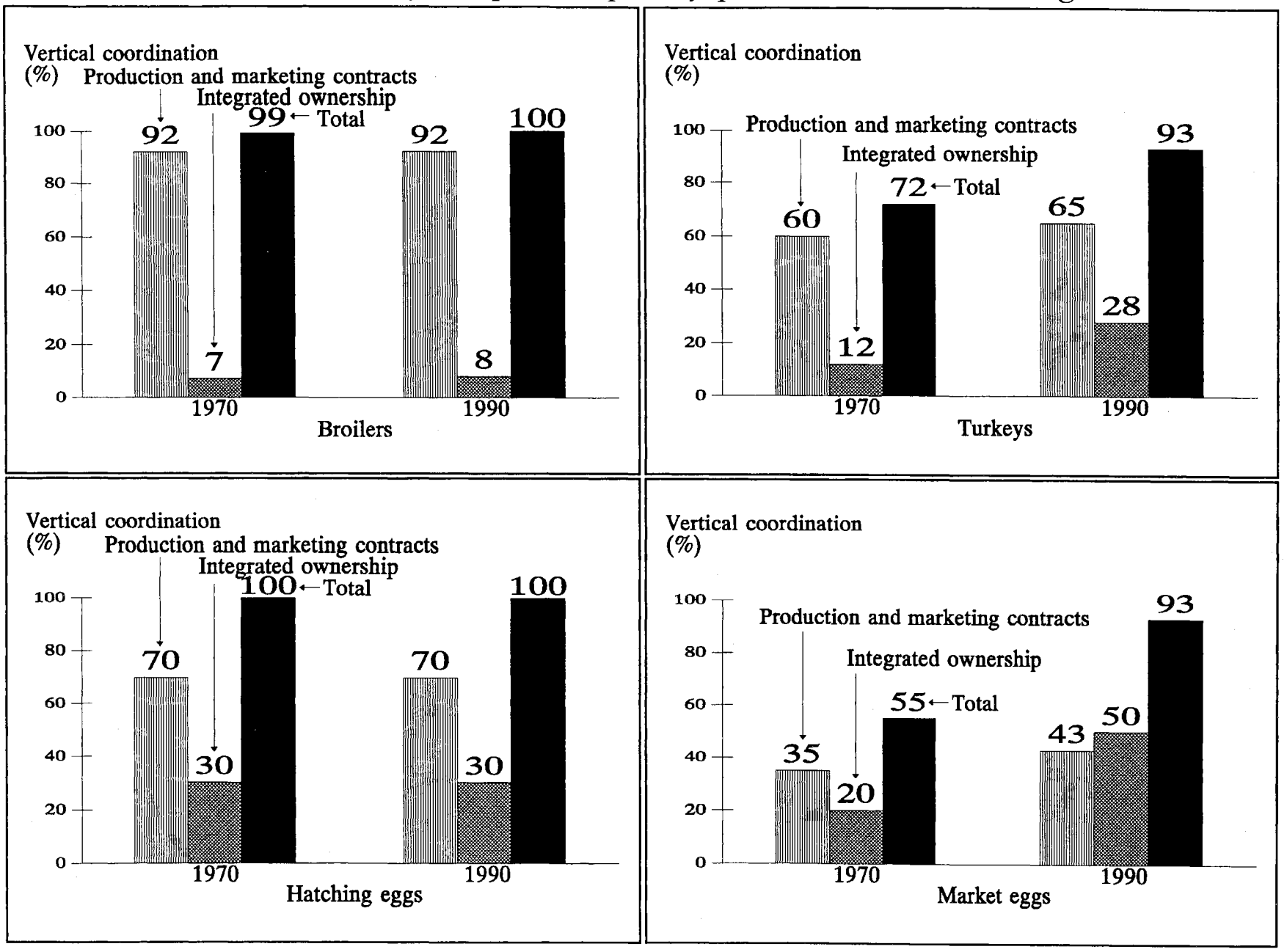
Year	Less than 1,000 head	1,000 head or more
1982	69%	31%
1992	50%	50%

Vertically coordinated hog production and marketing up, fed cattle down, and dairy steady.



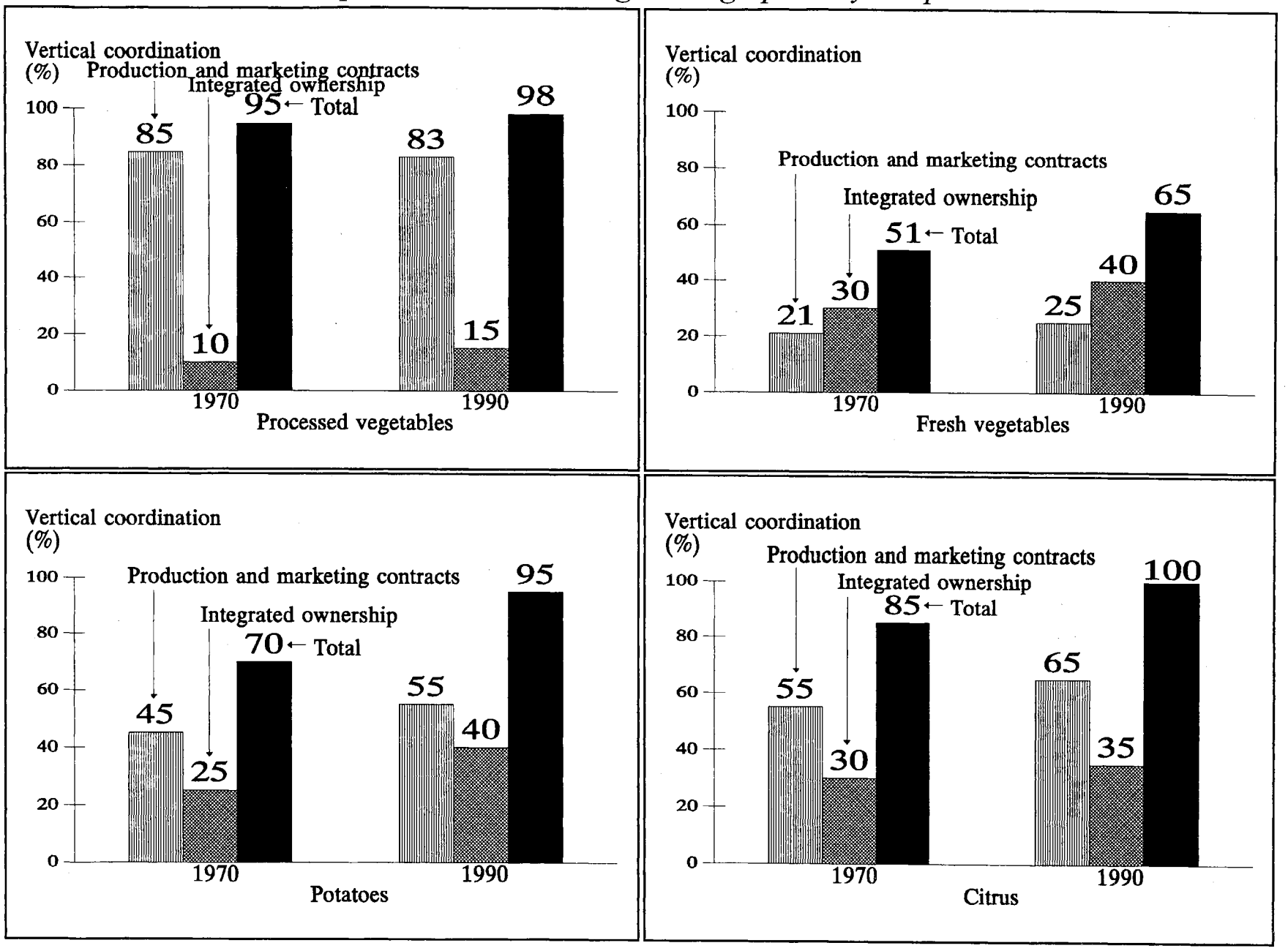
Source: USDA

Vertical coordination is nearly complete in poultry production and marketing.



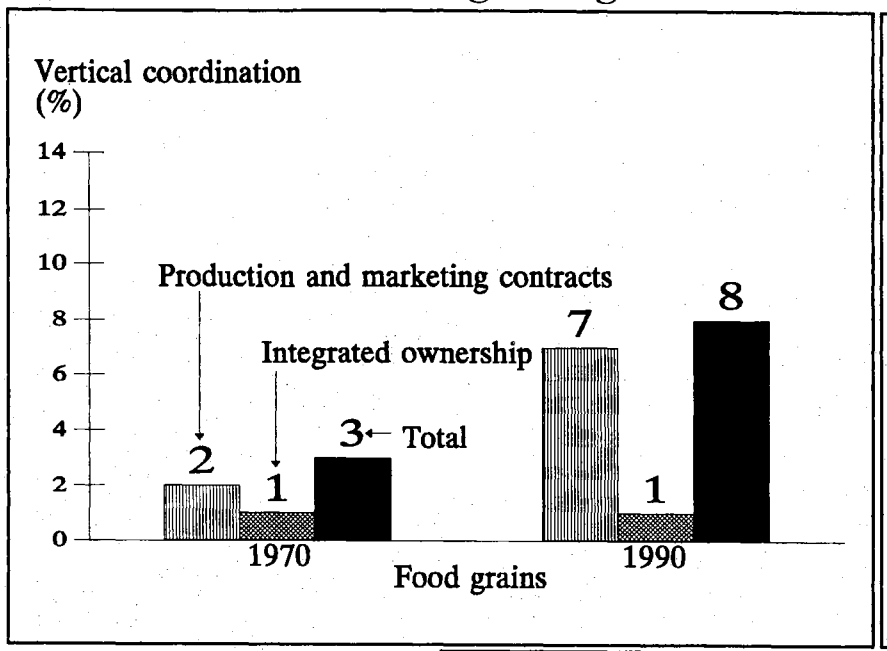
Source: USDA

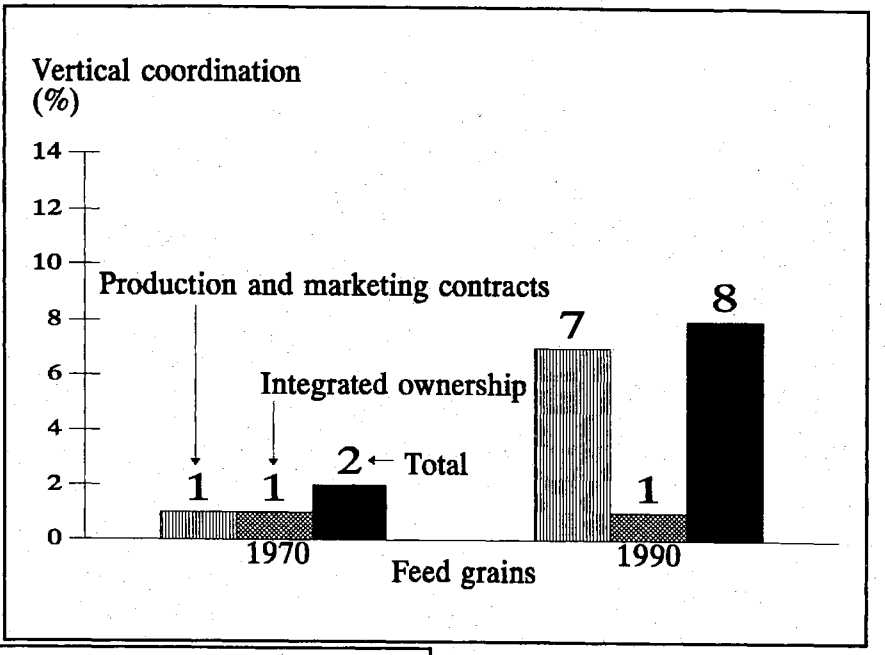
Vertical coordination is prominent and rising among specialty crops.

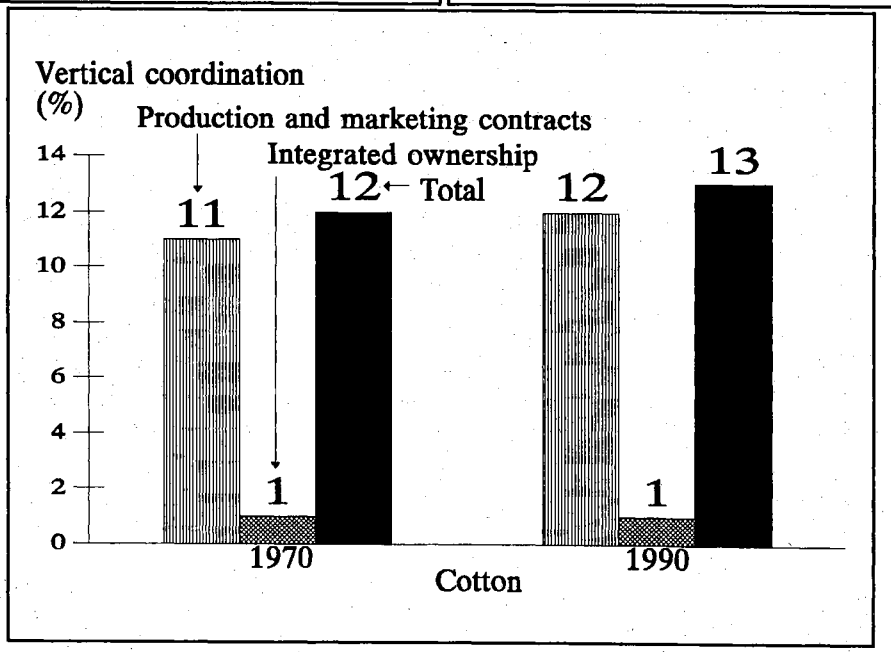


Source: USDA

Vertical coordination is growing but remains modest in field crops.







