The Changing Structure of Agriculture: Implications from Traceability Research

Brian Buhr, PhD
Professor
Applied Economics
University of Minnesota
34 Faculty Engaged in Four Areas:

- Environmental and Resource Economics
- Public Sector Economics
- Food Systems
- Growth, Development, and Trade
Perfectly Competitive Markets

- Many buyers and sellers
- Non-differentiated products
- Low barriers to entry
- Perfect or uniform information

→ Result: Law of One Price – Subject to Relevant Market Considerations
A Simple Supply Chain:

**Crop Genetics/Inputs**
- MS Corn Seed:
  - Monsanto = 29%
  - Pioneer = 30%
  - Syngenta = 12%
  - **HHI = 1985**

**Crop Farming**
- Advanced Pork – Largest Corn Gov’t Payment Recipient in Iowa
  - $2.6 mm 2000-2006
  - **HHI = 1**

**Meat Packing**
- 28% pork
  - Tyson = 17%
  - JBS = 11%
  - CR4 = 65%
  - **HHI = 1278**

- 14% Beef
  - Tyson = 24%
  - CMS = 22%
  - CR4 = 72%
  - **HHI = 1384**

- 23% broilers
  - PPR = 25%
  - PRD = 7%
  - SAN = 4%
  - CR4 = 60%
  - **HHI = 1207**

**Food Processing**
- 7% Proc. Foods
  - $25.2 bb
  - CR4 = 27%

- 6.4% Proc. Foods
  - $23.9 bb
  - CR4 = 27%

- 6.3% Proc. Foods
  - $23.3 bb
  - CR4 = 27%

**Food Retailing**
- 29% Food Retail
  - $233 bb
  - CR4 = 51%

- 8% Food Retail
  - $66.1 bb
  - CR4 = 51%

- 7% Food Retail
  - $59 bb
  - CR4 = 51%

- 6% Food Retail
  - $40 bb
  - CR4 = 51%

**Meat Animal Production**
- 17% sow herd
  - Smithfield
  - **CR4 = 30%**
  - **HHI = 352**

- 8% COF
  - Five Rivers
  - **CR4 = 20%**
  - **HHI = 116**

- 23% broilers
  - Tyson
  - **CR4 = 60%**
  - **HHI = 1207**

**Crop Farming**
- Advanced Pork – Largest Corn Gov’t Payment Recipient in Iowa
  - $2.6 mm 2000-2006
  - **HHI = 1**

**Meat Packing**
- 28% pork
  - Tyson = 17%
  - JBS = 11%
  - CR4 = 65%
  - **HHI = 1278**

- 14% Beef
  - Tyson = 24%
  - CMS = 22%
  - CR4 = 72%
  - **HHI = 1384**

- 23% broilers
  - PPR = 25%
  - PRD = 7%
  - SAN = 4%
  - CR4 = 60%
  - **HHI = 1207**

**Food Processing**
- 7% Proc. Foods
  - $25.2 bb
  - CR4 = 27%

- 6.4% Proc. Foods
  - $23.9 bb
  - CR4 = 27%

- 6.3% Proc. Foods
  - $23.3 bb
  - CR4 = 27%

**Food Retailing**
- 29% Food Retail
  - $233 bb
  - CR4 = 51%

- 8% Food Retail
  - $66.1 bb
  - CR4 = 51%

- 7% Food Retail
  - $59 bb
  - CR4 = 51%

- 6% Food Retail
  - $40 bb
  - CR4 = 51%
Food Supply Chain Concentration

Herfindahl-Hirschman Index (HHI)

DOJ Concentrated (>1800)

DOJ Moderately Concentrated (1000-1800)

DOJ Unconcentrated (<1000)

Crop Genetics: 1
Crop Farms: 473
Feed Mill: 558
Livestock Farms: 1,290
Meat Packing: 137
Food Processing: 1,004
Retail Grocer: 1,985
Simple Supply Chain – Key Points

- Vertical integration and contracting is clearly increasing in food chain.

- Nearly all major players are multi-nationals or even foreign direct investors → Global markets.

- Although the retail segment is almost “unconcentrated”, its size and relative concentration is clearly a countervail on suppliers.

- This deviation from perfect competition is increasingly viewed as an indication of market power and non-competitive pricing and to require litigation or legislation to remedy the problem.
Why Do Agricultural Firms Contract and Vertically Integrate?

- Because Vertical Integration is a **RESPONSE** to **MARKET FAILURES**

- Sample Causes of Market Failures
  - Unobservable traits: organic, local, low fat, antibiotic free, free range, cage-free, etc. etc.
  - Food safety, quality assurance and liability.
  - Search costs – timing of production and uncertainty.
Information is Key to Solving Most Market Failures: Traceability Case Studies

Funding Provided by USDA, Rural Business Cooperatives Service
Gold Plated Traceability – Van Drie Group

Feed

Farm

Slaughter/Processing

Consumer
Production/Information Economies of Traceability

- Reduced Recall Risk Exposure
  - Recall v. Intervention v. QA

- Identification of “Credence” Attributes
  - A Form of Hyper-Branding

- Assignment of Costs and Value in the Supply Chain
  Continuous Improvement.

