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BASELINE STUDY OF LIVESTOCK AND MEAT MARKETING TRENDS AND IMPLICATIONS FOR LIVESTOCK MANDATORY REPORTING

By:
Value Ag, LLC
Joe Parcell
parcellj99@gmail.com

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Project Researchers:
Joe Parcell, Glynn Tonsor, and Ted Schroeder

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About the Principal Investigators

Joe Parcell, PhD, is a Professor in the Department of Agricultural and Applied Economics at the University of Missouri. He has been on faculty at the University of Missouri since 1998. He received his M.S. and Ph.D. in agricultural economics and BA in mathematics, respectively. His research involves value chain demand drivers, price analysis, and marketing. He has extensive knowledge of supply and value chain issues through his research and practical experience with producer agricultural ventures. His over 200 scholarly publications, proceedings, book chapters, and extension publications relate to marketing, pricing, strategy, and value added. He is co-author of the textbook titled The Agricultural Marketing System. He is founder of Value Ag., LLC. Value Ag, LLC, headquartered in Columbia, Missouri, is an economic consultancy group committed to “Analyzing Innovative Ideas for Tomorrow’s Agriculture.”

Ted C. Schroeder, PhD, is a University Distinguished Professor of Agricultural Economics at Kansas State University. He has a B.S. from the University of Nebraska and Ph.D. from Iowa State University. He has been on the Agricultural Economics faculty at Kansas State University since 1986. He teaches and conducts research. He is director of the Center for Risk Management Education and Research. Ted has done extensive research in livestock market risk management, meat demand, meat and livestock marketing, and price discovery and has more than 100 published journal articles and numerous other publications. He has worked as a consultant on numerous meat and livestock value-added projects, and he has been the principal investigator on a large number of external grants.

Glynn T. Tonsor, PhD, is a Professor at Kansas State University in the Department of Agricultural Economics. He obtained a B.S. from Missouri State University and Ph.D. from Kansas State University. He was a faculty member at Michigan State University from May 2006 to March 2010 and then joined the Kansas State University faculty. Through active research, engaged outreach with industry, and first-hand knowledge with livestock production, Glynn has economic expertise in an array of topics important to stakeholders throughout the meat and livestock supply chain. Glynn's integrated research and extension program has resulted in more than 60 published journal articles, numerous other publications, a multitude of outreach contributions, and projects with more than \$2 million in cumulative funding.

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EXECUTIVE SUMMARY

The Livestock Mandatory Reporting (LMR) Act of 1999 was enacted to increase transparency in market transactions for swine, cattle, sheep, beef, and lamb. In 2012, coverage of pork transactions was added to the Act. LMR is scheduled for reauthorization in 2020. The 2015 authorization of the Act requires a comprehensive review of LMR by 2018. The purpose of this study is to help inform the 2018 comprehensive review. This study provides information regarding changes occurring in livestock and meat markets that will impact LMR design and associated market reporting.

USDA-AMS is responsible for implementation of the Act. Market information provided by USDA-AMS through LMR facilitates more efficient markets by informing more than a million livestock producers, hundreds of meat processors, some 37,000 retail food outlets, more than 1 million restaurants, as well as meat exporters, and the many industries that provide inputs, support, and service to the livestock and meat industry with important market information on a daily basis. Information contained in USDA-AMS livestock and meat market reports is used for decisions ranging from day-to-day marketing of livestock and meat products to long-term investments and policy.

Since enactment of the 1999 Act, major changes have occurred in the livestock and meat industry. Changes in the structure and ownership of reporting packers; how trade occurs in the industry; livestock production methods and technology; meat processing technology; product mix; product form; importance of export markets; and policy that all impact LMR design, data collection, and information reporting methods. Advances in information technology are also noteworthy.

This study identified evolving trends in how livestock and meat production and markets are changing to help inform the comprehensive LMR 2018 review. We conducted interviews with numerous industry participants including producers; packers; processors; retailers; market analysts and researchers; and industry association representatives to gain insight into evolving industry market trends and implications for LMR. We also utilized USDA-AMS historical data as well as published literature in completing this study.

Key Findings

1. Major structural shifts have occurred over the past 15 years in the meat packing and processing sectors in cattle, swine, sheep, beef, pork, and lamb. Packing firms have increased size, in many instances increased concentration, vertically integrated, and made major investments and changes in processing to improve supply chain management to respond to changing domestic and international customer and consumer demands. Producers are increasingly looking to vertical integration as a means to remain competitive and solvent. Furthermore, the use of LMR information has expanded beyond pricing to include establishing insurance contracts, futures contract settlement, indemnity loss payment determination, and for policy analysis.
2. Changing domestic and global meat customer and consumer demands are driving the meat industry to be more responsive to consumer interests. This is leading to increased

product differentiation, more vertical coordination and integration, and relative to when the Act was established generally a much different product mix is being produced by meat packers who report information to USDA-AMS under LMR.

3. Livestock and meat are being marketed in dramatically different ways today than in the recent past. Negotiated trade has been rapidly replaced by formula pricing, forward markets, and longer term marketing agreements. There is also an ongoing shift towards pricing livestock using meat values. Furthermore, traditional data providers are also increasingly LMR data users. This changes the form and role of LMR and USDA-AMS market reporting.
4. New methods for pricing livestock and meat products, such as internet based auctions, are being launched in industries that do not necessarily conform to traditional LMR or USDA-AMS practices. These types of marketing institutions will likely see continued interest as a way to provide lower cost opportunities for producers, packers, processors, and others to participate in price discovery instead of direct negotiation.

Key Implications

1. The importance of LMR to the livestock industry, domestic and international commerce, and to rural communities was made most obvious by the shutdown of LMR during the October 2013 federal government shutdown. Fears of another disruption to LMR information continues to resonate with data users.
2. Structural changes in livestock and meat markets are testing confidentiality structures in market information reporting. This issue has always been a concern, but it is becoming a greater concern as markets become more vertically integrated, differentiated, and in many instances thin. There is clear need to assess alternative ways to manage price reporting under such conditions to continue to provide the desired depth of market information the industry relies upon.
3. Changes in products being produced by packers through value added, branding, specialty programs, and other differentiation challenges market information reporting. This is an area that requires considerable assessment in future price reporting design.
4. The importance of international trade is elevating in meat markets. Continued efforts to provide timely market information related to products moving into and from international markets is a worthwhile endeavor.
5. Capability for USDA-AMS together with industry to quickly assess new market developments in the livestock and meat sectors and to determine how to modify reporting accordingly will be an important dimension of the effectiveness of LMR in the future.

CHAPTER 1: INTRODUCTION

Background

Public price reporting has immense value. A classic study on the value of price information is Stigler's 1961 "Economics of Information." He argues that "ascertainment of market price" (p. 213) is one of the most important dimensions of economic information.

The intent of price reporting is to reduce asymmetric information among market participants, which helps to achieve more efficient market outcomes and level the playing field and counterbalance possible market power. Price information signals resource allocation, production, processing, and marketing decisions. Price data from different market levels such as farm, wholesale, and retail are used to calculate marketing margins, which can help reveal changes in marketing costs among vertical industry sectors. The broad private and public importance of price information makes reliable, accessible, timely, and accurate price reporting a valuable activity worthy of public investment. This sentiment has been a major impetus to public support for USDA-AMS market reporting and was part of the initial motivation for mandating livestock and meat price reporting.

The Livestock Mandatory Reporting (LMR) Act of 1999 was enacted in 2000 and implemented in 2001 following the call by livestock industry participants for increased transparency in swine, cattle, sheep, boxed beef, and carcass and boxed lamb transactions. In 2012, wholesale pork was added as a mandatory reported product under the LMR Act. The Agricultural Marketing Service (AMS) of the United States Department of Agriculture oversees implementing and carrying out the secure collection of processor data and aggregating data into reports that mask confidential information. Many industry participants refer to LMR as mandatory price reporting (MPR). We use the acronym LMR to capture the breadth of the Act requirements to include both price and volume data.

During the past 15 years, the methods of commerce used by the livestock industry and the livestock industry's structure have changed considerably. Although the original intent of LMR was price transparency, LMR information has over time become the primary price discovery tool for the lamb, pork, and beef industries. Much attention is given to the role of reported prices within LMR, but LMR also mandates reporting of volume (i.e., head, loads, pounds) information, which is important to industry participants as well. Furthermore, over time the distinction between data users and data providers has blurred as processors required to report under LMR increasingly are also heavy users of resulting LMR reports. Approximately every five years, LMR is up for reauthorization. Significant historical dates relevant to the Act include statutory authority for LMR lapsing in 2005, the final rule of 2008 that re-established and revised LMR, 2010 reauthorization, which added wholesale reporting of pork, and 2015 reauthorization.

The 2015 reauthorization language requires completing a comprehensive review of LMR and delivering it to Congress by March 2018. In 2015, AMS leadership sought a precursor assessment of LMR to serve as a white paper for prioritizing topics important for further focused assessment as part of the mandated 2018 congressional report. AMS contracted with Value Ag, LLC to conduct the precursor study.

Objectives and Procedure

The purpose of this study is to identify and document changes occurring in livestock and meat markets that may impact LMR now or in the future. The objective is to determine current marketing trends for cattle, swine, sheep, beef, pork, and lamb that may influence LMR design, price reporting and transparency.

To complete the study three major sources of information were analyzed. First, information contained in public USDA-AMS reports and other publications were used to identify recent trends in livestock and meat markets. Second, scholarly literature was used to document important market changes. Third, the project researchers conducted extensive phone, email and in-person interviews with representatives from the pork, beef, and lamb industries. These contacts included producers, livestock and meat associations, data providers, industry and academic data users, AMS market reporters and administration, retailers, and various other entities within the meat protein value chain. Industry support and feedback for this report was strong; no entity, or individual, who was contacted refused to provide comment. To ensure confidentiality of those providing comments, the names of individuals and organizations are not reported. Although it is impossible to capture comments from every value chain participant, the report reflects sentiments from a broad array of these industry stakeholders.