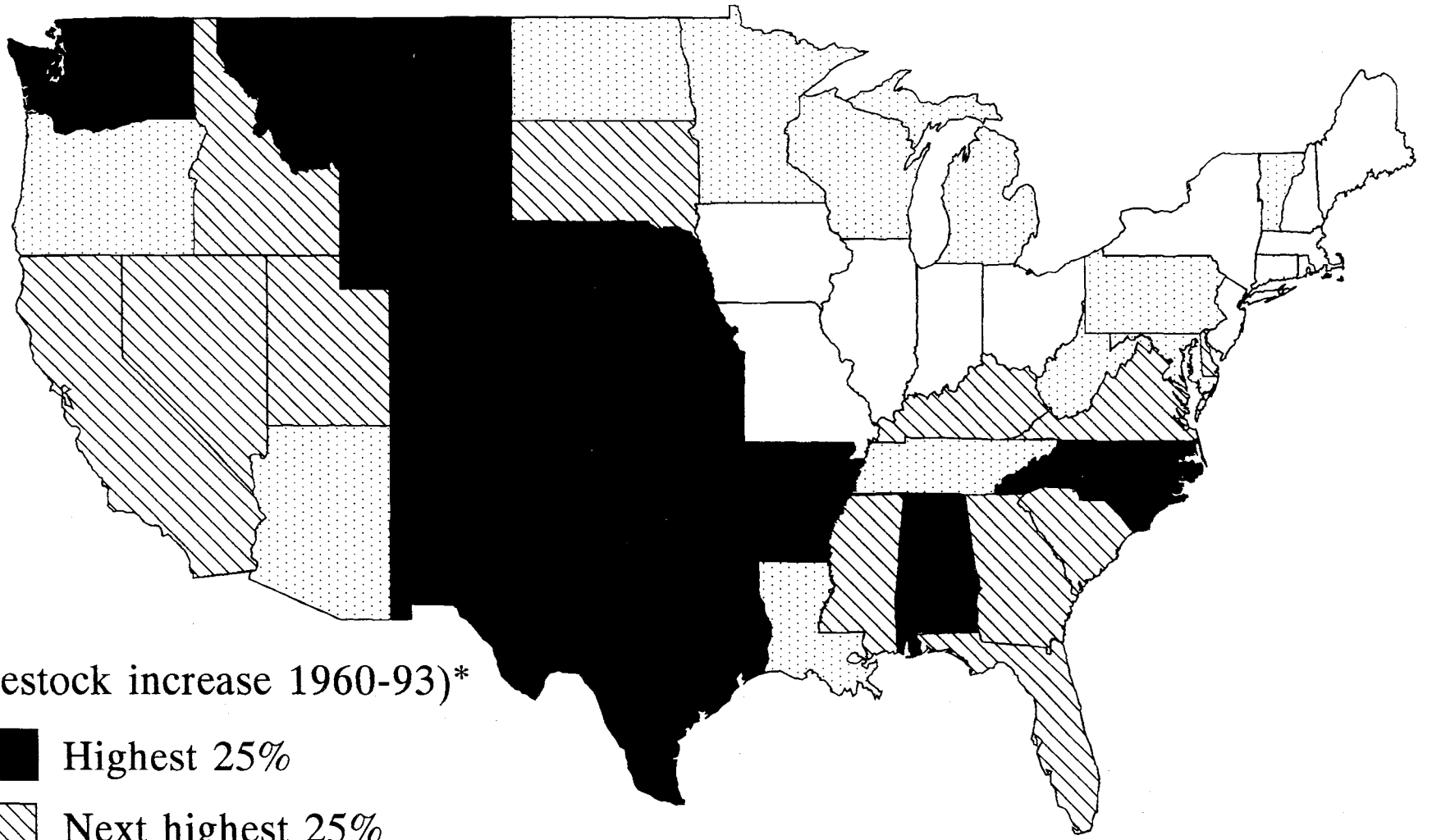
Source: USDA

Vertical Coordination: Production and Marketing Contracts (e.g., marketing orders) and Integration (e.g., control of input supply or marketing and farm production by one firm) U.S., 1970 and 1990.

	Production and Marketing Contracts (%)		Integrated Ownership (%)		Total (%)	
Commodity	1970	1990	1970	1990	1970	1990
Livestock						
Broilers	92	92	7	8	99	100
Turkeys	60	65	12	28	72	93
Hatching eggs	70	70	30	30	100	100
Market eggs	35	43	20	50	55	93
Mfg. grade milk	25	25	1	1	26	26
Fluid grade milk	95	95	0	0	95	95
Hogs	1	18	1	3	2	21
Fed cattle	18	12	7	4	25	16
Sheep/lamb	7	7	12	33	19	40
Field Crops						
Food grains	2	7	1	1	3	8
Feed grains	1	7	1	1	2	8
Cotton	11	12	1	1	12	13
Specialty Crops						
Processed vegetables	85	83	10	15	95	98
Fresh vegetables	21	25	30	40	51	65
Potatoes	45	55	25	40	70	95
Citrus	55	65	30	35	85	100
Other fruit	20	40	20	25	40	65

Source: Economic Research Service, USDA.

Livestock production is moving out of the cornbelt to open spaces and lower labor costs.



(% livestock increase 1960-93)*

- Highest 25%
- Next highest 25%
- Next lowest 25%
- Lowest 25%

Source: Basic data from USDA

*Absolute livestock numbers remain high in the cornbelt.

CONCENTRATION IN AGRIBUSINESS

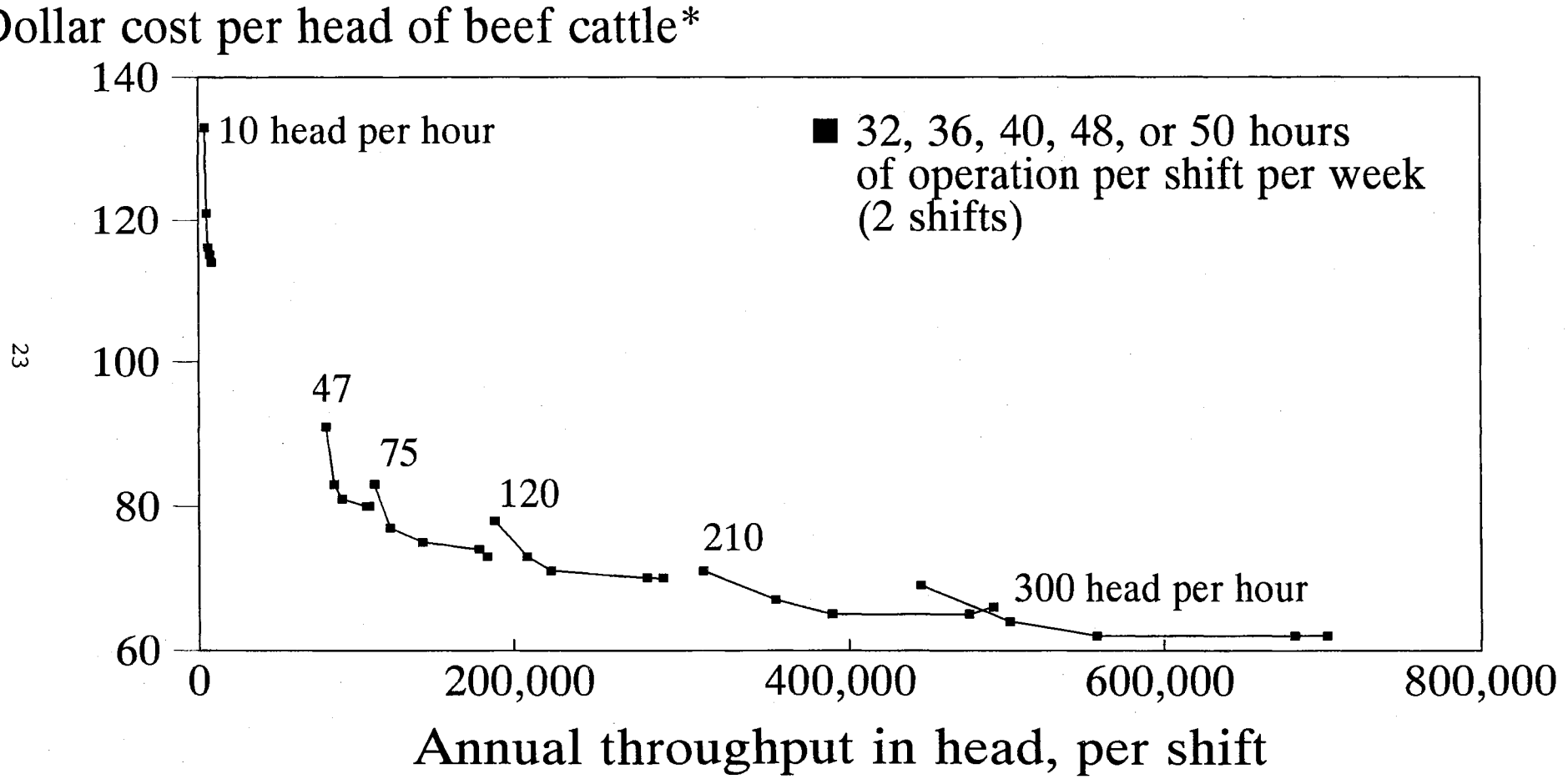
1. Farm industrialization is driven by:

   - Needs for precision farm production and marketing.
   - Management.
   - Technology.
   - Cost control.
   - Capital requirements.
   - Concentration in agribusiness.

2. Concentration in agribusiness as in farming is pushed by economies of size.

3. Four-firm concentration ratios are now high in many agribusiness industries. These ratios are defined as the percent of sales or shipments accounted for by the four largest firms in the industry.

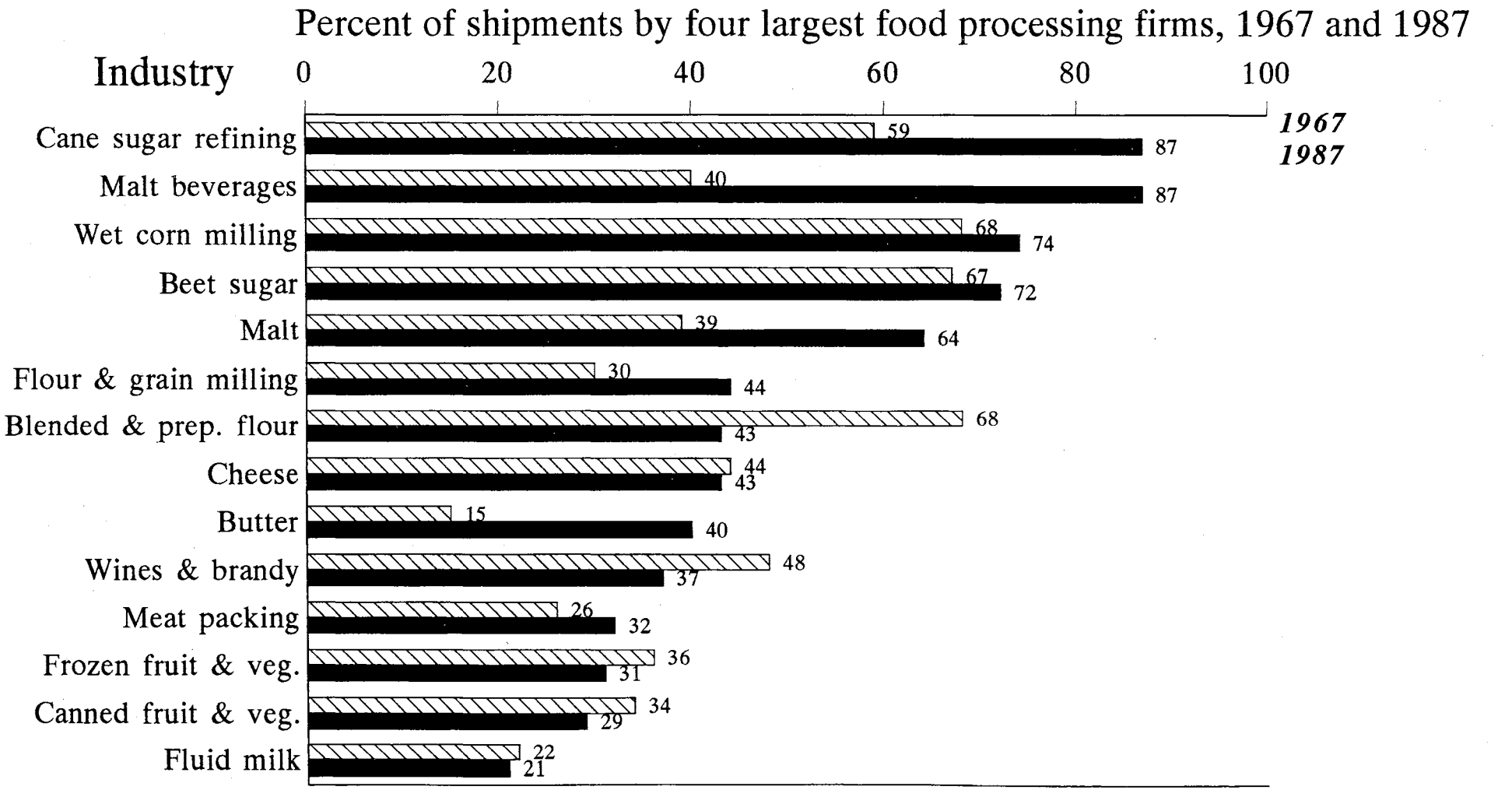
Driven by economies of large size, agricultural processing plants are getting larger and fewer.



*Costs especially for small operations overestimated where plants are diversified among species, reducing overhead per unit.

Source: L.P. Schertz and L.M. Daft. Food and Agricultural Markets

When marketing, farmers face fewer, larger processing firms and plants, inviting countervailing power.



Source: L.P. Schertz and L.M. Daft. *Food and Agricultural Markets*
Note: Concentration in marketing doesn't keep well managed commercial farms from making a favorable return, but does narrow markets for many small producers.

