



**PRICE DISCOVERY IN CONCENTRATED LIVESTOCK  
MARKETS: ISSUES, ANSWERS, FUTURE DIRECTIONS**

**Wayne Purcell, Editor**

**RESEARCH INSTITUTE ON LIVESTOCK PRICING**

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- **Steven Koontz and Wayne Purcell**
- **Ted Schroeder, Clement Ward, James Mintert, and Derrell Peel**
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- **Clement Ward**
- **Wayne Purcell**

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Department of Agricultural and Applied Economics  
Virginia Tech  
Blacksburg, VA 24061-0401  
February 1997**

Research Institute on Livestock Pricing  
Department of Agricultural and Applied Economics  
Virginia Tech  
324 Hutcheson Hall  
Blacksburg, Virginia 24061-0401

*Serving the Needs of the Livestock Industry*

**SESSION 1**

***PRICE DISCOVERY ISSUES***

Stephen R. Koontz and Wayne D. Purcell  
Agricultural Economists  
Michigan State University and Virginia Tech

Ted C. Schroeder, Clement E. Ward, James Mintert, and Derrell S. Peel  
Agricultural Economists  
Kansas State University and Oklahoma State University

David Kenyon  
Agricultural Economist  
Virginia Tech

## **Executive Summary of Price Discovery and the Future of the Livestock Sector\***

Stephen R. Koontz and Wayne D. Purcell

Price discovery is identified as being the recipient of increased attention during the 1980s and 1990s. Indeed, the authors suggest that the focus of attention is becoming even more intense during the 1990s. They refer to the petition for a rule change that was presented to the Secretary of Agriculture in October of 1996 by the Western Organization of Resource Councils (WORC). The petition calls for regulations or restrictions on how packers/processors could buy cattle. Specifically, the petition asks for the banning of, or control of, what has come to be known as “captive supply” instruments such as cash forward contracts, basis contracts calling for later delivery, and formula price contracts, where the final cash price is tied to some visible market price or index.

The authors suggest that part of the motivation for such proposed regulations comes from concern about the effectiveness and viability of the price discovery process. They go on to point out that it is not the price discovery process that was responsible for the low calf prices in 1995 and 1996, during a period of record high corn prices, and that the economic system must determine a price that is consistent with that needed to clear the market. The disastrously low calf prices were not due to a failure in price discovery. The authors also disagree with the implication in the proposed rulemaking change that price discovery will be effective when transactions are negotiated as compared to when transactions involve various forms of forward buying by contract. Effective price discovery involves pricing to value and other attributes that are in no way assured just because transactions are negotiated.

The authors suggest that part of the reason for the current state of unrest with regard to price discovery is that producers and producer groups do not like the low prices they have seen for livestock in recent years, and they do not like some of the alternatives to the traditional price-based marketplace that are developing. These alternatives include the above-mentioned captive supplies and would also presumably include the alliances and various other entities that are cropping up to achieve the inter-level coordination, especially in the beef business, that the price-based systems have not achieved.

The authors review some historical thinking about price discovery in the effort to fully understand why price discovery is of such interest in 1997. They note that researchers in past decades have suggested that if the traditional marketplace that features separate ownership of the economic functions at the different levels does not achieve coordination, in particular coordination between what the consumers want and what is produced, then those price-based mechanisms are likely to be replaced. They suggest there are huge economic incentives for processors to reduce costs, for example, by stabilizing flows of hogs, cattle, or sheep into their facilities. If that stabilization cannot

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\*This is a summary prepared by Wayne Purcell of Chapter 1 in *Price Discovery in Concentrated Livestock Markets*, the book that was distributed at the conference.

be achieved by the traditional price-based system, then it is likely to be done by various vertical arrangements that displace or replace the traditional pricing system.

The authors go on to discuss that, partly because of lack of information, lack of perspective, and also because of inadequacies in grades and grading, we have seen a failure of the pricing system in livestock in recent years. By failure, the authors mean that price discovery has not been such that pricing to value has been achieved. A majority of the slaughter cattle in the United States are sold at an average price, and, until very recently, much the same could have been said for slaughter hogs. In pork, moves by processors to reduce the variability in product offerings by controlling the genetics has changed the type of pricing and the type of coordinating mechanisms that appear to be likely in the hog sector in the future.

The authors present ideas and alternatives, suggesting that some of them might be seen as controversial. They argue that we must see technical progress in the pricing and grading systems. There is a need for technology that identifies in an objective way the value of slaughter livestock. To date, the investments in that type of technology have not been forthcoming at the pace that is needed for the beef industry to move forward in a progressive way.

Koontz and Purcell also raise the question of whether or not we might have to move to mandatory reporting of prices. They suggest it is appropriate to think about pricing and price discovery as something approaching the status of a classical public good. That is, access to prices, pricing, and price discovery is important to society. The authors suggest that there is no publicly defensible economic justification for the withholding of price information by private firms. They go on to suggest that if voluntary participation in the more highly concentrated marketplaces of today and the future do not provide the needed price-related information, then mandatory price reporting probably has to be considered.

The role of the emerging alliances in the livestock sector in the pricing process is discussed. The authors note that there is huge value to building marketing institutions which effectively coordinate production and marketing if the open market system, with its emphasis on negotiated prices, does not achieve that coordination. They had indicated earlier that the price-based system with its emphasis on negotiated prices is not accomplishing effective price discovery, that it is not pricing to value, and that it is not providing for the inter-level coordination needed in our livestock production and marketing systems. This, they suggest, is the reason that alliances are coming into use. The alliances provide a mechanism to allow vertical coordination that has not been accomplished historically via pricing and price discovery, but they are also displacing or replacing the traditional pricing systems.

In summarizing their comments in this area, the authors suggest that we need to understand that individual firms have the incentive to innovate and capture benefits to that innovation. They suggest that left to its own devices without any progressive change, the industry is likely to consolidate, industrialize, and continue to move to non-

price means of control and coordination. This phase would complete, the authors suggest, researchers' long anticipated replacement of a failed and failing price-based marketplace with all of its problems in achieving effective price discovery. The authors suggest that the industry has to make the changes necessary to get to better price discovery. This is important because of all the advantages that effective price discovery brings, advantages like pricing to value, allowing the industry to be consumer driven, and achieving coordinated activity and the efficiencies from that coordination. If there is no change toward improved price discovery in the system that is characterized by separate ownership at the various economic levels of activity and negotiated prices, then there will continue to be a change to the inevitable: a more concentrated, more regulated, and possibly less efficient system that pushes the producer into a pattern of forced actions. Clearly, the authors believe that we need to rethink what price discovery is and is not, think about its dimensions as a public good, and think about moving forward with some progressive and collaborative activities to improve price discovery if there is a desire to perpetuate the traditional price-based marketplace.



## **Executive Summary of Beef Industry Price Discovery: A Look Ahead\***

Ted C. Schroeder, Clement E. Ward, James Mintert, and Derrell S. Peel

The authors start their discussion with a careful differentiation between price discovery and price determination. They make the very important point that price determination, which is the result of the interaction of the broad forces of supply and demand, ultimately determines market price level. Thus, there is no reason to attribute low prices, when low prices are required to clear the market, to an ineffective or inefficient price discovery process. The authors suggest that price discovery begins with the market price level and involves the dynamic process of interaction between buyers and sellers as they seek to find a correct equilibrium or market-clearing price.

The chapter deals primarily with a detailed and very informative recounting of what the researchers learned in a substantial interview process at the feedlot and meatpacking levels.

The authors indicate that not all cattle feeders or meatpackers think we have major problems in price discovery. Others suggested that price discovery *is* a major problem and identified some of the issues. One was the need to better identify and price quality. A second was a need to improve pricing accuracy and move away from the current system of average pricing to more nearly value-based pricing. Third was the need for more complete and better market information. This latter point dealt with captive supply data and information on what is going on in the industry, information that needs to be available at both the cattle feeding and packer levels in roughly equal quantities and equal quality.

In somewhat more detail, the authors discuss the already identified issues and other price discovery issues that emerged during the interviews. They enumerate six, including 1) more accurate and less subjective measurements of beef quality is needed; 2) price premiums and discounts for fed cattle do not adequately reflect value differences; 3) inadequate market information inhibits efficient price discovery; 4) live cattle futures basis risk is excessive; 5) formula price arrangements adversely affect cash fed cattle market; and 6) group marketing of fed cattle may offer solutions to some price discovery problems.

The authors built much of the rest of their coverage around these issues. In terms of the beef quality issue and assessing of beef quality, they review the historical development of beef grades and documented available research that shows palatability, tenderness, juiciness, etc., differs considerably within the current set of quality grades. One study, for example, was quoted that indicated that 5.6 percent, 10.8 percent, and 26.4

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percent of the loin steaks from Prime, Choice, and Select carcasses respectively showed undesirable overall palatability ratings. Some possible solutions to this problem are identified.

The authors discuss the possibility of an in-line test for tenderness, raise questions about whether the federal grading system might need to be revised or changed, and discuss generally whether consumers might be willing to pay more for consistent, high-quality beef thereby justifying some improved measurement of quality.

The second area identified by the authors was the issue of pricing to value. The authors discuss the current tendency to price on averages and discuss the implications to the industry of not pricing to value to prompt changes over time in the nature and quality of the cattle being produced. They indicate that marketing agreements, alliances, and various types of formula pricing and/or price grids that are coming into use in the industry are means of trying to resolve this problem. They present data on the magnitude of the problems associated with pricing to averages and discuss the fact that both cattle feeders and packers agreed that we need to move to value-based pricing. Beyond suggesting that the use of price grids is likely to grow, there were no definitive responses in the interviews to indicate how we would get to an improved situation. There is some possibility that packers and/or processors who can identify beef quality more accurately than the current USDA quality standards may be able to develop a branded beef product to the benefit of both the cattle feeder and the processor.

The third area that evolved in the interviews deals with the role of market information. The authors note that as the industry changes in a significant way toward a more concentrated and more highly structured industry, informational needs are also changing. Apparently, a number of the cattle feeders who were interviewed were concerned about the asymmetry in availability of information within the industry. In particular, cattle feeders were concerned about their lack of knowledge of the volume and timing of packers' captive supplies, and indicated that it made it difficult for them to assess potential packer demand and bring it into the price discovery process. The authors note that a number of cattle feeders and at least one packer indicated that they expect to see substantial changes in the way cattle are marketed. They felt that there would be some moves away from pricing systems where the price, as being reported by the USDA or by private vendors, is based on a relatively small number of operations. The authors also discuss the possibility of moving from voluntary to mandatory price reporting. Most cattle feeders and packers were not in favor of mandatory price reporting, but several apparently indicated their willingness to consider it if voluntary approaches were not sufficient. The authors note that the availability of and access to market information has a big impact on price discovery. They reemphasize the concerns about asymmetry of information that were raised during the interviewing process. They also indicate that evolution in the way cattle and beef are being marketed means that the beef industry's information needs are changing. As more cattle are sold on a carcass-weight basis, for example, the USDA may need to change the information that they collect and report.

A fourth issue that prompted considerable discussion was the issue of effectiveness of the live cattle futures market as a risk transfer mechanism. There was some general indication of understanding of importance of the futures market in the overall price discovery process. Much of the discussion revolved around the recent changes in delivery procedures for the live cattle futures that have prompted some users and potential users to question the predictability of the cash-futures basis. The most recent change in specifications of the contract became effective with the contract that expired in June of 1995. There are some fairly loud voices in the industry that are suggesting that basis performance has deteriorated in the wake of this most recent contract change and that the industry needs to think about moving to a cash settlement. The authors discuss some of the problems associated with moving to cash settlement and review the study that was released in 1989 that opposed moving to cash settlement when this issue came up earlier. Whether there is now a sufficiently broad base of cash price information that would block the potential for manipulation in the cash market is an empirical question that might need to be researched. The authors also discuss the possible need for a dressed beef futures contract of some type, suggesting that as more of the cash business moves toward a dressed basis, we probably need a price discovery instrument in futures that discovers price at the same level in the system.

A fifth and volatile area that was discussed during the interview process reported by the authors deals with captive supplies in fed cattle markets. The authors review the level of captive supplies across recent years and review the recent research that was coordinated by Packers and Stockyards Programs in the Grain Inspection Packers and Stockyards Administration (GIPSA). The authors note that interviewees still have a perception that the declines in fed cattle prices in recent years have been created by packers' captive supplies. Interviewees also expressed concern that some of the reported high margins, especially during 1995 and 1996 at the packing level, are related to captive supplies. Coverage of the basic inverse relationship between beef production and Choice steer prices was included as the authors indicate that much of the price movement in recent years can be attributed more nearly to the need for the marketplace to determine a relatively low price to clear the market as compared to problems of price discovery. Clearly, there are potential policy implications and continuing questions that will be raised, but the research suggests that captive supplies have not been a major factor in depressed fed cattle prices nor have captive supplies been a major detriment to effective price discovery.

The sixth and last issue identified during the interview process dealt with group marketing alternatives. The authors discuss electronic trading and the extent to which it might "even the playing field" between cattle feeders and packers. They also note that it is important, if electronic marketing systems are to succeed, that there be a benefit to both buyers and sellers. It is true that electronic marketing and electronic trading systems could be a means of providing some of the information that cattle feeders feel they need and perhaps correcting any asymmetry in terms of information availability. But cattle feeders were hesitant to suggest that packers would adopt and use electronic means of procurement. They noted that packers are tied to their current method of procuring cattle, and they would need a substantial incentive to make a change. Another presumed

advantage of the group effort is improved bargaining and to provide some leverage at the cattle feeding level. This has been the objective of several efforts that have been discussed in the major cattle feeding areas in the Southern Plains. However, both cattle feeders and packers who were interviewed indicated that group efforts sometimes created an “us versus them” attitude and contributed to the adversarial relationships between feeders and packers. There is some reason to question how effective group bargaining would be if nothing is done to improve the price discovery process and to get nearer to a point of pricing to value. The idea of a closed cooperative that integrates various functions from top to bottom through the system was also discussed as a formal means of organizing group activity. Some of the new alliances in the industry are organizing this way. The authors suggest, however, that vertical integration in and of itself is not a panacea. It has the potential to bring some benefits, especially in terms of coordination of activity, and “pricing” to value for the participants in the system, but there is always the problem of cattle feeders being willing to make a commitment in terms of cattle. They might fail to make a commitment in terms of providing capital as well. Such a group effort always needs money, and one of the things that is missing in the industry is investments to change the product offering. Alliances including a closed cooperative-type structure do not necessarily bring that type of investment capital.

The authors attempt to organize the findings from the interviewing process in a fairly lengthy discussion of the future prospects for price discovery. They point out that one theme that pervades all change in the beef sector is that the industry needs to produce products of higher value to consumers. In other words, they are suggesting that it is very important that the industry move toward a consumer-driven status.

Beyond moving to a consumer driven status, the authors identify several factors that will influence price discovery and the level of vertical coordination achieved in the beef industry over the next decade. They list the following:

- Technology to improve our ability to identify and sort beef products according to varying quality attributes and values is needed.
- Federal beef quality grades are likely to be less important in 10 years than they are today.
- Our ability to predict meat quality from visual inspection of live cattle will not improve.
- Grid pricing will become more common in procurement of fed cattle by packers.
- More cattle will be produced under alliances that directly link cow-calf producers to retail.
- The result of more fed cattle being sold on a dressed weight, carcass quality, and yield grade basis, the expanded use of price grids, and increased presence of alliances will shift the center of price discovery more to the wholesale level in the beef system.

- Producer group marketing and closed cooperative efforts will increase.
- Certified beef marketing programs may expand modestly in the future.
- An increased share of beef will be branded in the future.
- Asymmetry of market information plagues the beef industry, and if industry participants do not cooperate and provide information as requested, mandatory reporting may occur.
- Market institutions need to evolve with the industry. Special reference here is to live cattle futures that may need to move to more of a dressed weight specification.
- Electronic trade of fed cattle may have a limited role in the industry.
- Negotiation of cattle terms of trade will increase significantly in fed cattle marketing. The authors are suggesting here that we will see larger operations and group efforts by producers in that negotiation process which includes more product specifications, etc., than has historically been the case.
- When technology and incentives for improved meat product market segmentation develop, the highly concentrated packing and increasingly concentrated cattle feeding industry structures will lead to rapid adoption throughout the industry.
- Better determination of value at the meat level and less emphasis on live fed cattle pricing will have implications for feeder cattle pricing.

Change in the way beef is produced and marketed, in the institutions used to coordinate the market, in the way product quality is determined, and other changes in the industry are inevitable. The authors point out that these changes will bring costs, risks, resistance, and some failures. The beef industry, suggests the authors, has historically been slow to change, but they indicate that a necessary condition to return to a more competitive position in the marketplace will be improvement in price discovery. If significant improvement does not occur, then the industry can expect greater emphasis on contracts and other non-price means of achieving a high level of coordination across the production, processing, and merchandising of beef.

