United States Department of Agriculture

Productivity Growth in U.S. and Midwest Agriculture

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Federal Reserve Bank of Chicago
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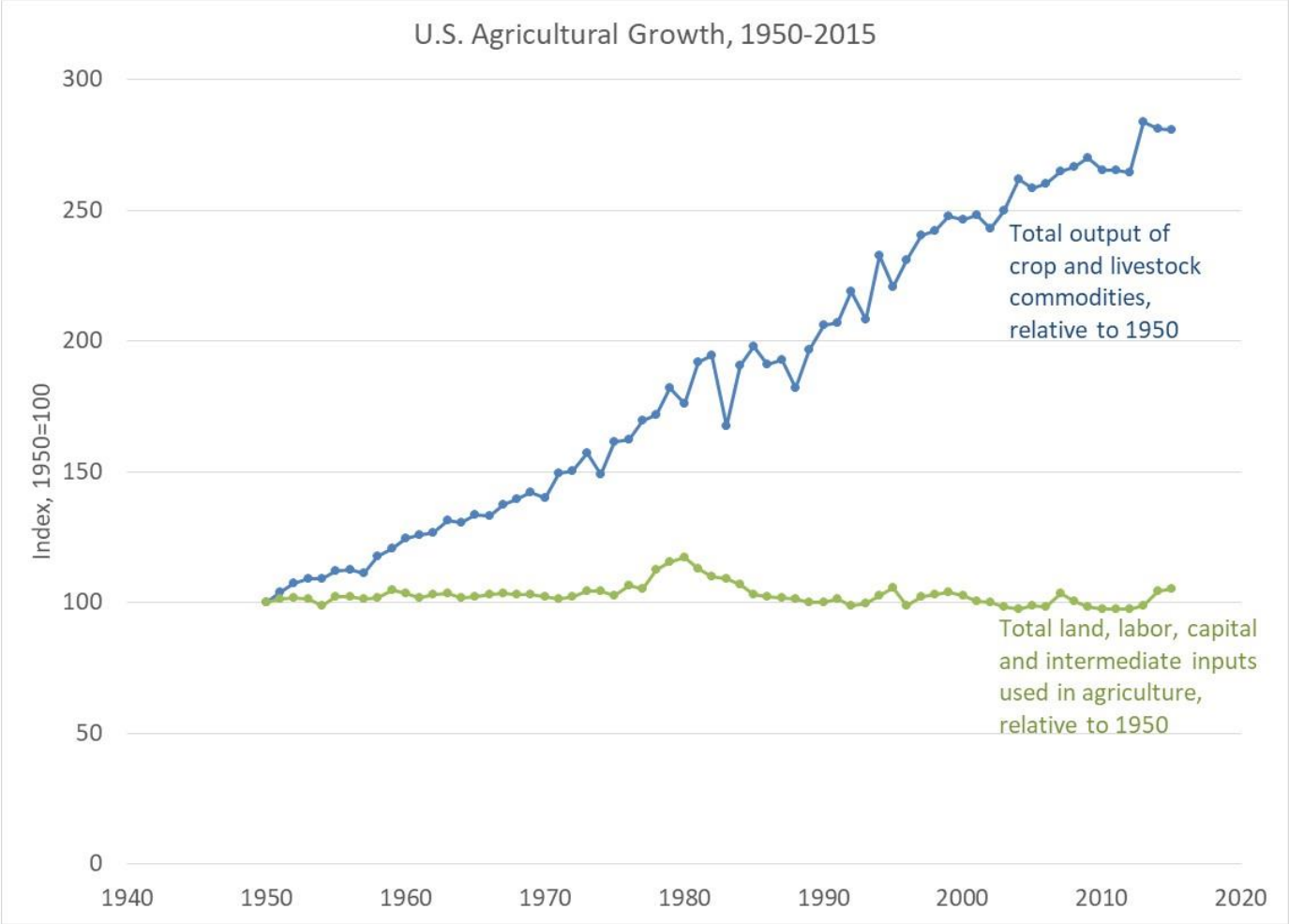
Productivity is the primary driver of growth in US agriculture

