

# The Changing Structure of Agriculture: Implications from Traceability Research

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Department of  
**APPLIED  
ECONOMICS**

- 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<sup>1</sup>:

## Crop Genetics/Inputs

**MONSANTO** 

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 Animal Production

**Smithfield** 17% sow herd  
 CR4 = 30%  
**HHI = 352**

**JBS**  
 8% COF  
 CR4 = 20%  
**HHI = 116**

**FIVE RIVERS**  
 CATTLE FEEDING

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

## Meat Packing

**Smithfield** 28% pork  
 Tyson = 17%  
 JBS = 11%  
 CR4 = 65%  
**HHI = 1278**

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

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

## Food Processing

**Tyson** 7% Proc. Foods  
 \$25.2 bb  
 CR4 = 27%

**kraft foods** 6.4% Proc. Foods  
 \$23.9 bb  
 CR4 = 27%

**Nestlé** 6.3% Proc. Foods  
 \$23.3 bb  
 CR4 = 27%  
**HHI = 136.80**

## Food Retailing

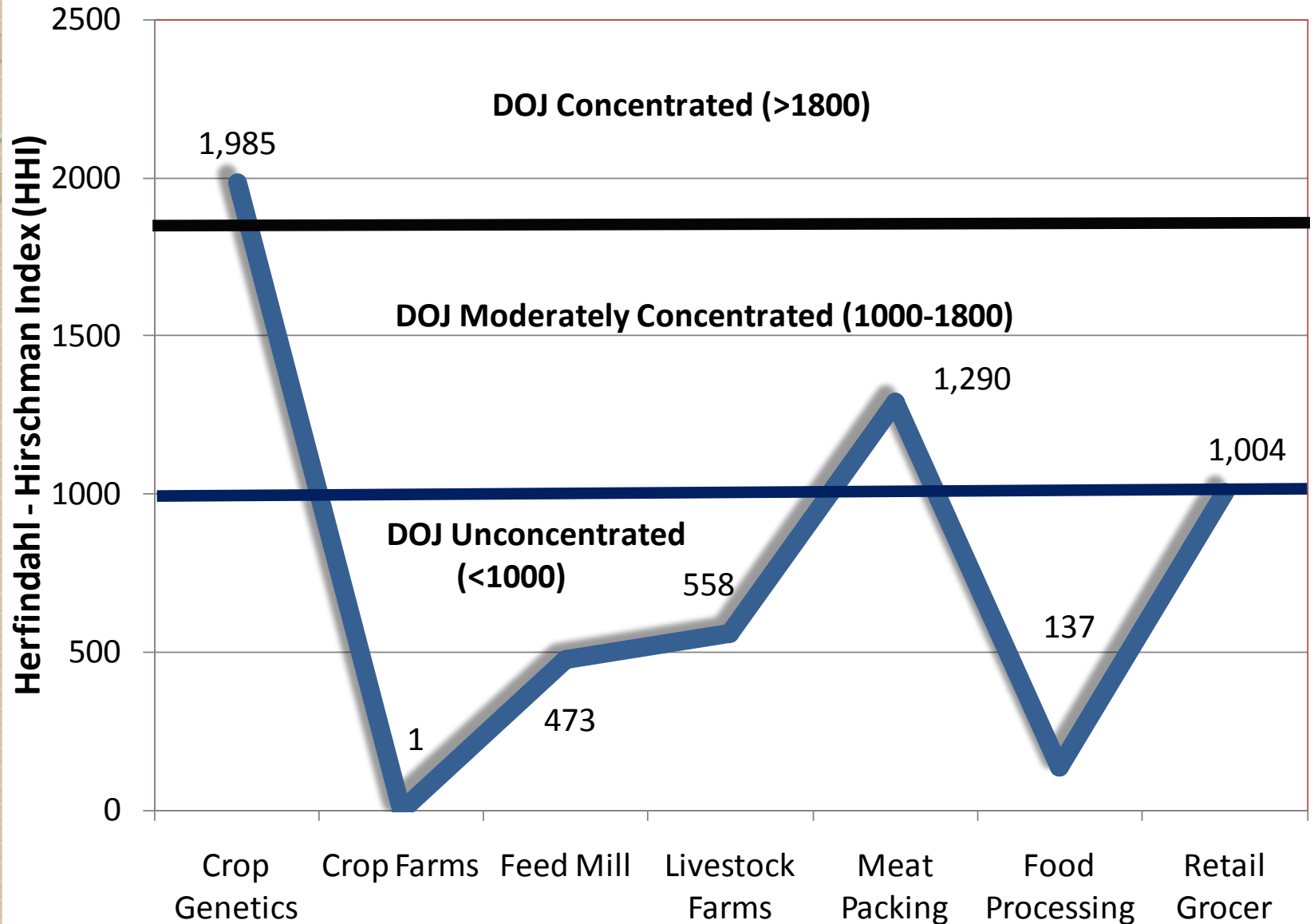
**Walmart** 29% Food Retail  
 \$233 bb  
 CR4 = 51%