Every industry participant we interviewed applauded AMS for taking the initiative to commission this study in preparation for the 2020 reauthorization and the separate 2018 report required by Congress. Participants thanked us for providing them with the opportunity to proactively consider livestock and meat marketing trends that may impact LMR data reporting and the use of LMR information provided by AMS. In many ways the active discussions we had with participants was viewed as the first in a multi-step process towards assessing LMR issues and carefully assessing ways to keep LMR concurrent with industry needs and trends.

CHAPTER 2: LIVESTOCK AND MEAT MARKET TRENDS

This project includes sheep, lamb, swine, pork, cattle and beef as covered by LMR. These six industries are unique in structure and scope (Table 1) and changed since the inception of LMR in 2001 (Table 2). These industries totaled retail equivalent sales of nearly \$200 billion in 2015 and indirectly impacted the US economy several times this level. More than 1 million livestock producers, 29,000 feedlot operators, hundreds of processors, a significant number of importers/exporters, 37,000 grocery stores, and over 1 million restaurants combine efforts to meet the demands of over 320 million domestic consumers and a growing base of foreign consumers (Table 3). LMR reports directly and indirectly provide market information, and serve as a source of price discovery, for participants across all of these sectors.

Table 1. Snapshot of LMR-Covered Livestock Industries of Cattle, Lamb and Swine (2015, except for GIPSA 2012)

	Cattle	Sheep	Swine
Metric Tons Produced Domestically (ERS)	10,752,178	68,239	11,116,742
Retail equivalent value (ERS)	\$105B	\$1.7B ¹	\$73B
Number of Producers (NASS)	915,000	50,012	63,246
Number of Processors (GIPSA)	168	81	157
Number of Processors Contributing to LMR (AMS)	33/42*	5*	47/46*
Per Capita Consumption, Pounds per Capita (ERS)	53.9	0.7	49.8
Percent of Exports to Domestic Meat Production (ERS)	10%	3%	20%
Percent of Imports to Domestic Meat Production (ERS)	14%	142%	4%

*The first number represents live animal processors and the second number represents meat and cull processors. Since boxed lamb and carcass lamb reporting includes importers, and the number of qualifying importers changes, no processor number is presented here for lamb.

1. Source: American Sheep Industry Association, 2011,

https://www.sheepusa.org/ResearchEducation_Publications_EconomicImpactAnalysis

Table 2. Snapshot of LMR-Covered Livestock Industries of Cattle, Lamb and Swine (2000)

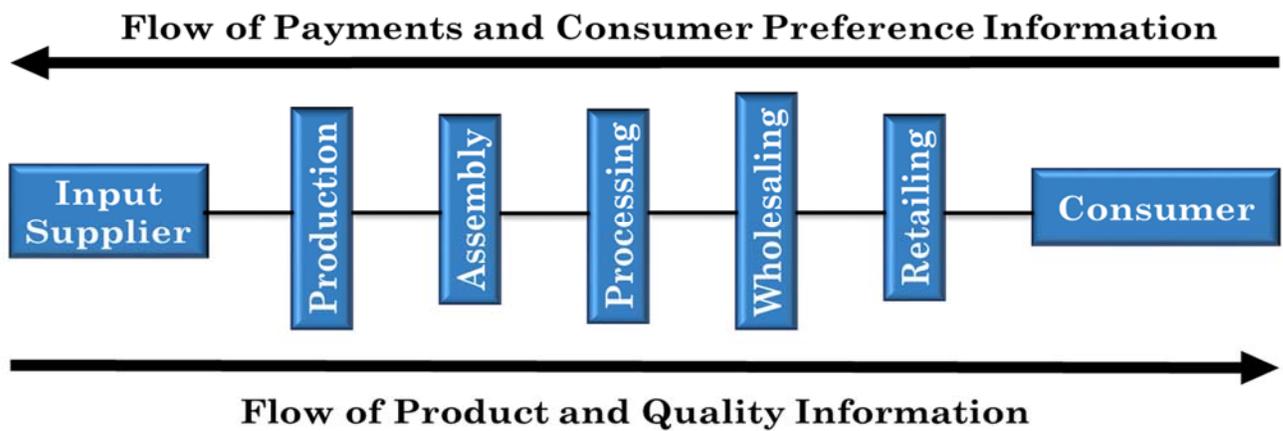
	Cattle	Sheep	Swine
Metric Tons Produced Domestically (ERS)	12,161,525	104,355	8,642,922
Number of Producers (NASS)	1.075M	66,100	86,360
Number of Processors (GIPSA)	189	62	186
Per Capita Consumption, Pounds per Capita (ERS)	67.8	0.8	51.2
Percent of Exports to Domestic Meat Production (ERS)	17%	2%	7%
Percent of Imports to Domestic Meat Production (ERS)	11%	56%	5%

Table 3. Snapshot of Entities impacted by LMR (2015)

	Cattle	Sheep	Swine
Number of Beef/Cattle Producers (NASS)	915,000	50,000	63,000
Feedlots	29,200		
Processors	168	81	157
Supermarket Stores (2013, FMI)	←	37,000	→
Restaurants (National Restaurant Association)	←	1M+	→

Barkema, Drabenstott, and Welch (1993) were among the first to document the consumer revolution and the food system offering a more discriminating consumer greater choice in food purchases. Since the inception of LMR, the US food industry has undergone significant change to provide consumers with greater choices. The changes in consumer preferences have been well documented (for example, see Okrent and Kumcu 2016). Show in Figure 1 is the flow of payments, preferences, and product quality and quantity information for the food, fiber, and fuel value chain. These supply chain activities are important for efficient commerce that leads to consumers with a variety of product offerings at the lowest cost. Parcell and Tonsor (2012) provide a summary of the importance of information for efficient market transactions between parties in the agricultural value chain. They offered suggestions for keeping public information relevant in face of increased industry consolidation/coordination, product proliferation, and global trade. As consumer preferences change, the food system has responded with change. While LMR has evolved into an important tool to facilitate efficient transactions, simultaneously other segments of the livestock supply chain have changed in response to the new consumer. All of these changes have become endogenous to each other because of the increased level of coordination in the red meat value chain.

Figure 1. The Food, Fiber, and Fuel Value Chain and Flows



Source: Rhoades, Dauve, and Parcell (2015)

The transformation of the meat supply chain over the past 15 years has significant implications for LMR:

1. The concept behind the LMR Act of 1999 originated from livestock producers seeking greater transparency in the marketing of live animals. The addition of meat to LMR was, at least compared to live animal reporting, an after-thought addition to the original Act. Over time, the growing importance of consumer preference, reorganization and diversification of the supply chain, and changes in the methods of commerce enhanced the importance of meat market reporting. The addition of mandatory wholesale pork price reporting of 2012 is an example of the growing importance of meat trade and of a major enhancement to LMR. Because of the growing coordination of the meat supply chain progressively more participants are dependent on LMR than just livestock producers.
2. As evidence of the expanded use of LMR information beyond a reflection or “mirror” of the market as intended by establishing the Act in 1999, there are multiple examples of unintended consequences that could arise when enhancements are proposed and resulting LMR information changes. For example LMR information is used by the CME Group for settling futures contracts; the sheep industry price protection insurance products rely on LMR data for indemnity payment calculation; the USDA Risk Management Agency established livestock indemnity program payments based on LMR data; and long-term USDA baseline forecasts which directly influence farm program policy utilize LMR data.

2.1 Structural Change in Livestock Production

Structural change at the farm level has been well documented (e.g., Jones, 2004; Key and McBride, 2007; McGrann, 2007; O’Donoghue et al., 2011; Parcell, Schroeder and Tonsor, 2009; Parcell and Schroeder 2014; Taylor, 2007) and the data (e.g., Ball et al., 2016; Hoppe and Newton, 2016; Key, 2016) corroborate these findings. The trend in structural change is not expected to slow. And, these trends have given rise to competing supply chains in the livestock and meat industry that are similar to supply chain differences in other highly concentrated industries (see Woolverton and Parcell, 2008).

Competing supply chain models have been the cause for the diverse livestock production systems typical in 2016 that result in divergent use and user preferences for LMR information. The primary supply chain model is commodity focused realizing economies of size where bigger, and fewer, operations continue to get larger. In this system processors add value to base meat commodity products. The supply chain model with the greatest growing consumer interest is referred to as a value chain system where producers produce a specific trait, or set of traits, targeting a specific consumer group. In this system the identity of the highly valued trait is preserved from producer to consumer. Characteristics of these systems are:

Economies of size supply chain characteristics at the production level:

- 1) Continued growth, focused on revenues.
- 2) Traditional (local) financing no longer sufficient to serve financial needs.
- 3) Increased need to manage the “profit margin” and “revenue risk” through contracting inputs and outputs.

- 4) Increased capacity to access and analyze information and translate information for decision making.
- 5) Emphasize genetics to deliver a more quality consistent commodity (see for example Martinez and Zering, 2004).
- 6) Increased coordination between supply chain segments to respond to consumer preferences and to coordinates supplies.
- 7) Increased incentive to vertically integrate to better leverage information, management, and volume.

Value added supply chain characteristics at the production level:

- 1) Smaller size focused on trading technology for labor.
- 2) Greater profit margin potential, higher costs, and more production and financial risk.
- 3) Coordinated value chain to preserve quality characteristic identity.
- 4) Served by specialized processors able to maintain quality identity.
- 5) Increased coordination between supply chain segments to secure flow of payments from retailers and quality from producers.
- 6) Specific genetics to deliver necessary characteristics or enable a specific production system.