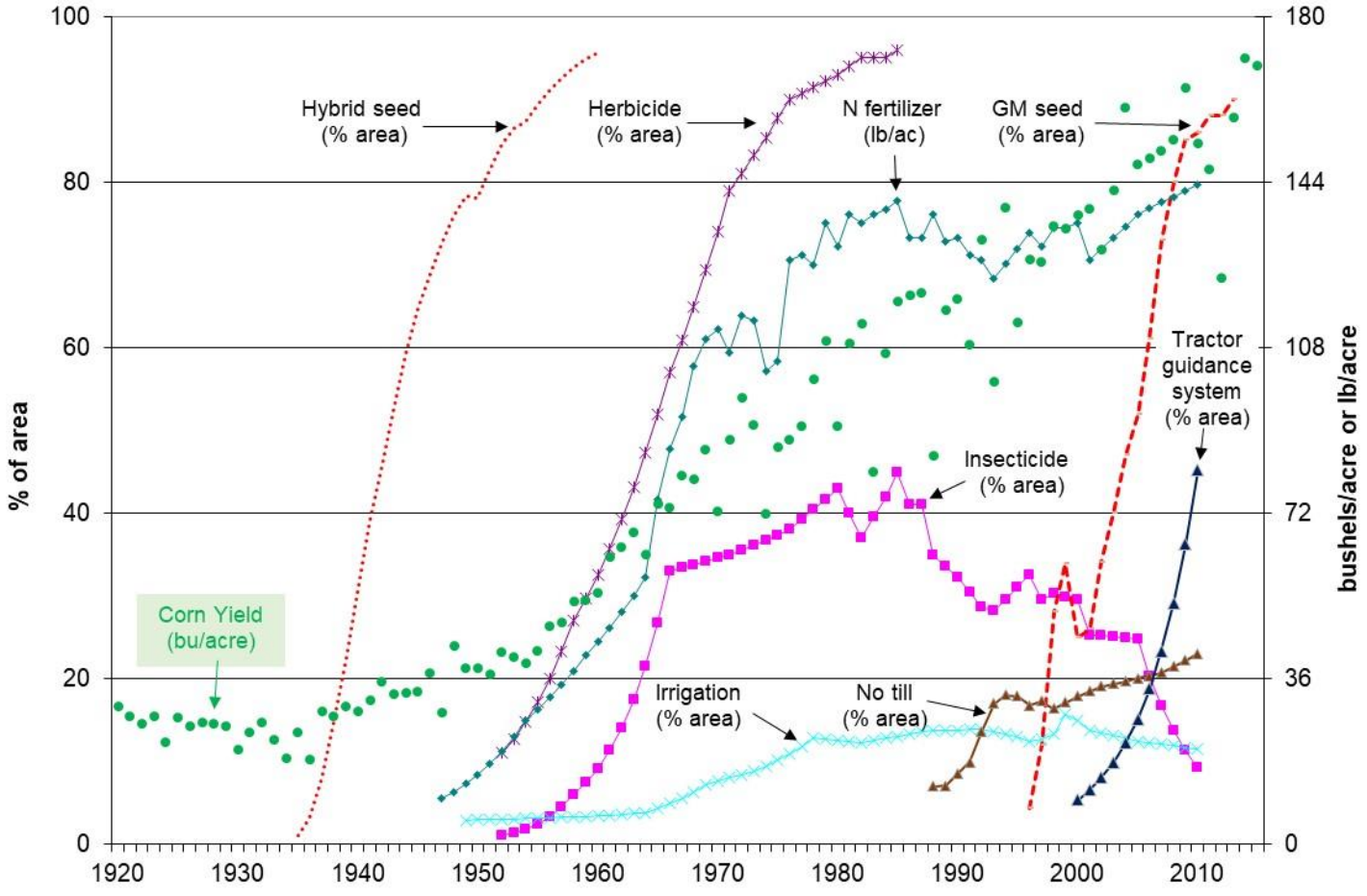


Source: Wang et al., Economic Research Service

Factors causing productivity to rise

- New technologies
- Economies of scale
- Specialization
- Much of this is driven by investments in research and development (R&D)

Technical change in corn production



Source: Economic Research Service analysis using data from the National Agricultural Statistical Service, Agricultural Statistics yearbook and the Agricultural Resource Management Survey

Production is moving toward larger farms

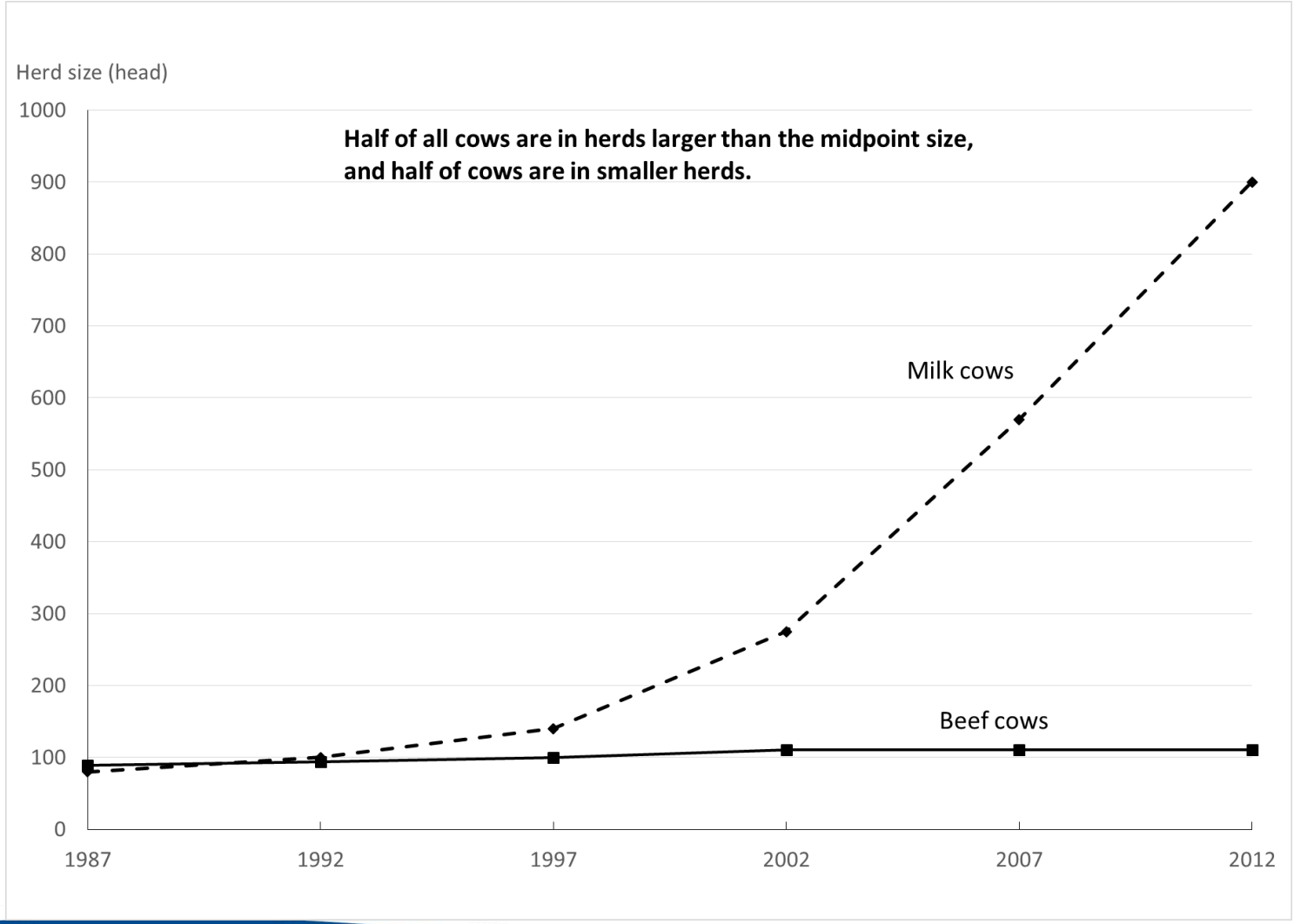
Livestock consolidation has been
significant everywhere except in beef cow-calf operations