## **Executive Summary of Pork Industry Price Discovery: A Look Ahead\***

David Kenyon

This article adapts and uses a model developed initially in 1981 by Reimund, Martin, and Moore. The researchers had looked at what had occurred in various industry sectors and put together a model that helped explain how a marketplace evolves and changes over time.

What the author calls the RMM model focuses on the process of structural change. The model identifies several factors that cause changes in structure and then looks at their role in the process. Those factors would be 1) various forms of technological improvement and advancement, 2) resource and product market factors, and 3) policy factors. Once one or more of these three factors initiates some structural change, then the RMM model suggests the industry will pass through several stages on its way to becoming more industrialized. These stages involve 1) technological change, 2) a shift in production location, 3) growth and development, and 4) adjustment to risk.

Kenyon uses this model as a way of thinking about the issues that are going on in the pork sector as we see the pace of change pick up in the 1990s. He discusses, within the confines of this model, pricing and coordination issues that have come to the fore, especially as the location of production moved to the nontraditional producing areas, a phenomenon that was predicted by the RMM model.

The author discusses the moves to carcass value pricing that started in the 1980s and quickly swept through the industry in the 1990s. The majority of hogs being sold in the United States today are sold under some sort of carcass merit system or carcass value pricing. With this type of pricing approach came growth in various types of marketing supply contracts. Some of these involve various types of price windows that allow the producer and the buyer to share the risk associated with volatile prices. Others involve no price windows and no sharing of price risk, but did involve price premiums and various types of agreements to price to value. This was a way of offsetting some of the deficiencies that the pork industry had shared with the beef industry in finding it difficult to price to value when everything was earlier sold on a liveweight basis and there was separate ownership of the various economic functions between the producer and the final consumer.

By the mid-1990s, the price risk management issue was becoming very important, and the Chicago Mercantile Exchange changed its live hog futures to what has come to be called the lean hog futures, starting with the February 1997 contract. That new contract is based on wholesale prices of 51-52 percent lean pork and is cash settled based

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on a weighted average carcass price reported by the USDA for the previous two days. By switching to a carcass price contract, the Chicago Mercantile Exchange was getting its price discovery mechanism in line with what was already happening in the cash market.

Kenyon discusses the impact of consumer demand on changing industry structure over time. Some researchers have suggested that the move to industrialization and the move to non-price means of coordination that various integrated and contractual arrangements have allowed have been prompted by the need to be consumer driven. Kenyon reviews these arguments but concludes that much of the change to date has not been prompted by an interest in satisfying consumer demand. Rather, the industrialization of the sector has come more nearly from the economies of size in large hog-producing operations that developed outside the traditional midwestern producing area and the profit stream that has flowed from those operations across the past 10-20 years. In other words, the author would submit that much of the industrialization to date has been driven by technological advancement and efficiency associated with large, even mega-sized, and quite profitable producing operations.

In the late 1990s, and this would be the fourth stage of development in the RMM model, the industry is developing new procedures for risk management and moving into closer coordination of production with demand. These new risk transfer mechanisms and approaches are developing as epitomized by the CME's move to a lean hog contract. As those price risk transfer mechanisms come into place, there is at least the beginning of an economic impetus that appears to be coming from moves toward a more nearly consumer-driven status. Kenyon suggests that sensitivity to changing consumer tastes and preferences will play a more important role in the pricing structure of the swine industry and price discovery processes in the future. A number of modern packing/processing facilities have moved into total quality control or at least have made an effort to accomplish that by controlling the genetics in both company-owned and contractual production operations. The author notes that demand for a consistent high-quality, uniform, and safe product will push the packer/processors to continue to coordinate with large producers to get the types of hogs that permit them to serve the modern consumer. Kenyon predicts that this is going to manifest itself in the form of improved returns at the processing level in the future and the potential for the entire sector to grow.

Kenyon notes that the continued rapid growth of the large producers, the decentralization of production, the need for improved price risk management, and the importance of responding to consumer desires are likely to continue to move the pork industry toward increased concentration and coordination. These trends, in turn, are likely to move the price discovery process away from the live hog cash market and to the carcass market. He had already noted that carcass value pricing systems are currently still tied to live hog prices, but as we move forward, he feels that is likely to change and that more of the price discovery process is likely to move up toward the wholesale level. All this is moving the sector toward a better price discovery process and more effective pricing to value, necessary conditions for being a consumer-driven industry. All this might, in turn, move the pork sector back toward a growth status and a more aggressive

and formidable competitor for a share of both the domestic and international meat market.



## Questions and Answers

Question: At least three of our four speakers have said that we need to move away from pricing livestock to using the wholesale meat prices. If I recall my history correctly, we have been having more problems with wholesale meat price discovery than we have had with livestock price discovery. Going back to the mid-70s, when terminal markets were still important, there were a lot of questions about formula pricing of wholesale meat back then. How do you feel about moving from one area where we have thin markets to another area where we also have thin markets in price discovery?

Ted Schroeder: I don't think we are necessarily saying that we are advocating that we just remove price discovery from the live level. The problem is that if we continue to price on something that we don't know the value of, we have major problems. We have to get the price discovery to a point where we know the value. Either we are going to have to determine the value better at the carcass level, or we are going to have to go to a level where we know the final-use value. We *do* know the value pretty well at the boxed level, at least with beef. The problem is we can't track from the boxed level back down to the live level. We can't get from the boxed level back to what the value of the animal is right now, at least with the pricing and transaction processes we are now using. Yes, maybe there are problems with price discovery in wholesale as well, but at least we are determining value at that level. I am not as convinced there are problems with wholesale price discovery as maybe there are problems with understanding information in the wholesale market. At least that is what we heard in the beef industry during the interviews. We have a lot more boxed trade going on than we have information on that boxed trade.

Jim Mintert: I think one other thing that is corollary to that is that we have done some work that suggests that a lot of price discovery in the pork sector actually occurs at the live level and feeds through the system from there. What we are actually suggesting, or at least I think it is a possibility, is that if we shift towards trading the live product (live cattle) on a wholesale price, we might actually see the best of both worlds in terms of seeing that wholesale market increase in liquidity and simultaneously improve the price reporting at that market level and actually gain on both sides. There is that potential.

Wayne Purcell: Remember Steve Koontz said that price reporting and price discovery is a public good, which means everybody wants to take advantage of it, but nobody wants to invest in it and contribute to it. Both panelists responding said that we have information that is not getting reported. Let's don't miss that point because I think in many respects, the system is starved for information. A lot of people in the room don't want to start thinking about mandatory reporting. Maybe that wouldn't work. But that discussion is starting to occur.

Question: Given that we have to drive off of consumer acceptance, which implies that we have to get back to pricing to value, we haven't talked at all about responsiveness at the cow-calf level. We talk about retail prices and packer prices, but have we done

anything much about effectiveness of price discovery at the cow-calf level? You guys interviewed feedlots and packers. Did you find out how that price discovery process is occurring at that lowest level?

Jim Mintert: In the context of our interviews, we really didn't do that. One other piece of information that I think we could draw on is that there have been a number of studies over the years that looked at feeder cattle pricing differentials. In particular, we have done a couple of those at Kansas State that looked at using the same types of models over two different time frames: one back in the mid-80s that Ted and I worked on shortly after we arrived at Kansas State, and another one where the data were collected in 1993. Those data suggest that there *are* some differences occurring across those time frames, perhaps related to different price levels that cattle feeders are willing to pay for feeder cattle based on some quality characteristics. It is limited to looking at the differences across that 1986-87 to 1993 time frame, but there is some evidence that some of that value difference is being transmitted back to the cow-calf producer. At this point, a fairly small amount of transfer of information *is* occurring, at least based on that 1993 data.

Question: The reason I ask is that I am from the little state of South Carolina. We actually didn't lose any cattle in the January inventory. We increased the heifers and the beef cow replacements. We are probably \$10-15 under some western markets on calf prices. We are apparently able to use price as some kind of signal; our people are responding. It doesn't appear to be a problem if we can handle those kinds of price discounts and still stay in business. Across a lot of the Deep South, we didn't lose the number of cattle that you lost.

Ted Schroeder: You have a whole lot of things there. We could spend an hour on the last comment because that is a longer run issue. One of the problems is, in this coordinated market, if the price signals for quality at the live animal level aren't there, they are never going to be there down through the system. It starts at the consumer level and it has to move down. When any part of that system from the consumer down to the cow-calf is blockaded, the rest of the system doesn't get that signal. If I am selling all my cattle for the same price from a quality perspective, there is no incentive to pay differentials for quality associated with the meat when I am buying feeder cattle. The only thing I am paying for primarily is production qualities. What can I feed the cheapest? What can I get to gain the quickest? It is a profit incentive based strictly on weight. We have to have the signal there to tell the cow-calf guy what the system needs to meet consumer preferences. You will not get the signal at the cow-calf level under the current market system if we sell fed cattle on averages. The way some cow-calf producers we visited with are trying to get that signal is through alliances. What Steve Koontz talked about earlier is that if the market is not working, vertical linkages *will* create a different and non-price way to get to value via an alliance or some other kind of non-price method.

Audience: Maybe that is some of the problem. I can handle it in the Southeast. Profit may not be a primary motive. If agricultural land is being taxed on a use-value basis, you can see there are a lot of incentives to stay in cattle production.

Wayne Purcell: What he is saying is substantially true in Virginia. We have 740,000 beef cows in Virginia, and those numbers don't seem to respond much to profits. We are above where we were in the mid-70s. So there are some other considerations going on. We have approximately 80 breeds of cattle in this country. We are talking about a system that eventually has to get fixed, given the quality problem, by changing the genetics. But maybe the shorter run needs involve the problems being fixed by product development and that sort of thing.

Dave Kenyon: One of the best articles I read in preparing some of my remarks was a 1995 article where they talk about the two places where the most information is being generated, 1) at the consumer level, and 2) clear down at the bottom, at the genetics. That is where the two control points are. If you want to coordinate what is going on at retail with the products we are producing on the farm, especially with available technology, you need to control the genetics. I think this is what some of the swine people have figured out. They have figured out what the consumer wants, and they have gone around the pricing system and gone right to the bottom to control the genetics. They have gotten the kinds of animals that have the traits and characteristics that they want in their product, and have started producing them. I think that happened because of a failure of the price-based market system. One of the other things I have done for the last several years is drive around the state a lot with the head of the Poultry Science Department at Virginia Tech. I asked him one day, "What started integration in poultry." He said, "When we decided that we were going to sit down and produce a breed of chickens that produced the qualities the consumers wanted, and forget all the different breeds of chickens, that is when we made progress." When I look at swine, I see that happening. NPPC has just funded a huge study. They are figuring out what all those product characteristics are that the consumers want. They are going to go after the needed information. I don't know as much about beef, but I do know that there are a tremendous number of breeds, and there is tremendous variation. You have to produce a consistent quality product that the consumer wants in 1997.

Steve Koontz: You also have an average beef cow herd of about 40 animals. Trying to create an adjustment in that area is going to be tough. Getting back to your question, alliances are in part trying to answer that question on pricing to value by transfer of information. But one thing I hear a lot that they seem to forget is that you only have the cattle feeder talking about wanting the information back from the packer on how the animals do "in the meat." That information, then, has to go further down the system to the cow-calf producer. The cattle feeders have to have an information system in place so they can track the animal, how it did "in the meat," how it performed in the feedlot, and then carry that information back to the cow-calf and stocker people in terms of their pricing.

Jim Mintert: I want to clarify an earlier point. Ted made the point that if there is very little price differential showing up at the fed cattle level, you wouldn't expect anything to show up at the feeder cattle level. But there *is* one aspect where we have seen some small price differentials show up at the fed level. What characteristic might that be? It is

color--black. If you look at our data, going back to the mid-'80s and early '90s, our data were suggesting Angus cattle were selling at a discount at the feeder cattle level relative to Herefords, and by the early '90s, they were selling at a premium. I think that is at least an indication that if we do see the price differential show up at the live level or fed cattle level, there is a strong likelihood that we will see *some* differentials show up back at the feeder cattle levels.

Question: I want to raise a question to both Dave Kenyon and Ted Schroeder. I heard Kenyon say that there are a lot more marketing contracts going on in the pork industry. At the same time, he was saying that there is a lot of grid pricing and all that good stuff. In the beef industry, though, you were decrying that the pricing system is weak (no grids, etc.) and you didn't say anything about contracts. I didn't hear the word "contracts" in the presentation once. It's about 20 percent contracted, I think, in the beef industry and probably the amount of captive supplies in the pork industry is over 35 percent. There seems to be an inconsistency here somewhere. Could you please explain this to me?

Ted Schroeder: He says, "Where is the beef industry going over the next 10 years, and why is it different than the pork industry?"

Wayne Purcell: That is a fair question because what we have done so far here in the question and answer session is recount the problems we know are out there. How are we going to solve them? If we don't deal effectively with these problems, what type of industry are we going to see? I think that is what he is asking.

Ted Schroeder: I will tell you what we heard. When we posed that question to the industry, the response was mostly "no change." They say it hasn't changed in 10 years and they don't think it will change much in the next 10 in terms of the volume of trade in the cattle industry that goes through contract or other non-cash means. Now, the nature of those non-price means of coordination has certainly changed considerably. If you look back to 1987-88 when this captive supply issue first starting cropping up, forward cash contracts were the issue and were a big player in that 20 percent captive supply. They probably made up the bulk of that 20 percent mentioned. But today, marketing agreements and formula-type trade is where the majority of that contract activity is going on. So, the nature of contracting has changed. Maybe the nature will continue to evolve. I'm not sure about that. I think there is going to be an increased emphasis (and we heard this from several people) on further forward kinds of procurement because the retailers are moving more and more towards forward agreements. Certainly, the food service industry is moving more towards long-term, forward pricing arrangements. They need those to secure their own strategic positions. As that continues to occur, there is going to have to be an increase in some kind of agreement between those sectors and the producer sector. We are seeing a lot of different kinds of agreements occur. Exactly what the mix is going to be is well beyond me, but I think we will see more and more movement towards non-price coordination. Whether it is contracting or ownership, and I don't think ownership is so much the trend, some type of contract activity to achieve stable flows into the packing plants and provide for coordination is going to increase.

Wayne Purcell: Ted, wouldn't that include not only timing of future delivery but probably move toward more specification of quality issues?

Ted Schroeder: I think that is a large part of what is driving the whole area: specification of quality. The search costs of trying to find (if you are matching product and specific consumer needs) those specific products get to be formidable. If you can reduce the search costs, especially if it is a high-quality product you need, you need to somehow secure the product through a forward agreement. That is what the major food service entities already do, and that is going to be passed on down.

Question: Over a short period of time, the swine industry went to 75 percent carcass value based. The cattle industry is taking a lot longer. Why is there a difference between the two? Is the hog industry just responding to those needs to coordinate more quickly? Has pricing to value changed the type of hogs we are producing?

Ted Schroeder: I will start to answer that and then pass it on. First, why is the cattle industry moving slower along this line than the hog industry? I think if you look at the structure of the cattle feeding industry relative to the hog industry, that explains most of it. In the hog industry, you are primarily dealing with people in the farrow-to-finish business that have direct control over the carcass quality that they produce. In the cattle feeding sector, we have a large portion of the industry that provides feeder cattle at auctions, and they have limited information (and in many cases no information) about the carcass quality of those animals when they are on the breaking table. As a result, as a cattle feeder, feeding those kinds of animals, you don't have a lot of incentive, in the short run, to move to a carcass-based pricing system. In fact, there are a lot of reasons why you might want to resist that. If your cattle are below average in quality, you will like pricing at "averages." I think the structural characteristic of the beef sector is the primary reason why this movement has been much slower in the fed cattle markets than in the hog markets.

Dave Kenyon: I will address the second question. I think the second question was, "Has carcass value pricing made much of a difference in the type of hogs that get produced?" I think the answer is "yes, very definitely." Current hogs are much leaner. There was a study just finished at Duke University, in their nutrition program, that said the fat content in the new NPD hog that Smithfield Foods, Inc., uses is 35 percent lower than the average pork in the market. I think some of these things are definitely making a difference in terms of the quality of the animals being produced.

Steve Meyer (in audience): Numerically, over the last four years we added 1.5 percent to the average fat-free meat index for pork in the U.S. We have gone from a system that is probably 80 percent rotational breeding programs to one that is now 80 percent terminal breeding programs just in response to the lean value programs. The other thing I want to point out is the NPD hogs are good hogs, they are lean hogs, heavily muscled, but that same study at Duke also shows the intra-muscular fat on those hogs is less than 1.8 percent. If any of you want to get a piece of that pork with low-fat content and go home,

you better know how to cook it or it will turn to “shoe leather” on you. Therein lies one of our problems: when we make hogs leaner, we may compromise on the quality.

Paul Engler (in audience): Based on what has been said here today in terms of price discovery, what is happening in the swine industry and the beef industry, and in light of the high percentage of hogs moving on a contractual basis, all this poses an obvious question. Which of the two industries, the hogs or cattle, has the most problem with price discovery?

