

January 2007

# **GIPSA Livestock and Meat Marketing Study**

Contract No. 53-32KW-4-028

## **Volume 1: Executive Summary and Overview Final Report**

Prepared for

**Grain Inspection, Packers and Stockyard Administration**  
U.S. Department of Agriculture  
Washington, DC 20250

Prepared by

**RTI International**  
Health, Social, and Economics Research  
Research Triangle Park, NC 27709

RTI Project Number 0209230





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RTI International is a trade name of Research Triangle Institute.



# Abstract

Over time, the variety, complexity, and use of alternative marketing arrangements (AMAs) have increased in the livestock and meat industries. Marketing arrangements refer to the methods by which livestock and meat are transferred through successive stages of production and marketing. Increased use of AMAs raises a number of questions about their effects on economic efficiency and on the distribution of the benefits and costs of livestock and meat production and consumption between producers and consumers. This final report focuses on AMAs used in the beef, pork, and lamb industries from the sale of live animals to final meat sales to consumers and addresses the following parts of the Grain Inspection, Packers and Stockyard Administration (GIPSA) Livestock and Meat Marketing Study:

- Part C. Determine extent of use, analyze price differences, and analyze short-run market price effects of AMAs.
- Part D. Measure and compare costs and benefits associated with spot marketing arrangements and AMAs.
- Part E. Analyze the implications of AMAs for the livestock and meat marketing system.

This final report follows the publication of an interim report for the study that used qualitative sources of information to identify and classify AMAs and to describe their terms, availability, and reasons for use. The portion of the study contained in this final report is based on quantitative analyses using industry survey data from producers, feeders, packers, processors, wholesalers, retailers, and food service operators; transactions data and profit and loss (P&L) statements from packers and processors; Mandatory Price Reporting (MPR) data; and a variety of other published data sources.

The final report contains separate volumes that describe the data collection methods and results (Volume 2) and the analysis results for the beef industry (Volume 3), the pork industry (Volume 4), the lamb industry (Volume 5), and meat distribution and sales (Volume 6). Volumes 3 through 6 address the effects of AMAs on prices, costs, quality, risk, and consumers and producers, to the extent feasible given the availability of data.

The principal contributors to this study are the following:

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# Executive Summary

As part of the congressionally mandated Livestock and Meat Marketing Study, this volume of the final report presents the results of analyses of the effects of alternative marketing arrangements (AMAs) in the fed cattle and beef, hog and pork, and lamb and lamb meat industries. This final report focuses on determining the extent of use of AMAs, analyzing price differences and price effects associated with AMAs, measuring the costs and benefits associated with using AMAs, and assessing the broad range of implications of AMAs. The analyses in this volume were conducted using results of industry interviews, industry survey data, transactions and profit and loss (P&L) statement data from meat packers, Mandatory Price Reporting (MPR) data, and data from other publicly available sources. Analyses are limited to the economic factors associated with AMA use, and the report does not analyze policy options or make policy recommendations.

In this report, AMAs refer to all possible alternatives to the cash or spot market. AMAs include arrangements such as forward contracts, marketing agreements, procurement or marketing contracts, production contracts, packer ownership, custom feeding, and custom slaughter. Cash or spot market transactions refer to transactions that occur immediately, or "on the spot." These include auction barn sales; video or electronic auction sales; sales through order buyers, dealers, and brokers; and direct trades.

It is important to note that the data collection period for the study, October 2002 through March 2005, was an unusual time for the U.S. meat industry. The beef industry experienced a

turbulent market because of the discovery of bovine spongiform encephalopathy (BSE) in North America. The initial BSE case in Canada in May 2003 stopped imports of live cattle to the United States. The first U.S. case of BSE in December 2003 blocked U.S. beef exports until July 2005. Cattle prices set annual record highs in 2003, 2004, and 2005. Packers experienced significant losses because of tight cattle supplies and continued imports of Canadian boxed beef. While hog prices were not at record highs, hog producer returns, which were negative during 2002 and much of 2003, turned positive from February 2004 through the end of 2006. The higher hog prices in 2004 and 2005 came at a time of record production, while demand for pork improved. Lamb prices increased sharply—setting record highs in the first quarter and second quarters of 2005—while the supply of lambs declined.

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## **ES.1 GENERAL STUDY CONCLUSIONS**

Within the context of these market conditions, the general conclusions of the study are as follows:

- Use of AMAs during the October 2002 through March 2005 period, including packer ownership, is estimated at 38% of the fed beef cattle volume, 89% of the finish hog volume, and 44% of the fed lamb volume sold to packers.
- Packer-owned livestock accounted for a small percentage of transactions for beef and lamb (5% or less), even when the small percentage of partial ownership arrangements is included, but accounted for a large percentage of transactions for pork (20% to 30% depending on assumptions).
- Given the current environment and recent trends, we expect moderate increases in use of AMAs in the lamb industry, but little or no increase in the beef and pork industries.
- Cash market transactions serve an important purpose in the industry, particularly for small producers and small packers. In addition, reported cash prices are frequently used as the base for formula pricing for cash market and AMA purchases of livestock and meat.
- The use of AMAs is associated with lower cash market prices, with a much larger effect occurring for finished hogs than for fed cattle.