FARM FINANCIAL STRUCTURE

1. Aggregate real assets, debt, and net worth have not changed much in decades.

2. Income-debt and debt-asset ratios deteriorated to the mid-1980s, but thereafter the farm financial position improved.

3. Operating and production expenses have increased relative to farm income.

4. Income and financial structure differ by farm size:

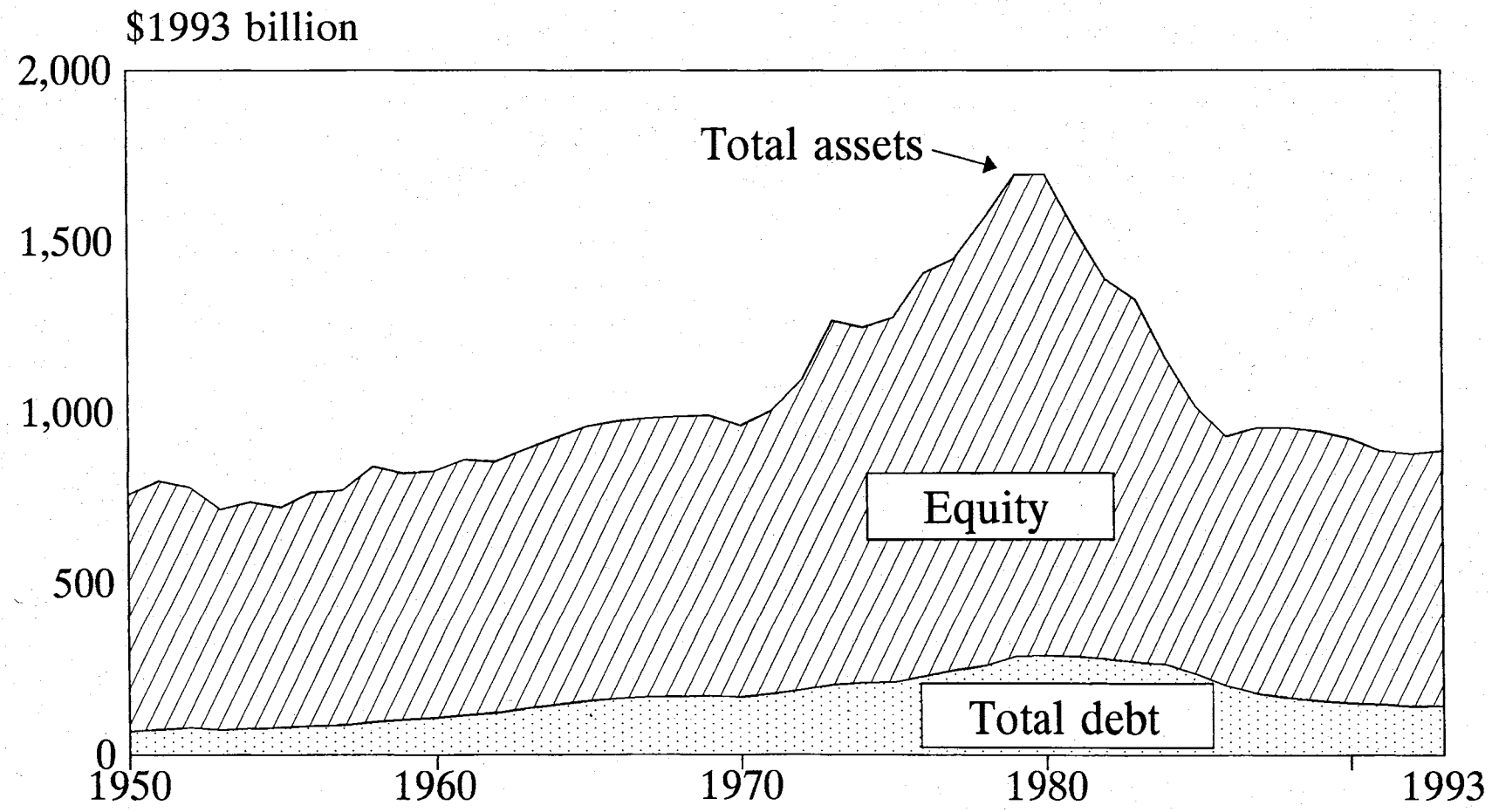
   - Small farms on average lose money farming but have substantial off-farm income.
   - Commercial farms have higher income, mostly from farming.
   - Small farms have low debt-asset ratios and a high proportion of assets in farm real estate.
   - Large farms rely relatively less on government payments and have low cash expenses relative to income.

5. Large and small farms emphasize cattle and calves; middle size farms emphasize grains and dairy.

6. Nonfarmers have owned about 36% of farmland since 1978. (not shown)

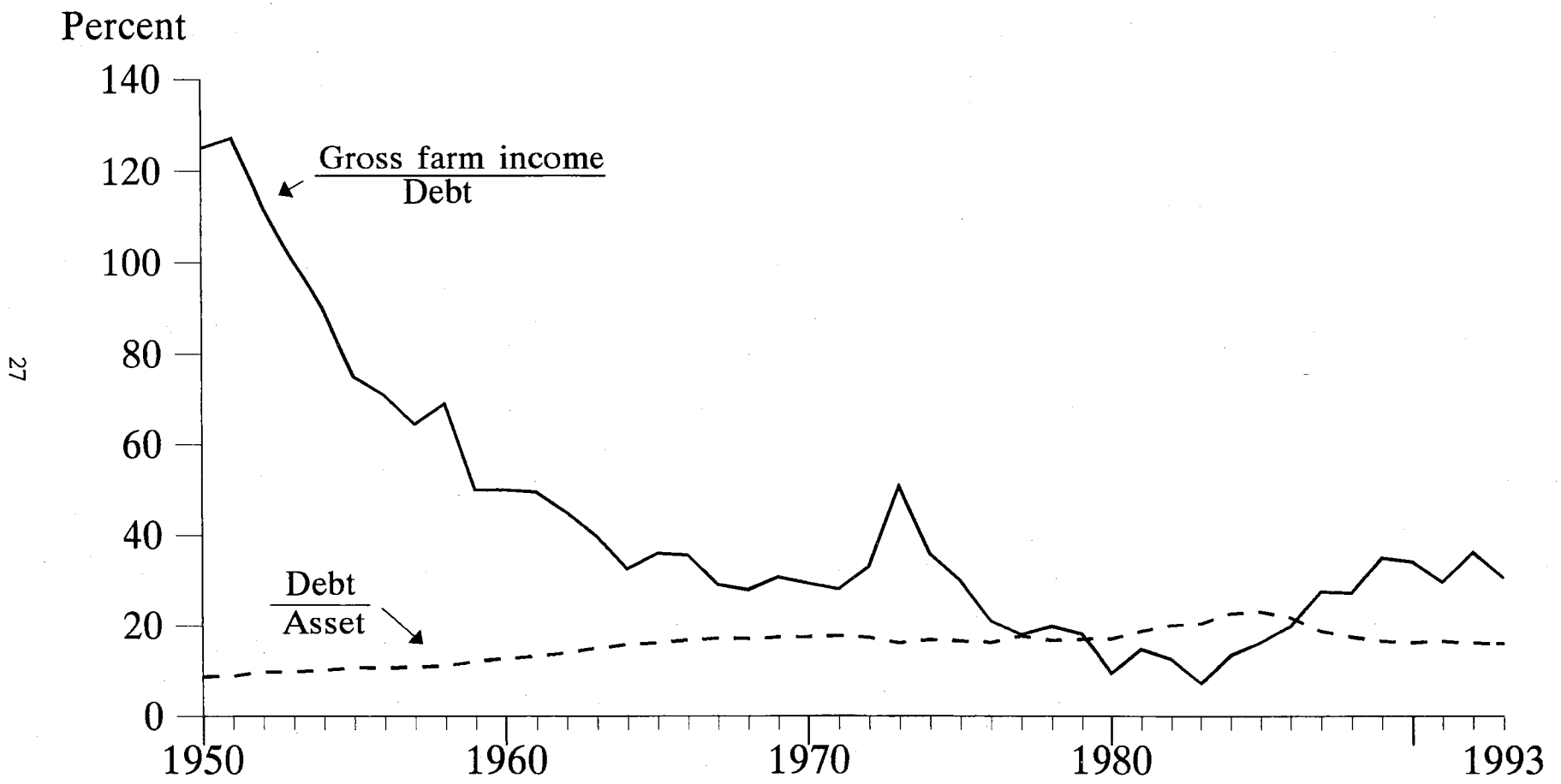
7. Foreigners own 1.2% of farmland. (not shown)

U.S. aggregate real assets, debt, and equity have returned to 1960's levels after 1970's bubble.



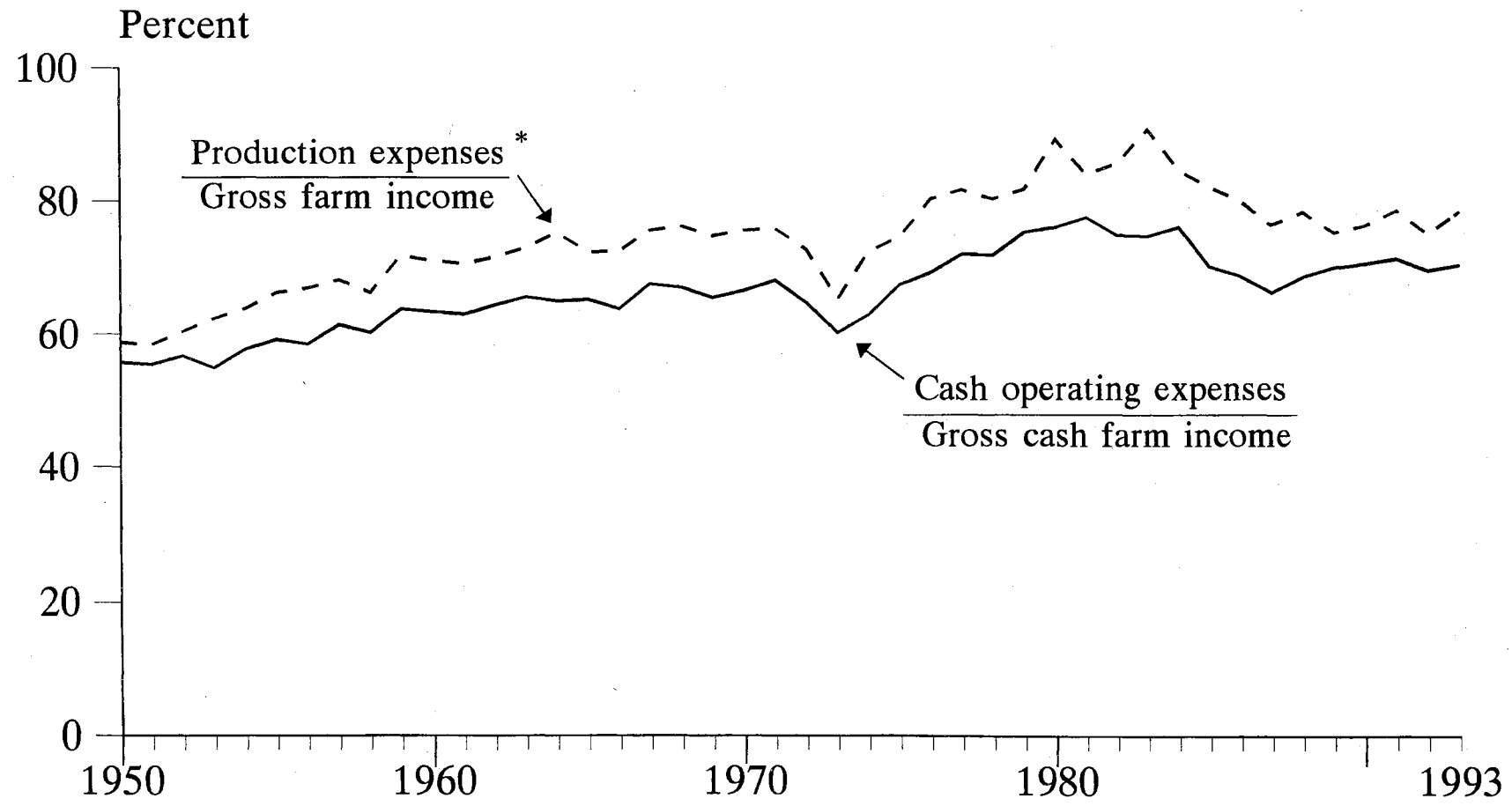
Source: USDA. Deflated by GDP deflator.

After long-term decline, farm income-debt ratio has risen since mid-1980s. After long-term rise, farm debt-asset ratio has fallen since mid-1980s. Both ratios indicate improved financial position in the last decade.



Source: USDA, National Financial Summary

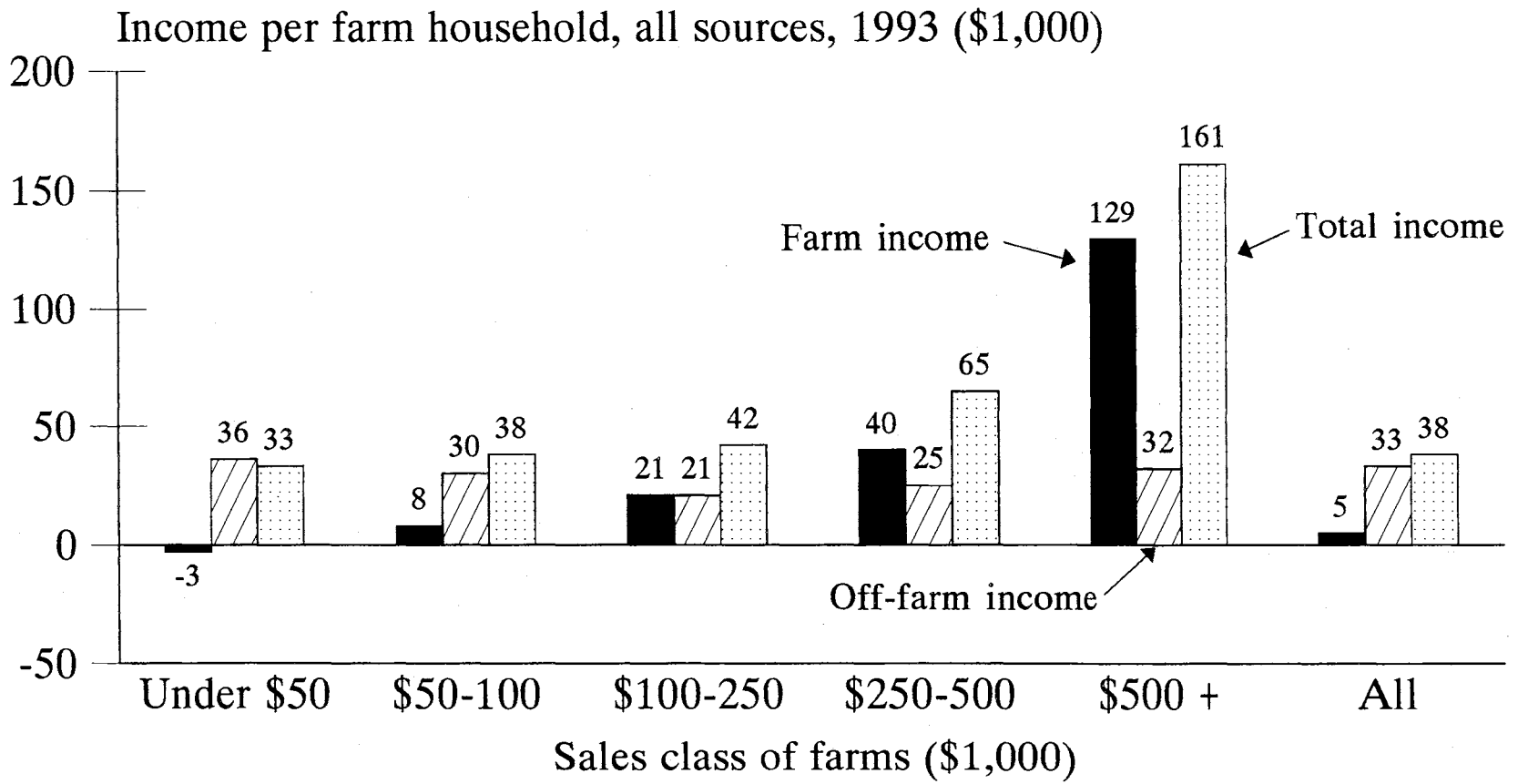
Operating and production expenses have increased relative to farm income since 1950.