Both production systems, for different reasons, have evolved in their need for public information such as LMR. Producers are seeking better access to information that resides closer to the consumer and end-product they are ultimately selling.

Structural change at the production level is important to LMR and USDA-AMS for several reasons:

1. There will continue to be lower negotiated trading volume at the live animal level (see for example Grimes and Plain 2009). Large scale producers will continue to consolidate and rely heavily on alternative marketing arrangements. Niche value-added producers face substantial financial risk if not involved with an alternative marketing arrangement guaranteeing a price level and/or market outlet. There will be increased use of meat prices to establish the base price of live animals. This will magnify the scrutiny of calculations like composite and cutout values, as many producers will lack the knowledge of processing and fabrication costs, yields, and processes.
2. Producers focused on an economies of size supply chain system will increasingly look to vertical integration to maintain competitiveness. A positive externality of vertical integration will be increased producer access to meat values, yields, and processing and fabrication costs. Producers aligned in vertical business partnerships will be better equipped to use a meat value to establish value for their own live animals.
3. Quality attributes will continue to change to reflect adjusting consumer preferences (see for example Marsh and McDonnell, 2006). At the farm-level these changes will occur relatively slower because of biology and fixed investments in animals and production facilities. Economic theory reveals if the economic incentives are large enough, a niche attribute will transition to a commodity attribute over time. Because historical information

facilitates forecasting, data users will increasingly need to be cognizant that the commodity of the future may not be the same as the commodity of the past. Identifying correlations between old and new information will be important for users of LMR information.

4. To enhance strategic planning, producers will increasingly look to LMR information to shed light on forward trends in volume and prices. Producers who regularly market livestock will increasingly look to LMR information as they develop near-term price expectations. Forecasting is important aspect of operational and strategic planning (Armstrong, 1985; Armstrong and Brodie, 1999; and Armstrong, Brodie, and McIntyre, 1987).

2.2 Structural Change in Livestock Packers and Meat Processors

Similar to studies of structural change at the farm-level, considerable research has been conducted on structural change between the farm level and consumers (e.g., MacDonald et al, 2000; Ollinger et al, 2006; Nguyen and Ollinger, 2009). Such structural change has been heavily studied for implications on pricing behavior by processors (e.g., Azzam and Salvador, 2004; Perloff and Rauser, 1983; Lawrence, Muth, Taylor and Koontz, 2007; Njoroge, 2003).¹ The use of alternative marketing arrangements to negotiated trade in the food industry was first noted by Hayenga et al. 1979. Structural change has brought about change in how the industry conducts commerce.

Immense structural change has occurred in the cattle, sheep, and swine processing sectors since the LMR Act of 1999 became law. To highlight this change, three timelines were created to show the mergers and acquisitions in the livestock packing and meat processing industry by species (Figures 2-4). Structural change has had the following impacts

Structural change and changes in commerce

- 1) Entities closer to the consumer are more dependent on fewer processors.
- 2) Publically traded versus privately owned allows different access to capital.
- 3) Constant expectation of growth.
- 4) Sustained growth requires either new markets or the acquisition of competitors.
- 5) Maintaining demand growth requires dedicated supply.
- 6) Increased need to manage the “profit margin” and “revenue risk” through contracting inputs and outputs.
- 7) Need for product innovation to sustain, or gain, market share.
- 8) Increased dependence on other partners in the supply chain increases information sharing.
- 9) Fewer individuals needed to conduct purchases and sales between entities.

Because of the changes that occur with commerce, the past, present, and future mergers and acquisitions are important for LMR and USDA-AMS for several reasons:

¹ Research by Albaek, Mollgaard, and Overgaard (1997) and then Stuhmeier (2015) offer empirical evidence and theoretical motivation for how collusive behavior can develop and for why mandatory price reporting can lead to higher expected market prices.

1. The composition of companies that are reporting regular market information and data to USDA-AMS under LMR guidelines has changed significantly over time. This brings changes in volumes of products represented by individual companies and proliferation in the forms and types of products being produced and marketed by individual companies. For example, when a pork processor merges with a large hog producer, the result is a major shift from producer-marketed hogs to packer-owned hogs. Or when a packer acquires a branded food processor, the packer suddenly has a new set of branded product lines under its domain that may divert meat products from commodity markets to intra-firm transfers to more branded product lines. These types of events, occurring at a rapid pace in the livestock and meat industry, are having substantive impacts on the quantity, type, and form of information available for USDA-AMS reporting. Adapting LMR accordingly has been, and will continue to be, a major challenge.
2. Increased consolidation directly affects confidentiality concerns in market price reporting. For example, when two LMR reporting packers merge, there is an immediate increase in the probability that existing USDA-AMS price reporting categories for meat or livestock may not be reportable because of the existing confidentiality guideline. Beef, pork, and lamb industries are all experiencing consolidation directly affecting current price reporting confidentiality restrictions. The same confidentiality guideline is applied across all three species (swine, cattle, and sheep) and associated meat sectors. With markedly different industry structure and industry evolution, this is an issue many voiced as worthy of further consideration by LMR and USDA in the future.
3. Larger firms have increased incentives to better vertically coordinate their supply chain. As such alternative marketing arrangements for both inputs and outputs, inter- and intra-firm transfers, and partnering has become more commonplace. Such activities directly impact the form of information that becomes available to USDA-AMS for price reporting. Negotiated markets become more thinly traded and reported and the types and nature of alternative marketing arrangements become increasingly important to design more effective price reporting protocols.
4. As negotiated live animal trade thins, price discovery for live animals is more heavily tied to meat trade. While the impetus for the 1999 LMR Act was live animal trade, future enhancements to LMR will have more emphasis on meat trade.
5. As value added production systems develop medium-size meat processors are becoming more involved with identity preservation of the value added commodity attributes. Understanding the marketing mix of medium-size meat processors is important to know whether they are able to add volume to meat LMR or if their products are subject to confidentiality exclusion.

All such structural changes lead to changes in how livestock and meat marketing occurs impacting the structure and effectiveness of LMR.

The LMR Act of 1999 was intended to be flexible to meet evolving industry needs. The AMS has been responsive to needed changes. For example significant changes in LMR during the first couple of years when the Act took effect included adjusting confidentiality rules in August 2001,

just five months after inception, from the original “3/60” confidentiality guideline to the “3/70/20” rule.² Furthermore, adjustments to price reports are frequently made by AMS to make reports more reflective of current industry practices. With the changes occurring in the livestock and meat industries, LMR and USDA-AMS will need to continue to be vigilant in making adjustments to reporting procedures to optimize relevance and value for market participants.

² The 3/70/20 confidentiality rule followed by USDA for mandatory price reporting states: “The guideline consists of three requirements: (1) At least three reporting entities need to provide data at least 50 percent of the time over the most recent 60-day time period, (2) no single reporting entity may provide more than 70 percent of the data for a report over the most recent 60-day time period, and (3) no single reporting entity may be the sole reporting entity for an individual report more than 20 percent of the time over the most recent 60-day time period.” Federal Register, May 16, 2008 (p. 28,618)