**Kroger** 8% Food Retail  
 \$66.1bb  
 CR4 = 51%

**COSTCO** 7% Food Retail  
 \$59 bb  
 CR4 = 51%

**SAFEWAY** 6% Food Retail  
 \$40 bb  
 CR4 = 51%  
**HHI = 1006**

# Food Supply Chain Concentration



# 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



# Gold Plated Traceability – Van Drie Group Farm

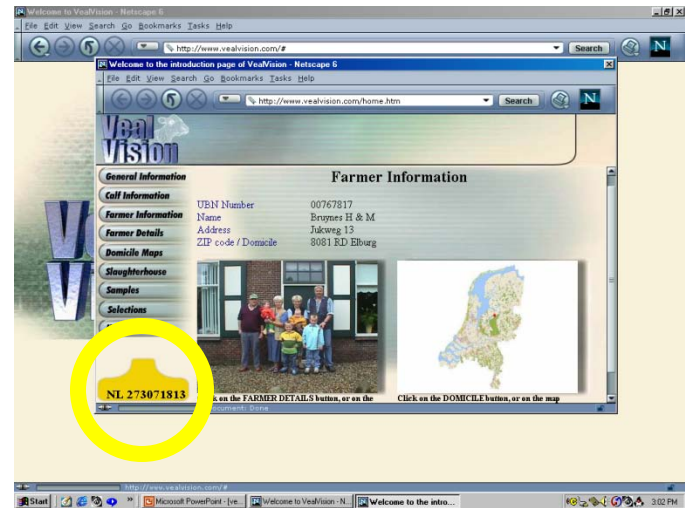
Feed



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?<sup>2</sup>

- 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<sup>3</sup>

- 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<sup>4,5</sup>

- 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.
- Response to Market Failures – Primarily Information Failures.
- 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:

### <sup>1</sup> Various Sources:

- National Pork Board, 2008, “QuickFacts”
- Congressional Research Service, 2008, RS22980
- Watt Poultry USA, <http://www.wattpoultry.com/PrintPage.aspx?id=21250>
- Successful Farmer, Pork Powerhouses, 2008
- Steven Key, *Cattle Buyers Weekly*
- Food Processing.com, *Top 100 Food Processors*
- Supermarket News, Top 75 Retailers

<sup>2</sup>Buhr, B.L. “Traceability and Information Technology in the Meat Supply Chain: Implications for Firm Organization and Market Structure.” *Journal of Food Distribution Research*. (Nov. 2003): 13-26.

<sup>3</sup>Wheatley, W.P. and B.L. Buhr. “After the Bubble: The Survival and Ownership of Internet Marketplaces for Farmers and Agribusiness” *Journal of Agricultural and Resource Economics*. 30(Dec 2005):502-519

<sup>4</sup>Resende-Filho, M. and B.L. Buhr. “A Principal-Agent Model for Evaluating the Economic Value of a Traceability System: A Case Study with Injection-site Lesion Control in Fed Cattle.” *American Journal of Agricultural Economics*. November 2008.

<sup>5</sup>Resende-Filho, M. and B.L. Buhr. “Economics of Traceability for Mitigation of Food Recall Costs.” *under revision, International Journal of Production Economics*. 2010.