Source: USDA, National Financial Summary

*Production expenses add capital depreciation and damage plus perquisites paid hired labor to cash operating expenses. Gross farm income adds value of home-produced food and rental value of dwelling to cash farm income.

Most farm households lost money farming, and 87% of farm houshold income was from off-farm sources in 1993. But commercial farms that accounted for most farm output had favorable income per household, and mostly from farm sources.

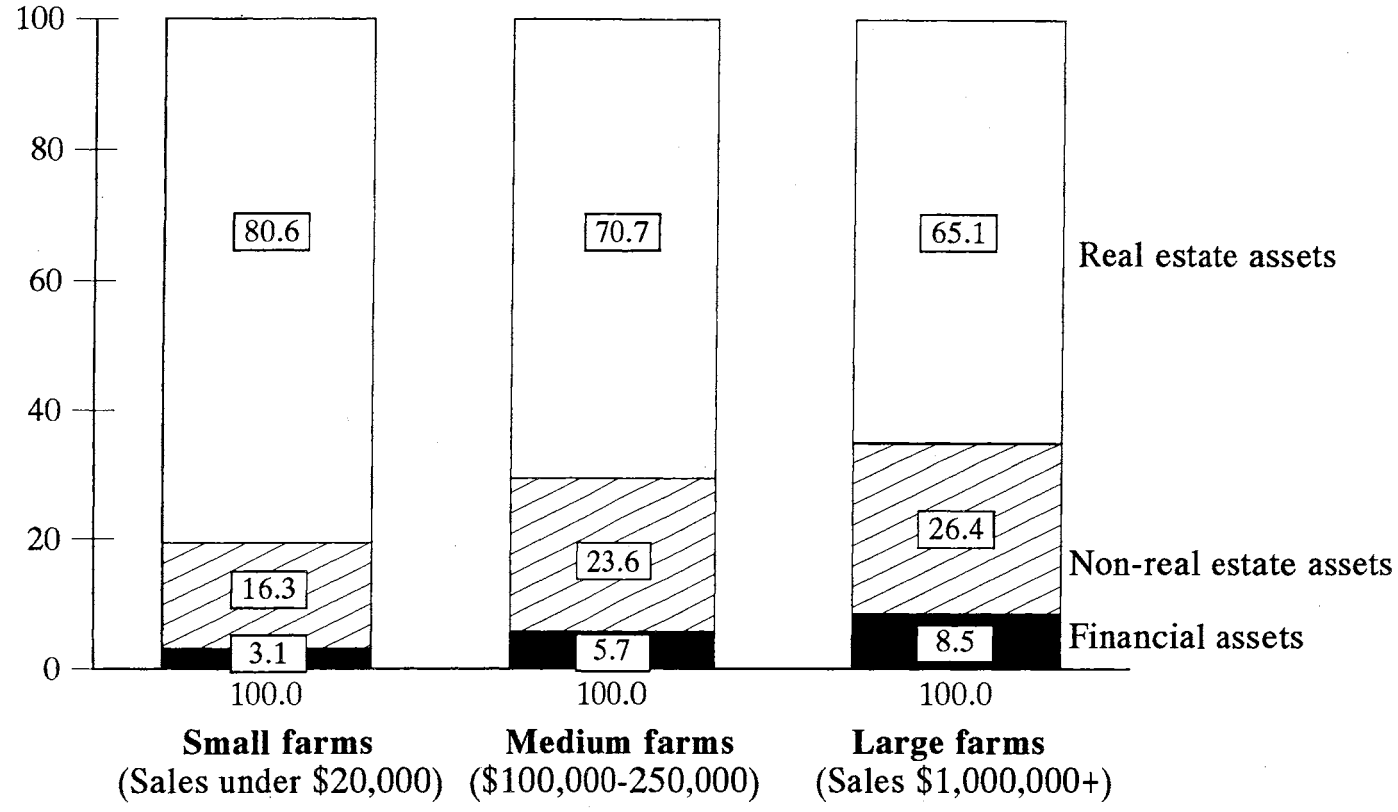


Percent of households	73.6	10.1	10.9	3.4	2.0	100.0
Percent of farm receipts	11.7	11.1	20.7	14.6	41.9	100.0

Source: USDA, National Financial Summary

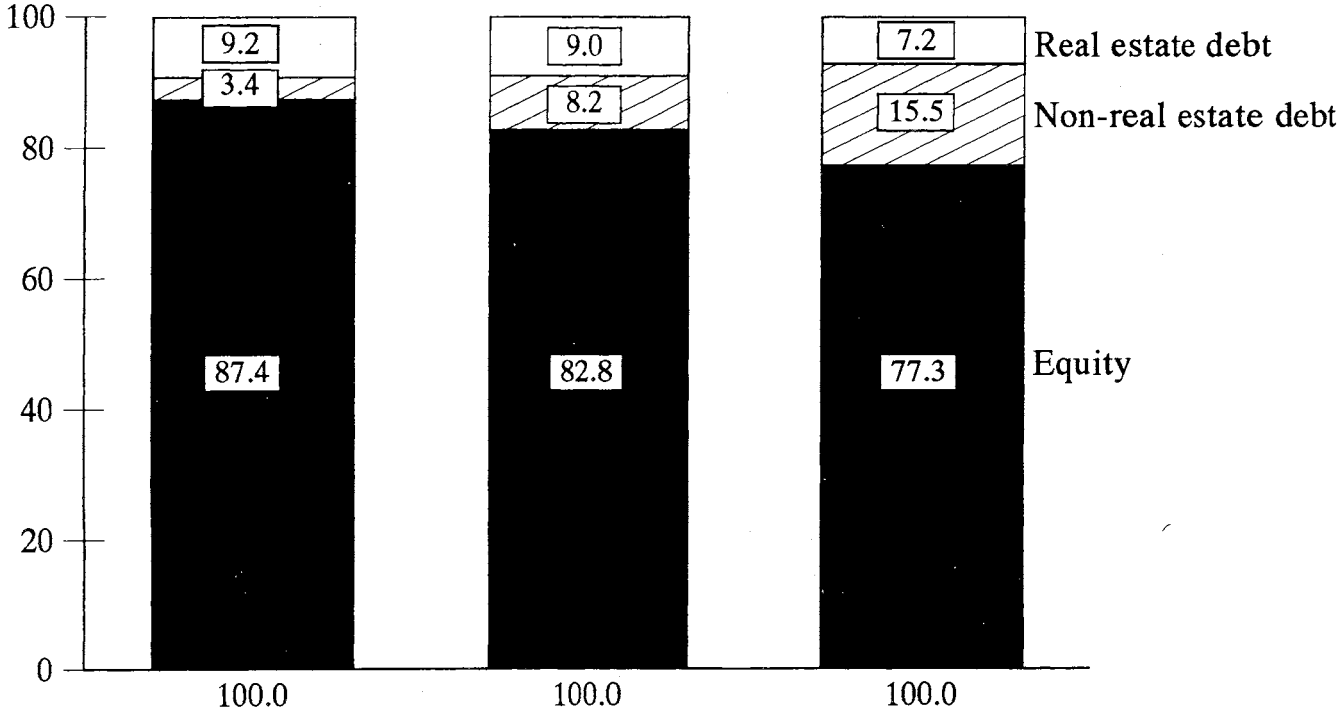
Large farms put a smaller share of their assets into real estate

Percent of total farm assets, 1993



... and smaller farms have high ratios of equity to debt.

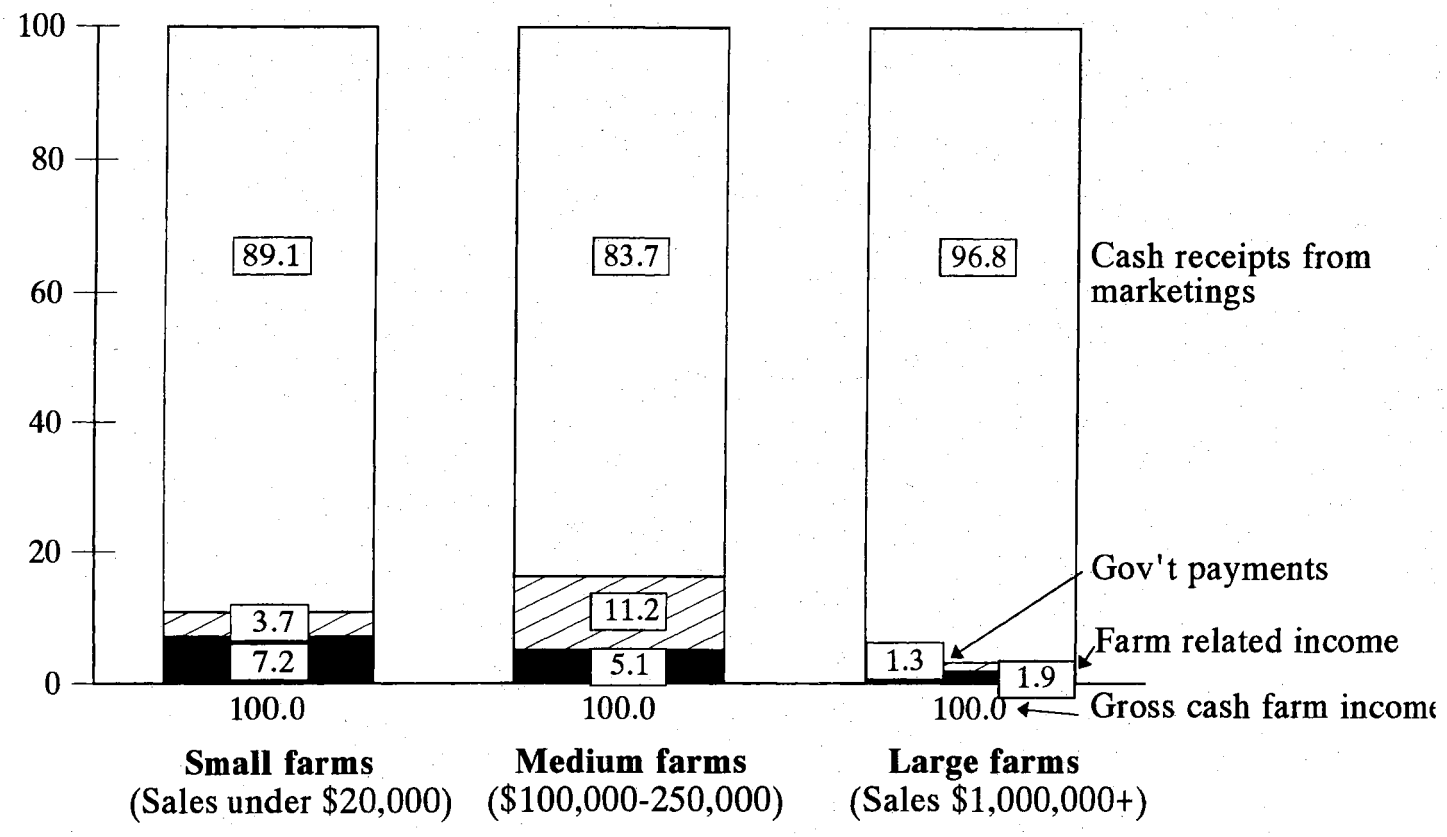
Percent of total farm assets (debt + equity), 1993



Source: USDA

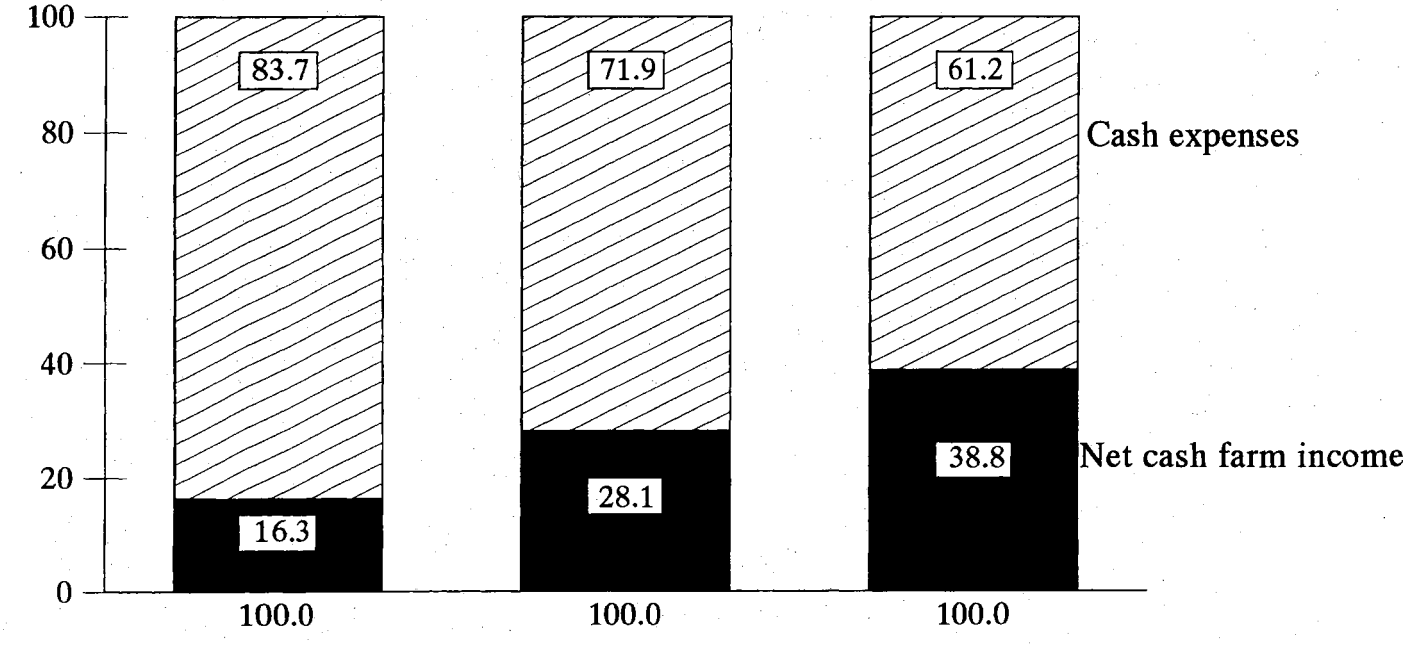
Large farms rely less on government payments and farm-related income*