- Many meat packers and livestock producers obtain benefits through the use of AMAs, including management of costs, management of risk (market access and price risk), and assurance of quality and consistency of quality.
- In aggregate, restrictions on the use of AMAs for sale of livestock to meat packers would have negative economic effects on livestock producers, meat packers, and consumers.

Primary conclusions for this final report by species are described below.

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## ES.2 FED CATTLE AND BEEF INDUSTRIES

The primary conclusions for this final report, as they relate to the fed cattle and beef industries (Volume 3), are as follows:

- **The beef producers and packers interviewed believed that some types of AMAs helped them manage their operations more efficiently, reduced risk, and improved beef quality.** Feedlots identified cost savings of \$1 to \$17 per head from improved capacity utilization, more standardized feeding programs, and reduced financial commitments required to keep the feedlot at capacity. Packers identified cost savings of \$0.40 per head in reduced procurement cost. Both agreed that if packers could not own cattle, higher returns would be needed to attract other investors and that beef quality would suffer in an all-commodity market place.
- **Eighty-five percent of small producers surveyed used only the cash market when selling to packers, compared with 24% for large producers, and pricing methods also differed by size of operation.** Large producers used multiple pricing methods, including individually negotiated pricing (74% of producers), public auction (35%), and formula pricing (57%). In comparison, small producers used individually negotiated pricing (32%), public auction (84%), and formula pricing (6%). Four times as many large producers sold cattle on a carcass weight basis with a grid compared with small producers.
- **Ten percent of large beef packers surveyed reported using only the cash or spot market to purchase cattle, compared with 78% of small beef packers.** Large packers relied heavily on direct trade and less on auction barns and dealers or brokers for their cattle procurement compared with small packers.

Conversely, small packers used AMAs for approximately half as much on a percentage basis as large packers. Both large and small packers used multiple pricing methods when buying cattle, including individually negotiated prices, formula pricing, public auction, and internal transfer pricing. While nearly all packers bought some cattle on a liveweight basis, 88% of large packers purchased cattle based on carcass weight with grids, while almost no small packers used this type of valuation.

- **Neither the producers nor packers surveyed expected the use of AMAs to change dramatically in the next 3 years.** In addition, they indicated that their use of AMAs had not changed significantly from 3 years earlier. Auction markets were the predominate marketing method across all producers selling cattle and calves. Based on the survey results, which tend to represent smaller packers, 19% of fed cattle are purchased through auctions. This is a substantially higher percentage than the estimate based on the transactions data obtained from larger packers.
- **The producers surveyed that used AMAs identified the ability to buy/sell higher quality cattle, improve supply management, and obtain better prices as the leading reasons for using AMAs.** In contrast, the producers surveyed that used only cash markets identified independence, flexibility, quick response to changing market conditions, and ability to buy at lower prices and sell at higher prices as primary reasons for using only cash or spot markets.
- **The packers surveyed that used AMAs said that their top three reasons for using AMAs were to improve week-to-week supply management, secure higher quality cattle, and allow for product branding in retail stores.** Much like producers, packers that used only cash markets identified independence, flexibility, quick response to changing market conditions, and securing higher quality cattle as reasons for using only the cash or spot market.
- **Transactions data summarized from the 29 largest beef packing plants during the time period of the study included more than 58 million cattle and 590,000 transactions and indicated that the cash or spot market was the predominate purchase method used.** Specific estimates of the percentage of cattle purchased through each type of marketing arrangement are as follows:

Note: To ensure the confidentiality of the companies that provided data for this study, the packer ownership category is often combined with other categories in the summary statistics presented in this volume. Results of analysis for the packer ownership category are provided in cases for which the results do not reveal company-specific confidential information.

- 61.7% cash or spot market
- 28.8% marketing agreements
- 4.5% forward contracts
- 5.0% packer owned, other method, or missing information

Thus, marketing agreements are the primary AMA used in the fed cattle and beef industries, but other types of AMAs are used extensively by individual firms for specific reasons that benefit their operations.

- **Transactions data indicate that packing plants in the Cornbelt/Northeast used AMAs less frequently than plants in the High Plains or West regions.** High Plains plants procured 61% of cattle by direct trade, 30% through marketing agreements, and a very small percentage through auctions and forward contracts. Cornbelt/Northeast plants bought the majority of their cattle by direct trade, but some were purchased through auctions and marketing agreements. Plants in the West bought a lower percentage by direct trade compared with the other regions and a higher percentage through marketing agreements and auction barns.
- **Individually negotiated pricing was the most common method used to determine purchase prices for fed cattle.** Specifically, 60% of cattle purchased by plants in the High Plains used individually negotiated pricing, with a similar percentage in the Cornbelt/Northeast and a substantially lower percentage in the West. Formula pricing was used to purchase 34% of the cattle in the High Plains, with a higher percentage in the West and a substantially lower percentage in the Cornbelt/Northeast. The formula was based most often on either U.S. Department of Agriculture (USDA)-reported prices or subscription service prices. Cornbelt/Northeast packers purchased the largest percentage of cattle on a liveweight basis (47%) in comparison with the High Plains (40%) and the West (25%). Packers in the West purchased more than half of their cattle using carcass weight with grid valuation, while packers in the High Plains and Cornbelt/Northeast used this valuation method for 42% and 44% of their purchases, respectively. The remainder were predominately purchased on a carcass weight basis without a grid.