Midpoint Farm Size

Commodity	1987	1997	2007	2012
		Annual Number Sold or Removed		
Broilers	300,000	480,000	681,600	680,000
Fed Cattle	17,532	38,000	35,000	38,369
Turkeys	120,000	137,246	157,000	160,000
Hogs	1,200	11,000	30,000	40,000
		Flock/Herd Size		
Egg Layers	117,839	300,000	872,500	925,975
Beef Cows	89	100	110	110
Milk Cows	80	140	570	900

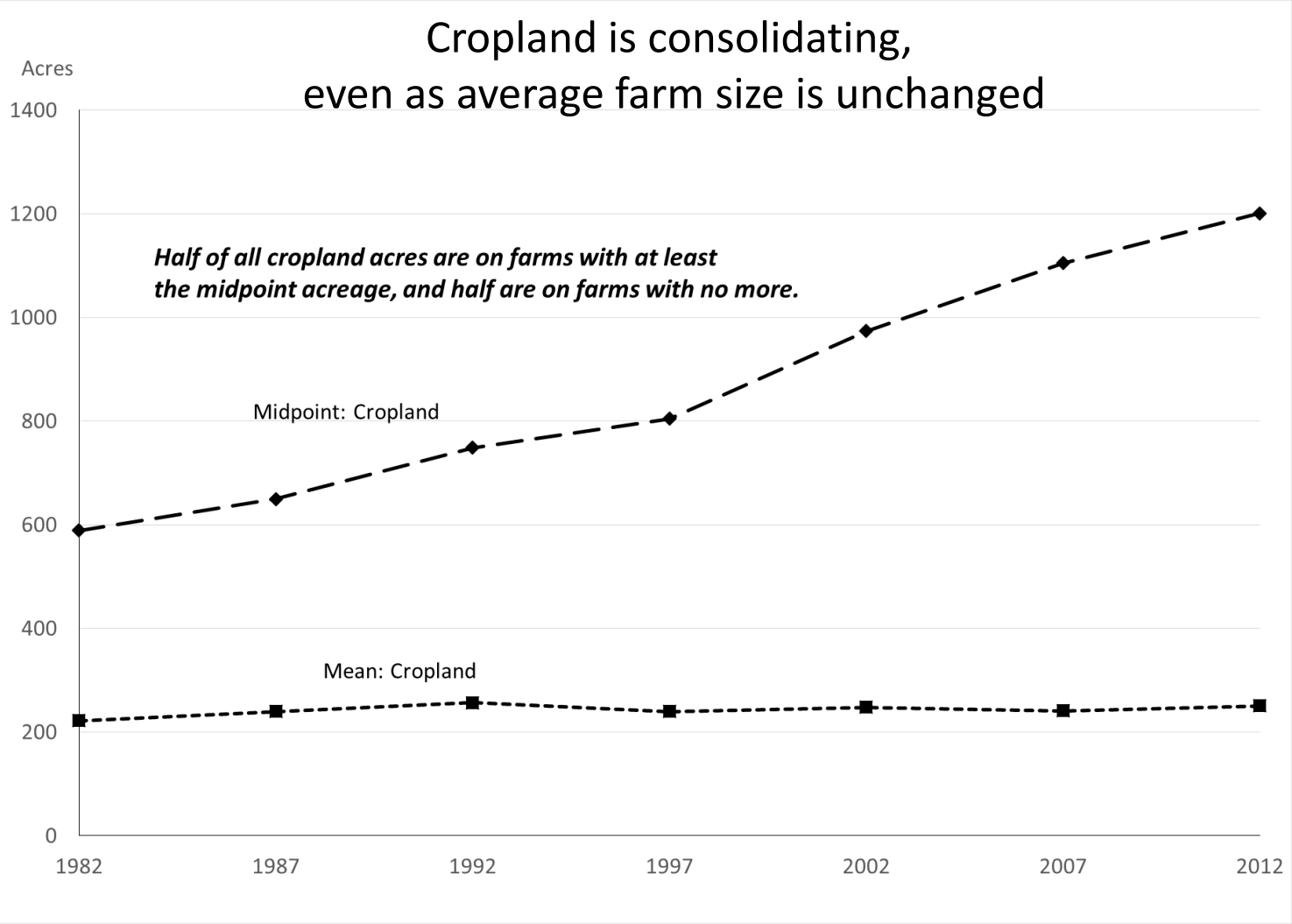
Source: MacDonald & Hoppe, Economic Research Service