Dave Kenyon: I would argue at this point in time that the beef industry has the most problems. I think what carcass value pricing in pork has done is it has really strengthened the connection between the consumer and what is getting produced. And I think it has really affected what is going on at the farm level. To this point, the base price level is still largely tied to a cash market where there are a large number of packers and where there are a large number of producers (the Iowa-Southern Minnesota market). If you look at the price surface for hogs, it just so happens that the whole industry is pricing off the highest hog prices in the country, which producers like to hear. Each individual packer has his own way of adjusting that price to come up with his carcass value, and all kinds of things happen when that gets done. But I think the pork industry has made real progress in the last 10 years in carcass value pricing.

Paul Engler: In the beef industry there is a lot of concern about lesser and lesser percentages of cattle sold on a negotiated basis. I would like to have you address that and whether or not you feel that is a factor in price discovery.

Dave Kenyon: Non-negotiated in the sense that the price they are receiving is often a formula based on a live price that is discovered somewhere else? I thought about that a lot and purposefully decided not to address it, so I guess that tells you where I am.

Steve Koontz: I would like to add a short note to that. In the beef industry, the only thing right now that has a significant amount of quality-based pricing (value-based pricing) is predominately the formula arrangements. This is especially true if it is a long-run negotiation versus a day-to-day transaction negotiation. What you are negotiating is a long-run base price (the formula) and maybe you negotiate the long-run premium/discount structure. Maybe that varies from time to time, but it doesn't need to vary every minute on every animal for it to still get closer to value-based pricing than where a pure and negotiated cash live animal trade is. So, I wouldn't use the same terminology to say that some of these formulas are non-negotiated trade. They *are* negotiated. It is just a different kind of negotiation, not bickering about every animal in every pen. It is just bickering about the base that we are going to use. I think it is essential to have a base. You can't just be using a base that is some average for a particular plant. I get concerned about that. I think the integrity of the price base is very important, and that is where negotiation still occurs.

Dave Kenyon: In terms of swine, and having analyzed the carcass value pricing systems, we are concerned about the base price for the Southeast. It could be higher. There are

some competition issues going on there, and you have to worry about that. There basically is no live price in the Southeast, it's all off formula from the Midwest. When you look at Southeast prices and compare them to the Midwest, high-quality hogs are not bringing as high a price in the Southeast. So we have some concerns about the pricing base.

Wayne Purcell: Paul, when you look at the written materials, you will find some indications in various places that price discovery can be a fuzzy concept. Not everyone thinks about it the same way. What we are hearing from the speakers is that effective price discovery is a pricing system that prices to value, that puts the correct value-related signals in place, and passes a signal down through the system to the producer. The producer can then respond to consumer-based needs and changes. That doesn't necessarily have any correlation with the percentage of your sales that are negotiated. You could have *all* the prices negotiated and have a very ineffective price discovery system in that context, which is what we have had for many years in the beef business. Having every pen be "negotiated" will not bring effective price discovery when we are still pricing on a live basis and guessing at value and still selling everything at an average price. I don't think there is any legitimate basis for arguing that more or less negotiation necessarily is going to get you to better price discovery in terms of pricing to value, coordinating the system, and moving toward being "consumer driven."

Question: Just how small can the price base be?

Wayne Purcell: How small can that base be, panel? David Kenyon has already talked about the fact that the entire pork industry is being driven off of Iowa-Southern Minnesota, and is that about 25 percent of the hogs, David?

David Kenyon: It would be more than that. About one-third.

Wayne Purcell: Many of you have been around long enough to remember the Food Commission of the 1960s. Dan Padberg, who was heavily involved in that, will be on the program later today. Back then, we were discussing how big the price had to be for it to still be legitimate. I'm not sure we know. The base could be quite small and still be okay if both buyer and seller are well informed.

Question: I would like to ask the panel, in reference to Paul's question, about how the hogs have been able to go into a value-based carcass pricing and we have not done that in the cattle business. How much do you think is related to the way the cattle are marketed as compared to the hogs, and how much of it is related to the structure of the industry? Most of the hogs are in farrow-to-finish, where it is basically one producer making all the decisions. In the cattle business you have about three different stages and lots of different profit centers who have to coordinate, and that is what has made the change hard in the cattle business.

Jim Mintert: The structure of the industry is very important. Theoretically, you should be able to accomplish that linkage between and across the various stages with the price

signals, but the problem is that there is a lack of information. If you are going to see us actually distribute that information back to the cow-calf level, that implies some changes are needed in terms of how we market feeder cattle, for example, so that people have better information about what their calves are eventually worth. Right now, though, most cow-calf producers have virtually no information on what the carcasses might look like from the cattle they produce on their farm or ranch. That situation is one that makes it very difficult to change very quickly.

Wayne Purcell: Someone said cow-calf producers had no reason to care, and that is probably right, because we are selling weight or tonnage and not anything else when we price on averages.

Question: In any of the price discovery research that has been done, did anyone look into what seems to be a bit of a paradox in terms of the Choice-Select spread? All of the meat scientists and the research tell us that tenderness and marbling are not closely related. It seems mysterious to me that the meat industry is always able to sell Choice at substantial premiums to Select. That seems to defy economic theory to me. Somebody is selling the stuff for more money. So if it doesn't relate to final use in the consumers' eyes--satisfaction, quality, palatability, etc.--how does the myth get perpetuated?

Comment: Not only are they selling it, somebody is buying it. How does that continue to happen?

Original Questioner: There must be a difference if they are continuing to buy it. It can't be completely wrong. Why would consumers pay more for it?

Ted Schroeder: But all the research would indicate that it is dead wrong.

Question: Are you telling me that all the consumers are wrong?

Ted Schroeder: No, I am asking more than anything. There seems to be a bit of dichotomy in thought between what the meat research scientists are telling us and what the marketplace appears to be telling us from the viewpoint of price premiums for Choice. What is responsible for the disparity?

Wayne Purcell: It clearly has to be the case that at the consumer level, to some degree, they are seen as two separate products. You have demand for and supply of Choice product, and you have demand for and supply of Select product. That is why you get the price differentials when those supply-demand dynamics change. That doesn't argue necessarily, though, that the term Choice has high informational value in terms of conveying quality. I think the research shows that there is a weak correlation between eating satisfaction and marbling, which makes it Choice. But they have to be seen as two separate products.

Jim Mintert: The correlation is small, but it is not zero.



Questioner: Is it \$22 per cwt., because we have seen those Choice-Select differences?

Wayne Purcell: It can be if you have demand for each of the two products fixed and get a huge disparity in what you are offering because corn is \$5.00 per bushel, and you don't feed the cattle long enough to grade Choice. I think that is what happens.

Question: We have heard a lot about information, but I never heard the word "misinformation" spoken today, and I hear that a lot in the political arena. It seems to me that our industry has thrived on the use of misinformation in this segment of the industry. In fact, it seems that profitability has come from the misinformation we have shared with each other in order to make a buck. I would like to put it to the panel. In your surveys, did you ever encounter this? Someone said earlier that we probably could be sued for the misinformation that we give out to one another. If it were in a financial network, we would be. What misinformation have you seen and what fuel would give teeth to this information that would make it more pure?

Steve Koontz: How do you communicate information if you don't do it in price? You have to do it through written agreements. If you are not doing it purely through price and through reliable business arrangements, what are your alternatives? They use these approaches with emphasis on price in financial areas and in the securities markets. If you misrepresent what you are doing, you end up with a lawsuit where the person that was cheated out of some benefit recoups their losses. How do you set up a system to do that? The easiest thing to do may be to improve the grading system so that we are pricing to final-use quality and then carry the pricing down through those new grades, and price to quality and value. Right now, there is too much commodity marketing on the beef side. We sell it all at the average price. There is no easy way around the fact that selling on averages is not good price discovery even if prices are negotiated, and it is causing the beef sector major problems.

**PROCEEDINGS**

***PRICE DISCOVERY IN  
CONCENTRATED LIVESTOCK MARKETS***

**National Conference**

**Kansas City, Missouri  
February 28 – March 1, 1997**

**Organized and Conducted by the  
RESEARCH INSTITUTE ON LIVESTOCK PRICING  
Agricultural and Applied Economics, Virginia Tech**

**PROCEEDINGS**

***PRICE DISCOVERY IN  
CONCENTRATED LIVESTOCK MARKETS***

**Wayne D. Purcell and Karen S. O'Connor, Editors\***

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Department of Agricultural and Applied Economics  
Virginia Tech  
Blacksburg, VA 24061-0401  
June 1997**

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\* Director and Program Support Technician, respectively, Research Institute on Livestock Pricing, Agricultural and Applied Economics, Virginia Tech, Blacksburg, VA 24061-0401

## PREFACE

This *Proceedings* is a compilation of two broad sets of information. First, you will find executive summaries of the chapters in *Price Discovery in Concentrated Livestock Markets: Issues, Answers, Future Directions*, a 134-page book that was distributed at the conference which documented research and information on price discovery in the beef and pork sectors. The conference was developed around these materials and the related presentations.

The second body of information in this volume deals with the numerous conference presentations plus the question and answer sessions at the conference. The conference was organized to feature discussion and interaction. Note the conference schedule on the next page. The end result, I believe, is a very productive coverage of some key issues in price discovery that are facing us in mid-1997.

Wayne Purcell  
June 1997

## CONFERENCE AGENDA

### Friday, February 28

- 11:00 - 1:00 Registration
- 1:00 **Welcome and Purpose**, W. Purcell, Director  
Research Institute on Livestock Pricing, Virginia Tech
- 1:15 **Price Discovery: Overall Issues and Why Our Markets Are at Risk**, S. Koontz, Agricultural Economist, Michigan State University
- 1:45 **Price Discovery in the Beef Sector in 2005: What, Why, Implications**, T. Schroeder, J. Mintert  
Agricultural Economists, Kansas State University
- 2:30 **Price Discovery in the Pork Sector in 2005: What, Why, Implications**, D. Kenyon, Agricultural Economist  
Virginia Tech
- 3:15 **Break**
- 3:30 **Questions and Answers**  
(Speakers as a Response Panel)
- 4:00 **The USDA in Concentrated Livestock Markets**  
  
**Important and Ignored Messages from GIPSA Coordinated Research**, C. Ward, Agricultural Economist, Oklahoma State University  
  
**Secretary's Commission: What It Means for Future Price Discovery**, D. Padberg, Chairman  
Commission on Concentrated Markets  
  
**Role of GIPSA in Price Discovery in Concentrated Markets**, G. Grinnell, Director, Industry Analysis, Packers and Stockyards
- 5:00 **Questions and Answers**  
(Speakers as a Response Panel)
- 5:50 **Adjourn**
- 6:30 **Reception**

### Saturday, March 1

- 8:00 **Price Discovery That Prices to Value**  
  
**Alliances: Why and How They Help, Beef**  
C. Lambert, National Cattlemen's Beef Association  
  
**Alliances: Why and How They Help, Pork**  
S. Meyer, National Pork Producers' Council  
  
**Price Discovery Issues: An Industry Perspective**  
K. DeHaan, Director, Technical Affairs, Beef America

- 9:00 **Questions and Answers**  
(Speakers as Response Panel)
- 9:30 **Break**
- 9:45 **Beef Quality: Grades, Tenderness, and Price Discovery Issues**  
  
**Tenderness and What Can Be Done**, M. Koohmaraie,  
Meats Unit Research Leader, U.S. Meat Animal Research Center  
  
**Value Differences Within Grade**, D. Wilkes, Integrated Beef Technologies  
  
**Grade Changes in the Current Environment: Procedures and Possibilities**, B. Carpenter, Director,  
Livestock and Seed Division, AMS, USDA
- 10:45 **Questions and Answers**  
(Speakers as a Response Panel)
- 11:15 **Cash-Futures Convergence and Price Discovery**  
  
**Delivery Process, Basis Performance, and Price Discovery**, R. Murphy, Research Economist, Chicago Mercantile Exchange  
  
**Experiences of the Cattle Feeding Sector**, T. Beall,  
Director, Livestock Marketing, Continental Grains
- 11:55 **Questions and Answers**  
(Speakers as a Response Panel)
- 12:15 **Lunch**
- 1:15 **Captive Supplies, Price Reporting, Implications to Price Discovery**  
  
**The Research Findings and What They Mean to Price Discovery**, T. Schroeder, Agricultural Economist  
Kansas State University  
  
**Captive Supplies and Price Reporting: An Industry Perspective**, P. Engler, President, Cactus Feeders  
  
**Public Market Information and What Its Demise Will Mean to Price Discovery and Industry Structure**  
W. Purcell, Agricultural Economist, Virginia Tech
- 2:15 **Questions and Answers**  
(Speakers as a Response Panel)
- 2:45 **A Call to Action: The Needed Agenda**  
S. Kay, Editor, Cattle Buyers Weekly
- 3:00 **Adjourn**

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**Research Institute on Livestock Pricing**  
**Department of Agricultural and Applied Economics**  
**Virginia Tech**  
**324 Hutcheson Hall**  
**Blacksburg, Virginia 24061-0401**  
**(540) 231-7725**  
**(540) 231-7622 (FAX)**  
**purcell@vt.edu**

*Serving the Needs of the Livestock Industry*

**SESSION 1**

***PRICE DISCOVERY ISSUES***

Stephen R. Koontz and Wayne D. Purcell  
Agricultural Economists  
Michigan State University and Virginia Tech

Ted C. Schroeder, Clement E. Ward, James Mintert, and Derrell S. Peel  
Agricultural Economists  
Kansas State University and Oklahoma State University

David Kenyon  
Agricultural Economist  
Virginia Tech

## **Executive Summary of Price Discovery and the Future of the Livestock Sector\***

Stephen R. Koontz and Wayne D. Purcell

Price discovery is identified as being the recipient of increased attention during the 1980s and 1990s. Indeed, the authors suggest that the focus of attention is becoming even more intense during the 1990s. They refer to the petition for a rule change that was presented to the Secretary of Agriculture in October of 1996 by the Western Organization of Resource Councils (WORC). The petition calls for regulations or restrictions on how packers/processors could buy cattle. Specifically, the petition asks for the banning of, or control of, what has come to be known as “captive supply” instruments such as cash forward contracts, basis contracts calling for later delivery, and formula price contracts, where the final cash price is tied to some visible market price or index.

The authors suggest that part of the motivation for such proposed regulations comes from concern about the effectiveness and viability of the price discovery process. They go on to point out that it is not the price discovery process that was responsible for the low calf prices in 1995 and 1996, during a period of record high corn prices, and that the economic system must determine a price that is consistent with that needed to clear the market. The disastrously low calf prices were not due to a failure in price discovery. The authors also disagree with the implication in the proposed rulemaking change that price discovery will be effective when transactions are negotiated as compared to when transactions involve various forms of forward buying by contract. Effective price discovery involves pricing to value and other attributes that are in no way assured just because transactions are negotiated.

The authors suggest that part of the reason for the current state of unrest with regard to price discovery is that producers and producer groups do not like the low prices they have seen for livestock in recent years, and they do not like some of the alternatives to the traditional price-based marketplace that are developing. These alternatives include the above-mentioned captive supplies and would also presumably include the alliances and various other entities that are cropping up to achieve the inter-level coordination, especially in the beef business, that the price-based systems have not achieved.

The authors review some historical thinking about price discovery in the effort to fully understand why price discovery is of such interest in 1997. They note that researchers in past decades have suggested that if the traditional marketplace that features separate ownership of the economic functions at the different levels does not achieve coordination, in particular coordination between what the consumers want and what is produced, then those price-based mechanisms are likely to be replaced. They suggest there are huge economic incentives for processors to reduce costs, for example, by stabilizing flows of hogs, cattle, or sheep into their facilities. If that stabilization cannot

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\*This is a summary prepared by Wayne Purcell of Chapter 1 in *Price Discovery in Concentrated Livestock Markets*, the book that was distributed at the conference.

be achieved by the traditional price-based system, then it is likely to be done by various vertical arrangements that displace or replace the traditional pricing system.

The authors go on to discuss that, partly because of lack of information, lack of perspective, and also because of inadequacies in grades and grading, we have seen a failure of the pricing system in livestock in recent years. By failure, the authors mean that price discovery has not been such that pricing to value has been achieved. A majority of the slaughter cattle in the United States are sold at an average price, and, until very recently, much the same could have been said for slaughter hogs. In pork, moves by processors to reduce the variability in product offerings by controlling the genetics has changed the type of pricing and the type of coordinating mechanisms that appear to be likely in the hog sector in the future.

The authors present ideas and alternatives, suggesting that some of them might be seen as controversial. They argue that we must see technical progress in the pricing and grading systems. There is a need for technology that identifies in an objective way the value of slaughter livestock. To date, the investments in that type of technology have not been forthcoming at the pace that is needed for the beef industry to move forward in a progressive way.