- **Regression analysis of the relationship between all fed cattle transactions prices and use of marketing arrangements indicates that, relative to direct trade transactions, prices for fed cattle sold through auction barns tended to be somewhat higher and prices for fed cattle sold through forward contracts tended to be somewhat lower.** These results are likely due, in part, to the differences in risk associated with the two methods: auction barn sales are subject to greater price risk, but forward contracts ensure market access and a guaranteed price for cattle producers. However, the results also are influenced by the period of the analysis, during which fed cattle prices were at record highs. The prices for fed cattle sold through marketing agreements and transferred through packer ownership were relatively similar to direct trade. Prices for cattle under packer ownership are internal transfer prices that are typically based on external market prices; thus, implications of the results for packer-owned cattle are less clear.
- **Regression analysis of the relationship between cash market (auction barns, dealers and brokers, and direct trade) transactions prices for fed cattle and use of marketing arrangements suggests that if capacity utilization within a plant increases through the use of AMAs, firms pay slightly less per pound for cattle purchased in the cash market.** Specifically, a 10 percentage point increase in capacity utilization through AMAs is associated with a 0.4 cent per pound carcass weight decrease in the cash market price. Furthermore, if more cattle are available through AMAs within the following 21 days, cash market prices decrease slightly. Specifically, a 10% reduction in the volume of cash market transactions, assuming that volume is shifted into AMAs, is associated with a 0.11% decrease in the cash market price.
- **Beef packer plant-level P&L data showed significant economies of scale in beef packing, and costs were decreasing across the entire data range analyzed.** When both are operated close to capacity, smaller plants are at an absolute cost disadvantage compared with larger plants. When larger plants operate with smaller volumes, they have higher costs than smaller plants operating close to capacity and, thus, have an incentive to increase throughput. For all plants, large and small, average total cost increases sharply as volumes are reduced. A representative plant operating at 95% of the maximum observed volume is 6% more



efficient than a plant operating in the middle of the observed range of volumes and is 14% more efficient than a plant operating at the low end of the observed range.

- **Based on an analysis of P&L statements, procurement of cattle through AMAs results in production cost savings to the plants that use them.** However, the results differ across firms and plants. Some plants benefited substantially from AMAs and other plants did not appear to capture any benefits. The weighted average industry total production cost savings associated with AMAs was approximately \$6.50 per animal. For an industry with an average loss of \$2.40 per head during the 30-month sample period, this is a substantial benefit.
- **Marketing agreements are the most widely used AMAs in the beef industry, and thus restrictions on the use of marketing agreements would have the greatest negative effects on costs of production in the beef packing industry.** Forward contracts and packer-owned cattle were used, but to a much lesser extent. Therefore, restrictions on the use of packer ownership and forward contracts for cattle would have lesser effects on costs of production.
- **While the results differ by plant and firm, simulation analysis indicates that reducing or eliminating AMAs would result in higher average total cost (ATC) for slaughtering and processing beef cattle and, likewise, reduced gross margins and packer profits.** The average increase to beef slaughter and processing ATC would be 4.7% with a hypothetical elimination of AMAs and 0.9% with a hypothetical 25% reduction in use of AMAs. Packer profits are estimated to decrease by 6.0% and 1.5% if AMAs were reduced by 100% or 25%, respectively.
- **Beef quality has a positive effect on beef demand, the producers and packers interviewed and surveyed believe that AMAs are important for beef quality, and quantitative analyses suggest that AMAs are often associated with higher quality.** Regression analysis of MPR data found a small but positive relationship between formula and packer ownership procurement and USDA Quality Grade and found no statistical relationship between cash purchases and USDA Quality Grade. Regression analysis on transactions data found that marketing agreement cattle had a higher percentage Choice and Prime carcasses without increasing the percentage of Yield Grade 4 and 5

carcasses and had only modest declines in Yield Grade 1 and 2 carcasses. Other procurement methods had a greater trade-off between preferred quality grade and preferred yield grade. Furthermore, marketing agreement cattle and packer-owned cattle were associated with relatively higher quality compared with direct trade cattle, as measured by a composite quality index, but the small percentage of cattle sold through auction barns was associated with the highest quality and the highest variability in quality. The small percentage of cattle sold through forward contracts was associated with the lowest quality but also the lowest variability in quality.