Compare: Major Consolidation in Dairy, None in Beef Cow-Calf



Source: MacDonald & Hoppe, Economic Research Service

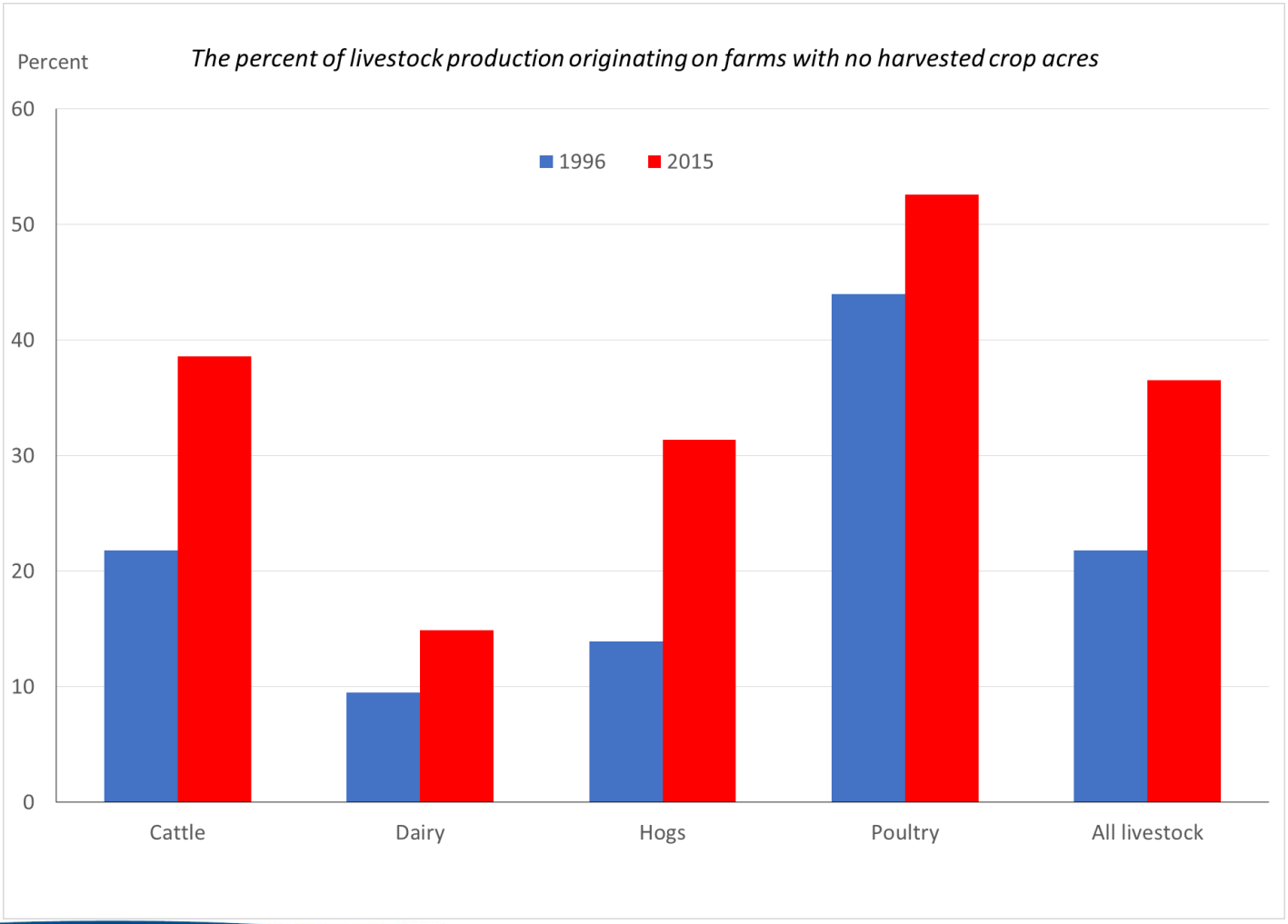
Crop production is also moving toward larger farms