Koontz and Purcell also raise the question of whether or not we might have to move to mandatory reporting of prices. They suggest it is appropriate to think about pricing and price discovery as something approaching the status of a classical public good. That is, access to prices, pricing, and price discovery is important to society. The authors suggest that there is no publicly defensible economic justification for the withholding of price information by private firms. They go on to suggest that if voluntary participation in the more highly concentrated marketplaces of today and the future do not provide the needed price-related information, then mandatory price reporting probably has to be considered.

The role of the emerging alliances in the livestock sector in the pricing process is discussed. The authors note that there is huge value to building marketing institutions which effectively coordinate production and marketing if the open market system, with its emphasis on negotiated prices, does not achieve that coordination. They had indicated earlier that the price-based system with its emphasis on negotiated prices is not accomplishing effective price discovery, that it is not pricing to value, and that it is not providing for the inter-level coordination needed in our livestock production and marketing systems. This, they suggest, is the reason that alliances are coming into use. The alliances provide a mechanism to allow vertical coordination that has not been accomplished historically via pricing and price discovery, but they are also displacing or replacing the traditional pricing systems.

In summarizing their comments in this area, the authors suggest that we need to understand that individual firms have the incentive to innovate and capture benefits to that innovation. They suggest that left to its own devices without any progressive change, the industry is likely to consolidate, industrialize, and continue to move to non-

price means of control and coordination. This phase would complete, the authors suggest, researchers' long anticipated replacement of a failed and failing price-based marketplace with all of its problems in achieving effective price discovery. The authors suggest that the industry has to make the changes necessary to get to better price discovery. This is important because of all the advantages that effective price discovery brings, advantages like pricing to value, allowing the industry to be consumer driven, and achieving coordinated activity and the efficiencies from that coordination. If there is no change toward improved price discovery in the system that is characterized by separate ownership at the various economic levels of activity and negotiated prices, then there will continue to be a change to the inevitable: a more concentrated, more regulated, and possibly less efficient system that pushes the producer into a pattern of forced actions. Clearly, the authors believe that we need to rethink what price discovery is and is not, think about its dimensions as a public good, and think about moving forward with some progressive and collaborative activities to improve price discovery if there is a desire to perpetuate the traditional price-based marketplace.

## **Executive Summary of Beef Industry Price Discovery: A Look Ahead\***

Ted C. Schroeder, Clement E. Ward, James Mintert, and Derrell S. Peel

The authors start their discussion with a careful differentiation between price discovery and price determination. They make the very important point that price determination, which is the result of the interaction of the broad forces of supply and demand, ultimately determines market price level. Thus, there is no reason to attribute low prices, when low prices are required to clear the market, to an ineffective or inefficient price discovery process. The authors suggest that price discovery begins with the market price level and involves the dynamic process of interaction between buyers and sellers as they seek to find a correct equilibrium or market-clearing price.

The chapter deals primarily with a detailed and very informative recounting of what the researchers learned in a substantial interview process at the feedlot and meatpacking levels.

The authors indicate that not all cattle feeders or meatpackers think we have major problems in price discovery. Others suggested that price discovery *is* a major problem and identified some of the issues. One was the need to better identify and price quality. A second was a need to improve pricing accuracy and move away from the current system of average pricing to more nearly value-based pricing. Third was the need for more complete and better market information. This latter point dealt with captive supply data and information on what is going on in the industry, information that needs to be available at both the cattle feeding and packer levels in roughly equal quantities and equal quality.

In somewhat more detail, the authors discuss the already identified issues and other price discovery issues that emerged during the interviews. They enumerate six, including 1) more accurate and less subjective measurements of beef quality is needed; 2) price premiums and discounts for fed cattle do not adequately reflect value differences; 3) inadequate market information inhibits efficient price discovery; 4) live cattle futures basis risk is excessive; 5) formula price arrangements adversely affect cash fed cattle market; and 6) group marketing of fed cattle may offer solutions to some price discovery problems.

The authors built much of the rest of their coverage around these issues. In terms of the beef quality issue and assessing of beef quality, they review the historical development of beef grades and documented available research that shows palatability, tenderness, juiciness, etc., differs considerably within the current set of quality grades. One study, for example, was quoted that indicated that 5.6 percent, 10.8 percent, and 26.4

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\*This is a summary prepared by Wayne Purcell of Chapter 2 in *Price Discovery in Concentrated Livestock Markets*, the book that was distributed at the conference.

percent of the loin steaks from Prime, Choice, and Select carcasses respectively showed undesirable overall palatability ratings. Some possible solutions to this problem are identified.

The authors discuss the possibility of an in-line test for tenderness, raise questions about whether the federal grading system might need to be revised or changed, and discuss generally whether consumers might be willing to pay more for consistent, high-quality beef thereby justifying some improved measurement of quality.

The second area identified by the authors was the issue of pricing to value. The authors discuss the current tendency to price on averages and discuss the implications to the industry of not pricing to value to prompt changes over time in the nature and quality of the cattle being produced. They indicate that marketing agreements, alliances, and various types of formula pricing and/or price grids that are coming into use in the industry are means of trying to resolve this problem. They present data on the magnitude of the problems associated with pricing to averages and discuss the fact that both cattle feeders and packers agreed that we need to move to value-based pricing. Beyond suggesting that the use of price grids is likely to grow, there were no definitive responses in the interviews to indicate how we would get to an improved situation. There is some possibility that packers and/or processors who can identify beef quality more accurately than the current USDA quality standards may be able to develop a branded beef product to the benefit of both the cattle feeder and the processor.

The third area that evolved in the interviews deals with the role of market information. The authors note that as the industry changes in a significant way toward a more concentrated and more highly structured industry, informational needs are also changing. Apparently, a number of the cattle feeders who were interviewed were concerned about the asymmetry in availability of information within the industry. In particular, cattle feeders were concerned about their lack of knowledge of the volume and timing of packers' captive supplies, and indicated that it made it difficult for them to assess potential packer demand and bring it into the price discovery process. The authors note that a number of cattle feeders and at least one packer indicated that they expect to see substantial changes in the way cattle are marketed. They felt that there would be some moves away from pricing systems where the price, as being reported by the USDA or by private vendors, is based on a relatively small number of operations. The authors also discuss the possibility of moving from voluntary to mandatory price reporting. Most cattle feeders and packers were not in favor of mandatory price reporting, but several apparently indicated their willingness to consider it if voluntary approaches were not sufficient. The authors note that the availability of and access to market information has a big impact on price discovery. They reemphasize the concerns about asymmetry of information that were raised during the interviewing process. They also indicate that evolution in the way cattle and beef are being marketed means that the beef industry's information needs are changing. As more cattle are sold on a carcass-weight basis, for example, the USDA may need to change the information that they collect and report.

A fourth issue that prompted considerable discussion was the issue of effectiveness of the live cattle futures market as a risk transfer mechanism. There was some general indication of understanding of importance of the futures market in the overall price discovery process. Much of the discussion revolved around the recent changes in delivery procedures for the live cattle futures that have prompted some users and potential users to question the predictability of the cash-futures basis. The most recent change in specifications of the contract became effective with the contract that expired in June of 1995. There are some fairly loud voices in the industry that are suggesting that basis performance has deteriorated in the wake of this most recent contract change and that the industry needs to think about moving to a cash settlement. The authors discuss some of the problems associated with moving to cash settlement and review the study that was released in 1989 that opposed moving to cash settlement when this issue came up earlier. Whether there is now a sufficiently broad base of cash price information that would block the potential for manipulation in the cash market is an empirical question that might need to be researched. The authors also discuss the possible need for a dressed beef futures contract of some type, suggesting that as more of the cash business moves toward a dressed basis, we probably need a price discovery instrument in futures that discovers price at the same level in the system.

A fifth and volatile area that was discussed during the interview process reported by the authors deals with captive supplies in fed cattle markets. The authors review the level of captive supplies across recent years and review the recent research that was coordinated by Packers and Stockyards Programs in the Grain Inspection Packers and Stockyards Administration (GIPSA). The authors note that interviewees still have a perception that the declines in fed cattle prices in recent years have been created by packers' captive supplies. Interviewees also expressed concern that some of the reported high margins, especially during 1995 and 1996 at the packing level, are related to captive supplies. Coverage of the basic inverse relationship between beef production and Choice steer prices was included as the authors indicate that much of the price movement in recent years can be attributed more nearly to the need for the marketplace to determine a relatively low price to clear the market as compared to problems of price discovery. Clearly, there are potential policy implications and continuing questions that will be raised, but the research suggests that captive supplies have not been a major factor in depressed fed cattle prices nor have captive supplies been a major detriment to effective price discovery.

The sixth and last issue identified during the interview process dealt with group marketing alternatives. The authors discuss electronic trading and the extent to which it might "even the playing field" between cattle feeders and packers. They also note that it is important, if electronic marketing systems are to succeed, that there be a benefit to both buyers and sellers. It is true that electronic marketing and electronic trading systems could be a means of providing some of the information that cattle feeders feel they need and perhaps correcting any asymmetry in terms of information availability. But cattle feeders were hesitant to suggest that packers would adopt and use electronic means of procurement. They noted that packers are tied to their current method of procuring cattle, and they would need a substantial incentive to make a change. Another presumed



advantage of the group effort is improved bargaining and to provide some leverage at the cattle feeding level. This has been the objective of several efforts that have been discussed in the major cattle feeding areas in the Southern Plains. However, both cattle feeders and packers who were interviewed indicated that group efforts sometimes created an “us versus them” attitude and contributed to the adversarial relationships between feeders and packers. There is some reason to question how effective group bargaining would be if nothing is done to improve the price discovery process and to get nearer to a point of pricing to value. The idea of a closed cooperative that integrates various functions from top to bottom through the system was also discussed as a formal means of organizing group activity. Some of the new alliances in the industry are organizing this way. The authors suggest, however, that vertical integration in and of itself is not a panacea. It has the potential to bring some benefits, especially in terms of coordination of activity, and “pricing” to value for the participants in the system, but there is always the problem of cattle feeders being willing to make a commitment in terms of cattle. They might fail to make a commitment in terms of providing capital as well. Such a group effort always needs money, and one of the things that is missing in the industry is investments to change the product offering. Alliances including a closed cooperative-type structure do not necessarily bring that type of investment capital.

The authors attempt to organize the findings from the interviewing process in a fairly lengthy discussion of the future prospects for price discovery. They point out that one theme that pervades all change in the beef sector is that the industry needs to produce products of higher value to consumers. In other words, they are suggesting that it is very important that the industry move toward a consumer-driven status.

Beyond moving to a consumer driven status, the authors identify several factors that will influence price discovery and the level of vertical coordination achieved in the beef industry over the next decade. They list the following:

- Technology to improve our ability to identify and sort beef products according to varying quality attributes and values is needed.
- Federal beef quality grades are likely to be less important in 10 years than they are today.
- Our ability to predict meat quality from visual inspection of live cattle will not improve.
- Grid pricing will become more common in procurement of fed cattle by packers.
- More cattle will be produced under alliances that directly link cow-calf producers to retail.
- The result of more fed cattle being sold on a dressed weight, carcass quality, and yield grade basis, the expanded use of price grids, and increased presence of alliances will shift the center of price discovery more to the wholesale level in the beef system.

- Producer group marketing and closed cooperative efforts will increase.
- Certified beef marketing programs may expand modestly in the future.
- An increased share of beef will be branded in the future.
- Asymmetry of market information plagues the beef industry, and if industry participants do not cooperate and provide information as requested, mandatory reporting may occur.
- Market institutions need to evolve with the industry. Special reference here is to live cattle futures that may need to move to more of a dressed weight specification.
- Electronic trade of fed cattle may have a limited role in the industry.
- Negotiation of cattle terms of trade will increase significantly in fed cattle marketing. The authors are suggesting here that we will see larger operations and group efforts by producers in that negotiation process which includes more product specifications, etc., than has historically been the case.
- When technology and incentives for improved meat product market segmentation develop, the highly concentrated packing and increasingly concentrated cattle feeding industry structures will lead to rapid adoption throughout the industry.
- Better determination of value at the meat level and less emphasis on live fed cattle pricing will have implications for feeder cattle pricing.

Change in the way beef is produced and marketed, in the institutions used to coordinate the market, in the way product quality is determined, and other changes in the industry are inevitable. The authors point out that these changes will bring costs, risks, resistance, and some failures. The beef industry, suggests the authors, has historically been slow to change, but they indicate that a necessary condition to return to a more competitive position in the marketplace will be improvement in price discovery. If significant improvement does not occur, then the industry can expect greater emphasis on contracts and other non-price means of achieving a high level of coordination across the production, processing, and merchandising of beef.

## **Executive Summary of Pork Industry Price Discovery: A Look Ahead\***

David Kenyon

This article adapts and uses a model developed initially in 1981 by Reimund, Martin, and Moore. The researchers had looked at what had occurred in various industry sectors and put together a model that helped explain how a marketplace evolves and changes over time.

What the author calls the RMM model focuses on the process of structural change. The model identifies several factors that cause changes in structure and then looks at their role in the process. Those factors would be 1) various forms of technological improvement and advancement, 2) resource and product market factors, and 3) policy factors. Once one or more of these three factors initiates some structural change, then the RMM model suggests the industry will pass through several stages on its way to becoming more industrialized. These stages involve 1) technological change, 2) a shift in production location, 3) growth and development, and 4) adjustment to risk.

Kenyon uses this model as a way of thinking about the issues that are going on in the pork sector as we see the pace of change pick up in the 1990s. He discusses, within the confines of this model, pricing and coordination issues that have come to the fore, especially as the location of production moved to the nontraditional producing areas, a phenomenon that was predicted by the RMM model.

The author discusses the moves to carcass value pricing that started in the 1980s and quickly swept through the industry in the 1990s. The majority of hogs being sold in the United States today are sold under some sort of carcass merit system or carcass value pricing. With this type of pricing approach came growth in various types of marketing supply contracts. Some of these involve various types of price windows that allow the producer and the buyer to share the risk associated with volatile prices. Others involve no price windows and no sharing of price risk, but did involve price premiums and various types of agreements to price to value. This was a way of offsetting some of the deficiencies that the pork industry had shared with the beef industry in finding it difficult to price to value when everything was earlier sold on a liveweight basis and there was separate ownership of the various economic functions between the producer and the final consumer.

By the mid-1990s, the price risk management issue was becoming very important, and the Chicago Mercantile Exchange changed its live hog futures to what has come to be called the lean hog futures, starting with the February 1997 contract. That new contract is based on wholesale prices of 51-52 percent lean pork and is cash settled based

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on a weighted average carcass price reported by the USDA for the previous two days. By switching to a carcass price contract, the Chicago Mercantile Exchange was getting its price discovery mechanism in line with what was already happening in the cash market.

Kenyon discusses the impact of consumer demand on changing industry structure over time. Some researchers have suggested that the move to industrialization and the move to non-price means of coordination that various integrated and contractual arrangements have allowed have been prompted by the need to be consumer driven. Kenyon reviews these arguments but concludes that much of the change to date has not been prompted by an interest in satisfying consumer demand. Rather, the industrialization of the sector has come more nearly from the economies of size in large hog-producing operations that developed outside the traditional midwestern producing area and the profit stream that has flowed from those operations across the past 10-20 years. In other words, the author would submit that much of the industrialization to date has been driven by technological advancement and efficiency associated with large, even mega-sized, and quite profitable producing operations.

In the late 1990s, and this would be the fourth stage of development in the RMM model, the industry is developing new procedures for risk management and moving into closer coordination of production with demand. These new risk transfer mechanisms and approaches are developing as epitomized by the CME's move to a lean hog contract. As those price risk transfer mechanisms come into place, there is at least the beginning of an economic impetus that appears to be coming from moves toward a more nearly consumer-driven status. Kenyon suggests that sensitivity to changing consumer tastes and preferences will play a more important role in the pricing structure of the swine industry and price discovery processes in the future. A number of modern packing/processing facilities have moved into total quality control or at least have made an effort to accomplish that by controlling the genetics in both company-owned and contractual production operations. The author notes that demand for a consistent high-quality, uniform, and safe product will push the packer/processors to continue to coordinate with large producers to get the types of hogs that permit them to serve the modern consumer. Kenyon predicts that this is going to manifest itself in the form of improved returns at the processing level in the future and the potential for the entire sector to grow.

Kenyon notes that the continued rapid growth of the large producers, the decentralization of production, the need for improved price risk management, and the importance of responding to consumer desires are likely to continue to move the pork industry toward increased concentration and coordination. These trends, in turn, are likely to move the price discovery process away from the live hog cash market and to the carcass market. He had already noted that carcass value pricing systems are currently still tied to live hog prices, but as we move forward, he feels that is likely to change and that more of the price discovery process is likely to move up toward the wholesale level. All this is moving the sector toward a better price discovery process and more effective pricing to value, necessary conditions for being a consumer-driven industry. All this might, in turn, move the pork sector back toward a growth status and a more aggressive

and formidable competitor for a share of both the domestic and international meat market.