- **The producers and packers surveyed that use AMAs value them as a method of dealing with production, market access, and price risks.** More specifically, feedlots believed that AMAs allow them to secure or sell better quality cattle and calves and improve operational management, efficiency, and capacity utilization. Packers identified AMAs as an important element of branded products and meeting consumer demand by producing a higher quality, more consistent product.
- **Regression analysis accounting for cattle quality and sales month found that auction market and forward contract prices were more volatile than direct trade, marketing agreement, and packer-owned cattle prices.** Furthermore, the volatility of prices for direct trade and marketing agreement cattle were relatively similar. Results were generally consistent for fed beef cattle and fed dairy cattle.
- **Hypothetical reductions in AMAs, as represented by formula arrangements (marketing agreements and forward contracts) and packer ownership, are found to have a negative effect on producer and consumer surplus measures.** Beef and cattle supplies and quality decreased and retail and wholesale beef prices increased because of reductions in AMAs. However, feeder and fed cattle prices decreased because of higher slaughter and processing costs resulting from the AMA restrictions. The short-run, long-run, and cumulative present value surplus for producers and consumers associated with reduced AMA volumes are all negative. Over 10 years, a hypothetical 25% restriction in AMA volumes resulted in a *decrease* in cumulative present value of surplus of
  - 2.67% for feeder cattle producers,

- 1.35% for fed cattle producers,
- 0.86% for wholesale beef producers (packers), and
- 0.83% for beef consumers.

A hypothetical 100% restriction in AMA volumes resulted in a *decrease* in cumulative present value surplus of

- 15.96% for feeder cattle producers,
- 7.82% for fed cattle producers,
- 5.24% for wholesale beef producers (packers), and
- 4.56% for beef consumers.

Thus, feeder cattle producers lose more surplus relative to the other sectors under either scenario. In addition, the estimated changes would imply a reduction in the competitiveness of beef relative to other meats.

- **The cost savings and quality improvements associated with the use of AMAs outweigh the effect of potential oligopsony market power that AMAs may provide packers.** In the model simulations, even if the complete elimination of AMAs would eliminate market power that might currently exist, the net effect would be reductions in prices, quantities, and producer and consumer surplus in almost all sectors of the industry because of additional processing costs and reductions in beef quality. Collectively, this suggests that reducing the use of AMAs would result in economic losses for beef consumers and the beef industry.

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### ES.3 HOG AND PORK INDUSTRIES

Primary conclusions for this final report, as they relate to the hog and pork industries (Volume 4), are as follows:

- **AMAs are an integral part of hog producers' selling practices and pork packers' procurement practices.** There are significant regional differences in the observed patterns of use of AMAs: a stronger reliance on cash/spot markets and marketing contracts is apparent in the Midwest, and a stronger reliance on production contracts and packer ownership of hogs is apparent in the East. The pattern of future use of AMAs is not expected to change dramatically; hence, we do not expect that hog industry industrialization will emulate the industrialization of the poultry sector.
- **Based on individual transactions data, there are substantial differences in daily hog prices paid by packers on a carcass weight basis.** On average, the

price dispersion is about 40% of the average value of the transaction prices each day. One part of such strong price dispersion can be explained by factors such as region, quality, or plant size. However, even after controlling for these factors, the remaining differences must be due to organizational issues related to supply chain management in the pork processing sector.

- **Results indicate that, on average, plants that use a combination of marketing arrangements pay lower prices for their hogs relative to plants that use the cash/spot market only.** In addition, comparing the magnitudes of the portfolio effects to the magnitudes of the individual marketing arrangement effects shows that individual marketing arrangements have minimal additional impact on the average price after accounting for the portfolio effect. That is, the portfolio system categorical variables capture almost the entire effect on lowering the average price.
- **Of particular interest for this study is the effect of both contract and packer-owned hog supplies on spot market prices; as anticipated, these effects are negative and indicate that an increase in either contract or packer-owned hog sales decreases the spot price for hogs.** Specifically, the estimated elasticities of industry derived demand indicate
  - a 1% increase in contract hog quantities causes the spot market price to decrease by 0.88%, and
  - a 1% increase in packer-owned hog quantities causes the spot market price to decrease by 0.28%.

A higher quantity of either contract or packer-owned hogs available for sale lowers the prices of contract or packer-owned hogs and induces packers to purchase more of the now relatively less expensive hogs and purchase fewer hogs sold on the spot market.

- **Based on tests of market power for the pork industry, we found a statistically significant presence of market power in live hog procurement.** However, the results regarding the significance of AMA use for procurement of live hogs in explaining the sources of that market power are inconclusive. Whereas the model based on farm–wholesale price spread data shows that a higher proportion of AMA use leads to increased market power, the model estimated with company-level individual transactions data indicates that AMA use may not be a source of market power in pork packing.