Figure 2. Beef Industry Mergers & Acquisitions

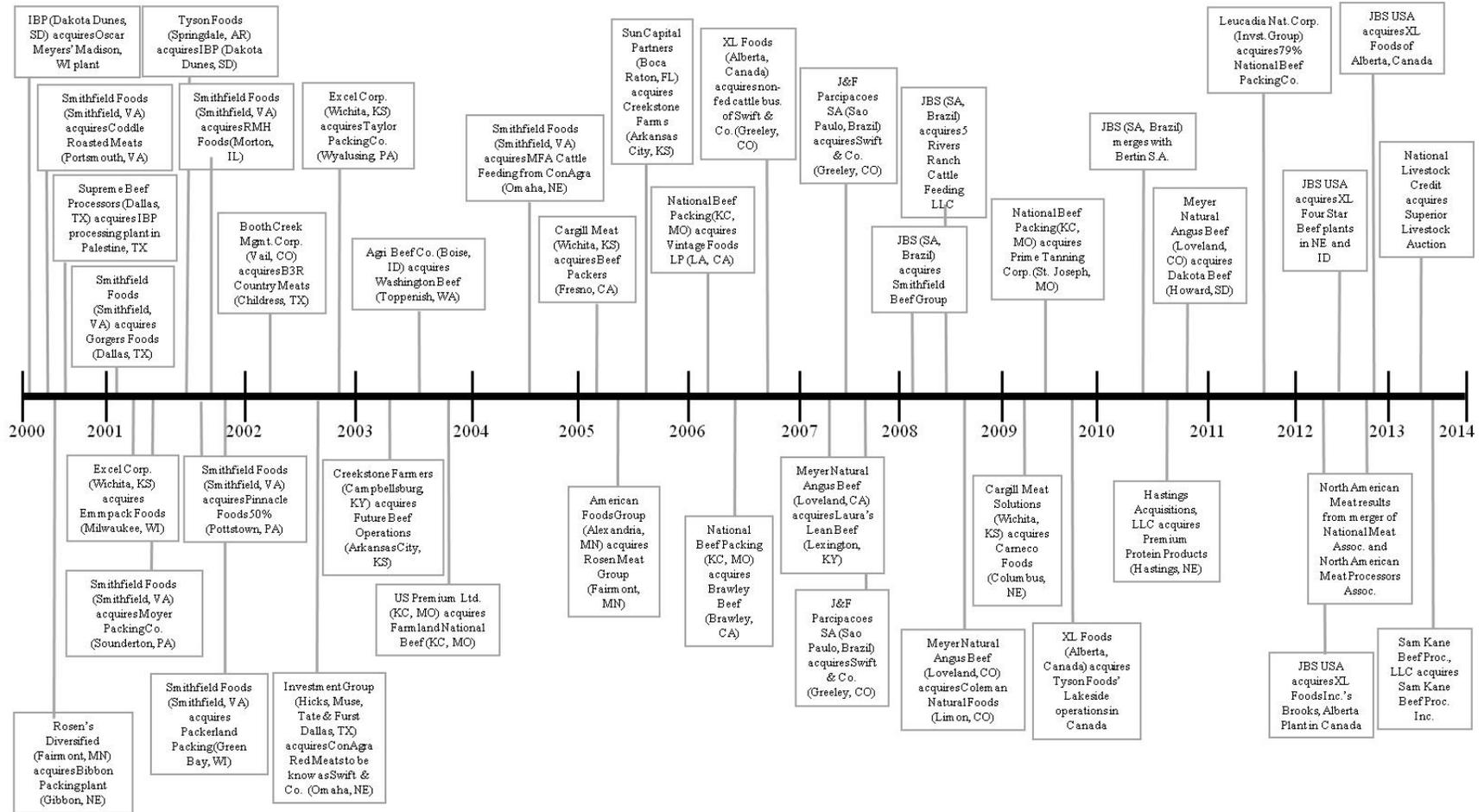


Figure 3. Lamb Industry Merger & Acquisitions

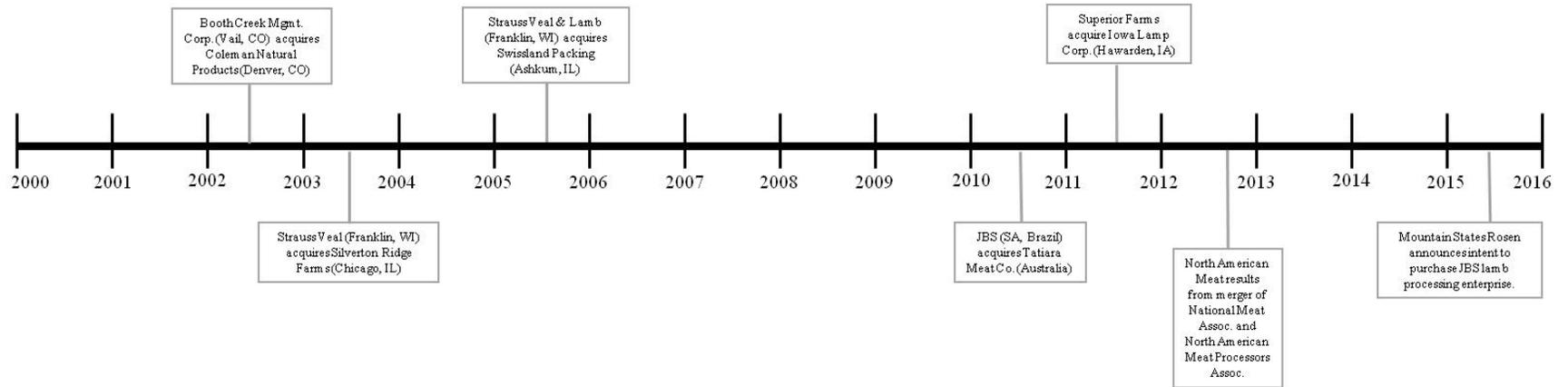
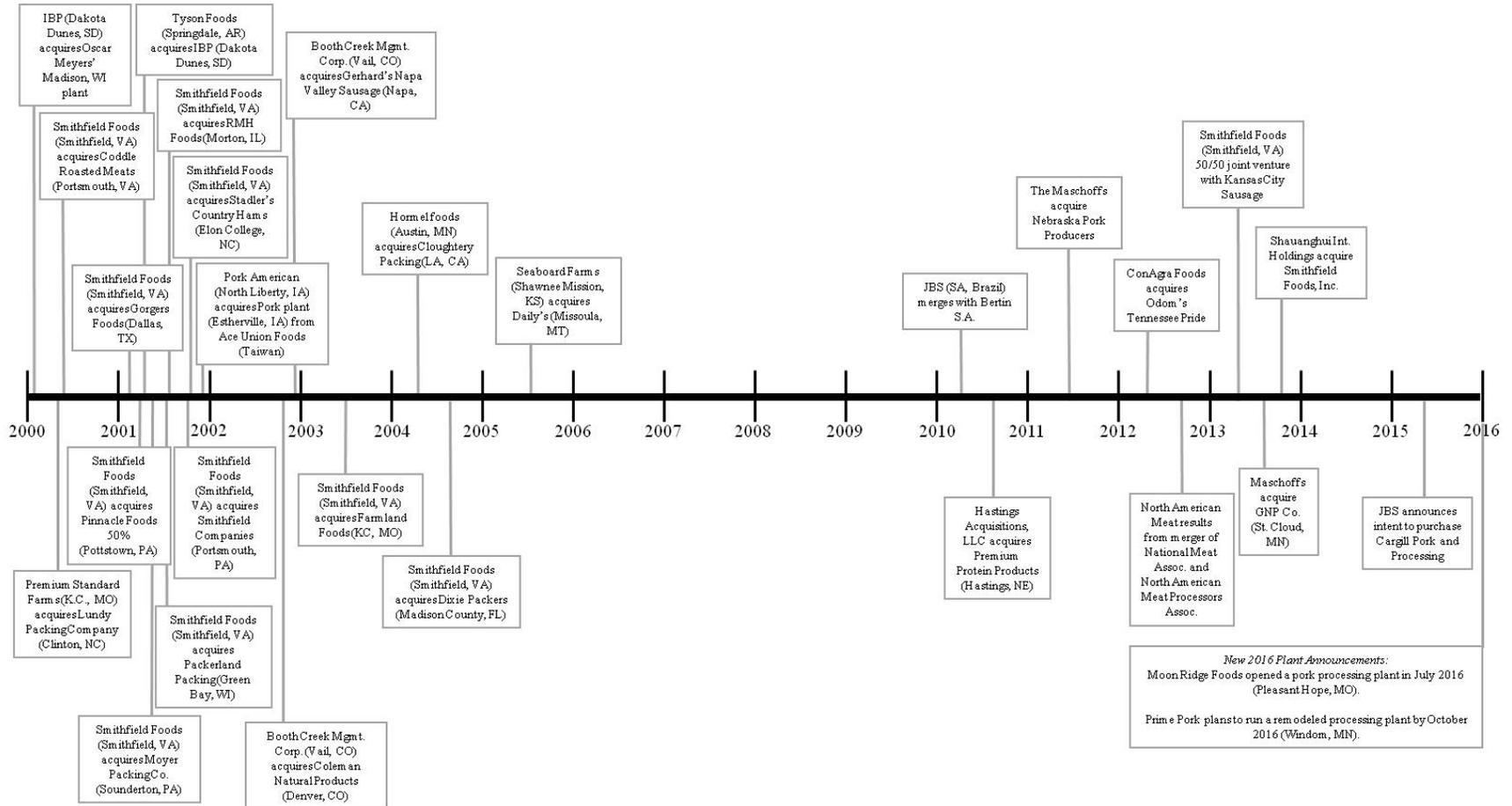


Figure 4. Swine Industry Mergers & Acquisitions



2.3 Changes in Livestock and Meat Marketing

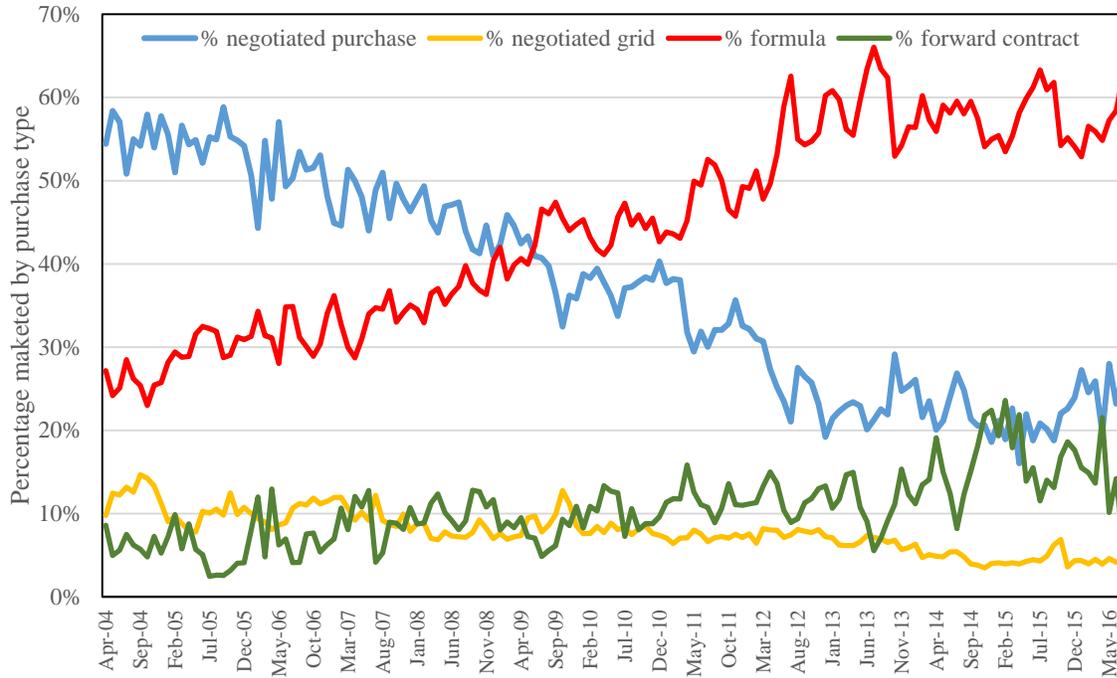
A number of authors have documented the impacts on livestock markets associated with LMR (e.g., Anderson et. al, 1998; Azzam, 2003; Bastian, Koontz, and Menkhous; 2001; Koontz, 1999; Njoroge et al., 2007; Pendell and Schroeder, 2006; Perry et al., 2005; Schroeder, Grunewald, and Ward, 2002; and Wachenheim and DeVuyst, 2001). Koontz and Ward (2011) review and synthesize all of the research up until 2011 that involve mandatory price reporting.