## Questions and Answers

Question: At least three of our four speakers have said that we need to move away from pricing livestock to using the wholesale meat prices. If I recall my history correctly, we have been having more problems with wholesale meat price discovery than we have had with livestock price discovery. Going back to the mid-70s, when terminal markets were still important, there were a lot of questions about formula pricing of wholesale meat back then. How do you feel about moving from one area where we have thin markets to another area where we also have thin markets in price discovery?

Ted Schroeder: I don't think we are necessarily saying that we are advocating that we just remove price discovery from the live level. The problem is that if we continue to price on something that we don't know the value of, we have major problems. We have to get the price discovery to a point where we know the value. Either we are going to have to determine the value better at the carcass level, or we are going to have to go to a level where we know the final-use value. We *do* know the value pretty well at the boxed level, at least with beef. The problem is we can't track from the boxed level back down to the live level. We can't get from the boxed level back to what the value of the animal is right now, at least with the pricing and transaction processes we are now using. Yes, maybe there are problems with price discovery in wholesale as well, but at least we are determining value at that level. I am not as convinced there are problems with wholesale price discovery as maybe there are problems with understanding information in the wholesale market. At least that is what we heard in the beef industry during the interviews. We have a lot more boxed trade going on than we have information on that boxed trade.

Jim Mintert: I think one other thing that is corollary to that is that we have done some work that suggests that a lot of price discovery in the pork sector actually occurs at the live level and feeds through the system from there. What we are actually suggesting, or at least I think it is a possibility, is that if we shift towards trading the live product (live cattle) on a wholesale price, we might actually see the best of both worlds in terms of seeing that wholesale market increase in liquidity and simultaneously improve the price reporting at that market level and actually gain on both sides. There is that potential.

Wayne Purcell: Remember Steve Koontz said that price reporting and price discovery is a public good, which means everybody wants to take advantage of it, but nobody wants to invest in it and contribute to it. Both panelists responding said that we have information that is not getting reported. Let's don't miss that point because I think in many respects, the system is starved for information. A lot of people in the room don't want to start thinking about mandatory reporting. Maybe that wouldn't work. But that discussion is starting to occur.

Question: Given that we have to drive off of consumer acceptance, which implies that we have to get back to pricing to value, we haven't talked at all about responsiveness at the cow-calf level. We talk about retail prices and packer prices, but have we done

anything much about effectiveness of price discovery at the cow-calf level? You guys interviewed feedlots and packers. Did you find out how that price discovery process is occurring at that lowest level?

Jim Mintert: In the context of our interviews, we really didn't do that. One other piece of information that I think we could draw on is that there have been a number of studies over the years that looked at feeder cattle pricing differentials. In particular, we have done a couple of those at Kansas State that looked at using the same types of models over two different time frames: one back in the mid-80s that Ted and I worked on shortly after we arrived at Kansas State, and another one where the data were collected in 1993. Those data suggest that there *are* some differences occurring across those time frames, perhaps related to different price levels that cattle feeders are willing to pay for feeder cattle based on some quality characteristics. It is limited to looking at the differences across that 1986-87 to 1993 time frame, but there is some evidence that some of that value difference is being transmitted back to the cow-calf producer. At this point, a fairly small amount of transfer of information *is* occurring, at least based on that 1993 data.

Question: The reason I ask is that I am from the little state of South Carolina. We actually didn't lose any cattle in the January inventory. We increased the heifers and the beef cow replacements. We are probably \$10-15 under some western markets on calf prices. We are apparently able to use price as some kind of signal; our people are responding. It doesn't appear to be a problem if we can handle those kinds of price discounts and still stay in business. Across a lot of the Deep South, we didn't lose the number of cattle that you lost.

Ted Schroeder: You have a whole lot of things there. We could spend an hour on the last comment because that is a longer run issue. One of the problems is, in this coordinated market, if the price signals for quality at the live animal level aren't there, they are never going to be there down through the system. It starts at the consumer level and it has to move down. When any part of that system from the consumer down to the cow-calf is blockaded, the rest of the system doesn't get that signal. If I am selling all my cattle for the same price from a quality perspective, there is no incentive to pay differentials for quality associated with the meat when I am buying feeder cattle. The only thing I am paying for primarily is production qualities. What can I feed the cheapest? What can I get to gain the quickest? It is a profit incentive based strictly on weight. We have to have the signal there to tell the cow-calf guy what the system needs to meet consumer preferences. You will not get the signal at the cow-calf level under the current market system if we sell fed cattle on averages. The way some cow-calf producers we visited with are trying to get that signal is through alliances. What Steve Koontz talked about earlier is that if the market is not working, vertical linkages *will* create a different and non-price way to get to value via an alliance or some other kind of non-price method.

Audience: Maybe that is some of the problem. I can handle it in the Southeast. Profit may not be a primary motive. If agricultural land is being taxed on a use-value basis, you can see there are a lot of incentives to stay in cattle production.

Wayne Purcell: What he is saying is substantially true in Virginia. We have 740,000 beef cows in Virginia, and those numbers don't seem to respond much to profits. We are above where we were in the mid-70s. So there are some other considerations going on. We have approximately 80 breeds of cattle in this country. We are talking about a system that eventually has to get fixed, given the quality problem, by changing the genetics. But maybe the shorter run needs involve the problems being fixed by product development and that sort of thing.

Dave Kenyon: One of the best articles I read in preparing some of my remarks was a 1995 article where they talk about the two places where the most information is being generated, 1) at the consumer level, and 2) clear down at the bottom, at the genetics. That is where the two control points are. If you want to coordinate what is going on at retail with the products we are producing on the farm, especially with available technology, you need to control the genetics. I think this is what some of the swine people have figured out. They have figured out what the consumer wants, and they have gone around the pricing system and gone right to the bottom to control the genetics. They have gotten the kinds of animals that have the traits and characteristics that they want in their product, and have started producing them. I think that happened because of a failure of the price-based market system. One of the other things I have done for the last several years is drive around the state a lot with the head of the Poultry Science Department at Virginia Tech. I asked him one day, "What started integration in poultry." He said, "When we decided that we were going to sit down and produce a breed of chickens that produced the qualities the consumers wanted, and forget all the different breeds of chickens, that is when we made progress." When I look at swine, I see that happening. NPPC has just funded a huge study. They are figuring out what all those product characteristics are that the consumers want. They are going to go after the needed information. I don't know as much about beef, but I do know that there are a tremendous number of breeds, and there is tremendous variation. You have to produce a consistent quality product that the consumer wants in 1997.

Steve Koontz: You also have an average beef cow herd of about 40 animals. Trying to create an adjustment in that area is going to be tough. Getting back to your question, alliances are in part trying to answer that question on pricing to value by transfer of information. But one thing I hear a lot that they seem to forget is that you only have the cattle feeder talking about wanting the information back from the packer on how the animals do "in the meat." That information, then, has to go further down the system to the cow-calf producer. The cattle feeders have to have an information system in place so they can track the animal, how it did "in the meat," how it performed in the feedlot, and then carry that information back to the cow-calf and stocker people in terms of their pricing.

Jim Mintert: I want to clarify an earlier point. Ted made the point that if there is very little price differential showing up at the fed cattle level, you wouldn't expect anything to show up at the feeder cattle level. But there *is* one aspect where we have seen some small price differentials show up at the fed level. What characteristic might that be? It is



color--black. If you look at our data, going back to the mid-'80s and early '90s, our data were suggesting Angus cattle were selling at a discount at the feeder cattle level relative to Herefords, and by the early '90s, they were selling at a premium. I think that is at least an indication that if we do see the price differential show up at the live level or fed cattle level, there is a strong likelihood that we will see *some* differentials show up back at the feeder cattle levels.

Question: I want to raise a question to both Dave Kenyon and Ted Schroeder. I heard Kenyon say that there are a lot more marketing contracts going on in the pork industry. At the same time, he was saying that there is a lot of grid pricing and all that good stuff. In the beef industry, though, you were decrying that the pricing system is weak (no grids, etc.) and you didn't say anything about contracts. I didn't hear the word "contracts" in the presentation once. It's about 20 percent contracted, I think, in the beef industry and probably the amount of captive supplies in the pork industry is over 35 percent. There seems to be an inconsistency here somewhere. Could you please explain this to me?

Ted Schroeder: He says, "Where is the beef industry going over the next 10 years, and why is it different than the pork industry?"

Wayne Purcell: That is a fair question because what we have done so far here in the question and answer session is recount the problems we know are out there. How are we going to solve them? If we don't deal effectively with these problems, what type of industry are we going to see? I think that is what he is asking.

Ted Schroeder: I will tell you what we heard. When we posed that question to the industry, the response was mostly "no change." They say it hasn't changed in 10 years and they don't think it will change much in the next 10 in terms of the volume of trade in the cattle industry that goes through contract or other non-cash means. Now, the nature of those non-price means of coordination has certainly changed considerably. If you look back to 1987-88 when this captive supply issue first starting cropping up, forward cash contracts were the issue and were a big player in that 20 percent captive supply. They probably made up the bulk of that 20 percent mentioned. But today, marketing agreements and formula-type trade is where the majority of that contract activity is going on. So, the nature of contracting has changed. Maybe the nature will continue to evolve. I'm not sure about that. I think there is going to be an increased emphasis (and we heard this from several people) on further forward kinds of procurement because the retailers are moving more and more towards forward agreements. Certainly, the food service industry is moving more towards long-term, forward pricing arrangements. They need those to secure their own strategic positions. As that continues to occur, there is going to have to be an increase in some kind of agreement between those sectors and the producer sector. We are seeing a lot of different kinds of agreements occur. Exactly what the mix is going to be is well beyond me, but I think we will see more and more movement towards non-price coordination. Whether it is contracting or ownership, and I don't think ownership is so much the trend, some type of contract activity to achieve stable flows into the packing plants and provide for coordination is going to increase.

Wayne Purcell: Ted, wouldn't that include not only timing of future delivery but probably move toward more specification of quality issues?

Ted Schroeder: I think that is a large part of what is driving the whole area: specification of quality. The search costs of trying to find (if you are matching product and specific consumer needs) those specific products get to be formidable. If you can reduce the search costs, especially if it is a high-quality product you need, you need to somehow secure the product through a forward agreement. That is what the major food service entities already do, and that is going to be passed on down.

Question: Over a short period of time, the swine industry went to 75 percent carcass value based. The cattle industry is taking a lot longer. Why is there a difference between the two? Is the hog industry just responding to those needs to coordinate more quickly? Has pricing to value changed the type of hogs we are producing?

Ted Schroeder: I will start to answer that and then pass it on. First, why is the cattle industry moving slower along this line than the hog industry? I think if you look at the structure of the cattle feeding industry relative to the hog industry, that explains most of it. In the hog industry, you are primarily dealing with people in the farrow-to-finish business that have direct control over the carcass quality that they produce. In the cattle feeding sector, we have a large portion of the industry that provides feeder cattle at auctions, and they have limited information (and in many cases no information) about the carcass quality of those animals when they are on the breaking table. As a result, as a cattle feeder, feeding those kinds of animals, you don't have a lot of incentive, in the short run, to move to a carcass-based pricing system. In fact, there are a lot of reasons why you might want to resist that. If your cattle are below average in quality, you will like pricing at "averages." I think the structural characteristic of the beef sector is the primary reason why this movement has been much slower in the fed cattle markets than in the hog markets.

Dave Kenyon: I will address the second question. I think the second question was, "Has carcass value pricing made much of a difference in the type of hogs that get produced?" I think the answer is "yes, very definitely." Current hogs are much leaner. There was a study just finished at Duke University, in their nutrition program, that said the fat content in the new NPD hog that Smithfield Foods, Inc., uses is 35 percent lower than the average pork in the market. I think some of these things are definitely making a difference in terms of the quality of the animals being produced.

Steve Meyer (in audience): Numerically, over the last four years we added 1.5 percent to the average fat-free meat index for pork in the U.S. We have gone from a system that is probably 80 percent rotational breeding programs to one that is now 80 percent terminal breeding programs just in response to the lean value programs. The other thing I want to point out is the NPD hogs are good hogs, they are lean hogs, heavily muscled, but that same study at Duke also shows the intra-muscular fat on those hogs is less than 1.8 percent. If any of you want to get a piece of that pork with low-fat content and go home,

you better know how to cook it or it will turn to “shoe leather” on you. Therein lies one of our problems: when we make hogs leaner, we may compromise on the quality.

Paul Engler (in audience): Based on what has been said here today in terms of price discovery, what is happening in the swine industry and the beef industry, and in light of the high percentage of hogs moving on a contractual basis, all this poses an obvious question. Which of the two industries, the hogs or cattle, has the most problem with price discovery?

Dave Kenyon: I would argue at this point in time that the beef industry has the most problems. I think what carcass value pricing in pork has done is it has really strengthened the connection between the consumer and what is getting produced. And I think it has really affected what is going on at the farm level. To this point, the base price level is still largely tied to a cash market where there are a large number of packers and where there are a large number of producers (the Iowa-Southern Minnesota market). If you look at the price surface for hogs, it just so happens that the whole industry is pricing off the highest hog prices in the country, which producers like to hear. Each individual packer has his own way of adjusting that price to come up with his carcass value, and all kinds of things happen when that gets done. But I think the pork industry has made real progress in the last 10 years in carcass value pricing.

Paul Engler: In the beef industry there is a lot of concern about lesser and lesser percentages of cattle sold on a negotiated basis. I would like to have you address that and whether or not you feel that is a factor in price discovery.

Dave Kenyon: Non-negotiated in the sense that the price they are receiving is often a formula based on a live price that is discovered somewhere else? I thought about that a lot and purposefully decided not to address it, so I guess that tells you where I am.

Steve Koontz: I would like to add a short note to that. In the beef industry, the only thing right now that has a significant amount of quality-based pricing (value-based pricing) is predominately the formula arrangements. This is especially true if it is a long-run negotiation versus a day-to-day transaction negotiation. What you are negotiating is a long-run base price (the formula) and maybe you negotiate the long-run premium/discount structure. Maybe that varies from time to time, but it doesn't need to vary every minute on every animal for it to still get closer to value-based pricing than where a pure and negotiated cash live animal trade is. So, I wouldn't use the same terminology to say that some of these formulas are non-negotiated trade. They *are* negotiated. It is just a different kind of negotiation, not bickering about every animal in every pen. It is just bickering about the base that we are going to use. I think it is essential to have a base. You can't just be using a base that is some average for a particular plant. I get concerned about that. I think the integrity of the price base is very important, and that is where negotiation still occurs.

Dave Kenyon: In terms of swine, and having analyzed the carcass value pricing systems, we are concerned about the base price for the Southeast. It could be higher. There are

some competition issues going on there, and you have to worry about that. There basically is no live price in the Southeast, it's all off formula from the Midwest. When you look at Southeast prices and compare them to the Midwest, high-quality hogs are not bringing as high a price in the Southeast. So we have some concerns about the pricing base.

Wayne Purcell: Paul, when you look at the written materials, you will find some indications in various places that price discovery can be a fuzzy concept. Not everyone thinks about it the same way. What we are hearing from the speakers is that effective price discovery is a pricing system that prices to value, that puts the correct value-related signals in place, and passes a signal down through the system to the producer. The producer can then respond to consumer-based needs and changes. That doesn't necessarily have any correlation with the percentage of your sales that are negotiated. You could have *all* the prices negotiated and have a very ineffective price discovery system in that context, which is what we have had for many years in the beef business. Having every pen be "negotiated" will not bring effective price discovery when we are still pricing on a live basis and guessing at value and still selling everything at an average price. I don't think there is any legitimate basis for arguing that more or less negotiation necessarily is going to get you to better price discovery in terms of pricing to value, coordinating the system, and moving toward being "consumer driven."

Question: Just how small can the price base be?

Wayne Purcell: How small can that base be, panel? David Kenyon has already talked about the fact that the entire pork industry is being driven off of Iowa-Southern Minnesota, and is that about 25 percent of the hogs, David?

David Kenyon: It would be more than that. About one-third.

Wayne Purcell: Many of you have been around long enough to remember the Food Commission of the 1960s. Dan Padberg, who was heavily involved in that, will be on the program later today. Back then, we were discussing how big the price had to be for it to still be legitimate. I'm not sure we know. The base could be quite small and still be okay if both buyer and seller are well informed.

Question: I would like to ask the panel, in reference to Paul's question, about how the hogs have been able to go into a value-based carcass pricing and we have not done that in the cattle business. How much do you think is related to the way the cattle are marketed as compared to the hogs, and how much of it is related to the structure of the industry? Most of the hogs are in farrow-to-finish, where it is basically one producer making all the decisions. In the cattle business you have about three different stages and lots of different profit centers who have to coordinate, and that is what has made the change hard in the cattle business.

Jim Mintert: The structure of the industry is very important. Theoretically, you should be able to accomplish that linkage between and across the various stages with the price

signals, but the problem is that there is a lack of information. If you are going to see us actually distribute that information back to the cow-calf level, that implies some changes are needed in terms of how we market feeder cattle, for example, so that people have better information about what their calves are eventually worth. Right now, though, most cow-calf producers have virtually no information on what the carcasses might look like from the cattle they produce on their farm or ranch. That situation is one that makes it very difficult to change very quickly.