Source: MacDonald & Hoppe, Economic Research Service

Farms are becoming more specialized

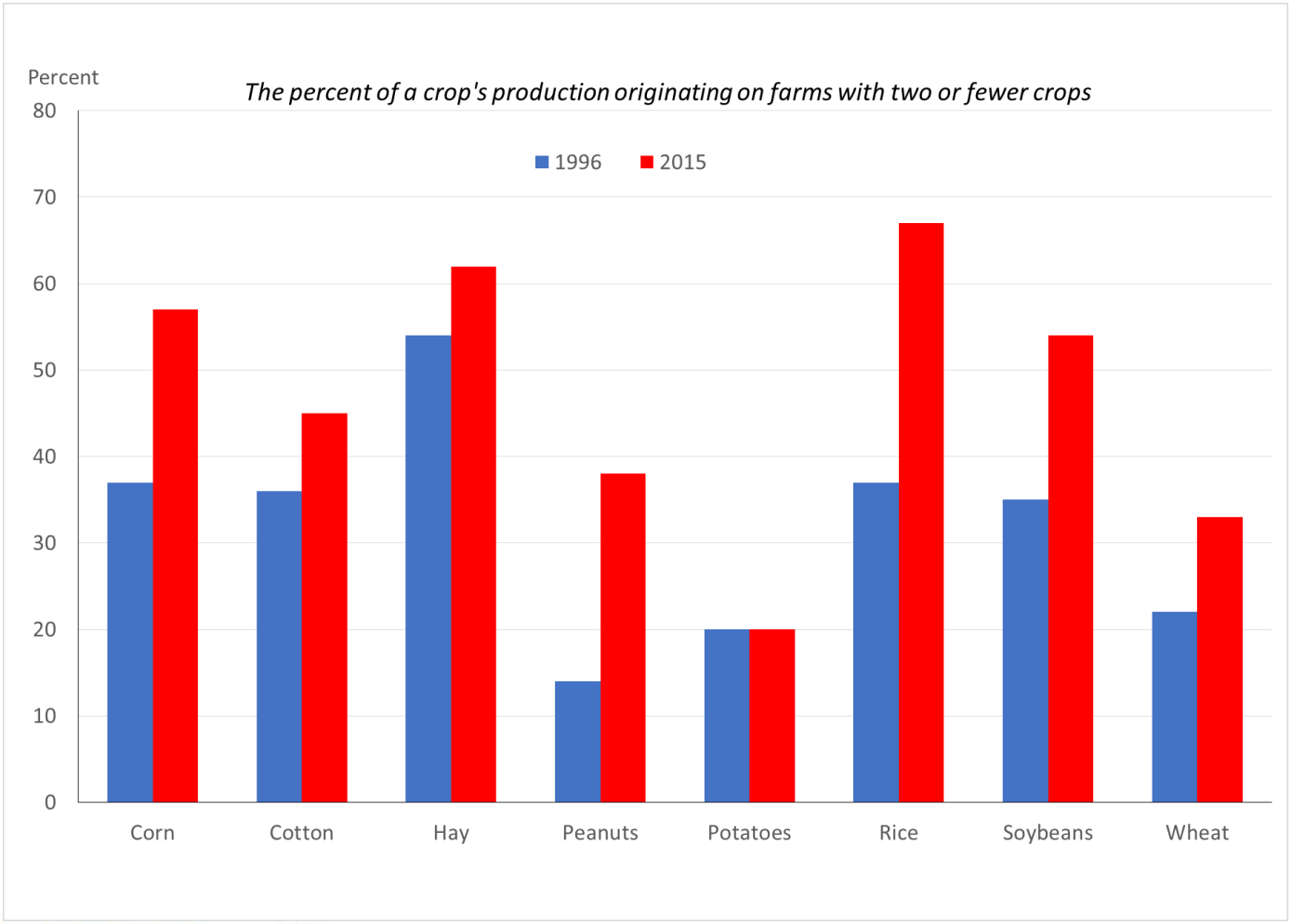
Crop and livestock production are separating



Source: MacDonald & Hoppe, Economic Research Service

Farms are becoming more specialized

Farms are focusing on fewer field crops



Source: MacDonald & Hoppe, Economic Research Service

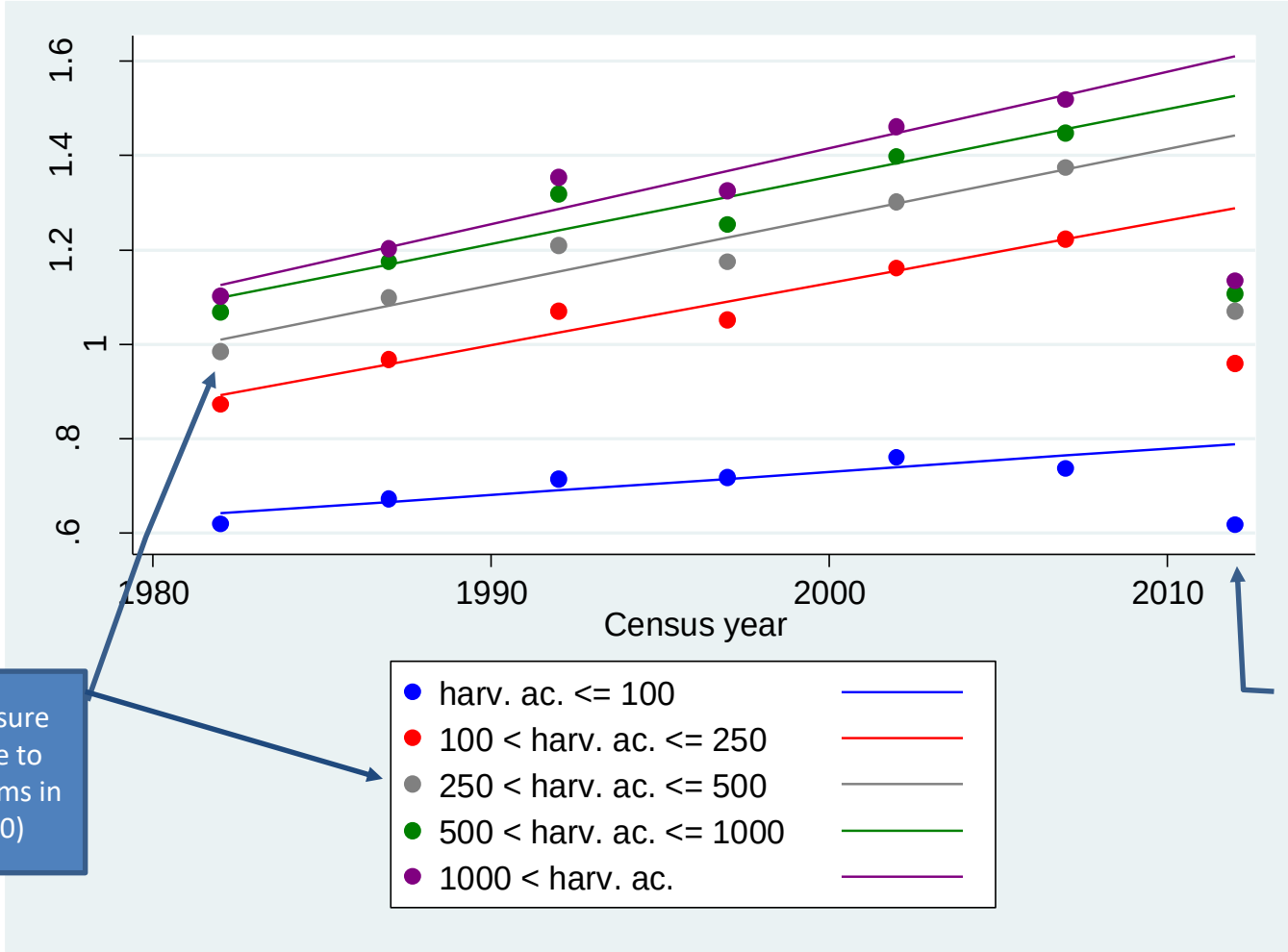
Drivers of Consolidation and Specialization