Percent of farm gross cash income, 1993



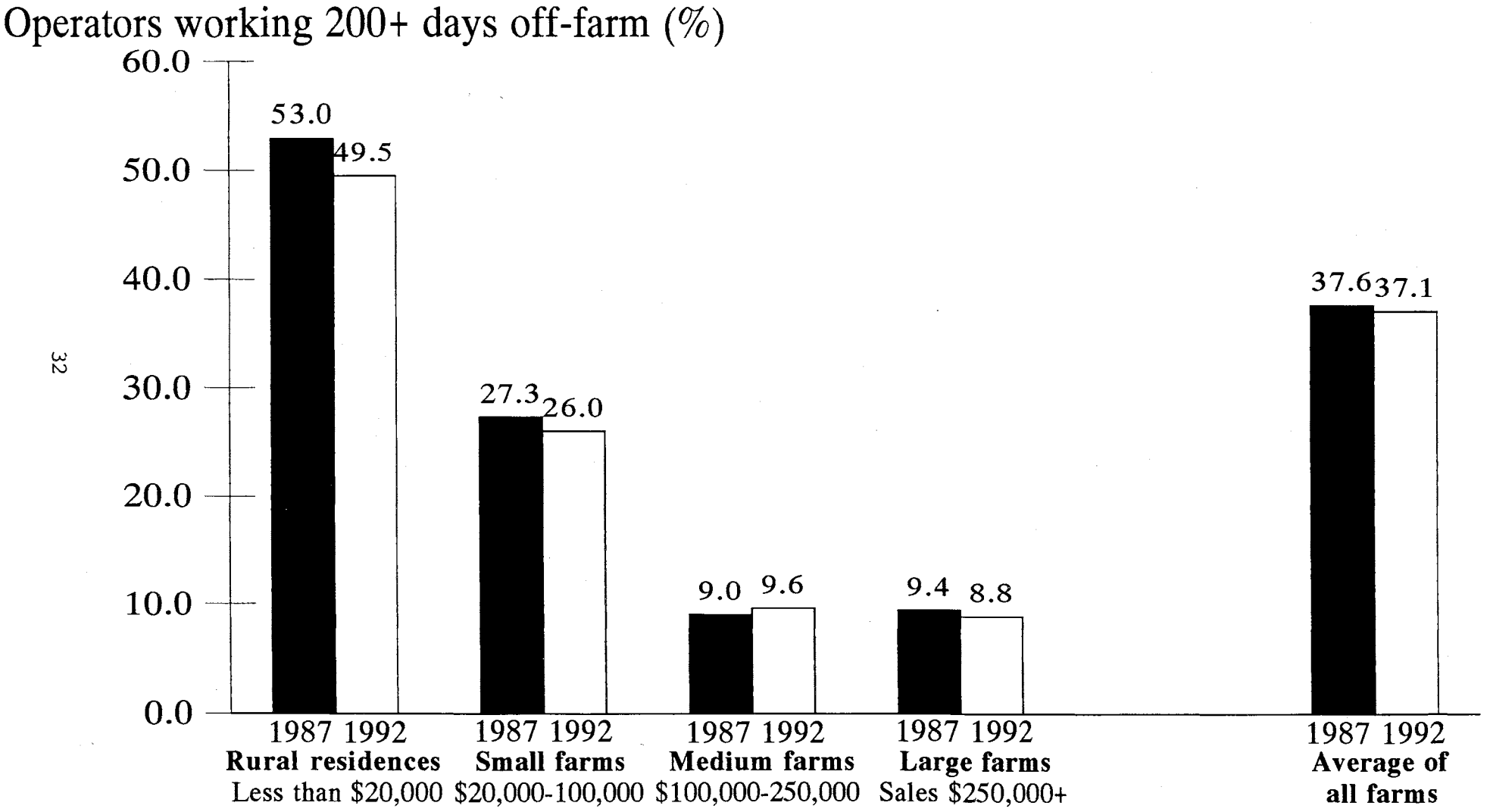
... and small farms have high cash expenses relative to net cash income.

Percent of farm gross cash income
(expenses + net cash farm income), 1993



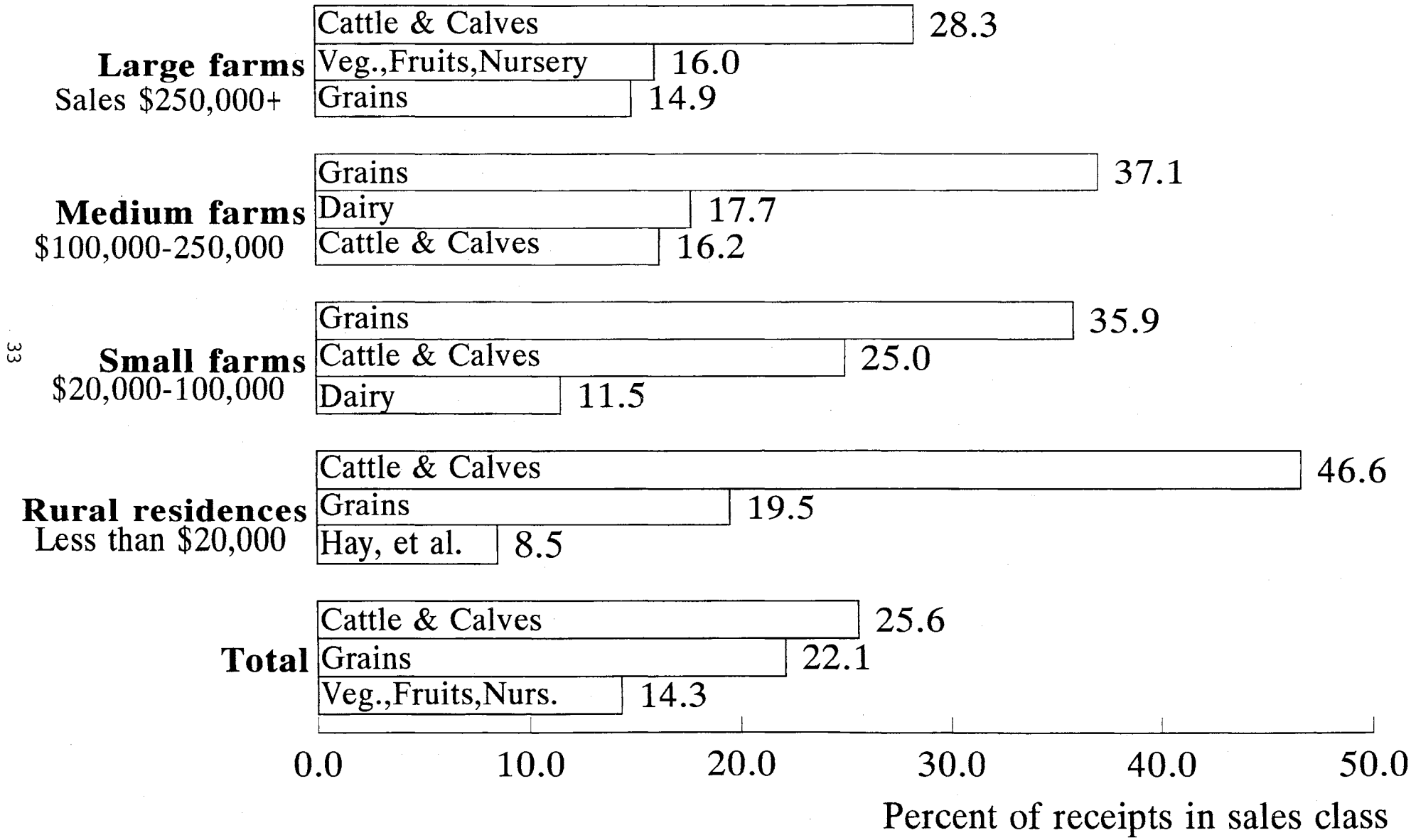
*Mostly custom-work income
Source: USDA

Off-farm work is most prominent on smaller farms.



Source: Census of Agriculture

Large and small farms emphasize cattle and calf production, middle size farms emphasize grains and dairy.



Source: Ag. Census

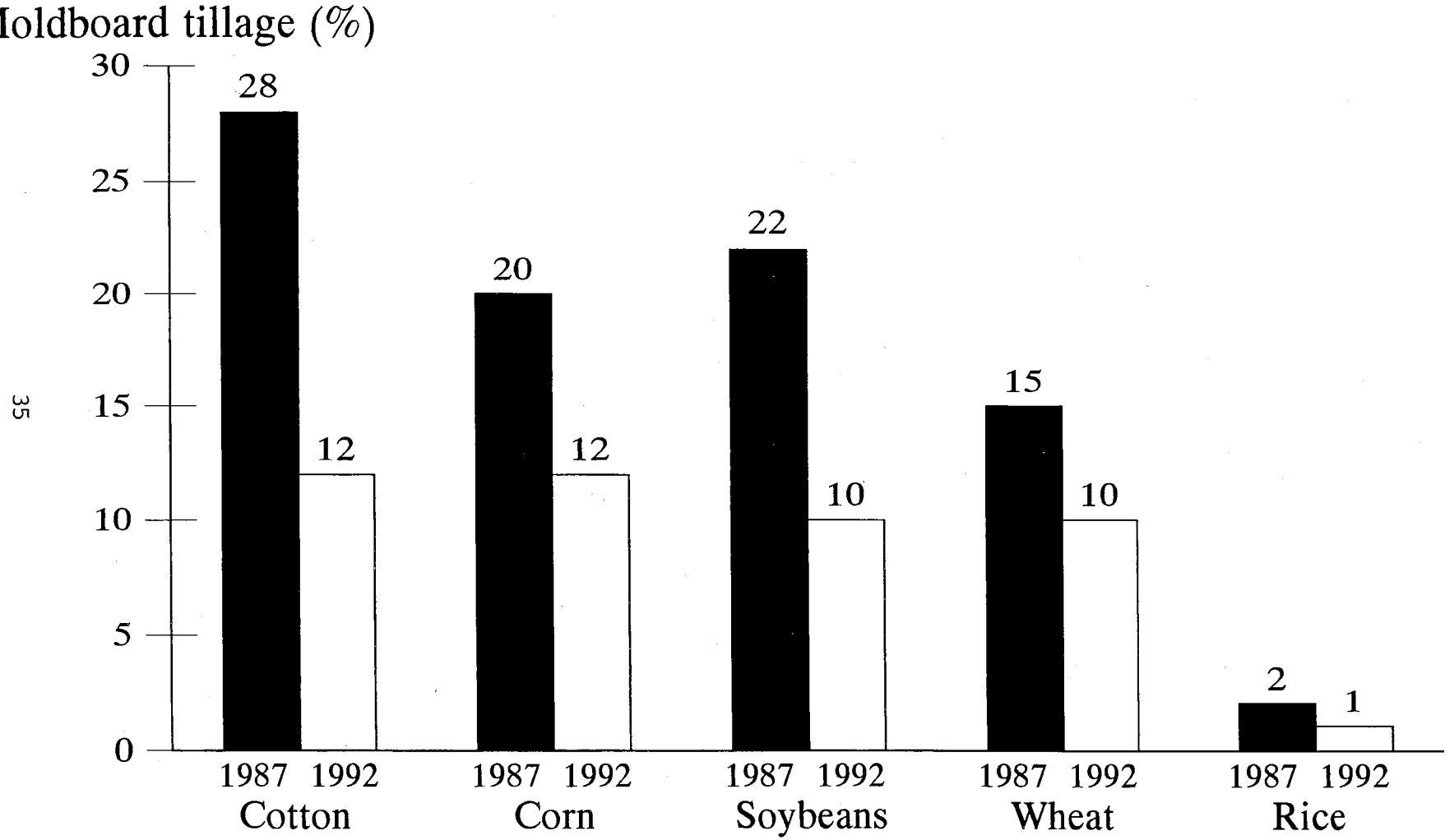
FARM STRUCTURE AND ENVIRONMENT

1. Farmers have made progress in protecting the environment.

   - Moldboard tillage is down and conservation tillage is up.
   - Fertilizer use is down and use-efficiency is up.
   - Wetland loss has slowed.
   - Soil erosion is lower.