Wayne Purcell: Someone said cow-calf producers had no reason to care, and that is probably right, because we are selling weight or tonnage and not anything else when we price on averages.

Question: In any of the price discovery research that has been done, did anyone look into what seems to be a bit of a paradox in terms of the Choice-Select spread? All of the meat scientists and the research tell us that tenderness and marbling are not closely related. It seems mysterious to me that the meat industry is always able to sell Choice at substantial premiums to Select. That seems to defy economic theory to me. Somebody is selling the stuff for more money. So if it doesn't relate to final use in the consumers' eyes--satisfaction, quality, palatability, etc.--how does the myth get perpetuated?

Comment: Not only are they selling it, somebody is buying it. How does that continue to happen?

Original Questioner: There must be a difference if they are continuing to buy it. It can't be completely wrong. Why would consumers pay more for it?

Ted Schroeder: But all the research would indicate that it is dead wrong.

Question: Are you telling me that all the consumers are wrong?

Ted Schroeder: No, I am asking more than anything. There seems to be a bit of dichotomy in thought between what the meat research scientists are telling us and what the marketplace appears to be telling us from the viewpoint of price premiums for Choice. What is responsible for the disparity?

Wayne Purcell: It clearly has to be the case that at the consumer level, to some degree, they are seen as two separate products. You have demand for and supply of Choice product, and you have demand for and supply of Select product. That is why you get the price differentials when those supply-demand dynamics change. That doesn't argue necessarily, though, that the term Choice has high informational value in terms of conveying quality. I think the research shows that there is a weak correlation between eating satisfaction and marbling, which makes it Choice. But they have to be seen as two separate products.

Jim Mintert: The correlation is small, but it is not zero.

Questioner: Is it \$22 per cwt., because we have seen those Choice-Select differences?

Wayne Purcell: It can be if you have demand for each of the two products fixed and get a huge disparity in what you are offering because corn is \$5.00 per bushel, and you don't feed the cattle long enough to grade Choice. I think that is what happens.

Question: We have heard a lot about information, but I never heard the word "misinformation" spoken today, and I hear that a lot in the political arena. It seems to me that our industry has thrived on the use of misinformation in this segment of the industry. In fact, it seems that profitability has come from the misinformation we have shared with each other in order to make a buck. I would like to put it to the panel. In your surveys, did you ever encounter this? Someone said earlier that we probably could be sued for the misinformation that we give out to one another. If it were in a financial network, we would be. What misinformation have you seen and what fuel would give teeth to this information that would make it more pure?

Steve Koontz: How do you communicate information if you don't do it in price? You have to do it through written agreements. If you are not doing it purely through price and through reliable business arrangements, what are your alternatives? They use these approaches with emphasis on price in financial areas and in the securities markets. If you misrepresent what you are doing, you end up with a lawsuit where the person that was cheated out of some benefit recoups their losses. How do you set up a system to do that? The easiest thing to do may be to improve the grading system so that we are pricing to final-use quality and then carry the pricing down through those new grades, and price to quality and value. Right now, there is too much commodity marketing on the beef side. We sell it all at the average price. There is no easy way around the fact that selling on averages is not good price discovery even if prices are negotiated, and it is causing the beef sector major problems.

**SESSION 2**

***THE USDA IN CONCENTRATED LIVESTOCK MARKETS***

Clement E. Ward  
Agricultural Economist  
Oklahoma State University

Daniel Padberg  
Chairman  
Commission on Concentrated Markets

Gerald Grinnell  
Director, Industry Analysis Staff  
Grain Inspection, Packers and Stockyards Administration

**Executive Summary of  
Important and Ignored Messages from the Packers and  
Stockyards Program's Concentration Research Study\***

Clement E. Ward

Ward reviews briefly the studies that were conducted under the coordination of the Packers and Stockyards Program. He notes that these studies had access to detailed data that had not, to date, been made available to researchers. But in spite of the number of research dollars, the man-years, and the extensive effort that was expended, the resulting research reports, suggests Ward, have been virtually ignored by agricultural journalists, industry associations, analysts, and producers. He suggests that one of the reasons those findings might have been ignored is because they were not consistent with many individuals' and groups' *a priori* expectations as to what they thought the research would find, or perhaps hoped the research would find.

Ward notes that the Secretary of Agriculture, in forming the USDA Advisory Committee on Agricultural Concentration, charged that committee with reviewing market concentration in the meatpacking industry through analysis of the recent USDA study of concentration in red meat packing. Ward goes on to point out that the committee, in fact, did very little reviewing of those research efforts and used virtually none of their 38-page final report to review those results. He moves into a discussion of what some of the important findings were from the studies and stresses how important it is that these research findings, which is the best science currently available, be taken into consideration in any policy and regulatory changes that are suggested in the livestock and meat markets.

One of the studies documented by Ward was a study in the PSA round of efforts to define regional cattle procurement markets. As Ward notes, several approaches were employed, but the general finding was that the cattle market may be larger and more nearly a national market than researchers had previously expected. The studies found, for example, that some cattle were bought by packers and processors from up to 300 miles away. Ward notes that the study found considerable overlap and considerable potential for competition for fed cattle in many of the cattle-producing regions, especially those areas that have the most concentrated levels of production. The overall conclusion was that a few states, especially Nebraska, Kansas, and Texas, represent the core geographical market for fed cattle in the center of price discovery. All other cattle feeding areas are linked to this market center, but as would be expected, the strength of the linkage diminishes somewhat as plants are located farther from the core. If there are regional markets in the U.S. that are somewhat separable from that Southern Plains feeding area, it appears they would be in the northwestern part of the country, in Washington and

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\*This is a summary prepared by Wayne Purcell of Chapter 4 in *Price Discovery in Concentrated Livestock Markets*, the book that was distributed at the conference.



Oregon, and in the eastern and northeastern part of the country, especially in Pennsylvania and New York.

Ward reviews the study on price determination in slaughter cattle procurement, another one of the studies that was conducted under the coordination of PSA. He noted that the findings from this study, which was conducted at Texas A&M University, indicate that the larger, more efficient packers appear to be passing some of their efficiency gains back to cattle feeders in the form of higher prices. In general, larger packers paid higher prices for fed cattle. They also paid higher prices for cattle purchased from the most concentrated feeding areas and paid higher prices for cattle purchased closer to their plants, both results that would have been expected. There was some difference in terms of price levels being paid for cattle purchased by varying types of captive supply arrangements. Higher prices were apparently paid for fed cattle purchased by marketing agreements, and somewhat lower prices were paid for cattle on forward cash contracts.

Ward deals with the results of the research conducted at Kansas State University and Oklahoma State University on the role of captive supplies in prices for fed cattle. This has come to be a very controversial area, and a number of alternative approaches were employed in seeking to isolate the price impact of captive supply arrangements. In summarizing the findings, Ward indicates that the findings were generally small in economic terms, and sometimes positive and sometimes negative. This is consistent with earlier work that had found no substantial price depressing influence from captive supplies. He notes that larger plants tend to make greater use of captive supply procurement methods in trying to keep their plant utilization rates at higher levels. Those larger plants also tend to use the captive supplies strategically to try to increase contract cattle and other types of captive supply cattle when they expected to see higher cash markets. Price impacts were often negative but small. In some instances, the findings associated with captive supply arrangements were statistically significant only because of the very large number of observations involved but were not significant in terms of economic impact. For example, the results were sometimes as small as \$.01 to \$.04 per hundredweight. A large price difference was found between forward contracted cattle and cash market purchases. This difference amounted to about \$2.00 per hundredweight on a liveweight basis and could possibly be explained by the fact that cattle feeders were paying some cost to have the packer accept and manage exposure to price risk via a cash price contract.

Ward reviewed the effort conducted at Virginia Tech to look at the effects of concentration on prices paid for cattle. Data considerations, data problems, and lack of specificity in measurement made this analysis very difficult. There had been an expectation that the widely employed methodology in the research community would be appropriate to apply to firm-level and plant-level data. Previous work had shown that aggregation across plants, across time, etc., made the methodology that was designed to identify the presence of market power suspect, but this study had access to micro-level data. The data were not well measured, but *were* sufficient for the researchers to identify a potentially important finding in that the plants and/or firms studied do not meet the

widely assumed short-run profit-maximizing types of behavior. Non-parametric tests, which are less demanding in terms of data, confirmed that plants and firms are not strict short-run profit maximizers. This raises questions about the appropriateness of the methodology and should move the research emphasis in the future more toward examination and analysis of firm behavior as compared to trying to monitor costs and/or revenue streams looking for evidence of market power. The cost and revenue data are not measured in packers' normal accounting processes sufficiently well to allow such studies to be effective, and the finding that they do not meet the widely assumed profit-maximizing behavior makes any such approach doubly suspect.

A report on vertical coordination in hog production that was completed by Iowa State University and the University of Missouri personnel was reviewed. The report found that larger hog producers expect to continue their rapid rate of growth across the next five years. This seems to conform to Kenyon's arguments in an earlier chapter in the book that profitability in hog production has been the key driving force in terms of industrialization of the hog sector. The authors did expect closer relationships between the packers and less reliance on cash market prices in the future. The same type of price discovery concerns that have plagued the beef industry in recent years may be preceding similar price discovery concerns in the hog industry. Contracting has come into vogue and has advantages for both buyers and sellers of hogs. Reasons for using marketing contracts in hogs parallel those that have been found in fed cattle, meaning the packer can schedule the flow of livestock as an important raw material, and the producer has guaranteed access to a market outlet.

One of the Packers and Stockyards Program studies was a review of the literature and assessment of the competition in meatpacking across time conducted by researchers Azzam and Anderson. The empirical research, the authors suggest and Ward reports, does not show conclusively that the packing industry is noncompetitive. This is consistent with a finding by the General Accounting Office when they reviewed the research literature in the early 1990s. Azzam and Anderson, as Ward notes, raised the question of whether or not a static textbook-type theory of perfect competition is really the appropriate benchmark. These findings and the concerns about the ability to measure cost and revenue streams sufficiently well reinforce the findings at Virginia Tech that advances in methodology and changed research procedure might be in order. The authors concluded, according to Ward's review, that policies steering the packing industry toward rivalrous behavior are preferable to policies that attempt to ensure a specific market structure. In other words, the authors are suggesting a move away from an emphasis on number, size, and location of firms, or level of concentration, and more toward a focus on meatpacker behavior.

Ward closes his discussion by pointing out that a number of findings from the six different projects are consistent. There is a single core area to the fed cattle market in this country located in Nebraska, Kansas, and Texas. Higher prices tend to be paid for cattle in that core geographical area. The larger, more efficient packers appear to be paying higher prices and, apparently, passing back some of their efficiency to cattle feeders.

Ward also notes in his conclusions that larger plants tend to make greater use of captive supply procurement methods. Those methods, in turn, allow the plants to keep plant operating levels at or near designed capacity. Operating at higher utilization rates apparently reduces packers' costs because they tend to pay higher prices for cattle when they were operating at or near capacity.

Ward suggests that the findings note that the hog industry appears to be following some of the trends in the past several years of the fed cattle industry. An example is a finding that large hog producers expect to continue their rapid growth rate and expect to establish close ties with packers and rely less on cash market prices. Those changes can be interpreted as more nearly captive supplies in the hog industry and more concerns about price discovery in the next few years are likely to emerge, some of the ground that has already been covered in cattle.

In closing his discussion, Ward notes that this broad range of studies did not find major negative effects from concentration. On the other hand, if you ask whether these studies exonerate packers from questions about use and abuse of market power, Ward would say "no." Questions certainly remain. There are questions about what is the appropriate theory and what is the appropriate benchmark to use in assessing competitiveness in a dynamic real-world and global market. As future research dollars are allocated, should they be devoted to understanding the behavior of large firms as compared to trying to measure characteristics of large firms in a highly concentrated industry? Ward raises these questions, and they are pertinent ones. Ward concludes that the Packers and Stockyards Program studies contributed importantly both to the research literature and to the policy making process in this general area of price discovery and concentrated markets.

## Secretary's Commission: What It Means For Future Price Discovery

Daniel I. Padberg

Dr. Purcell invited me to give an analysis of the Secretary's Advisory Committee, which I chaired. It seems that there are some differences in the committee's report as compared with academic analyses and with other industry analyses. How should we look at these differences? In what context should the Committee's report be considered?

We might start this process with an inventory of the reports, publications, ideas, economic conditions, and political positions concerning "Concentration in Agriculture" when the Secretary appointed the Committee. The congressionally mandated GIPSA studies were controversial (GIPSA 1-6). While they were excellent studies, they fell short of settling the arguments concerning the present dangers of concentration. Most published academic or scientific studies have been critical of concentration in the meatpacking industry. All of these "technical studies" stopped before making and defending policy prescriptions. Cow-calf operators, and many communities serving them, were being severely stressed by the low prices offered for calves. There was an observation that traditional antitrust ideas and policies were gradually falling into less acceptance and lower use as applied to the economy in general. At the same time, there was increasing sentiment for evoking traditional antitrust policy in applications to the meatpacking industry.

It is most hazardous to speculate about the motivation of anyone--especially a successful politician (such as the Secretary). Yet that is inevitable if we are to develop the "context" appropriate for interpreting the report of the Committee. These conditions made policy making difficult and risky. Appointing a committee was a way to lower the risk. The committee's results were in no way binding on the Department. The cost was small (most of the committee members paid their own travel and other expenses). If the report took a position that turned out to be unpopular (and therefore wrong), it could be disregarded. If the committee report moved along the lines the Department liked, it could be used as a justification for doing what the Department wanted to do anyway. Aside from these rather standard considerations, there was at least some hope that well-meaning, thoughtful, and hard-working people could come up with something useful.

The Committee that was chosen included persons who felt that concentration in the meatpacking industry is a real threat to farmers, consumers, and the environment. It also included persons who may have had anxieties about concentration but were reluctant to impose restrictions on an industry competing in an international environment where non-U.S. competitors had no similar restrictions. As we considered the evidence available to us, and what we could produce from hearings, this came to be the dividing issue. Should our industry have restrictive rules placed on it? As it turned out, the majority answered, "no," while a minority felt that "yes" was a better answer. Each member of the Committee probably had a different perception of the evidence as well as

a unique set of policy preferences. As I try to describe the position and process of analysis of the majority, I may do justice to none but my own perceptions.

This paper will present the broad outlines of evidence available. In addition, the policy context for this evidence will be considered.

## **The Evidence**

A great deal has been written on concentration in agriculture and concentration in the meatpacking industries. The issue has come up many times throughout this century. Many political speeches have had this matter as a theme. There have been many studies of different approaches and with varying objectives. Studies in scientific journals have come to be quite abstract and mathematical--very scientific. Other studies in the trade press make an effort to be more practical and intuitive. Government studies strike more of a middle ground.

### Scientific Studies

As scientists have approached "the monopoly problem," they have had a tendency to measure statistical associations between some performance variable, such as cost, price or profit, and some measures of monopoly, such as concentration, firm size, product differentiation, etc. It has been hypothesized that in a monopolized industry, prices, costs, profits, or some combination of the three, are higher than they would be in a more competitive industry. It follows that in a particular industry, communities or other subsets having higher concentration would be expected to have higher prices, costs, and/or profits. Testing this hypothesis with multiple regression, or variants of it, has been the most common pattern of scientific study.

The best and most useful feature of the scientific studies is that they are a medium for the development of theory. Science is developed through these studies. There is difficulty, however, when these studies are used to reflect current events within an industry. I have essentially three problems with them. First, there is a bias toward overstating the nature and extent of statistically significant relationships. This is because only affirmative results are publishable. A study that is very careful with data, but finds no statistically significant relationship, is considered a failure. While many of these are conducted, you never see them, creating the impression that the reported relationships are the norm.

The second concern I have is related to the first. Since a significant relationship is required, we are motivated to bend the statistical method to achieve "significance." There are many ways to "tweak" our models to achieve a greater variation of results. Back in the mid-1960s, I was doing such a study and found that with a series of variations in the variables used and the form in which they were used, that I could produce over 1,000 variations to my analytical model. While most of these models had statistical

properties that were weak, there were some that looked reasonably good. I finally submitted a paper based on one of them. The reviewer did not challenge whether the model was an accurate reflection of the industry; he suggested several new ways I hadn't thought of to tweak the model to obtain yet better statistical results. He was using his command of science to advise me and there may have been some ultimate purpose achieved by my following his suggestions. Certainly, finding a true representation of the behavior of the industry was not it. I finally discarded the whole exercise.

My third concern with the more scientific studies is that often product differentiation is misinterpreted in these models. In the food industry, the firms that develop their products most are usually among the larger firms. Therefore, they are frequently in concentrated industries. Some of the significant associations which relate large firms to higher costs, higher profits, and/higher prices may be cases where the products are better, or are seen as better by consumers.