- **Estimated total and average cost functions indicate that economies of scale diminish as the pork packing firm size increases.** The estimates indicate that the scale economies are exhausted well within the sample output range such that the biggest plants already exhibit negative returns to scale. That is, they operate on the upward-sloping portions of their average cost curves. The observed patterns of procurement portfolio choices by packers also indicate that certain combinations of marketing arrangements may reduce costs and/or increase economies of scale. In particular, relative to using spot market procurements alone, all other combinations of marketing arrangements improve the efficient scale of production.
- **Based on the observation that packers use marketing arrangements in clusters (portfolios), we hypothesized that marketing arrangements may be complementary to each other in the sense that implementing one procurement practice may increase the marginal return of the other practice; however, the analyses of the complementarity of marketing arrangements produced inconclusive results.** Simpler tests based on the correlation/association approach indicate that marketing contracts are in fact complementary to production contracts and/or packer owned arrangements. Also, the portfolio coefficients in the performance equations based on either the earnings before insurance and taxes (EBIT) or the gross margin show that all marketing arrangement portfolios improve plant performance relative to simple spot market purchases. However, the coefficient associated with the portfolio of three marketing arrangements is smaller than the coefficient associated with portfolios of two marketing arrangements, thus violating the complementarity requirement. More conclusive formal tests were not feasible given data limitations.
- **To analyze quality differences in live market hogs across alternative procurement methods (AMAs), we tested whether various quality attributes used by the industry are significantly different across AMAs and found that different AMAs are associated with different levels of quality of hogs.** Even though the rankings are not unique, we found that marketing contracts (especially other purchase arrangements and other market formula purchases) are consistently associated with higher quality hogs than negotiated (spot market) purchases.

- **An examination of the relationship between the proportion of AMAs used to procure live hogs and the quality of resulting pork products indicates that a higher proportion of AMA use is associated with higher quality pork products.** We measured pork product quality using Hicks' composite commodity index and hypothesized that a higher percentage share of the AMAs (essentially marketing contracts and packer-owned hogs) should produce higher quality pork products. The correlation coefficient showed that these two series are positively correlated, thus confirming our hypothesis.
- **An analysis of risk associated with different marketing arrangements shows that different types of marketing arrangements exhibit different price volatilities as measured by the variance of prices.** Therefore, hog producers selling hogs using different types of marketing arrangements experience different levels of risk. From the hog producers' point of view, the ordering of marketing arrangements in decreasing order of risk is as follows: (1) spot/cash market sales; (2) marketing contracts in which the pricing formula is based on spot market prices; (3) marketing arrangements in which the pricing formula is based on some futures or options price; (4) other purchase arrangements containing ledgers, windows, and other pricing mechanisms, which may serve as a cushion against price volatility; and (5) production contracts.
- **In analyzing the importance of hog producers' risk aversion for contract choice, we found that hog producers who use production contracts are more risk averse than producers who use cash/marketing arrangements.** The difference in risk exposure between contract producers and independent farmers is substantial because production contracts eliminate all but 6% of total income volatility. Therefore, the utility losses associated with forcing producers to market their hogs through channels different from their risk-aversion-preferred marketing arrangement choice are substantial.
- **In analyzing the economic effects of hypothetical restrictions on the use of AMAs in the hog and pork industries, we found that hog producers would lose because of the offsetting effects of hogs diverted from AMAs to the spot market, consumers would lose as wholesale and retail pork prices rise, and packers would gain in the short**

**run but neither gain nor lose in the long run.** The results applied to three different simulations: (1) 25% reduction in both contract- and packer-owned hogs, (2) increase the spot/cash market share to 25%, and (3) complete ban of packer-owned hogs. The reason that producers and consumers lose in all three simulation scenarios is because of efficiency losses from reducing the proportion of hogs sold through contracts and/or packer owned channels. Although a reduction in AMAs leads to an improvement for hog producers through a reduction in the degree of market power, the loss in cost efficiencies offsets the gains from reduced market power. In all instances, the price spread between farm and wholesale prices would be expected to increase because of the net increase in the costs of processing. Moreover, wholesale, and hence retail, prices would increase, causing pork to become more expensive for consumers.

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## ES.4 LAMBS AND LAMB MEAT INDUSTRIES

Primary conclusions for this final report, as they relate to the lamb and lamb meat industries (Volume 5), are as follows:

- **Lamb packers procure fed lambs primarily through formula pricing arrangements and auctions.** According to MPR data, lamb packers procure 42.2% of fed lambs through formula pricing arrangements and 39.4% through auctions. Negotiated sales account for 12.0% of fed lamb procurement, and packer ownership represents 4.9%. Contracted procurement represents only 0.8% of lamb procurement, while imports represent only 0.7%. These data are similar to those obtained from the lamb packer survey.
- **The means and standard deviations of fed lamb prices from MPR data for formula pricing and cash arrangements were similar during the sample period.** The price series were highly correlated with an estimated correlation coefficient of 0.970. A reduced-form model of the difference between normalized formula pricing and cash fed lamb prices indicated that lamb inventories, lamb carcass price risk, and seasonality were the primary determinants of variations in the difference.
- **Changes in procurement methods for lamb would impose costs on the lamb marketing system by reducing efficiencies, but may also provide some benefits by altering potential market power effects.** If formula pricing procurement is restricted,

lamb acquisition costs would rise. However, some of this increase in costs may be offset by a reduction in potential oligopsony power. Ultimately, a combination of these effects yields net changes in lamb prices, quantities, and producer surplus.