2. Large farms are as good if not better at protecting the environment than are small farms.

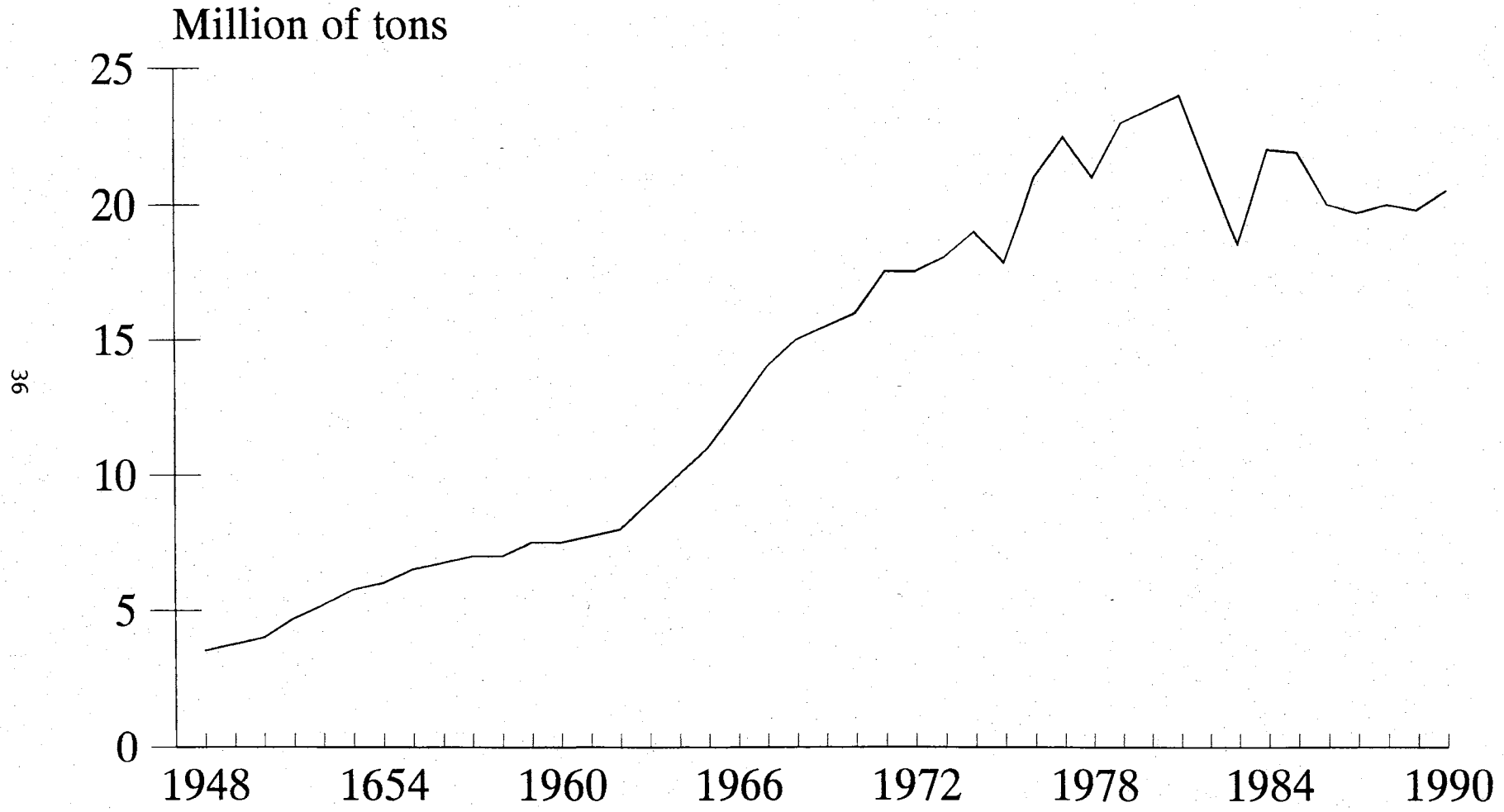
*Moldboard tillage is down and conservation tillage is up.**



*Some non-moldboard plow tillage is not conservation tillage for lack of residue left on the soil surface. However, the rise in conservation tillage has been nearly proportional to the decline in moldboard tillage.

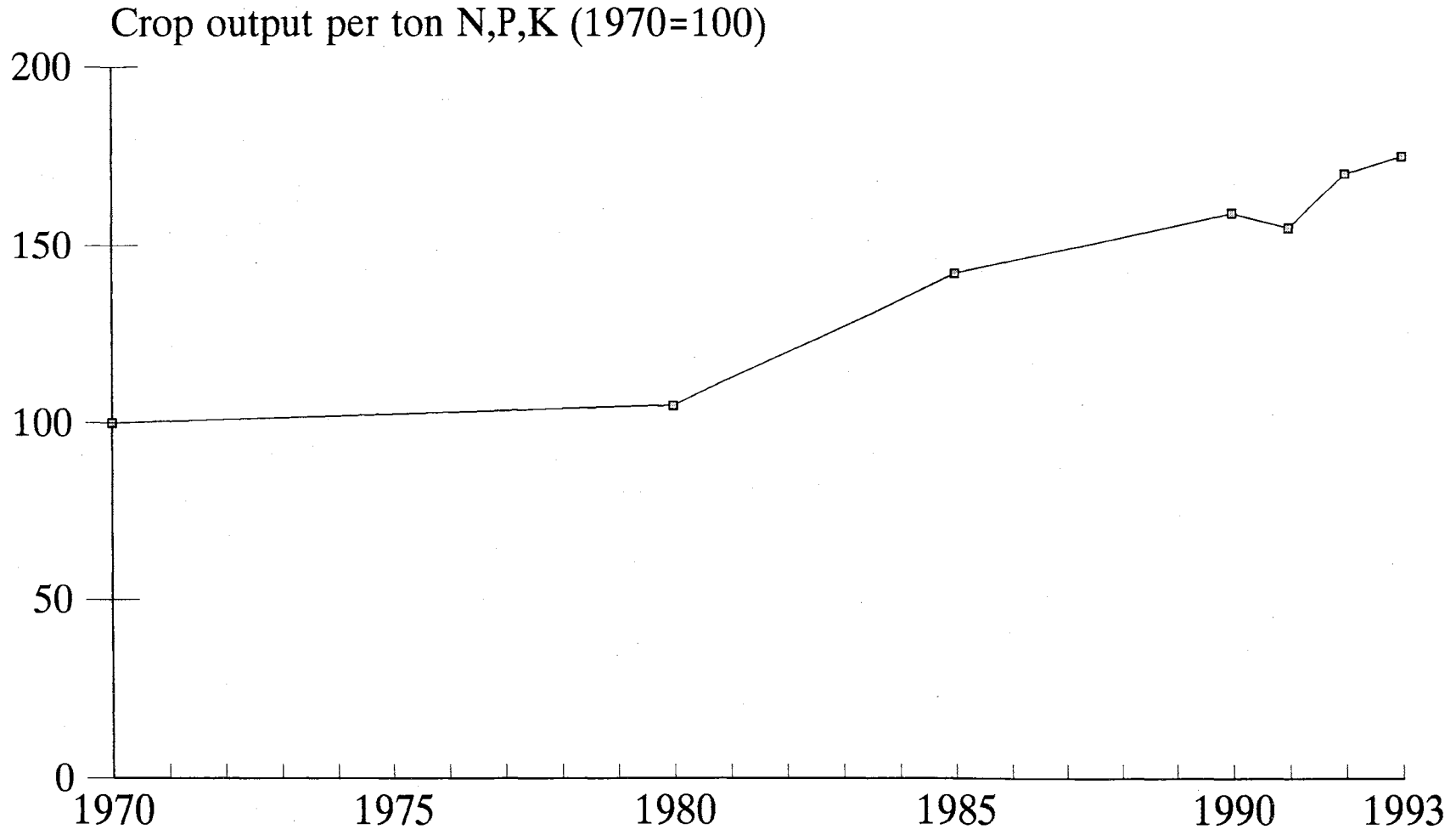
Source: USDA

*Farmers have reduced plant nutrient (N,P,K) use since the 1970s.**



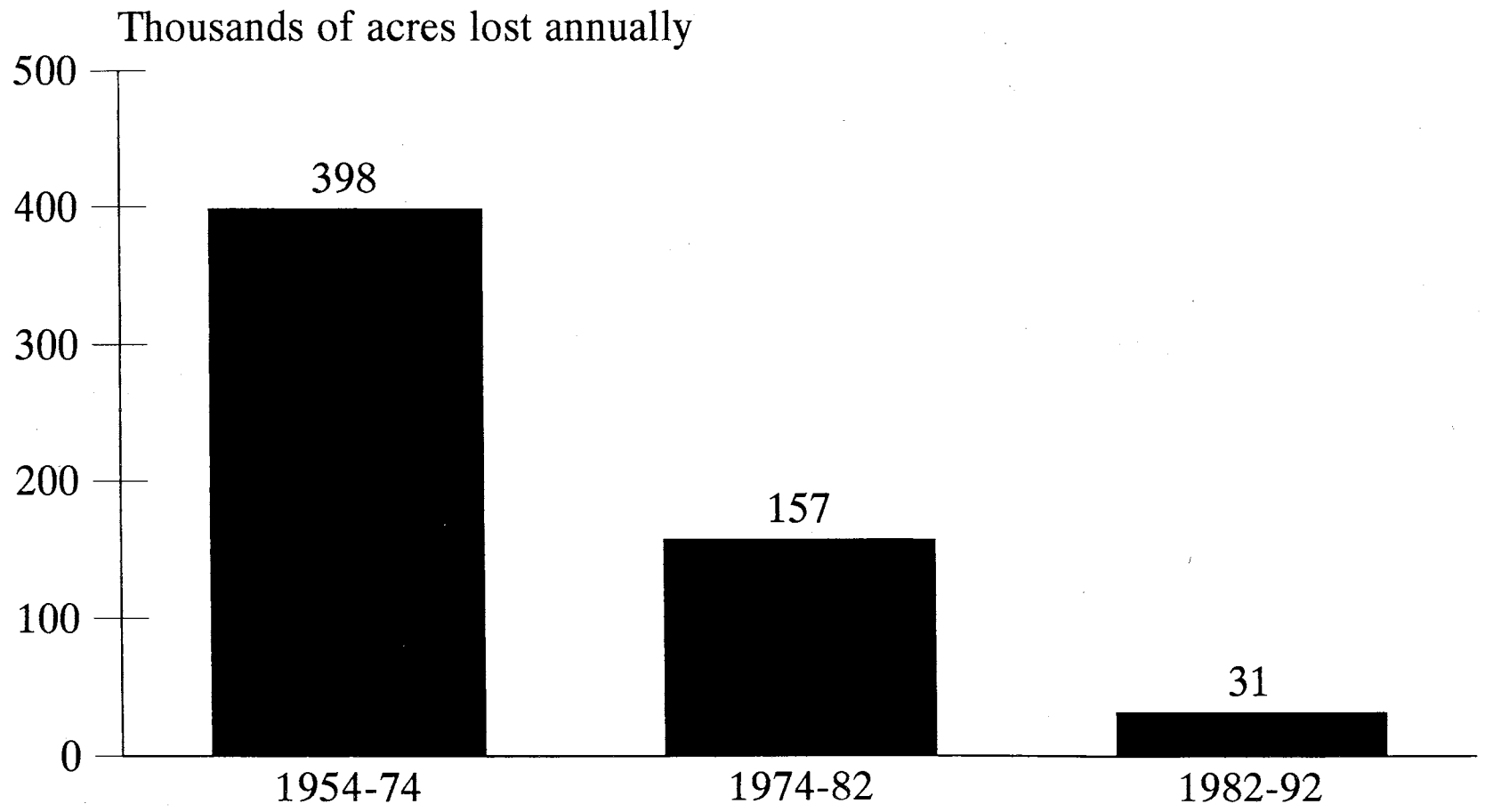
*Does not include nutrients from plant residues and manure.
Source: USDA

Fertilizer efficiency has improved.



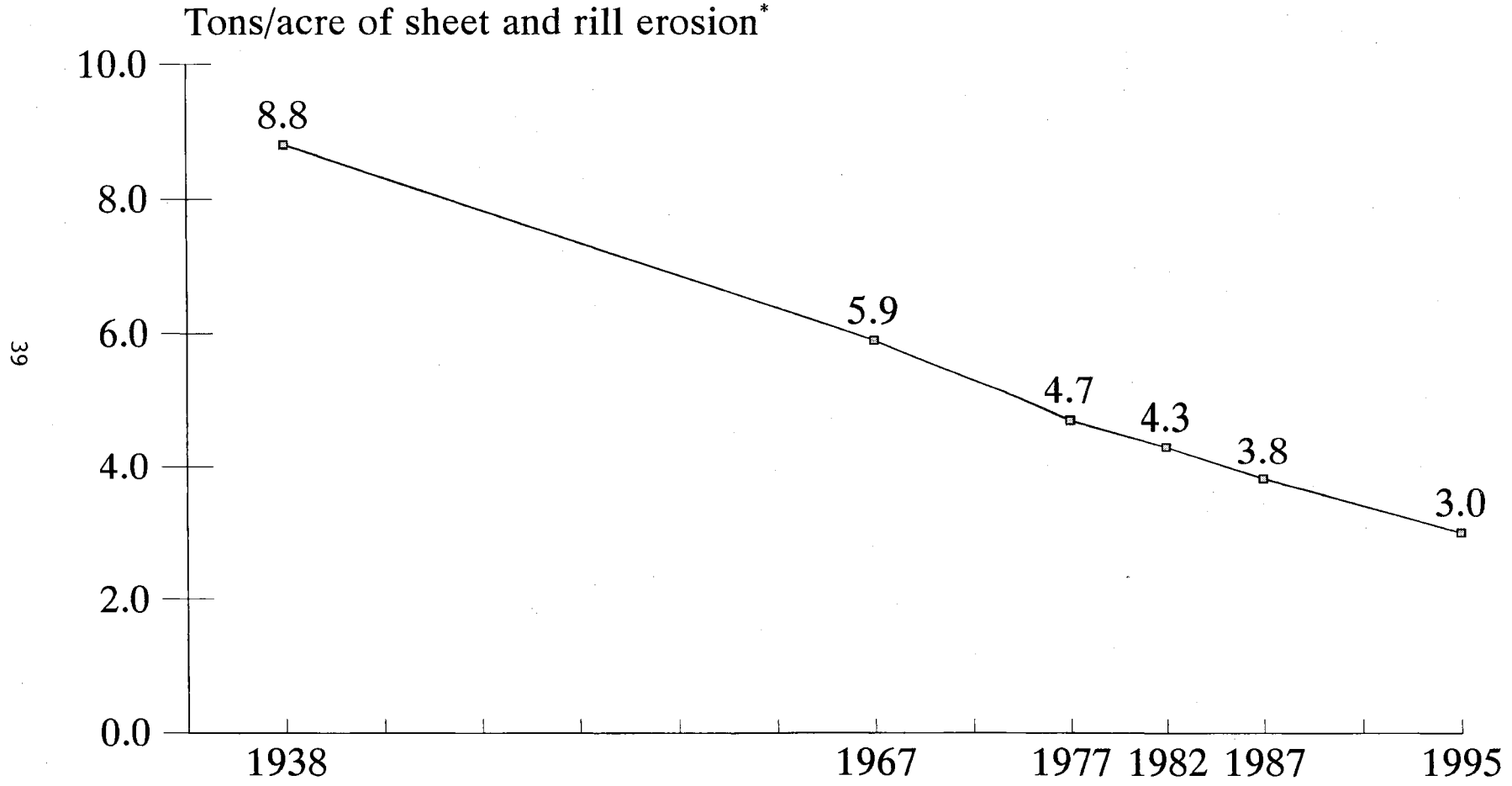
Source: Economic Research Service, USDA, *Fertilizer Use and Trade*, March 1993

Wetland losses caused by agricultural activity slowed considerably between 1954 and 1992.