In my experience, agricultural economists are quite capable of identifying something they call monopoly when it is really due to firm-level marketing and product differentiation. We typically have a "commodity" mentality growing from our early training. This makes the usual industrial organization model seem good to us. Product differentiation, though more developed in the food industries than in other consumer products industries, is not something we are sensitive to or trained to analyze. Product differentiation is not easily or successfully represented in the larger, more sophisticated econometric models developed for commodities.

When I look at the body of "more scientific" studies written on concentration in the food industries in general or meatpacking in particular, I don't feel they contribute a lot to our question concerning the practical effects of concentration in these industries. They seem to me to be a development of theory and research methods, but not much of a representation of actual conditions in the industries. Often the data are incomplete and used as an example of the method, rather than making a serious effort at being "descriptive." I was interested, but not especially surprised, to see that the experts chosen in the GIPSA studies to assess past academic studies came out with essentially the same conclusion (GIPSA-RR 96-6).

### Government Studies

Government studies are less theoretical and are notably more policy oriented. Perhaps those are reasons why they are more useful. Often, government studies are designed to test a proposition arising from the academic studies. Usually, they do not find the relationships reported by academics. Often government studies have better data, sometimes because of subpoena power, than academic studies. Better data, the ability to report the results they get (even if it isn't significant), less emphasis on theory, and more emphasis on policy questions usually make government studies more useful to policy makers (Padberg 1992a).

### Studies in the Trade Press

Analysis in the trade press is almost the opposite from the academic studies. I think they tend to be screened such that no study showing clear evidence of monopoly would be published. Also, they are so lacking in theoretical sophistication that they usually suffer. I think one can learn a lot about the practical operation within the industry from these studies--which is what they usually try to emphasize.

### Committee Hearings

From our open hearing, we learned about the severity of economic problems caused by the unusually low prices for calves--affecting whole communities in some regions of our country. We heard about some strange movement of cattle across the Canadian border--motivated to get the U.S. inspected and approved roll on the beef--which reduced the capacity available for the expanded sell-off of our cattle. We heard of packers' alleged tricks to manipulate the reported price of cattle. We observed some fear of retaliation on the part of farmers who told us of their concerns.

### **Interpreting the Evidence**

Probably most people are uncomfortable with the levels of concentration in meatpacking. This concern has caused considerable attention, observation, and study aimed at establishing evidence that high concentration is associated with bad performance. At the same time, there is little evidence of major problems resulting from the modern higher levels of concentration. At this point, some would say, "What is the problem?"--and conclude that there is no problem.

The matter of concentration in agriculture is not as simple and direct as that. I felt that there was wide agreement that the high concentration present in meatpacking gives a *potential* for monopolistic behavior. Whether or not it was translated into bad operating results and whether we were able to measure it did not remove this potential. In addition, working with very large businesses with better and different information than that which was available to the public is an affront to our preference for equality and economic democracy. As I see the policy issues in this matter, we are challenged to find ways to deal intelligently with the potential for monopolistic behavior and with ways to bring the competitive setting to fit better into our preference for equality and economic democracy.

### **The Policy Framework**

How should our government relate to industry? What should be the central focus for our industrial policy?

### The Influence of Trade

It seems to me that our sense of what we should do about concentrated industries is undergoing a substantial change. Probably the major motivation for this is our sense of functioning in industry that is interactive with the world economy. Our forefathers laid the foundations of our country in a setting that was politically and economically independent of the power blocks of Europe and Asia. That was important in their reason for being here and in their sense of what our country should be. They developed an elaborate set of concepts and policy about economic and political equality. Our antitrust laws stood out as similar to our other policy, but unusual in the world of other nations (Padberg and Love).

In this isolation, our “industrial policy” related to intra-national fairness while industrial policy in most nations related to competitiveness. It was only in the 1970s that we entered substantially into the globally interactive economy. Since then, we have slowly learned that it doesn’t work well if our firms, which are constrained to tests of intra-industry fairness, are also competing with similar firms in other nations that have no similar constraints. This concern has had little public and formal expression, but it seems that everyone understands it. Juries are less likely to find against large firms. Government agencies are less likely to bring antitrust actions. We are just beginning to learn and use policies (all informal) to support the competitiveness of our firms in international competition.

Bringing our formal policy up to date is no small matter. After two centuries of saying that intra-industry fairness is the most important thing in our industrial policy, we have trouble now saying that is not so important. That would be like saying all men are not created equal after all. Regardless of where the truth might lie, that is not something we are going to say. Both of those propositions are very important in our culture. So, I perceive that we are hung up on our industrial policy. We know the historical pattern doesn’t work very well, but it will take at least a couple of decades before we can deal directly with changing it.

It is not surprising that our connectedness with the world economy is more important in the view of some people than others. Communities in the upper Midwest are not used to worrying a great deal about our strategic and long-term competitiveness internationally. It is not hard to find people who still find intra-industry fairness as the most important matter in industrial policy. In such a view, it is entirely consistent to seek a policy of intervention that would improve intra-industry fairness--regardless of its effect on our competitiveness. Policy makers must balance this perception and goal with others.

#### Direct Intervention versus Disclosure

There is another factor in the changing policy context. We have a history of very direct and explicit interventions on the part of government. Market orders are an example--pricing of milk, knocking cling peaches off the trees, etc. These policies are under ever-greater scrutiny and are frequently rescinded as they are reconsidered. There



is a trend toward policy which gets the job done with less overt intervention. An example in the food industry concerns policy to assure the nutritional value of manufactured foods. The major thrust of policy, which began early in this century, was to have government approved “recipes” for manufactured food products. They were called Standards of Identity (Padberg and Kaufman). This program is essentially made obsolete by the newer nutritional labeling laws. Here the government intervention is not so explicit. The government establishes what is most important and requires disclosure of information of those factors without being involved in each product formulation. Most observers feel this policy works as well or better, yet it interferes much less with the competitive activities of the firms. The policy Congress passed in 1993 had broad bipartisan support (Padberg 1992b).

There are several factors supporting this transition. It is only in the second half of this century that business has gained strength in the development and use of science. With the incorporation of science into product competition, industry has become the primary sponsor of much scientific development and practice. Earlier, there was the image that government could use science as a policy instrument and generally present government agencies with superior scientific competence. That is much more difficult today. Industry can and does invest much more in scientific apparatus and people than does government. The head of the class at mid-century would likely become a public servant--today they go to industry.

Industry is also able to ruthlessly discard its failures while government has greater difficulty withdrawing support from failing initiatives. This evolves into a condition where both political parties have come to accept that most government agencies have a great deal of obsolescence. Their functions may no longer be important; their equipment is not up to date; and their people may not be first class. This point can be overstated, but it is especially difficult to maintain a well-equipped and high morale federal agency in the face of present budgets. Agencies where the emphasis (and budget) has been declining are hardest hit. Seniority keeps the older employees and precludes acquiring the new technology that new hires would bring. In this environment, many are uncomfortable with direct government intervention. Even where there is agreement on the need for policy (such as the case of consumer nutrition), there is reluctance to have government define products. The idea of requiring disclosure of salient nutrient information and letting firms compete and consumers choose works much better.

Is there a way that disclosure can be used more and intervention used less in our interim industrial policy? Is it possible that some or all of the problems we heard about in the hearings could be lessened or dealt with by disclosure of the right information?

What would be the effect of using disclosure rather than direct government intervention in the red meat industry? How would you do it? Are prices, costs, and profits the important variables affecting the public interest? Is information about these variables available to the general public? Would providing this information be a sensible policy instrument as an alternative to more direct government intervention?

In the hearings, we came across a great deal of spurious rumors about prices, costs, and profits. The lack of current, accurate, and complete information on these variables makes it easy for tortured farmers to impute monopoly behavior to the meatpackers. The same lack enables the farm and trade press to send out a lot of opinion based on speculation rather than fact. Almost always the speculation is more interesting than the facts.

Another factor is the opportunity to study these questions formally--by academics and/or government agencies. Without appropriate and accurate information, these studies use approximations and guesses. The result is poor for our science community as well as for anyone reading the studies.

The motivation of firms, especially in highly concentrated industries, may be affected because they assume that information on their prices, costs, and profits are unobservable. They may be tempted to use antisocial monopolistic economic behavior in secret. Small firms may pay little attention to their public image. It is not at all unusual to see large firms very concerned about their public image. Texaco was quick to settle its case of discrimination. Large firms associated with consumer products want to sell to the public. Firms want their shares of stock to be popular. They also must attract the most competent of the graduating class. For all of these reasons, disclosure persuades large firms to do their duty. Allowing the largest firms to maintain secrecy about their performance variables goes against all practical and theoretical logic. If we are to live our future in conditions of economically concentrated industries, allowing the large firms to practice secrecy seems to be a poor policy choice.

It would be much better for the actions of these firms to be open to the careful view of all. They would not be so tempted to violate their public trust. If they did, it would be clear and obvious to all--the affected industries as well as governmental agencies responsible for protecting the public interest.

I conclude that open disclosure relates to both parts of our twin policy concerns--it substantially improves the operating results by affecting the motivations of the firms and it tends to level the playing field by giving everyone the same information. We may want to reward large firms for advantages their large size enables--such as scale economies. It seems to me that we are not likely to benefit from rewarding them for the superior information their large size can develop, particularly because of the potential to use this information against smaller rivals or trading partners.

### How to Do It

When the disclosure of information is proposed, it is seen in the context of the extensive price reporting and similar work (the Cattle on Feed Report, etc.) done by USDA to facilitate markets. Some of the information proposed will facilitate markets to work better. Yet, there is a pattern of purpose that goes beyond facilitating markets. It is

facilitating freedom in a most basic way. It says that if farmers must relate to giant food marketing corporations, they have a right to know how those corporations are functioning in relation to particular performance variables, whatever performance measures involve the public interest. These large firms must not be harassed by poorly staffed governmental agencies, but they must report their basic information regularly and accurately.

We have a policy about information disclosure used by the census and other government information agencies. It requires information to be withheld (and not released to the public) if the information applies to less than four firms. This is a policy that has been in effect for a long time--it was certainly put in place long before large businesses came to challenge government and all other agencies in our society. Certainly, this policy must be set aside because it precludes providing information on individual firms--which is required to relate to monopoly problems. In an industry like meatpacking, this policy would preclude most all of the information being released because the largest four firms have most of the industry nationally. In many regions, there are less than four firms.

### **Should We Restrict Captive Supplies?**

Probably the first issue on captive supplies relates to what adverse operating results we can expect if we do not make this intervention. In my reading of the evidence, there is little to support the notion that serious adversity will result from packers having freedom to make advanced arrangements for part (or all) of their supplies. In addition, this would cut off the opportunity for packers to develop a possibly more efficient channel of meat marketing. Many of the significant innovations in improving efficiency and reducing operating costs have come through vertical integration.

Further, I would be reluctant to restrict the behavior of our packers when a consequence would be to hamper their competition in the global economy.

Still further, if government action is needed, I would prefer to deal with it by requiring disclosure rather than requiring the intervention of a government agency in the operating activities of firms.

### **References**

*Concentration In Agriculture*, Report of the USDA Advisory Committee on Agricultural Concentration, June 1996.

GIPSA-RR 96-1 Marvin L. Hayenga, Stephen R. Koontz, and Ted C. Schroeder, *Definition of Regional Cattle Procurement Markets*. September 1996.

- GIPSA-RR 96-2 Slaughter Cattle Procurement and Pricing Team, Texas A&M Agricultural Market Research Center. *Price Determination in Slaughter Cattle Procurement*. September 1996.
- GIPSA-RR 96-3 Clement E. Ward, Ted Schroeder, Andrew P. Barkley, and Stephen R. Koontz, *Role of Captive Supplies in Beef Packing*. September 1996.
- GIPSA-RR 96-4 S. Murthy Kambhampaty, Paul Driscoll, Wayne D. Purcell, and Everett D. Peterson, *Effects of Concentration on Prices Paid for Cattle*. September 1996.
- GIPSA-RR 96-5 Marvin L. Hayenga, V. J. Rhodes, Glen A. Grimes, and John D. Lawrence, *Vertical Coordination in Hog Production*. September 1996.
- GIPSA-RR 96-6 Azzeddine Azzam and Dale Anderson, *Assessing Competition in Meatpacking: Economic History, Theory, and Evidence*. September 1996.
- Padberg, D. I., and Alan Love, 1993. "Rationale for Public Intervention in Food and Agricultural Markets," *Food and Agricultural Marketing Issues for the 21st Century*, Food and Agricultural Marketing Consortium, Texas A&M University, College Station, TX.
- Padberg, D. I., 1992a. "Generalizability of Industrial Organization Studies: The Case of Food Retailing," *Agribusiness: an International Journal*, Vol. 8, No. 4, pp. 377-385.
- Padberg, D. I., and Phillip Kaufman, 1994. "Are Standards of Identity Obsolete or Redundant?" *Re-Engineering Marketing Policies for Food and Agriculture*, Food and Agricultural Marketing Consortium, Dept. of Ag Econ, Texas A&M University, College Station, TX.
- Padberg, D. I., 1992b. "Nutritional Labels as Policy," *AJAR*, V. 74, #5, pp. 1209-1212.

## **Role of GIPSA in Price Discovery in Concentrated Markets**

**Gerald Grinnell**

Price discovery probably is a bigger, more complex and important subject than many people realize. It goes to the heart of many competitiveness issues. It also may be one of the least understood subjects in marketing and is tightly intertwined with market structure and market performance. I am pleased to attend this conference.

I was asked to discuss GIPSA's role in price discovery in the concentrated meatpacking industry.

Concentration in meatpacking has increased in recent years.

1. The four leading steer and heifer slaughterers increased their share of total slaughter from 50 percent in 1985 to 72 percent in 1990 and 81 percent in 1995.
2. Four-firm concentration in hog slaughter has begun to rise--from 32 percent in 1985 to 46 percent in 1995.
3. Concentration in lamb slaughter was 51 percent in 1985 and has fluctuated in the 70-78 percent range since 1987.
4. Concentration in cow and bull slaughter has been relatively low (26 percent in 1995), but may be starting to rise as well.

The causes and competitive implications of concentration differ among the four types of animals. Production processes, marketing channels, and price discovery mechanisms also are quite different for each type of animal and for the meat products produced from them.

Availability of publicly available market news information and futures contracts, which play a major role in price determination and price discovery, also varies among the animal types.

GIPSA's role in price discovery in the livestock and meat markets is largely limited to protecting the integrity of the marketplace by helping to assure that unfair trade practices and anti-competitive practices are not used.

This includes protection against:

- Price fixing and collusion
- Price discrimination
- Predatory pricing
- Territorial allocation
- Illegal agreements with selected trading partners.
- Manipulation of market news reports (prices, quantities, etc.)

- Fraud in the operation of scales
- Fraud in the operation of meat quality measurement devices and their use in setting prices.

Specifically, GIPSA is responsible for enforcing the Packers and Stockyards Act of 1921 as amended. Enforcement is accomplished by actively monitoring the industry and by conducting investigations when warranted. GIPSA has a field staff of some 145 persons in 11 regional offices who keep their fingers on the pulse of activity and conduct investigations. Meatpackers also file annual reports with the Agency covering their operations, including procurement activities and financial data. The Agency is responsible for collecting data and conducting economic and statistical analyses as needed in support of its enforcement activities.

Since GIPSA collects data and conducts analyses of the industry, it also releases summary statistics incidental to its regulatory function and, thus, has an indirect role in issues relating to price discovery. For example:

- Providing statistical data on the structure of the meatpacking industry
  - ⇒ Concentration
  - ⇒ Plant size and location
  - ⇒ Contractual arrangements
  - ⇒ Sources of supply
- Providing information on procurement practices and other information that can contribute to structural changes
- Conducting economic and statistical analyses of market structure, conduct, and performance. E.g.,
  - ⇒ Procurement practices (vertical coordination agreements, etc.)
  - ⇒ Effects of concentration and market power
  - ⇒ Pricing decisions (factors affecting prices, pricing methods, etc.)
  - ⇒ These analyses support the Agency's monitoring and investigative activities.

GIPSA is not:

- A source of current market information
- A source of information on current financial performance.

I was asked to discuss what we have learned from the concentration study that will help us monitor the meatpacking industry.

Clem Ward has just discussed the findings of the concentration study. I will briefly highlight a few of the findings.