Livestock and meat products have experienced major shifts over time in how commerce occurs. Figures 5, 6, and 7 summarize changes in relative volumes of fed cattle, market hog and lamb sales methods over time. These trends are also summarized by the recent work of Adjemian et al. (2016a, b), while Purcell (1992) was the first to point out pricing and coordination issues as livestock market coordinate. Apparent in these charts is that what USDA-AMS categorizes as negotiated trade, has declined precipitously over the past 10-15 years. For example, negotiated fed cattle sales represented between 50-60% of volume in 2004 and dropped to 20-30% over the last couple of years. In contrast, formula trade went from about 30% to 60% of volume during this same time period. Market hogs went from 15% negotiated to less than 5% as packer-owned hogs nearly doubled from about 15% to 30%. Compounding the issue for both beef and lamb is that the volume of transactions has declined over time as beef production has declined and as imports of lamb have increasingly replaced domestic lamb production.

Boxed beef is also realizing significant changes in pricing methods (Figure 8). Negotiated 0-21 day sales have gone from about 50% of trade in 2002-03 to about 20% in 2016. Formula trade has increased from about 30% to 50% or more over the same time period. Longer term trends in relative pricing methods for wholesale pork are not readily available since LMR on wholesale pork is only available since July 2013 and boxed lamb pricing methods have not been regularly reported.

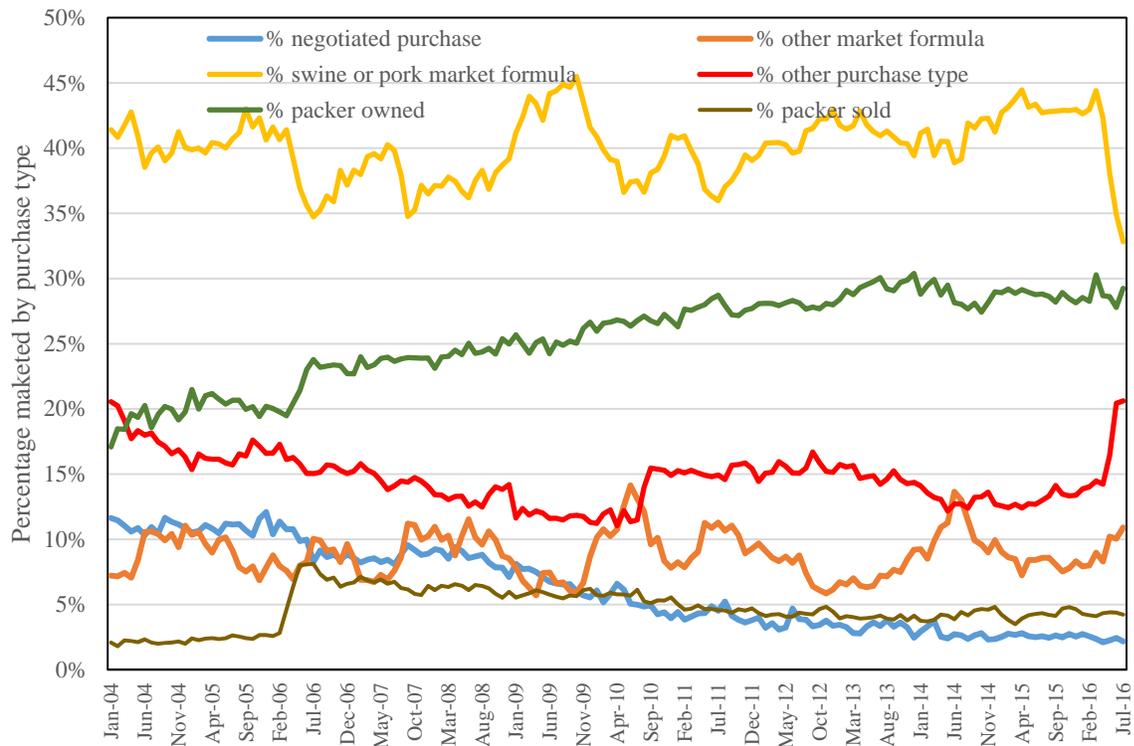
Note, in each of Figures 5 through 8 the outlier volume level in October 13 signifies the loss of transactions due to the government shutdown.

Figure 5. Total Cattle Sold by Transaction, Monthly April 2004 through July 2016.



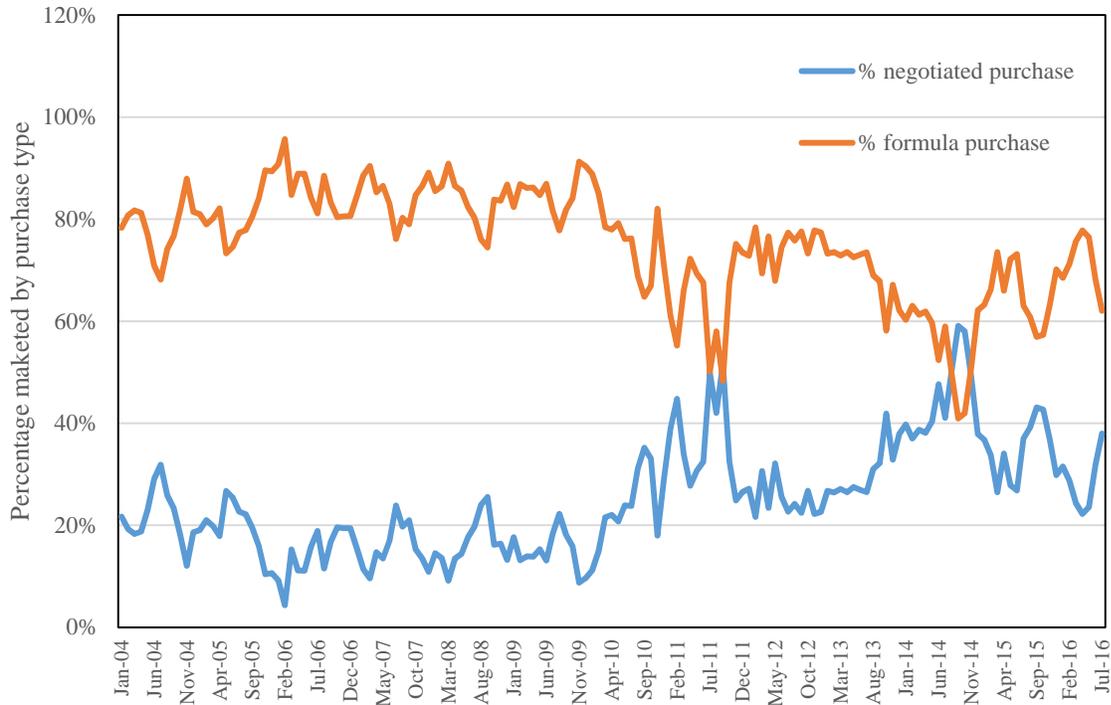
Data Source: USDA-AMS

Figure 6. U.S. Hogs Sold by Transaction and Total Head Transacted, Monthly 2004 through July 2016.



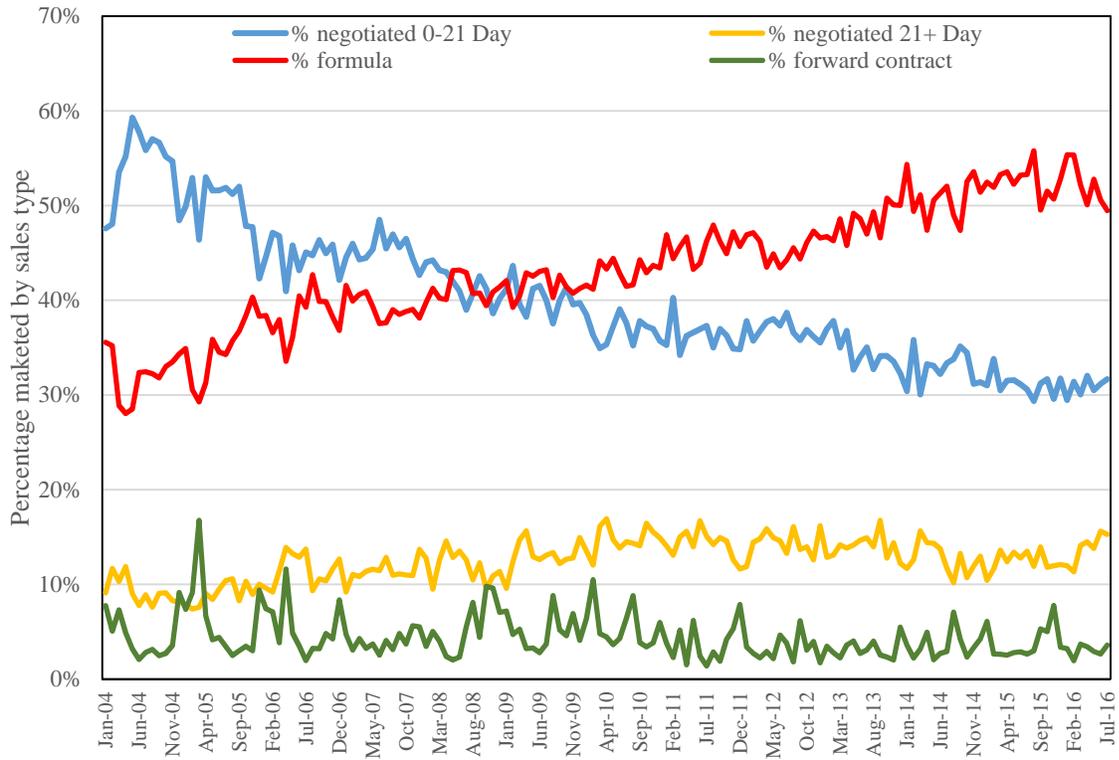
Data Source: USDA-AMS

Figure 7. U.S. Lambs Sold by Transaction, Monthly 2004 through July 2016.