Source: USDA Natural Resources Conservation Service, National Resources Inventory, NRI.

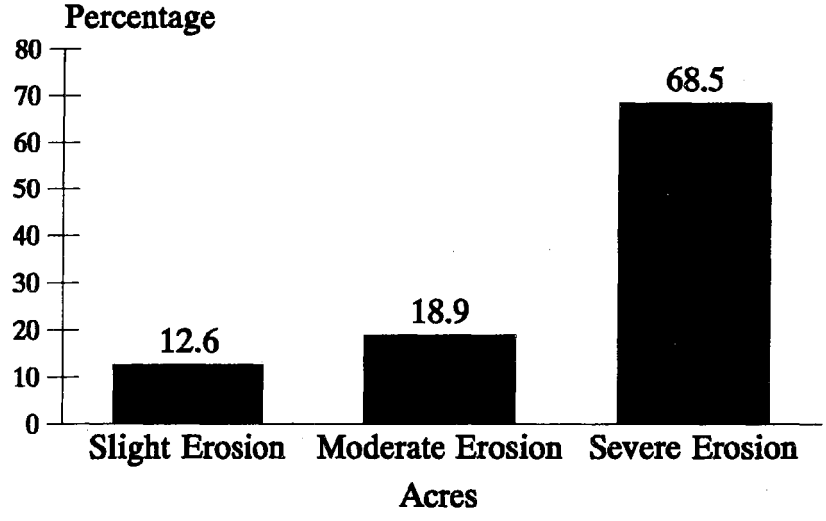
Soil erosion (sheet and rill per acre) is down two-thirds since 1938 and down half since 1967.



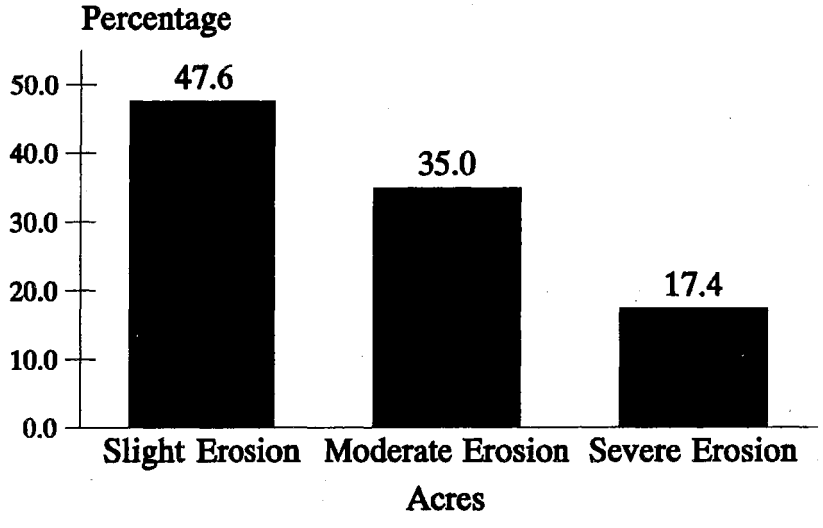
*Does not include wind erosion.
Source: USDA

The nation's soil erosion has been cut markedly since 1985 by conservation tillage, Conservation Reserve Program, and Conservation Compliance Program.

*Erosion Rates in 1985**



*Erosion Rates in 1995**



*Categories of erosion from all sources

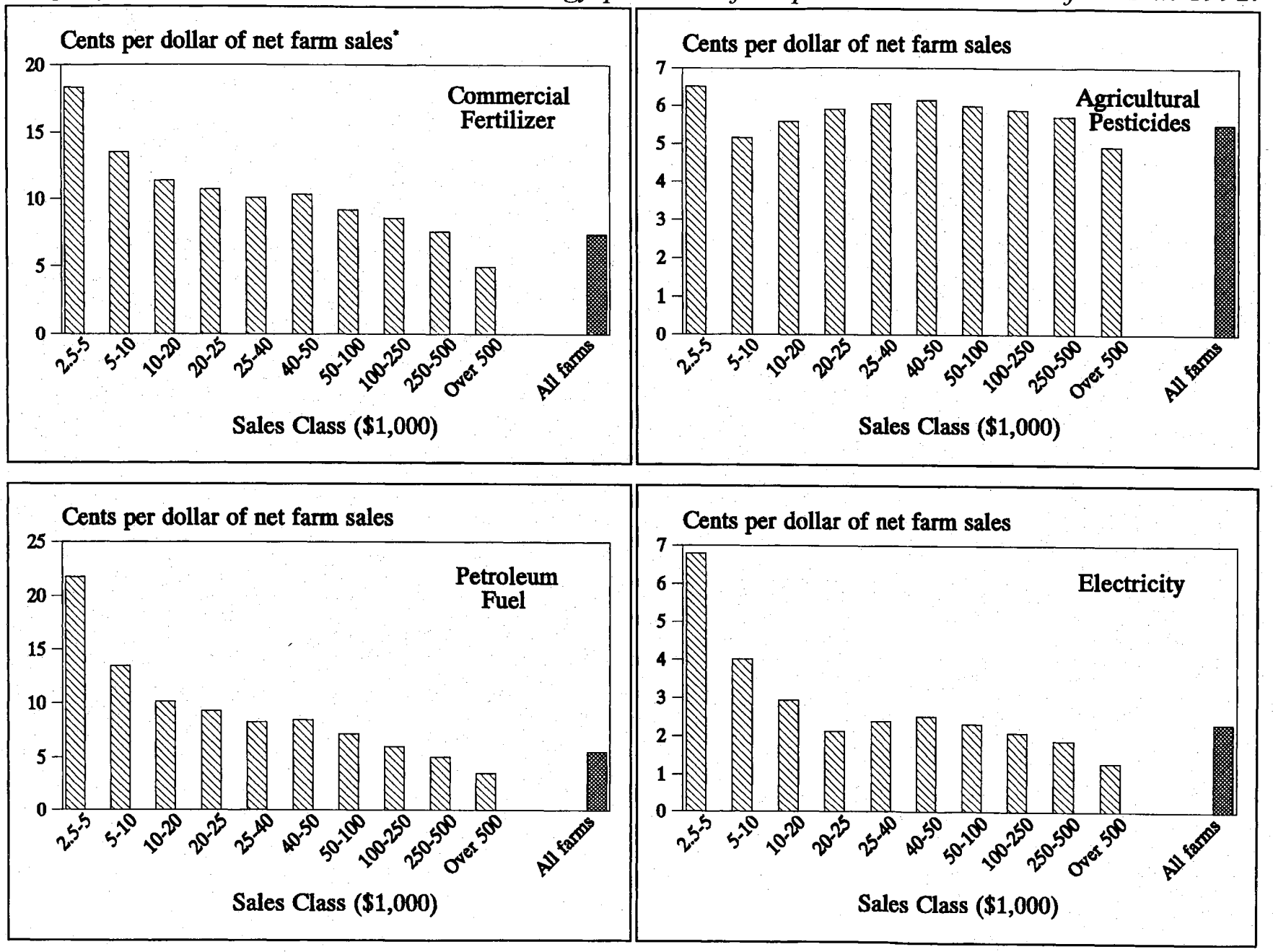
Slight: Erosion rates at or below tolerable levels

Moderate: Erosion rates between one and two times tolerable levels

Severe: Erosion rates more than two times above tolerable levels

Source: USDA Natural Resources Conservation Service

Larger farms used less chemicals and energy per unit of output than did smaller farms in 1992.



Source: Census of Agriculture.

*Net farm sales is gross sales less purchased feed, seed, and livestock. Data are not adjusted for on-farm supplied nutrients. None of the panels adjust expenditures for quantity discounting of input prices that may understate quantities on large farms.

FARM SUCCESSION
Who Will Farm in the 21st Century?

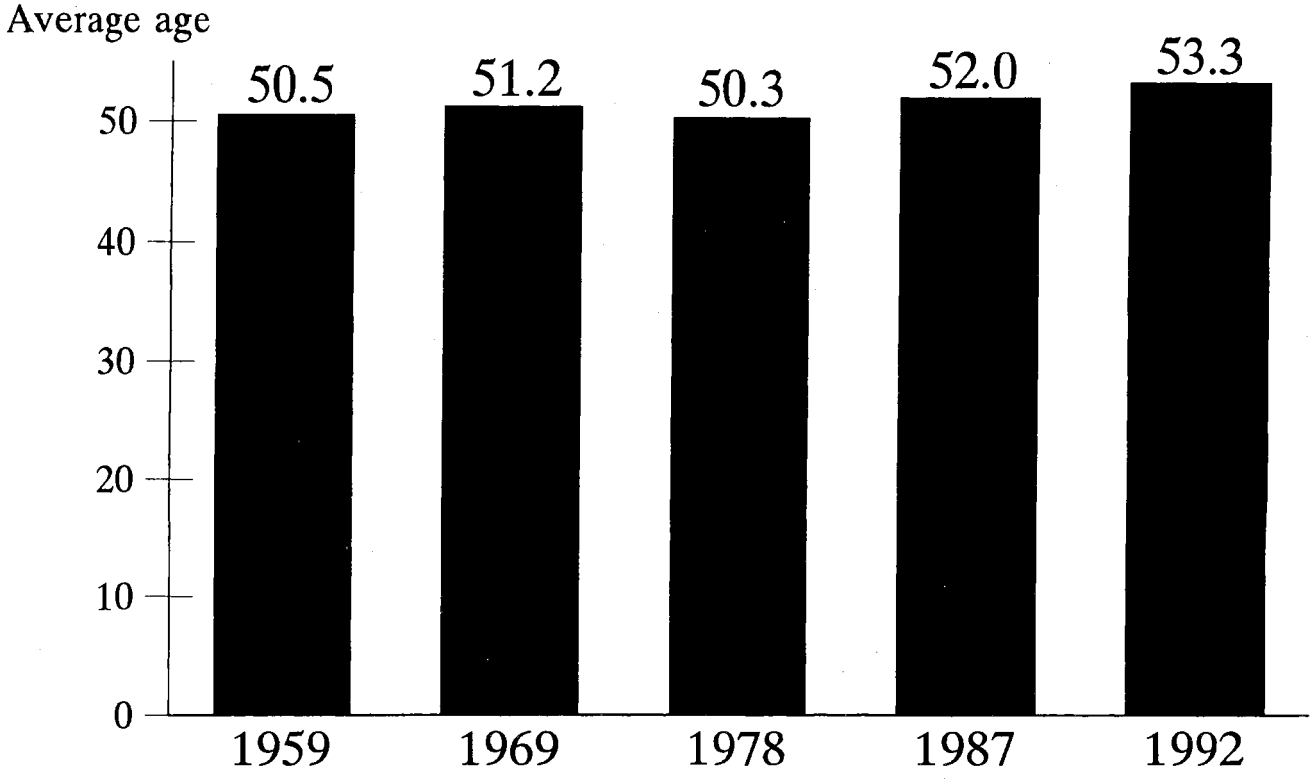
1. The concern

   - Farm operators are getting older on average.
   - The share of operators age 55 and over is at an all time high.

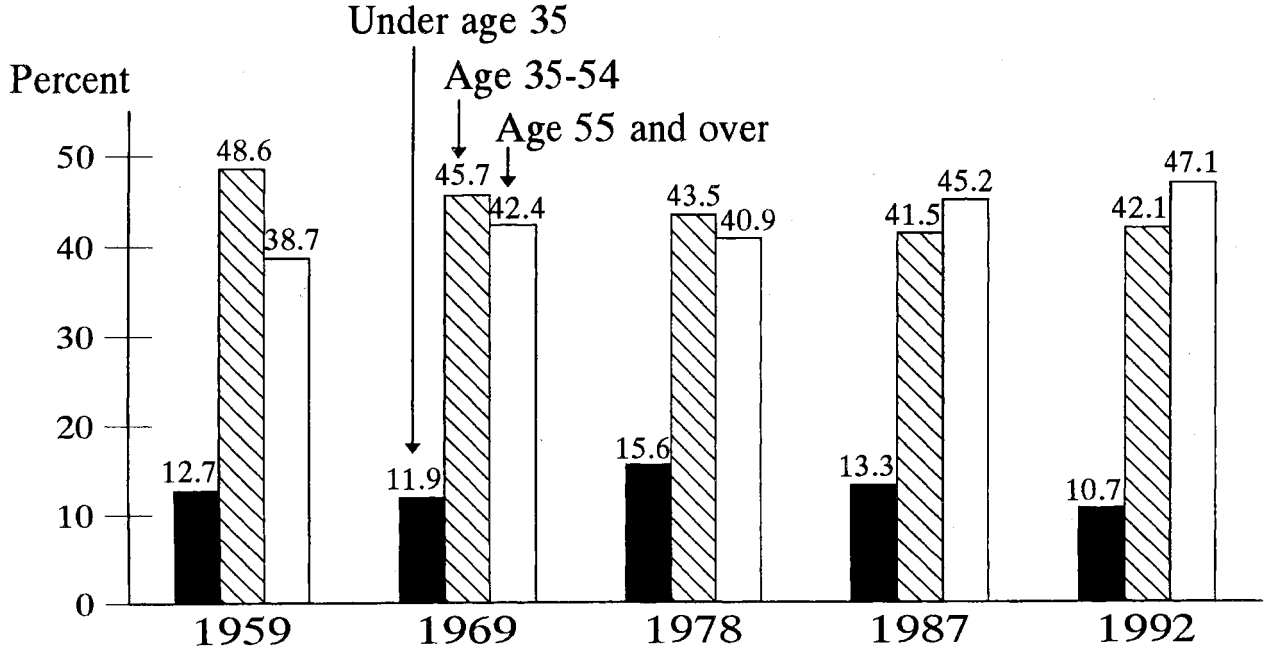
2. The other side

   - Aided by parents and lower land prices (since the mid-1980s) the proportion of young farmers (under age 35) is nearly as high as in 1959 and 1969.
   - Although about 50,000 operators retire or die each year, replacements are needed for only 5,000 operators on commercial farms (farms with sales over $100,000 that account for four-fifths of sales).
   - Plenty of replacements are available from youth raised on farms, noncommercial operators, and nontraditional sources.
   - Young farm operators have made considerable progress – based on income and wealth.
   - There will be no shortage of farm operators – if returns are favorable and if political and legal processes do not rule out alternative farm structures (e.g., vertical coordination) capable of supplying the demand for farm management, entrepreneurship, and capital.