Patterns—persistent and widespread—indicate that commodity programs and crop insurance cannot be the dominant forces

Technology plays an important role, allowing a farmer or farm family to manage more acres or animals.

* Larger, faster, smarter equipment.
* Inputs and practices, tied to seeds and pest management, that reduce labor hours per acre of production.
* Animal housing and feeding systems that allow less labor, and effective management of larger herds/flocks

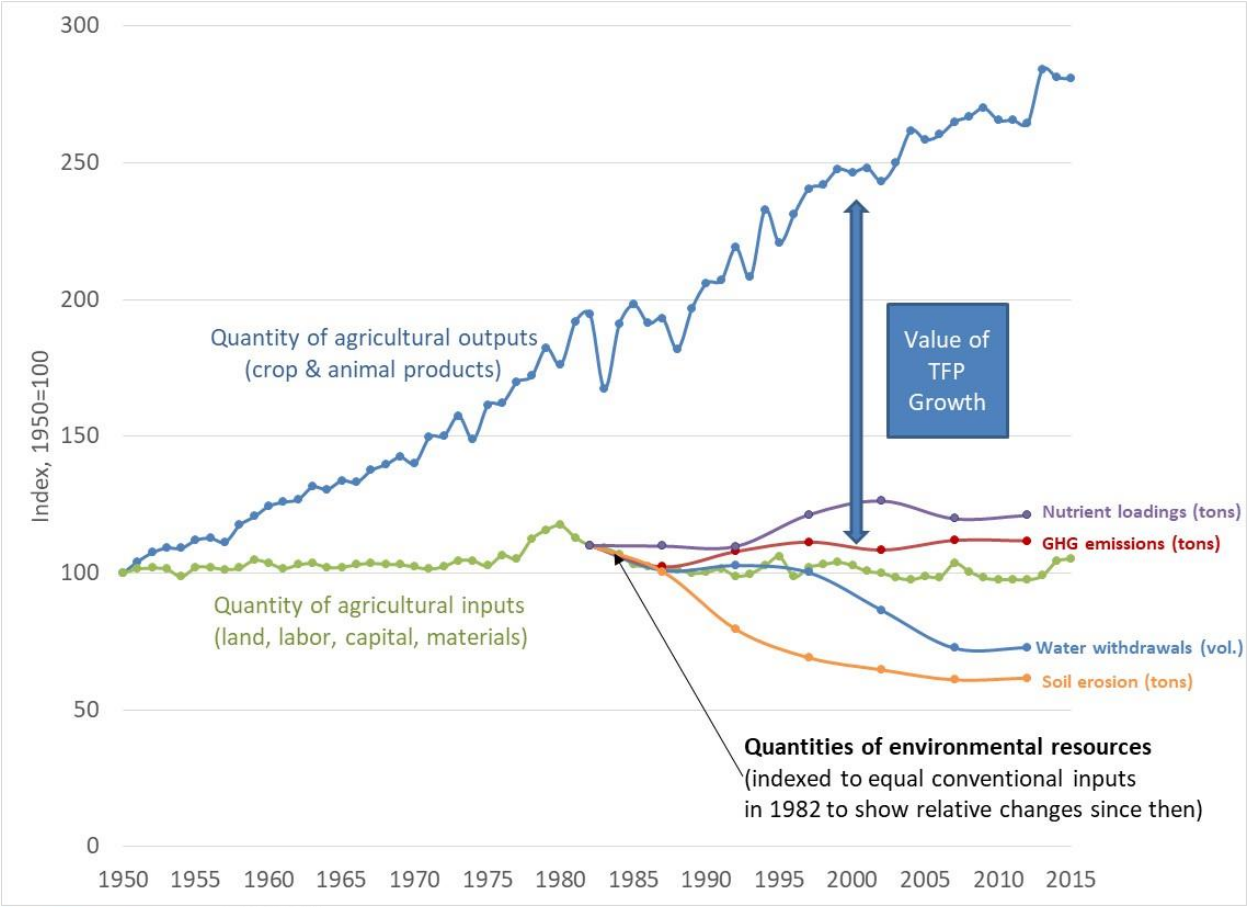
For crop farms in the Cornbelt, total factor productivity (TFP) is higher on larger farms