- “Nested Supply” Chains
  - GAMS/Schering Plough/Fitzsimmons Farms
  - Overcoming Batch Processing Limitations?
Does Traceability Impact Market Structure and Vertical Integration?²

- Not yet…
  - No common standards for information limits exchange.
  - Concerns about liability/misrepresentation.
  - Market formation and price discovery does not exist.

- Primary benefits are from data captured that improves operational efficiencies by firms (e.g., feed impact on meat quality).

- Hypothesis that some higher level of adoption needs to occur to gain operational efficiencies, then there will be less incentive to integrate once they’re depleted.

Source: Buhr, J. of Food Dist. Res. 2003
Market Participation With Electronic Markets and Traceability

- In order to reduce vertical integration, must have markets and prices.
- Requirements:
  - Liquidity is key issue – chicken and egg.
  - Participant ownership provides liquidity.
  - Participant ownership creates competition issues and squeezes out third-party markets.
  - Need government facilitation of third-party markets to enhance competition.

Source: Wheatley and Buhr, JARE, 2005
Product Quality Incentives for Vertical Integration and Traceability\textsuperscript{4,5}

- Concerns about liability and food safety are significant contributors to incentives for vertical integration (information problem again).

- Traceability even at low levels improves behavior in the chain reducing incentives for VI and improving food safety (Source: Filho and Buhr, AJAE, 2008)

- Traceability significantly mitigates the cost of recalls by avoiding over-recall and implicating firms not otherwise affected (Source: Filho and Buhr, 2009 (in review))
Summary

- Concentration and Vertical Integration Continue in Agriculture.


- Research in supply chain information systems and market formation leads to methods to improve market functioning and reduce failures.

- Instead of restricting business ownership by litigation and legislative regulations, need to consider facilitation of adoption and support of electronic markets and traceability. (Buhr, *Drake Journal of Agricultural Law*, Forthcoming 2010)

An Embedded Result:

- Spillovers of research funding – a traceability project that leads to insights on competition that’s highly relevant to USDA/DOJ joint hearings on competition.
Examples of Federally Funded Research in Applied Economics.

- Trade Adjustment Assistance for Farmers (USDA, Nat’l Institute of Food and Agri.)
- Transitioning to Organic Production (USDA, NIFA)
- Uniform Farm Management Program (USDA, NIFA)
- Human Capital Development to Advance Agricultural Trade (USDA, Economic Research Service)
- Expansion of Modern Retail Food Marketing in Emerging Markets: (USDA, ERS)
- Competitiveness in the Face of Uncertain Policies and Markets (USDA, ERS)
- Exchange Rates, Macroeconomics and U.S. Agriculture (USDA, ERS)
- Supermarket Operations and Management Practices (USDA, ERS)
- Spatial Decision-Making Tools for Efficient Allocation of Invasive Species Control (USDA, ERS)
- Water Policy, Agricultural Production and Rural Income in China (USDA, ERS)
- Organic and Natural Foods Technical Assistance (USDA, Foreign Agricultural Service)
- Health and Environmental Benefits of Bioenergy Crop Production (USDA, ERS)
- Digital Center for Risk Management Education (USDA, NIFA)
- Longitudinal Effects of Extended Childhood Intervention (National Institute of Health)
- Integrated Modeling of Future Agricultural Change in Response to Climate Change (USDI, Geological Survey, NASA)
- International Assessments in the Patenting of Genes (NIH)
- Case Study on Local Foods (USDA, ERS)
- Charitable Contributions in a Voluntary Compliance Income Tax Election (IRS)
- Exploring Parent Decision – Making, Subsidies and Employment on Child Care (US Dept. of Health and Soc. Svc.)
Value of Federal Funding

- **Competitive Grants**
  - Funded graduate students – key to training next generation of researchers.
  - Funding lead to subsequent grants from other agencies and organizations - Leverage
  - Reduced individual competitive grants concern – concerns about new faculty development

- **Base Funding**
  - Critical for research capacity and planning.
  - Exploratory research with low probability of grant success or simply too speculative.
Thank You!
Sources:

1 Various Sources:
   ◦ National Pork Board, 2008, “QuickFacts”
   ◦ Congressional Research Service, 2008, RS22980
   ◦ Successful Farmer, Pork Powerhouses, 2008
   ◦ Steven Key, Cattle Buyers Weekly
   ◦ Food Processing.com, Top 100 Food Processors
   ◦ Supermarket News, Top 75 Retailers