Data Source: USDA-AMS

Figure 8. U.S. Beef Sales by Transaction, Monthly 2004 through July 2016.



Data Source: USDA-AMS

In our discussion with industry participants, consensus suggested trends toward less negotiated individual transactions and more forward contracts, marketing agreements, formula pricing, and packer-intra-firm transfers will continue for the foreseeable future. This is occurring because of several longer term business management strategies and, as such, recent trends will continue.

The trends in changing livestock and meat procurement methods have several implications for LMR:

1. Negotiated trade is thinning with fewer transactions across every sector being represented in this category (e.g., Nelson and Turner, 1995). Formula pricing is becoming more common. Much of formula pricing uses negotiated reported prices as the base in the formula. Thus, negotiated trade is being leveraged more heavily even as it declines in volume. This has shifted the role of LMR for negotiated prices more to price discovery in addition to price reporting. Any changes in LMR rules or USDA-AMS reporting protocols for negotiated prices directly impact many formula trades. This certainly increases the sensitivity to, and magnitude of, impact of adjustments to negotiated trade reporting protocols by AMS. Industry must carefully weigh the cost versus the benefit of a change before recommending adjustments to AMS or the LMR Act.
2. Because of the importance of negotiated price reports for a variety of industry concerns, there is considerable interest in maintaining reliable negotiated price reports. However, with thinning markets several challenges arise in accomplishing this goal:
 - a. The livestock industries represented here realize that thin markets will be subject to elevated confidentiality concerns making reporting more sporadic especially for disaggregated products reported more frequently (e.g. daily) or regionally (rather than nationally). Consideration and assessment for more product aggregation across time (e.g., daily to weekly reports), as multi-day rolling averages, across product form (e.g., composites as opposed to individual products), or across locations is needed. But this all has tradeoffs that must be assessed – the next three points illustrate such tradeoffs.
 - b. Aggregate or composite price reporting is one way to deal with thinning markets, but aggregation brings with it several issues. Based on our conversations with industry stakeholders, an increasing number of both livestock and meat alternative marketing arrangements are using USDA-AMS composite prices yet doing so with partially accurate understanding.
 - c. One way USDA-AMS might deal with thinning negotiated markets is to increase the length of time included in a specific report. Based on our conversations with industry stakeholders an increasing number of both livestock and meat alternative marketing arrangements are using USDA-AMS published weekly/rolling averages or are computing rolling averages for their own use in commerce and decision making. This can work during periods of stable markets, but when markets are moving up or down rapidly, increasing the length of time included in a report greatly reduces the value of the report. Industry stakeholders have differing perspectives on what time period constitutes establishing a market price. This is to be expected, as at the live

animal level the marketing patterns of hog producers and cattle and lamb producers differ due to the flow of production. This is a tradeoff that needs to be assessed industry-by-industry for implications.

- d. Because of the changes in which marketing and procurement is occurring through alternative marketing arrangements there is greater emphasis on looking forward. For example, the regulation was amended in 2008 to accommodate a change in negotiated cattle trade and include 15- to 30-day delivery transactions. Live cattle forms and reports now include both one- to 14-day and 15- to 30-day delivery windows. There will be increased demand for USDA-AMS to report forward looking information. However, this requires packers to increasingly report intentions rather than just what they have paid for livestock. This is addressed further in the next comment.
 - e. The issue of reporting packer intentions in MPR has raised concerns about the original intent of MPR. Intentions and plans for scheduled slaughter delivery by packers goes beyond being a mirror of what prices have been paid for livestock and associated volume in these transactions. This overall issue is one that deserves on-going assessment since this information on intentions of packers has largely been collected through discretionary interpretation of LMR and may not be in the Act itself.
3. Thin negotiated markets are bringing new forms of pricing into the array of price discovery institutions and platforms. The Fed Cattle Exchange, an electronic, web-based fed cattle market is one such example. There was considerable debate as this exchange was developed whether the prices from this market would, or even could legally, be included in LMR. This electronic market was launched by Superior Livestock Auctions as one way to increase the number of cash fed cattle transactions in the thinning negotiated fed cattle market. This market recently closed because of technical problems with software, but is reschedule to start trading again. The transactions that occurred in this market, as far as we understand, were not included in USDA LMR reports. This specific example simply illustrates the types of transactions that are likely to evolve. In this era of electronic commerce, more electronic livestock and meat markets are likely to evolve. AMS will continue to face these types of requests going forward.
 4. Several participants mentioned a desire to potentially include negotiated transactions from intra-company transfers in AMS reports. There was support for including these transactions when it is determined that the transaction occurred through negotiation (for background see Parcell, Brees and Giddens, 2003). Some participants went further and suggested that one party to the transaction be an independent producer, i.e., exclude packer intra-company transactions. Precedent exists for including intra-company trade when independent producers are involved. Farmland Industries, a cooperative, supplied hog data to LMR and included transactions where the independent producer was a cooperative patron. Similarly, US Premium Beef (USPB) farmer-owners contributed cattle to the former USPB majority-owned National Beef processing plants. USPB was organized initially as a cooperative and later as an LLC. With a number of farmer-owned swine processing plants planned to open, a large farmer-owned sheep processing plant operating as a major player in sheep processing, and interest in farmer-owned beef

processing, the potential exists to capture sufficient volume that would garner including these transactions. One concern is that intra-company transactions may not be market-determined. We highlight the issue here as one that AMS will be faced with again in the future.

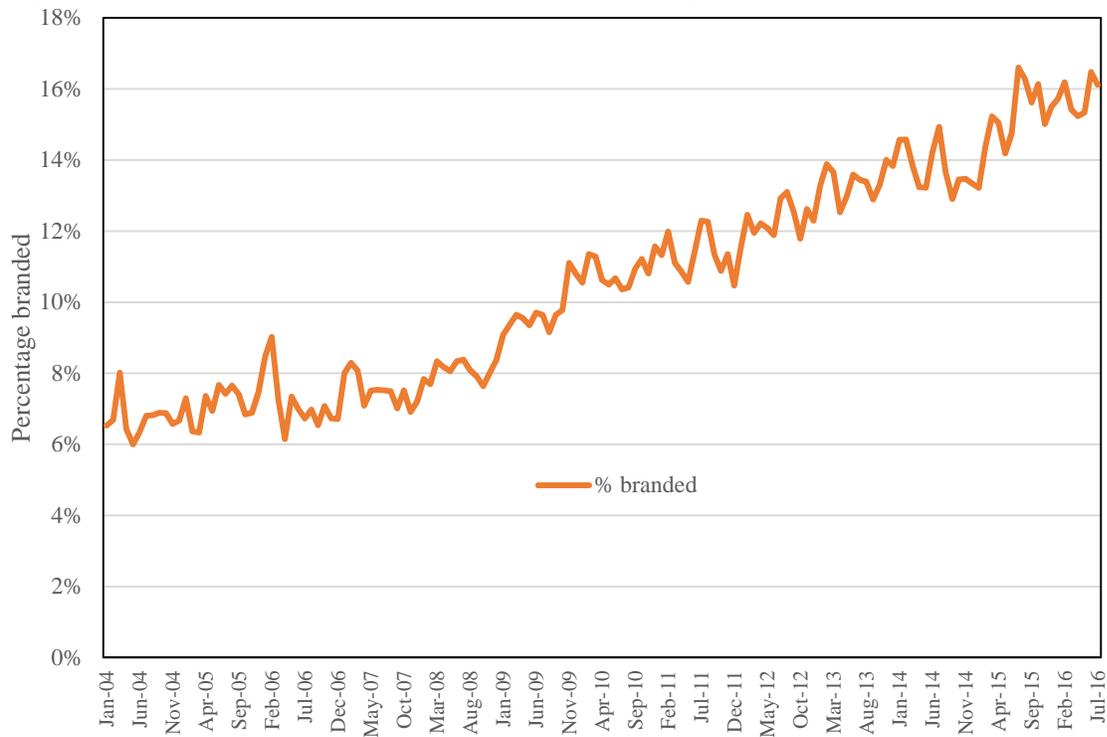
2.4 Product Proliferation and Price Reporting Standardization

There is considerable product proliferation occurring in meat markets. Increased case-ready product, specialty trimmed cuts, branded products and other forms of differentiation (naturally raised, etc.) are adding to a large array of meat products being marketed by reporting packers. Boxed lamb, pork, and boxed beef market participants consistently referenced product differentiation and proliferation reducing negotiated trade volume on commodity products as a significant current and future concern. Several researchers have documented the proliferation in retail-level branding efforts (e.g. Parcell and Schroeder, 2007; Schulz, Schroeder, and White, 2012; and Ward, Lusk, and Dutton, 2007). For example in the LMR data, Figure 9 summarizes the % of boxed beef indicated as being branded product relative to the total volume of boxed beef trade. Two common concerns surfaced regarding product differentiation. First, participants shared concern that product differentiation has increased use of alternative marketing arrangements in meat trade. Although using alternative marketing arrangements more frequently has reduced the volume of negotiated transactions, alternative marketing arrangement use is the reality of a more coordinated value chain driven by diverse consumer preferences. We expect use of alternative marketing arrangements to continue to increase and further erode negotiated meat trade volume.