Source: Nigel Key, *Food Policy*

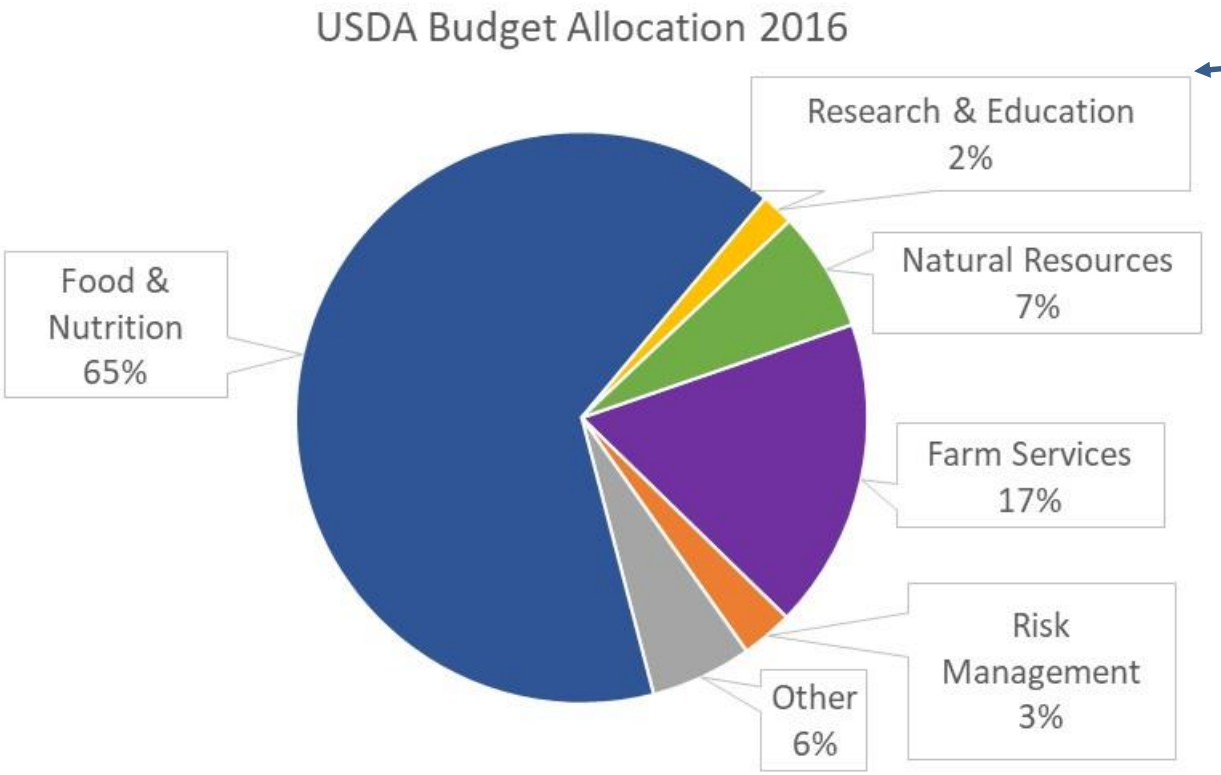
What about natural resource use?

Environment inputs (or undesirable outputs) have stayed about the same or declined as farm output has increased



Sources: USDA Economic Research Service & Natural Resources Conservation Service, US Geological Service

Main policy instrument affecting productivity is investment in research and development (R&D)

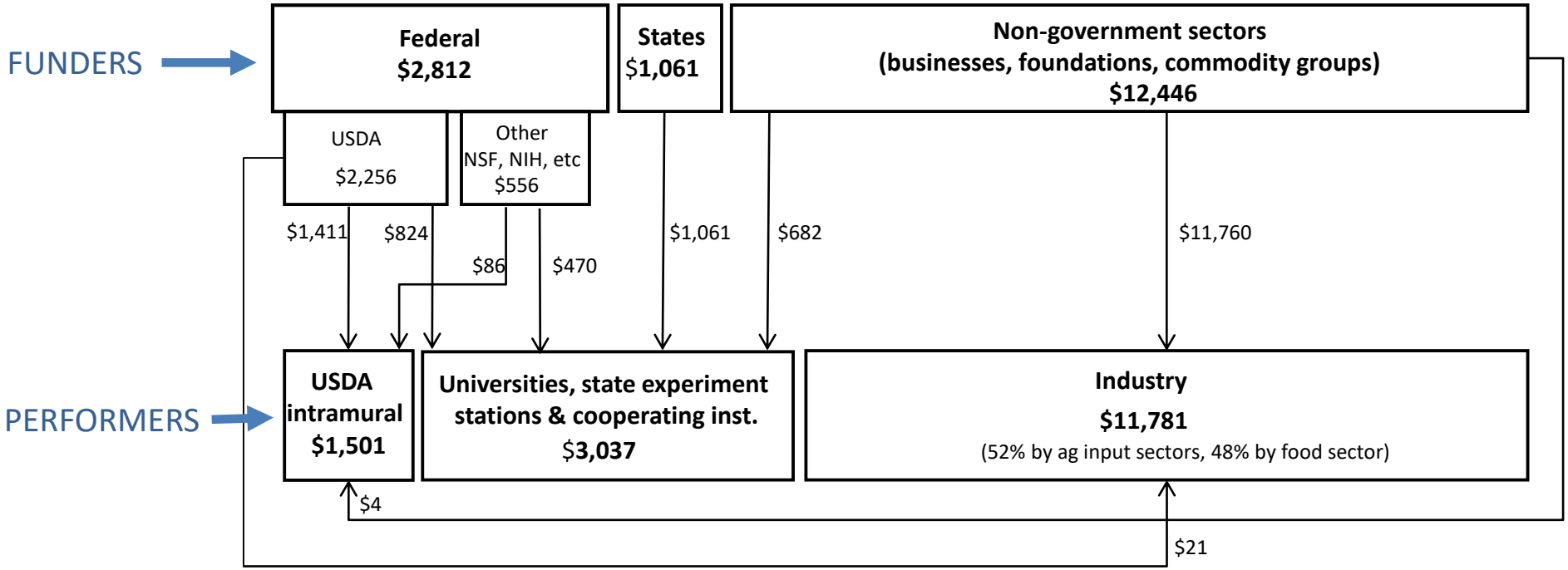


Public investment in agricultural R&D has yielded high returns: at least $10 in benefits to the US economy per $1 in R&D spending (Fuglie & Heisey, Economic Research Service)