- **Given that lamb markets are relatively thin, the primary effect of MPR may have been to reduce price risk rather than to influence price levels.** The implementation of MPR in 2001 increased slaughter lamb price by only 0.129%.
- **AMAs were found to have statistically significant although economically small effects on lamb prices.** A 10% increase in formula pricing lamb procurement would increase the slaughter lamb price by an estimated 2.54%; this effect is likely due to risk reductions. A 10% increase in cash lamb procurement increases slaughter prices by an estimated 2.68%. A 10% increase in packer ownership reduces slaughter lamb prices by an estimated 0.23%.
- **Increases in formula pricing and cash procurement methods reduce lamb procurement costs, while increases in packer ownership increase procurement costs.** The effects of formula pricing and cash procurement methods on procurement costs for lambs were similar and not statistically different from one another.
- **Technological change has likely increased lamb quality over time.** However, there does not appear to be any statistically significant difference in the quality of lambs procured through formula pricing and cash procurement methods.
- **Price risk shifting from lamb producers to lamb packers and breakers has not occurred as a result of AMAs.** No statistical difference was found between the variances of prices for each type of AMA.
- **Restrictions on the use of AMAs cause almost every sector in the lamb industry to lose producer surplus, even if potential market power (if it exists) is reduced or eliminated.** Reductions in the use of AMAs have both positive and negative effects on the lamb industry. Reductions in potential market power (a positive effect) do not offset the increases in processing costs and reductions in lamb quality (negative effects).
- **Restrictions on the use of AMAs would likely reduce the competitiveness of the lamb industry.**



Although lamb is not a strong substitute for beef and pork, restrictions on the use of AMAs would place it at a competitive disadvantage to these other meats. More importantly, however, it appears that imported lamb is a strong substitute for domestic lamb. Hence, the loss of competitiveness in response to restrictions on the use of AMAs is much more pronounced with respect to lamb imports.

- **AMAs may have multiple effects on accessing the lamb market.** Ease of entry may be affected by the availability of AMAs, because financing of production operations often depends on the assurance of market access and price risk management. However, for small producers, it may be more difficult to secure AMAs because it is more costly for packers to negotiate with many small producers relative to fewer large producers. Hence, if AMAs reduce the viability of public auctions, small producers may find that their market access is limited.
- **Restrictions on the use of AMAs may increase concentration of various segments of the lamb industry, but the effect of increased concentration on market power is unknown.** There are no clear effects of the changes in the use of AMAs on concentration in the lamb industry. Concentration in the lamb packing industry has remained relatively flat, even though the use of AMAs has increased. However, increased use of AMAs may reduce the viability of auctions and could lead to increased concentration in the lamb feeding sector. In addition, if restrictions on AMAs reduce the competitiveness of domestic lamb meat relative to lamb imports, then concentration in the lamb packing and processing industry is likely to increase in response to declining domestic demand.

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## ES.5 MEAT DISTRIBUTION AND SALES

Primary conclusions for this final report, as they relate to meat processing, distribution, and sales (Volume 6), are as follows:

- **Transactions data on meat processor purchases indicate a much larger use of AMAs than do the survey data.** Based on transactions data, only 21% of beef and pork products were purchased on the spot market. Internal transfers were a large factor for pork but were virtually nonexistent for beef. Forward contracts were 28% of beef purchases, but less than 1% of pork purchases. The type of purchase method used is either not important to meat processors or they did not

understand the meaning of the categories, because 39% of beef and 32% of pork purchase methods were listed as “other or missing.”

- **Approximately 99% of pork and 55% of beef product pounds that were priced using formula pricing used a USDA-reported price as the base.** The other base used for purchased beef was a subscription service. Although nearly all pork pricing formulas are based on USDA-reported prices, it is worth noting that wholesale pork, while reported by USDA, is not covered under Mandatory Price Reporting (MPR).
- **Meat processors play an important distribution role in the meat value chain by purchasing large lots from a few sources and selling small lots to many firms.** Transaction purchase data included 53,831 records from 32 firms, averaging 22,800 pounds per transaction. Sales transactions from 11 firms included 848,295 records, averaging 771 pounds per transaction, and these were all case ready or RTE. A high percentage of these transactions did not identify the sales method, indicating that processors either did not understand the meaning of the categories that were listed or do not track this information.
- **When examining data specific to the beef industry, aggregate cattle purchase and beef sales transactions data suggest no relationship between cattle purchase methods and branded beef sales, although this relationship may be important to individual firms.** Plants that sold 0% to 20% of their beef as branded product purchased approximately the same percentage of their cattle on the spot market as did plants that sold 21% to 40% of their beef as branded product. Although the differences were small, the 21% to 40% plants used more forward contracts and less packer ownership than did the 0% to 20% plants. Shares of marketing agreement cattle were nearly identical across the two groups. In addition, 60% of the meat purchased on the spot market by processors was branded product compared with none through marketing agreements and internal transfers.
- **Although potentially important to some beef industry firms, aggregate transaction data suggest that downstream marketing arrangements have no relationship to cattle purchase methods.** Beef plants were divided into two groups based on beef sales methods—0% to 50% and 51% to 100% cash or spot market beef sales. Transactions from both groups indicated that they each bought 60% of their cattle

through the spot market and 40% using AMAs. The 0% to 50% cash sales group used more marketing agreements, and the 51% to 100% cash sales group had more packer-owned cattle.