The second concern is that of product differentiation whereby processors offering more case-ready product invokes the 3/70/20 confidentiality restriction. This is leading to new meat products that do not fit the IMPS code categories for either lamb or beef or lead to new product specification sheets for wholesale pork. As a result, either the product is only sold by one processor, or the product creates an entirely new product category that rarely trades. Furthermore, the niche primal categories take away trade volume from other primal categories and force these categories closer to the 3/70/20 confidentiality restriction.

Overall, this is an area that we heard a lot of discussion with industry participants. Many also provided general recommendations for addressing these concerns going forward. Without doubt, this is a major topic with need for substantive assessment as LMR and USDA-AMS contemplate meat price reporting in the future.

Figure 9. Branded Beef Sales, Monthly 2004 through July 2016.



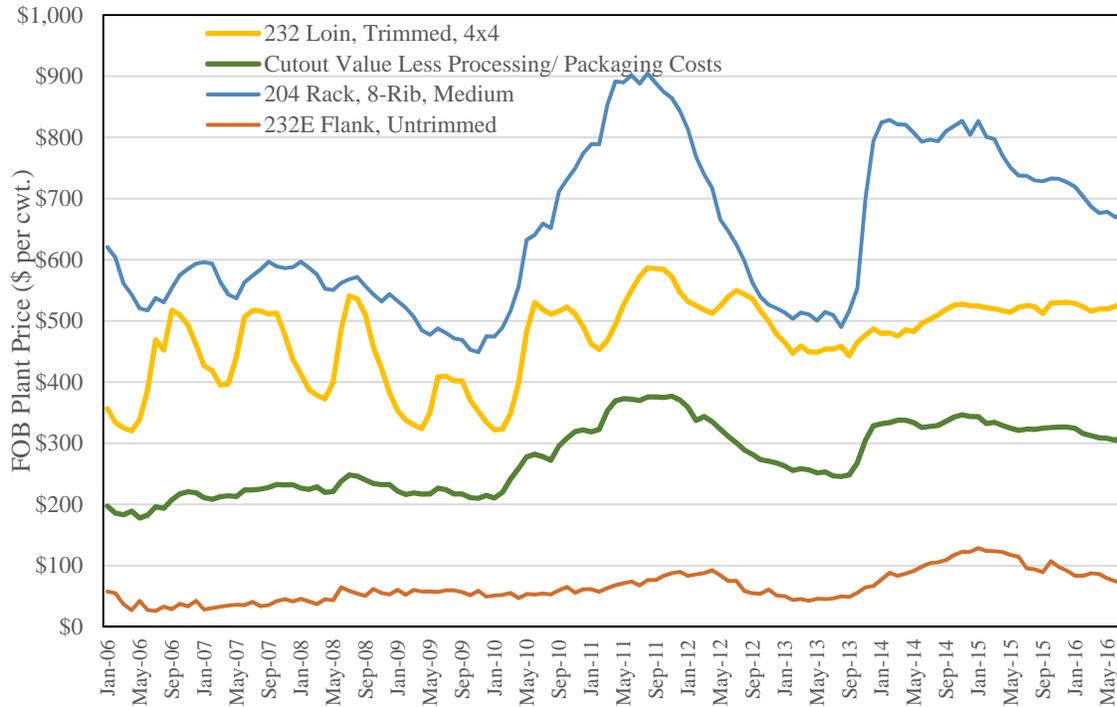
Data Source: USDA-AMS

2.5 Composite and Primal Calculations

Composite and primal value calculations are increasingly being used as the base price for meat alternative marketing arrangements (AMAs). An increasing number of live animal transactions also use the cutout value, or carcass, composite to establish base prices. Composite calculations were voluntarily offered by AMS in response to industry interest in tracking overall value proposition. Composite calculations were not intended for price discovery purposes. However, industry participants found comfort in composite calculations, and they adopted them into alternative marketing arrangements and used them for business decision making. Across the beef, lamb, and pork industries, the value of these composite calculations is increasing and will most likely continue to increase in use.

Both Tomek (198) and Franke, Parcell, and Tonsor (2011) show the importance of the number of transactions to the confidence in the price level. As certain markets thin, data users will look to alternative markets. Motivation for adoption of composite calculations is the high degree of correlation between the primal or cutout has to the underlying commodity, or product, being priced off. Also, data users are more comfortable with the series' because of the greater frequency of a price being reported. For example, Figure 10 is a summary of the consistency and low variability for certain lamb primals and lamb cutout. And, Figure 11 is the example of the correlation in movement between the choice boxed beef cutout and two negotiated live cattle price series.

Figure 10. Lamb Primal and Cutout Prices, Monthly 2006 through July 2016.



Data Source: USDA-AMS

Figure 11. Choice Beef Cutout and Selected Choice Live Cattle Prices, Weekly 2006 through July 2016.



Data Source: USDA-AMS

2.6 International Trade

Trade is immensely important to the US livestock and meat industry and this will continue into the foreseeable future. This is an area all industry participants agreed upon. There were also sentiments strongly supporting more reporting of especially North American trade -- specifically, inclusion of Canada and Mexico -- in beef LMR. Some participants expressed reservation that including North American trade would not sufficiently add to negotiated trade liquidity and justify the costs of submitting data, auditing, and adjusting the AMS reporting system. The percent of total US beef exports to domestic US production is 10% in 2015 (see Table). Approximately 1/3 of total US beef exports is to either Canada or Mexico. With increased importance of international trade in livestock and meat markets, there is desire by industry for consideration of incorporating similar muscle cut specification North American trade in with domestic trade price reporting.

CHAPTER 3: LMR IN A DYNAMIC INDUSTRY

The nature, magnitude, and velocity of changes occurring in livestock and meat markets indicates LMR and USDA-MPR will face regular changes in how commerce occurs, in structural issues with reporting firms, and in product changes over time. Nearly every interview we conducted pointed to immense value that could be gained from coordinated regular communication with USDA between reauthorization periods.

Interview participants provided a number of anecdotes about significant industry change being a factor that would bring value to regularly scheduled meetings open to LMR data providers and LMR data users. Some industry changes occurred relatively quickly, and AMS was able to implement an adjustment because of strong industry advocacy and awareness, e.g., prevalence in use of basis contracts and adding this as a transaction category. Some changes have been completely unforeseen, e.g., the current trend away from processors trimming grind at the plant instead of retail due to FSIS ruling that retail trimming presents a food safety concern. Or, when there is a situation of how to report products and into what bucket differentiated products are being reported, e.g., country of origin labeling law with exemptions (see Tonsor, Schroeder, and Parcell 2015) and subsequent repeal of the law. Or, when there are longer term industry issues like thinning markets and the need for broad-based prioritization and study of means by which to sustain negotiated trade. The area of continued communication with industry and USDA-AMS is a fruitful area for additional effort. Ultimately any efforts by USDA-AMS to expand communication with the industry must be reciprocated by industry representatives to be successful.

Some interviewed stakeholders acknowledged the AMS development of the MPR Data Mart portal as providing both better access and enhanced transparency of LMR data. Some stakeholders without access to analytical resources, however, still seem to have trouble knowing what to do with the immense amount of information available through the MPR Data Mart portal

Every industry participant we visited with said USDA-AMS is approachable, responsive, and willing to help address issues that arise. Despite this willingness to help, our multiple discussions with stakeholders from each industry, made it apparent that confusion exists about the information contained in various price reports and especially in composite values such as cutout and primal values. Several comments indicated a desire for additional transparency and documentation of underlying processes used in deriving composite values. In short, the net social value of LMR could expand if additional documentation were provided. Industry in turn could enhance social value by more regularly providing updated yield and cost information for composite calculations by USDA-AMS.

Beyond coordinated communication, all parties involved would be well served by a systematic process by which proposed adjustments to LMR are empirically assessed both for direct and indirect implications *before* being implemented. Given the dynamic and diverse nature of the livestock and meat industry as synthesized in this report the need for an empirical assessment of candidate changes only grows over time. In many cases, but not all, this will require engagement of third-party experts with appropriate skills and unbiased roles in assessing proposed changes.