Total FY2016 USDA budget authority = $166 billion

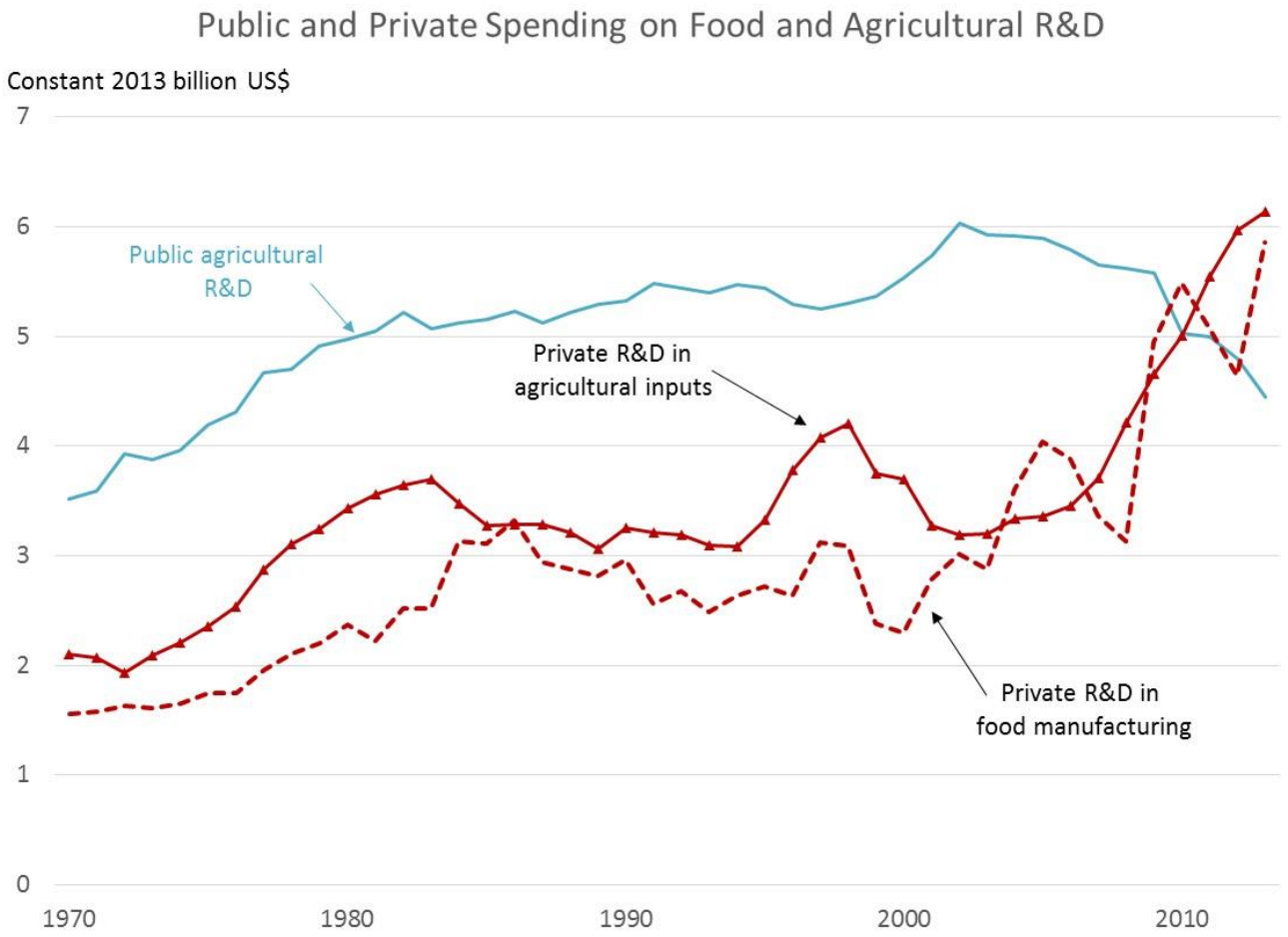
Sources: Economic Research Service using data from USDA Office of Budget and Program Analysis

The U.S. system for food and agricultural R&D
(figures for 2013, in millions)



Source: Clancy, Fuglie & Heisey, Economic Research Service

Private-sector spending on agricultural R&D has eclipsed public-sector spending



Source: Clancy, Fuglie & Heisey, Economic Research Service

Challenges facing future growth in US agricultural productivity:

- Declining investment in agricultural R&D
  - Public sector since 2009
  - Private sector?
- Consumer apprehensions with some new technologies and farming practices
- Climate change
  - May negatively affect crop yields
- Water scarcity (western states) and other environmental issues

Contacts and References

- Keith Fuglie (kfuglie@ers.usda.gov)

ERS *Amber Waves* articles

Wang et al., U.S. Agricultural Productivity Growth: The Past, Challenges, and the Future

MacDonald & Hoppe, *Examining Consolidation in U.S. Agriculture*

Clancy, Fuglie & Heisey, U.S. Agricultural R&D in an Era of Falling Public Funding

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Wang et al., Agricultural Productivity Growth in the United States

MacDonald & Hoppe, *Three Decades of Consolidation in U.S. Agriculture*

Fuglie & Heisey, Economic Returns to Public Agricultural Research