- **Aggregate transactions data for the beef industry suggest some relationship between meat buyer type and cattle purchase methods.** Packers that sold more beef to meat processors bought fewer cattle on the spot market but about the same number of cattle through AMAs (with the difference resulting from a larger percentage of other purchases or missing information). Packers that sold a larger amount of beef to retailers and food service operators bought a larger percentage of their cattle on the spot market and a slightly lower percentage of cattle through AMAs.
- **The pork industry is more vertically integrated than is the beef industry.** Pork packers produce a higher percentage of the animals that they slaughter than do beef packers, and pork processors acquire much more of their product through internal transfer than do beef processors.
- **Meat processor buyers mix and match purchase and pricing methods.** Formula pricing was used as the pricing method for spot market, forward contracts, and marketing agreements. Likewise, individually negotiated prices were more common in forward contracts than in spot markets.

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## ES.6 LIMITATIONS OF THE ANALYSES

Decisions regarding methodologies, assumptions, and data sources used for the study had to be made in a short period of time. The analyses presented in this final report are based on the best available data, using methodologies developed to address the study requirements under the time constraints of the study. Some analyses were limited because of availability and quality of the transactions and P&L statement data. However, secondary data were used, as available, to supplement primary data in order to conduct the analyses.



# 1

## Introduction

AMAs include all possible alternatives to use of cash or spot markets for conducting transactions.

Over time, the variety, complexity, and use of AMAs have increased in the livestock and meat industries. Marketing arrangements refer to the methods by which livestock and meat are transferred through successive stages of production and marketing. A marketing arrangement also designates a method by which prices are determined for each individual transaction. The increased use of AMAs raises a number of questions about their effects on economic efficiency and on the distribution of the benefits and costs of livestock and meat production and consumption between producers and consumers.

USDA's GIPSA is charged with facilitating the marketing of livestock, meat, and other agricultural products. This agency also promotes fair and competitive trading practices for the overall benefit of consumers and American agriculture. In fulfilling its mission, GIPSA evaluates, among other things, the implications of the evolving landscape of AMAs and pricing methods.

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*In 2003, Congress allocated funds to GIPSA to conduct a broad study of the effects of AMAs on the livestock and meat industries.*

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In 2003, Congress allocated funds to GIPSA to conduct a broad study of the effects of AMAs on the livestock and meat industries. GIPSA developed the specific scope and objectives of the study, and following a competitive bidding process, RTI was awarded a contract to conduct the Livestock and Meat Marketing Study.

The questions posed by the Livestock and Meat Marketing Study included the following: What types of marketing arrangements are used? What is the extent of their use? Why do firms enter into the various arrangements? What are the

terms and characteristics of these arrangements? What are the effects and implications of the arrangements on participants and on the livestock and meat marketing system?

The study examined the following species and meat types:

- fed cattle and beef,
- hogs and pork, and
- lambs and lamb meat.

The study comprised five main parts:

- Part A. Identify and classify types of spot marketing arrangements and AMAs.
- Part B. Describe terms, availability, and reasons for use of spot marketing arrangements and AMAs.
- Part C. Determine extent of use, analyze price differences, and analyze short-run market price effects of AMAs.
- Part D. Measure and compare costs and benefits associated with spot marketing arrangements and AMAs.
- Part E. Analyze the implications of AMAs for the livestock and meat marketing system.

The interim report released in August 2005 addressed Parts A and B of the study. This final report focuses on Parts C, D, and E.

An interim report released in August 2005 addressed Parts A and B of the study (Muth et al., 2005). The report described marketing arrangements used in the livestock and meat industries and defined key terminology.<sup>1</sup> Results presented in the interim report were preliminary because they were based on assessments of the livestock and meat industries using published data, review of the relevant literature, and industry interviews.

Concurrent with conducting Parts A and B of the study, the study team developed and pretested information collection plans for obtaining transactions data and P&L statements from packers, processors, and downstream market participants. In addition, the study team developed and pretested a set of 10 industry survey questionnaires to obtain additional information beyond what could be obtained in transactions data and P&L statements. We received approval for both information collection requests from the Office of Management and Budget (OMB) in October 2005.

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<sup>1</sup> Terms used in the study are included in the glossary.