CHAPTER 4: REFERENCES

- Adjemian, M.K., T.L. Saitone, and R.J. Sexton 2016a. "A Framework to Analyze the Performance of Thinly Traded Agricultural Commodity Markets." *American Journal of Agricultural Economics*. 98:581-596.
- Adjemian, M.K., B.W. Brorsen, T.L. Saitone, and R.J. Sexton 2016b. "Thin Markets Raise Concerns, But Many are Capable of Paying Producers Fair Prices." USDA, Economic Research Service, March 2016.
- Albaek, S., P. Mollgaard, and P.B. Overgaard. 1997. "Government-Assisted Oligopoly Coordination? A Concrete Case." *Journal of Industrial Economics* 45:429-443.
- Anderson, J.D., C.E. Ward, S.R. Koontz, D.S. Peel, and J.N. Trapp. 1998. "Experimental Simulation of Public Information Impacts on Price Discovery and Marketing Efficiency in the Fed Cattle Market." *Journal of Agricultural and Resource Economics* 23(1):262-278.
- Armstrong, J.S. and R.J. Brodie. 1999. "Forecasting for Marketing." *Quantitative Methods in Marketing*. Second Edition. London: International Thompson Business Press.
- Armstrong, J.S., R.J. Brodie, and S.H. McIntyre. 1987. "Forecasting Methods for Marketing: Review of Empirical Research." *International Journal of Forecasting* 3:355-376.
- Armstrong, J. 1985. *Long-Range Forecasting*. New York: John Wiley
- Azzam, A. 2003. "Market Transparency and Market Structure: The Livestock Mandatory Reporting Act of 1999." *American Journal of Agricultural Economics* 85:387-395.
- Azzam, A. and S. Salvador. 2004. "Information Pooling and Collusion: An Empirical Analysis." *Information Economics and Policy* 16:275-86.
- Becker, G. 2006. "Livestock Price Reporting: Background." CRS Report for Congress. Order Code RS21994, October. Available at: <http://www.nationalaglawcenter.org/assets/crs/RS21994.pdf>.
- Ball, E. S.L. Wang, R. Nehring, and R. Mosheim. "Agricultural Productivity in the U.S." USDA, Economic Research Service, May 2016
- Barkema, Alan, Mark Drabenstott, and Kelly Welch. "The Quiet Revolution in the U.S. Food Market," Economic Review (Federal Reserve Bank of Kansas City), May/June 1991. The Economist. Dec. 4, 1993.
- Bastian, C.T., S.R. Koontz, and D.J. Menkhous. 2001. "Will Mandatory Price Reporting Improve Pricing and Production Efficiency in an Experimental Market for Fed Cattle?" NCR-134 Conference on Applied Commodity Price Analysis, Forecasting and Market Risk Management. St. Louis, 23-24 April.
- Franken, J., J. Parcell, and G. Tonsor. 2011. "Impact of Mandatory Price Reporting on Hog Market Integration." *Journal of Agricultural and Applied Economics*. 43, 2: 229-241.
- Grimes, G., and R. Plain. 2009. "US Hog Marketing Contract Study." Unpublished report, University of Missouri, Columbia, MO.
- Hayenga, M.L., B.L. Gardner, A.B. Paul, and J.P. Houck. 1978. "The Concept of a Thin Market." In Pricing Problems in the Food Industry (with Emphasis on Thin Markets), ed., M.L. Hayenga, pp. 7-13. Monograph No. 7, North Central Regional Research Project NC-117.
- Hoppe, R. D. Newton. 2016. "Farm Structure and Organization" USDA, Economic Research Service.
- Jones, K.G. 2004. "Trends in the U.S. Sheep Industry." USDA, Economic Research Service.
- Key, N. and W.D. McBride. 2007. "The Changing Economics of U.S. Hog Production." USDA, Economic Research Service.
- Key, N. 2016. "Livestock Production Practices." USDA, Economic Research Service.

- Koontz, S.R. 1999. "Accuracy of United States Department of Agriculture Fed Cattle Price Reporting: Is Mandatory Price Reporting Needed?" NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management.
- Lawrence, J.D., M.K. Muth, J. Taylor, and S.R. Koontz. 2007. "Meat Processors Purchasing and Sale Practices: Lessons Learned from the Grain Inspection, Packers, and Stockyards Administration Livestock and Meat Marketing Study." NCCC-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. Chicago, Illinois.
- Marsh, J.M. and T. McDonnell. 2006. "Livestock Mandatory Price Reporting and Effects on Lamb Price Risk." Agricultural Marketing Policy Center, Montana State University, Paper No. 18. November.
- Martinez, S. and K. Zering. 2004. "Pork Quality and the Role of Market Organization." United States Department of Agriculture, Economic Research Service. Agricultural Economic Report Number 835.
- MacDonald, James M. & Ollinger, Michael & Nelson, Kenneth E. & Handy, Charles R., 2000. "Consolidation In U.S. Meatpacking," Agricultural Economics Reports 34021, United States Department of Agriculture, Economic Research Service.
- McGrann, J. 2007. "The United States Beef Cattle Industry: Production, Structure, and Trends." Texas A & M University.
- Nelson, R.G. and S.C. Turner. 1995. "Experimental Examination of a Thin Market: Price Behavior in a Declining Terminal Market Revisited." *Journal of Agricultural and Applied Economics* 27:149-160.
- Njoroge, K., A. Yiannaka, K. Giannakas, and A.M. Azzam. 2007. "Market and Welfare Effects of the U.S. Livestock Mandatory Reporting Act." *Southern Economic Journal* 74(1, January):290-311.
- Njoroge, K. 2003. "Information Pooling and Collusion: Implications for the Livestock Mandatory Reporting Act." *Journal of Agricultural and Food Industrial Organization* 1(Article 14):1-13.
- O'Donoghue, E., R. Hoppe, D. Banker, R. Ebel, K. Fuglie, P. Korb, M. Livingston, C. Nickerson, and C. Sandretto. 2011. "The Changing Organization of U.S. Farming." USDA, Economic Research Service.
- Okrent, A.M., and A. Kumcu. 2016. "U.S. Households's Demand for Convenience Foods." United States Department of Agriculture Economic Research Service Report Number 211. .
- Ollinger, Michael & Nguyen, Sang V. & Blayney, Donald P. & Chambers, William & Nelson, Kenneth B., 2006. "Food Industry Mergers and Acquisitions Lead to Higher Labor Productivity," Economic Research Report 7246, United States Department of Agriculture, Economic Research Service.
- Parcell, J.L., M. Brees, and N. Giddens. 2002 "Establishing the Transfer Price: Balancing Businesses" MU Guide G642, 3p.
- Parcell, J.L., and T.C. Schroeder. 2007. "Hedonic Retail Beef and Pork Prices." *Journal of Agricultural and Applied Economics* 39(1): 29-46
- Parcell J.L., T.C. Schroeder, and G.T. Tonsor. 2009. "Wholesale Pork Price Reporting Analysis." Commissioned by the Agricultural Marketing Service, USDA. *Value Ag, LLC*.
- Parcell and Schroeder. 2014. "Development of Methodology for Calculating Estimated Net Price Information for Negotiated Barrows and Gilts. Commissioned by the Agricultural Marketing Service, USDA. *Value Ag, LLC*.
- Parcell, J.L., and G. Tonsor. 2012. "Information and Market Institutions." In W. Armbruster and R. Knutson (Eds.), *Marketing Policy*. New York, NY: Springer Publishing
- Pendell, D.L. and T.C. Schroeder. 2006. "Impact of Mandatory Price Reporting of Fed Cattle Market Integration." *Journal of Agricultural and Resource Economics* 31(December):568-579.

- Perry, J., J. McDonald, K. Nelson, W. Hahn, C. Arnade, and G. Plato. 2005. "Did the Mandatory Requirement Aid the Market? Impact of the Livestock Mandatory Reporting Act." United States Department of Agriculture, Economic Research Service, LDP-M-135-01. September.
- Perloff, J.M. and G.C. Rausser. 1983. "The Effect of Asymmetrically Held Information and Market Power in Agricultural Markets." *American Journal of Agricultural Economics* 65(2, May):366-372.
- Purcell, W.D. 1992. "Pricing and Competition in Concentrated Livestock Markets." Pricing and Coordination in Consolidated Livestock Markets. Blacksburg: Research Institute on Livestock Pricing.
- Rhodes, J.V., J. Dauve, and J.L. Parcell. 2015. *The Agricultural Marketing System*. 7th Edition. Mizzou Publishing (Columbia, Missouri).
- Schroeder, T.C., S. Grunewald, and C. Ward. 2002. "Mandatory Price Reporting in Fed Cattle Markets: Motivations and Implications." *Council on Food, Agricultural, and Resource Economics (C-FARE) Annual Symposium, Public Information and the Food and Agricultural System*. November 6, 2002. Washington, DC.
- Schulz, L., T. Schroeder, and K. White. 2012. "Value of Hedonic Steak Branding: Hedonic Analysis of Retail Scanner Data." *Agricultural and Resource Economics Review*. 41(2): 260-273.
- Stigler, J. 1961. "The Economics of Information." *The Journal of Political Economy*. 69(3), 213-225.
- Stuhmeier, T. 2015. "Price Disclosure Rules and Consumer Price Comparison." *The B.E. Journal of Economic Analysis and Policy*. 2(15):815-35.
- Taylor, R. 2007. "Market Structure of the Livestock Industry." Testimony to the US House of Representative Committee on Agriculture, Subcommittee on Livestock, Dairy, and Poultry.
- Tomek, W.G. 1980. "Price Behavior on a Declining Terminal Market." *American Journal of Agricultural Economics*, 62(3), 434-444.
- Tonsor, G., T. Schroeder, and J. Parcell. 2015. "Economic Impacts of 2009 and 2013 U.S. Country-of-Origin Labeling Rules on U.S. Beef and Pork Markets." Report to the Office of Chief Economist.
- Ward, C.E., and S. Koontz. 2011. "Livestock Mandatory Price Reporting: A Literature Review and Synthesis of Related Market Information." *Journal of Agricultural & Food Industrial Organization*. Volume 9:1-31.
- Ward, C.E., J.L. Lusk, and J.M. Dutton. 2007 "Extent and Characteristics of Retail Fresh Beef Branding." *Journal of Food Distribution Research* 39(3): 79-90.
- Wachenheim, C.J. and E.A. DeVuyst. 2001. "Strategic Response to Mandatory Reporting Legislation in the U.S. Livestock and Meat Industries: Are Collusive Opportunities Enhanced?" *Agribusiness* 17(2):177-195.
- Woolverton, A. and J. Parcell. 2008. "Can Niche Agriculturalists Take Notes from the Craft Beer Industry?" *Journal of Food Distribution Research*. 39(2).