Farmers on average are getting older

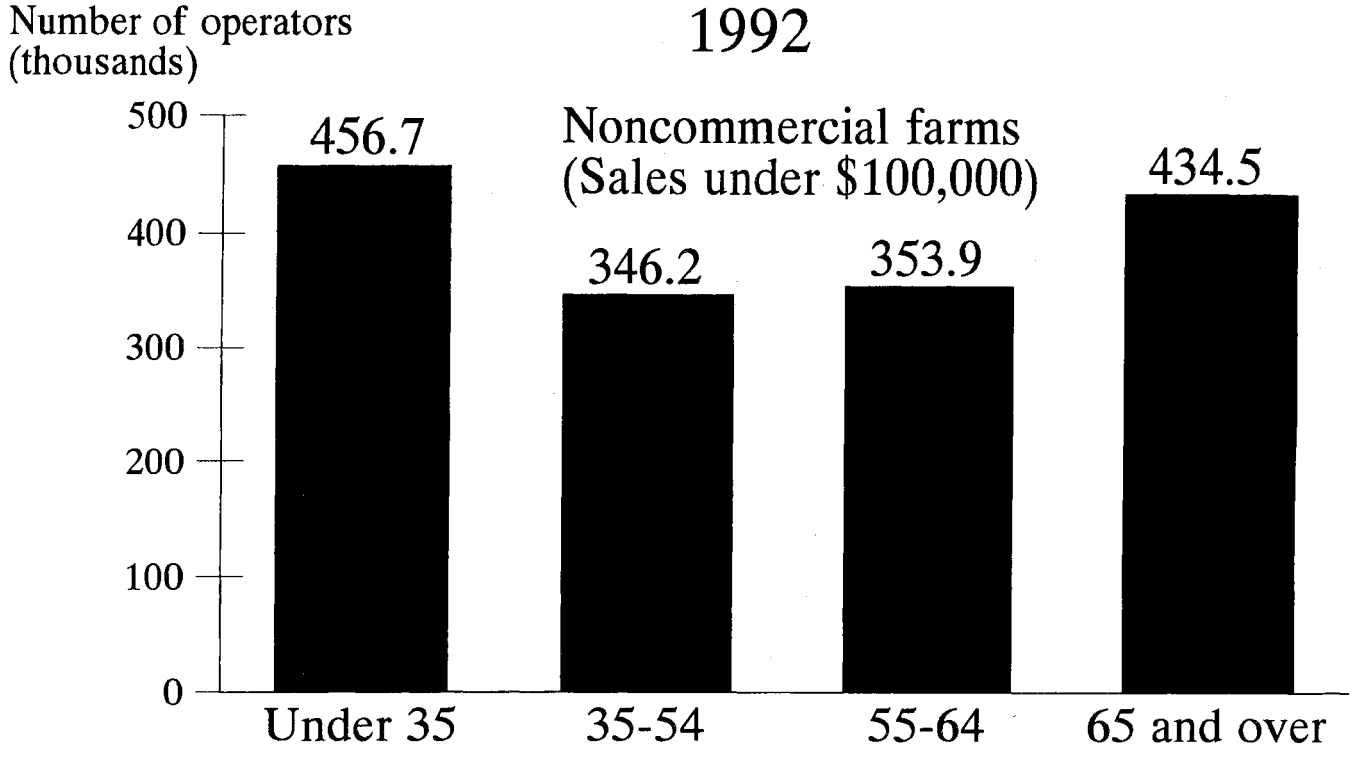


... but the proportion of operators under 35 years of age is nearly as high as in 1959 and 1969.

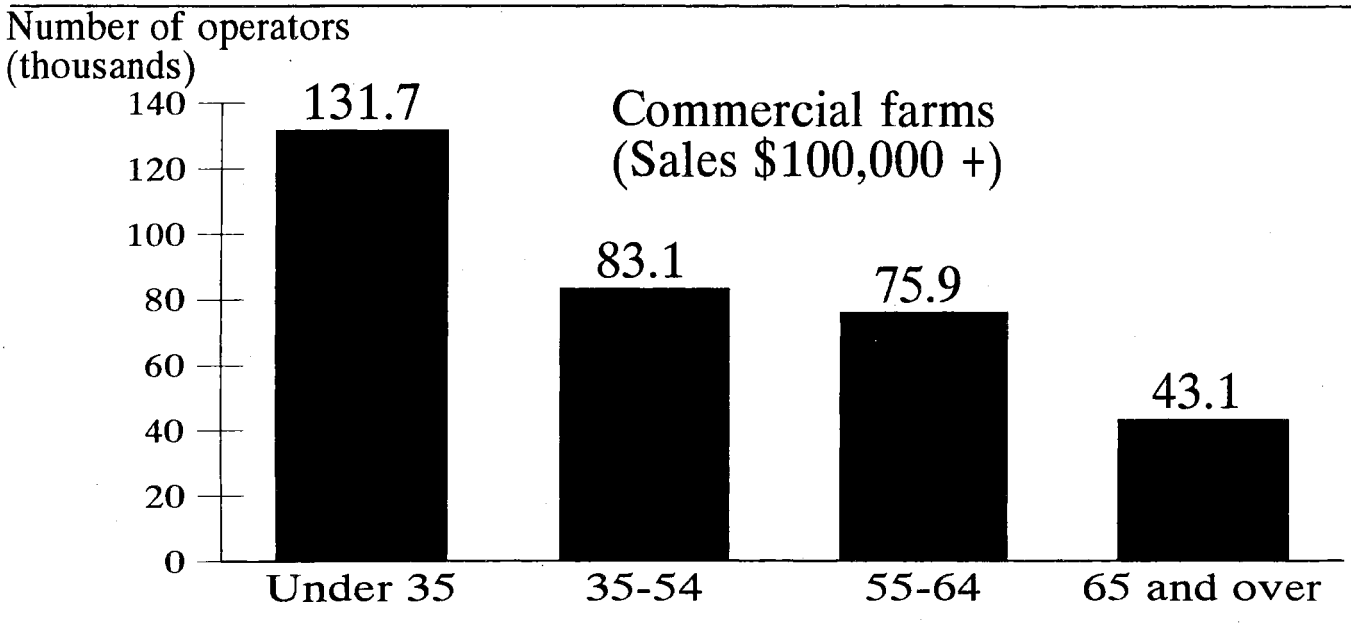


Source: Census of Agriculture.

Nearly 50,000 farm operators will retire or die per year in the next decade



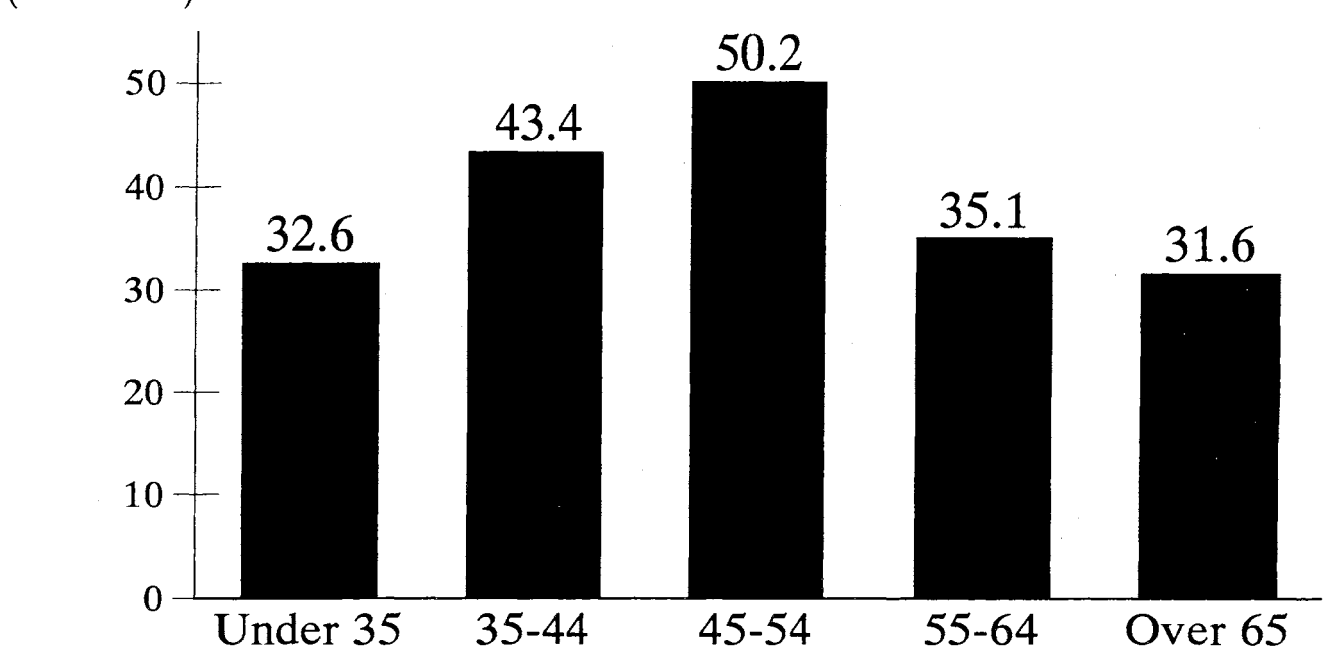
*... but only about 5,000 operators will need to be replaced on commercial farms.**



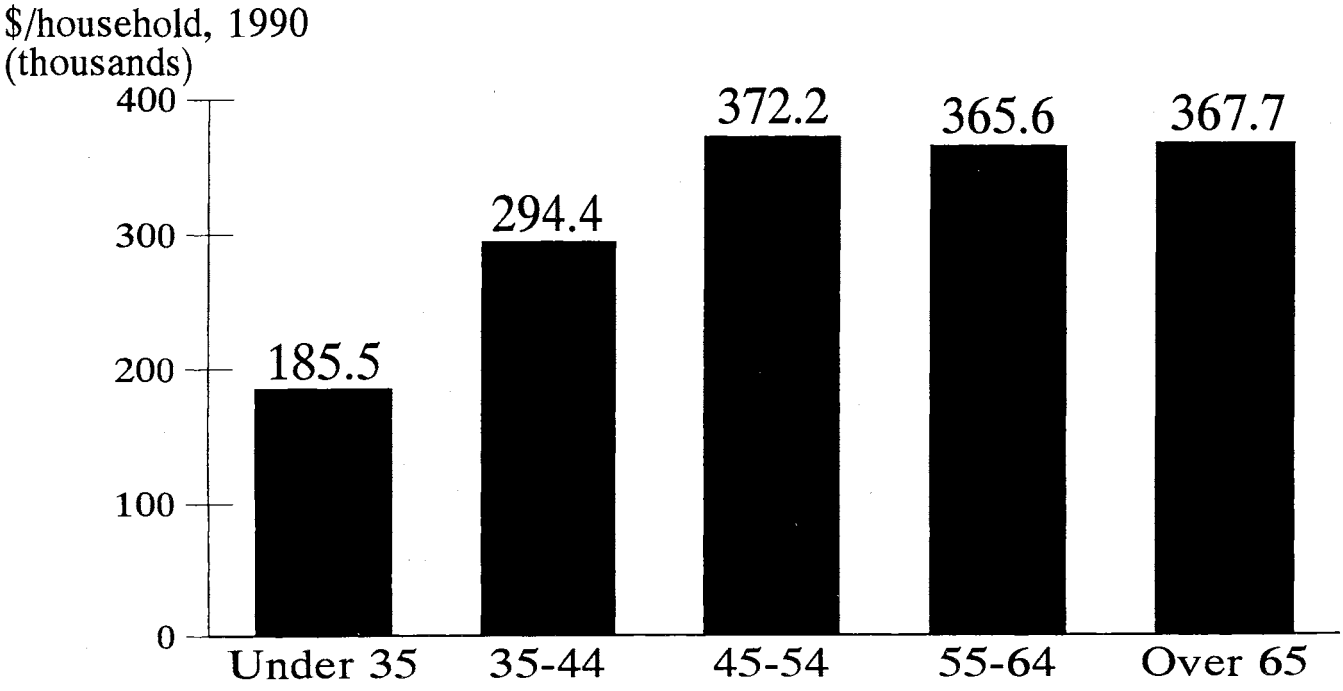
*Commercial farms (accounting for four-fifths of farm output) can draw the 5,000 operators needing replacement each year from the ranks of 803,000 noncommercial operators under age 55, from the 40,000 males raised on farms reaching age 25 each year, or from nonconventional sources such as nonfarmers and farm women.

Source: Census of Agriculture

Income per household of farm operators 35-54 years of age compares favorably with that of older operators.



*Wealth per household of farm operators 35-54 years of age also compares favorably with that of older operators.**



*Farm net worth for operators under 35 years of age would need to grow 3.5% per year for 20 years to reach average wealth of operators 55-64 years of age in 1990. That seems attainable given that real per capita net worth of farmers increased at that rate from 1970 to 1990.

Number and Shares of Farm Operators by Age, Selected Census Years in the United States.

	Age Category (Years)							
Census Year	Under 25	25-34	35-44	45-54	55-64	Over 65	Total	Average Age
1959								
Number	61,300	403,400	806,100	980,000	802,700	617,300	3,670,800	50.5
Percent	1.7	11.0	21.9	26.7	21.9	16.8	100.0	
1969								
Number	52,900	273,700	522,700	724,000	704,000	453,000	2,730,300	51.2
Percent	1.9	10.0	19.2	26.5	25.8	16.6	100.0	
1978								
Number	66,600	285,400	433,900	549,200	552,200	370,500	2,257,800	50.3
Percent	3.0	12.6	19.2	24.3	24.5	16.4	100.0	
1987								
Number	35,900	242.700	411,200	454,900	495,800	448,300	2,088,800	52.0
Percent	1.7	11.6	19.7	21.8	23.7	21.5	100.0	
1992								
Number	27,906	178,862	381,746	429,333	429,839	477,650	1,925,336	53.3
Percent	1.4	9.3	19.8	22.3	22.3	24.8	100.0	

Source: Bureau of the Census, (1992 and earlier years).