This final report describes the results of quantitative analyses addressing Parts C, D, and E of the study, using data from the industry surveys across all stages of livestock and meat production, transactions data and P&L statements from packers and processors, production contract settlement data from packers, and a variety of publicly available data. According to the Performance Work Statement (PWS) in the contract with GIPSA, the results of these analyses will provide information to

- livestock producers to help them make more informed production and marketing decisions,
- the general public to help them understand the roles and reasons for using these arrangements,
- GIPSA for its role in enforcing the Packers, and Stockyards Act, and
- USDA and Congress to help them determine whether policy changes affecting livestock marketing methods that were originally considered during the development of the 2002 Farm Bill are warranted.

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*The Livestock and Meat Marketing Study was limited to economic factors associated with spot marketing arrangements and AMAs and did not analyze policy options or make policy recommendations.*

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The study is national in scope, but it considered regional differences among marketing arrangements, if applicable, and international dimensions related to marketing arrangements, if significant. All stages of production and marketing were addressed, including farm level, slaughtering, processing, wholesaling and distribution, retailing, food service, and export. The Livestock and Meat Marketing Study was limited to economic factors associated with spot marketing arrangements and AMAs and did not analyze policy options or make policy recommendations.





# 2

## Overview of Parts C, D, and E of the Study

Throughout the report, industry participants are grouped into the following categories:

- livestock producers and feeders
- meat packers and processors (or breakers)
- wholesalers and distributors
- exporters
- food service or restaurant establishments
- retail establishments

Parts C, D, and E include complementary analyses of the effects of AMAs in each industry. The aims of Part C were to determine the extent to which various types of spot marketing arrangements and AMAs are used, to analyze price differences among the marketing arrangements, and to analyze the effects of alternative arrangements on short-run spot market prices as follows:

- Determine the volume of livestock and meat transferred through the various types of spot and alternative arrangements by type, size, and location of market participants.
- Report average price levels and differences in prices by type, size, and location of market participants.
- Determine price differences associated with the various types of spot marketing arrangements and AMAs, adjusting for quality differences, lot size, and other relevant factors that may affect prices, and determine how price differences vary with market conditions.
- Determine if packers' use of alternative procurement and pricing arrangements for fed cattle, slaughter hogs, and lambs is causally related to spot market prices for these animals in the short run and determine the nature of the relationship.

The aims of Part D were to measure and compare possible costs and benefits associated with the various types of spot marketing arrangements and AMAs as follows:

- Determine cost and efficiency differences and measure size and other economies and diseconomies associated with the use of AMAs.
- Determine the extent to which any differences in animal and meat quality are associated with differences in spot marketing arrangements and AMAs.<sup>2</sup>
- Determine if the various types of marketing arrangements shift risks among market participants or alter risk levels.<sup>3</sup>

The aims of Part E were to analyze the implications of AMAs for the livestock and meat marketing system, using the models developed in Parts C and D, as follows:

- Assess system-wide economic implications of restrictions on AMAs used by packers to purchase livestock.
- Assess the relative overall strength of positive and negative economic incentives for increased or decreased use of the various types of marketing arrangements.
- Examine the implications of expected changes in the use of various marketing arrangements over time.

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<sup>2</sup> As noted in the PWS, quality measures might include meat grades, tenderness, taste, nutritional characteristics, consistency, and conformity to specifications.

<sup>3</sup> As noted in the PWS, risk might relate to price, quality, loss of product, loss of supplier, loss of buyer, reduced credit rating, or less reliable trading partners.

# 3

## Information Sources Used for Parts C, D, and E of the Study

The analyses conducted for the final report build on information obtained for and summarized in the interim report. The interim report was based on information from the empirical agricultural economics and management literature, information from the development and pretesting of the data collection instruments for the transactions data collection and the industry surveys, available contract forms for beef cattle and hogs, discussions with trade associations, and discussions with industry participants.

The analyses presented in this final report use the following types of data:

- purchase and sales transactions data from meat packers and processors
- P&L statements from meat packers and processors
- production contract settlement data from hog packers
- industry survey responses from livestock producers, meat packers, meat processors, meat wholesalers, meat exporters, grocery retailers, and food service operations
- a broad range of publicly available data, including MPR data



# 4

## Organization of the Report

This final study report provides information and quantitative results for Parts C, D, and E of the Livestock and Meat Marketing Study. The volumes of the final report are as follows:

- Volume 2: Data Collection Methods and Results
- Volume 3: Fed Cattle and Beef Industries
- Volume 4: Hog and Pork Industries
- Volume 5: Lamb and Lamb Meat Industries
- Volume 6: Meat Distribution and Sales
- Appendix A: Glossary

The results from Volume 2 are incorporated into all volumes, in the relevant sections. Volumes 3 through 5 have a similar structure, which follows the requirements of the study, as specified in the PWS. Volume 6 has a different structure to include additional analyses beyond the species-specific analyses included in the previous volumes.



# 5

## References

Muth, M.K., G. Brester, J. Del Roccili, S. Koontz, B. Martin, N. Piggott, J. Taylor, T. Vukina, and M. Wohlgenant. July 2005. *Spot and Alternative Marketing Arrangements in the Livestock and Meat Industries: Interim Report*. Prepared for the U.S. Department of Agriculture, Grain Inspection, Packers and Stockyards Administration.