- Economic factors, especially technological change, have been critical to most of the structural changes in commercial meatpacking since the 17th century.
- Fed cattle prices in all U.S. regions are linked, suggesting a broad national market for fed cattle. However, regional differences in pricing do exist. Eighty-two percent of cattle are purchased within 150 miles of slaughter plants, although some cattle are shipped much greater distances. Cattle procurement patterns showed considerable overlap among plants and arbitrage costs among plants were relatively small.
- Large packing plants purchase more of their cattle from large feedlots than do small plants.
- Captive supplies play an important role in cattle procurement, although the effects of captive supplies on prices may be less than some believe.
- The effects of concentration are not well understood.
- Vertical coordination in hog production and marketing will become more common. Large hog producers are leading the way in contracting. Expansion of contract hog production and marketing is affecting regional hog production patterns and will affect the future structure of the industry.
- Hog pricing patterns are consistent with the existence of a national market for pricing of slaughter hogs. Spatial hog procurement patterns are relatively efficient. Packers absorb some of the transportation costs.
- Research literature suggests that conduct in the red meat packing industry is not consistent with perfect competition as defined by economic theory. However, past empirical research has produced inconclusive results.

## **Lessons from the Concentration Study**

Some of the lessons from the concentration study are:

- The study reinforces the notion that livestock markets are complex and dynamic. A number of animal specialties and geographic peculiarities exist. This has led to a wide array of trading terms and arrangements that affect behavior and affect one's ability to generalize about the industry.
- Due to the existence of the varied and complex procurement arrangements, it would be easy to over-generalize and miss important dimensions of livestock procurement.
- We have gained knowledge about collecting and processing transactions data and cost and revenue data on meatpackers' operations.

- We have gained important knowledge about the role of captive supplies, the relevant geographic definition for cattle and hog markets, geographic price leadership, the role of plant size in cattle procurement, etc. As one might expect, the study has raised as many new questions as it has answered. However, it helps focus our efforts into areas that appear to have the most promise.

### Areas Needing Further Work

The concentration study had a limited scope and, thus, did not attempt to address many issues involving competition in the meatpacking industry.

Since a number of issues were not addressed by the study and some new issues were raised as a result of the study, there obviously is a lot we don't understand about livestock procurement and meat marketing. The following is a list of issues that appear to warrant further examination.

- A common message from the concentration study is the need to understand competitive behavior in the meatpacking industry. According to Azzeddine Azzam and Dale Anderson, one of the contractor teams on the concentration study, we need to better understand the dynamics of the meatpacking industry. They recommend that research focus on the *process* of competition or the rivalrous interaction between competitors and on competitors' strategies for responding to technological and market forces. This requires short-term monitoring as well as longitudinal data at the firm and plant level to describe how entry, exit, market shares, and other factors change the industry over time.
- Better understand cattle procurement arrangements. E.g.,
  - ⇒ Geographical pricing patterns and the extent to which packers absorb transportation costs
  - ⇒ Extent to which producers are paid for differences in animal quality when cattle are purchased using different pricing and procurement methods
  - ⇒ Extent and terms of marketing agreements and other procurement contracts
  - ⇒ Effects of different pricing and procurement methods on risk sharing, cattle quality, and prices
  - ⇒ Sources of pricing information
  - ⇒ Role and use of futures markets by packers and livestock producers
- Could use a better understanding of hog procurement practices, including information similar to that described above for cattle. Need better characterization of types of contracts and more information about terms of contracts, effects of contracts on



operating costs, risks, and prices. Need to examine geographic shifts in hog production patterns and their competitive implications.

- Better understanding of lamb procurement as discussed above for cattle and hogs.
- Need a much better understanding of packers' costs. E.g., procurement, transportation, slaughter, fabrication/processing, sales, distribution, and sales promotion. Similarly, need information about input prices (especially labor), technology employed, and progressiveness.
- We don't know enough about meat markets, sales arrangements and distribution patterns, e.g., who packers sell to, what products they sell to each class of customer, terms of trade, prices, contractual arrangements.
- Better understanding of the role of market share and concentration in meatpacking. Size economies, price and non-price leadership, innovation, market penetration, profitability, etc.

Several of these involve elements of price discovery. It's easy to identify areas that we would like to know more about. The concentration study made an important contribution and provides a foundation upon which we can continue to build.

#### GIPSA's Response to the Concentration Study

The price discovery process is changing. Increased concentration and increased use of production and marketing arrangements contribute to this change. Decreased use of public markets and associated increases in direct purchases of livestock have increased the difficulty of monitoring market developments and explaining the price discovery process. The importance of regulatory agencies such as GIPSA increases in such a time, in part because others cannot monitor as easily. However, there are practical limits on a regulatory agency. Increased use of private transactions means greater reliance on monitoring techniques that depend on access to proprietary firm data.

While the interest in regulatory oversight grows, the public also wants a smaller government and less government regulation. This poses a challenge--how to develop enforcement methods that are effective and not overly intrusive.

We have reviewed the findings of the concentration study and the recommendations of Secretary Glickman's Advisory Committee on Agricultural Concentration.

The Advisory Committee recommended that GIPSA "just enforce" the Packers and Stockyards Act. The Committee cited section 202(b) of the Act, which states

“it shall be unlawful for any packer with respect to livestock, meats, meat food products, or livestock products in unmanufactured form, or for any live poultry dealer with respect to live poultry to: make or give any undue or unreasonable preference or advantage to any particular person or locality in any respect whatsoever, or subject any particular person or locality to any undue or unreasonable prejudice or disadvantage in any respect whatsoever.”

As a direct result of the concentration study and the Advisory Committee report, we have:

- Arranged for follow-up analysis of the effects of concentration on prices paid for fed cattle using data already collected for the concentration study.
- Begun a follow-up analysis of captive supplies using data we collected for an investigation of cattle procurement in Kansas in 1995 and cattle procurement in Texas in 1995 and 1996.
- Initiated a major hog procurement investigation to examine contractual arrangements in the Central United States.
- Initiated an investigation of the trade practices of the Nation’s leading lamb slaughterers, to examine pricing and procurement methods, areas, contractual arrangements, etc.
- Published, for public comment, a petition for rulemaking submitted by the Western Organization of Resource Councils (WORC), that would prohibit packers from procuring cattle for slaughter through the use of certain forward contracts and prohibit packers from owning and feeding cattle, unless the cattle are sold for slaughter in an open, public market.

We encourage participants at this conference to provide any comments you may have on the WORC proposal. The *Federal Register* notice includes several specific questions that we welcome comments on. A few of the questions give an indication of types of information requested. E.g.,

What would be the effects of implementing the proposed rules on the structure, conduct, and competitive performance of the cattle producing, cattle feeding, meatpacking, wholesaling, and retailing industries?

How do formula or basis-priced forward contracting and packer feeding affect cattle prices? Do formula or basis-priced forward contracting and packer feeding have adverse competitive effects or other adverse economic effects?

Does sufficient evidence exist to find that the formula or basis-priced forward contracting and packer feeding practices outlined in the petition violate Section 202 of the Packers and Stockyards Act? If so, what is the evidence?

We are particularly interested in receiving any theory, research and other information, especially data, analyses, or other empirical evidence supporting one's position.

We encourage you to obtain a copy of the *Federal Register* notice if you are interested in commenting. The notice appeared on January 14, 1997 at page 1845. The closing date for comments is April 14, 1997.

### Conclusions

In summary, livestock and meat markets are complex and dynamic. Monitoring and analyzing the livestock and meat markets require a large amount of data and considerable resources. Price discovery issues involve a number of persons and organizations. GIPSA has a strong interest in price discovery issues since they have a direct bearing on our enforcement program. As I indicated above, our principal role is to assure open competitive markets through investigations and related enforcement activities. We have limited capacity to examine many of the price discovery issues and look forward to learning from the researchers and others who have information on this topic.

## Questions and Answers:

Question: Is a part of the problem, in terms of the public's perception of captive supplies, somewhat related to the wording of the outcome of these studies? They always have an element of non-conclusiveness to them even though the scientific data says it is conclusive. I think what is necessary is for people to answer questions with "yes" or "no" as opposed to "maybe," "certainly," "probably," etc. Maybe it is the wording of those reports that gets people on edge with the whole process. Obviously, in science you never have zero probability, but when you have a dataset on captive supply that overwhelmingly suggests that there is not a problem, I think that should be said rather than leave the element of doubt as some of your slides do.

Clem Ward: Maybe that is true, but I think that element of uncertainty is there. If you do the same work with another time period, you might find different results, even applying those same models. We did at least four versions of each of the three modeling approaches, and we didn't get exactly the same coefficients each time. But when you get some results that are positive \$.20 per cwt., and some negative at \$.30, I don't have a lot of confidence in that. So "probably" or "maybe" is definitely going to precede the results.

Question: Did the minority viewpoint that came out in this report reflect data, or is that just a viewpoint of the people on the committee for social or political reasons?

Dan Padberg: For economic reasons, it included some farmers who were in the process of losing their farms because their calves were worth about half what they were a couple of years previously. We listened to a young man who started up by buying some heifers a couple of years ago, and they are worth half what they were when he bought them. The bank didn't like that, and he was about to lose his farm. Those are the kinds of feelings that play into this. It was not entirely philosophical; it was experiential, and reflected a different way of perceiving what was fair. Fairness in our national history and a sense of ourselves is very important. All those things colored their sense of how to take these data into consideration.

Question: I was interested in the discount you had on cash forward contracts for cattle. Did you subject that discount to any analysis as far as whether that was a reasonable insurance premium?

Clem Ward: No, not exactly. The only thing that we compared it with was a study that a graduate student at Oklahoma State did years ago. Back then, we went out and collected some data from feedlots. We didn't feel very comfortable with what we did in that study because we didn't have as large a sample as we wanted. Partly the same reason we had problems with data with the packers was the same as with the feeders. They didn't keep the kinds of records on contracts that we needed. But, essentially, the discount or risk premium that we found from that study was not much different from this. It was a little bit less.

Wayne Purcell: I think everyone got this point, but on a liveweight basis, which is what we normally think about, it is \$2.00 per cwt. That is still a lot of money, but it was only there for the cash contract cattle. Your point is that this is a way of passing risk from the cattle feeder to the packer, right? And that is a risk premium.

Clem Ward: We had one or two packers tell us that they know they pay less for forward contracted cattle than cash cattle.

Question: Is that because futures were trading up during that time period, or did you take that into account?

Clem Ward: You probably know the answer to that. We used a quadratic time trend variable to account for the seasonal or within-year price pattern. So that should have accounted for time dimensions, but in the latter half of that year, prices *were* trading up. Whether or not there is a lag relationship there that is partly explaining the findings, I don't know. It may be.

Question: It has been said several times that people cast a shadow on findings from these data because they are already a few years old. Is there any talk about repeating this for later data, a different market scenario? This is important information. If you re-run that information during that later time period and get similar results, even some of the skeptics would have to accept the findings.

Clem Ward: P&S plans to do that with the data they are using for their Kansas investigation and Texas investigation for captive supplies. Jerry Grinnell said those analyses would use data from 1995 and 1996. For the other parts of the concentration study, I don't know if they plan to duplicate that for a different time frame.

Question: When will those results be available?

Jerry Grinnell: I don't have a specific timeline. Hopefully, early next year, but we don't know for sure.

Question: Will it be the same group of people that worked on the first study?

Jerry Grinnell: No, we are talking about doing that in-house.

Question: Regardless of the lawsuit, wouldn't it behoove us to take the same set of researchers and the same methodology to analyze the second set of data?

Clem Ward: We have explained the model we used in detail in our report so that anybody should be able to do it.

Jerry Grinnell: We plan to look at the model used and simulate that and possibly do more in addition. We are looking into different options.

Clem Ward: If we had had more time, we would have done some different things with the model. But we didn't have time. I hope this group will do that.

Question: It seems like every time we have a study, we learn that nothing is wrong. It relieves me to know that nothing is wrong. However, it seems like we do discover prices in the Panhandle about 30 minutes a week. It is all at the same price. That brings me to ask you to please define competition.

Wayne Purcell: I am not going to try to define competition just yet, but nobody has said here today that selling all the cattle in the Panhandle in 30 minutes in a week is effective at anything. In fact, several of the speakers have said that is not good price discovery, and selling all the cattle at an average price is the antithesis of what we need to do in this industry. I don't think anyone has said there is nothing wrong with that. Maybe we have to deal with why that is occurring. It goes back to the need to look at the dynamics of what is going on that Jerry Grinnell talked about. Maybe we ought to stress not so much what percent of the business the four large firms do, but how do they behave. What is the behavior that is causing us to discover price for all those cattle in one 30-minute segment? Who has brought us to this point, the buyer, the seller or both? Then, we sell them at the same average price. Panel, would you like to elaborate on that? Nobody has said that is good.

Clem Ward: Absolutely not. In fact, as Ted Schroeder reported, when we visited packers and feeders, the finding was that both sides would agree that this is not good. We have evolved to that position over time. I don't think you can point to any one thing or any one side of the market. There was a time when supplies were tight, so it was easy for a packer to go out and take the whole showlist at one price. We have gotten away from pricing pen by pen, but that is the opposite direction of a move toward value-based pricing. Then, I think it evolved to the point where you start pricing big groups of cattle at one price, then you get into more of a strategy of "exactly when am I going to pull the trigger on that price?" So you sit across from the guy and wait until somebody blinks. I think the industry, for whatever the reasons, has backed itself into that corner and does not know how to get out other than to break out individually and work with some kind of alliance or marketing agreement or something like that where you bypass the current pricing system. If everybody did that, it would create problems too.

Wayne Purcell: Either Ted Schroeder or Jim Mintert, you said you were concerned that the asymmetry of information and the lack of available information at the feedlot level, and the concern that raises about access to buyers and access to a marketplace in a highly concentrated market, may be contributing to this 30-minute time window. Is that a fair statement?

Jim Mintert: That is exactly right.

Wayne Purcell: The Commission, without changing the structure, really came down hard on getting more information into this situation. I bet there are a lot of people in the room

(and I probably would fit in that category) who believe a lot of these things could get handled in the marketplace if we had better information. Maybe that is the closure and the common ground we need. I don't think I have heard anybody speak against that. The people who have to give up the information and would prefer to keep that information secret are not going to like that, however.

Clem Ward: If we had something like a large trader report, once a week or something, where you had the aggregate supplies of cattle from the packers, so that the feeders knew about how many captive supply cattle might be coming that week or the next couple of weeks, I think that would help your situation. It would help all feeders, and it would help reduce some of that information asymmetry. As it is, the packers know what they have bought forward. All they have to do is get their information from feeders as to how many others are bought forward (and they probably have a pretty good idea since there are only three of them), so they have a pretty good idea where they stand. Feeders may not know nearly as well.

Wayne Purcell: If you stop and think about the fact that we are selling everything at an average price, half of the people like that. Half of the people are selling cattle at prices above what they are worth.

Jim Mintert: We had a couple of feedlots tell us that they tried using formula trading, but they didn't do as well. The reason they didn't do as well was because the quality of their cattle wasn't very good. (They didn't necessarily add that, but that was the reason.)

Clem Ward: We have a graduate student doing some work at Oklahoma State looking at cash pricing versus formula for one particular price grid, and the worst pen happens to be a pen that has a lot of Standards and a lot of heavies, a lot of Y4s, and you know it will not do very well on a grid system. But it got an average price.

Wayne Purcell: That is not going to work longer term. That is not the way the industry will go forward. I think everyone will agree to that.

Audience Comment: It may be the fact that in the last three weeks in the Panhandle of Texas, the showlist of cattle has not sold in 45 minutes. It has sold over a period of days, for different prices, and that is a reflection of supply. In that concentrated group of people who are purchasing those cattle, the captive supply information is known. But not all sellers have that information, so we have supply and demand and that "fuzzy area" around those curves. How nebulous the situation is and the "fuzziness" around knowing the current price is different in the last three weeks than it was two months ago when the showlists were bigger and cattle feeders had no bargaining advantage.

Wayne Purcell: Ted, did you put up that "fuzzy" idea? I am serious. I suspect that is going to be a take-away of this conference for many people in the room because it really made the point about when we don't have good information, the process gets variable, weak, price discovery processes are ineffective, and we price wrong, etc.

Question: I heard about this 30-minute thing. Was the number on page 62 of the book that we were given for the conference the actual number of transactions on that day?

Clem Ward: Yes. There were some days when nothing happened, and there were some weeks when there were a lot of transactions on a lot of days.

Question: What would be your response to a statement such as, “If the system is transferring ownership from producer to buyer (packer), and that process is open and on top of the table where everybody has a chance to either sell the best price or buy the best price, and the transactions are all recorded instantly, etc., wouldn’t that change the concerns of the people like us about concentration?” Really, by definition, if there are two competitors, you can have a competitive market. I am not saying that we need to reduce down to two. But whatever that number is, two, five, or fifteen, if the trades are all on the table and everybody knows what the prices are and they all have their chance to participate, then a lot of the concerns will disappear.

Bill Albanos (in audience): It sounds like you are talking about electronic marketing. If we had electronic marketing, I think that would relate to a lot of the lack of information or lack of understanding because everybody would see the same thing, see a complete picture, and see a change in the dynamics of it. Yes, I think that would go a long way to making equality of information. That reminds me of something. About 15 years ago, I was at the University of Illinois. We got a contract to work on electronic markets for beef. A young assistant professor and I were doing the project, and we had to go to Iowa Beef and other packers to get them to participate in this project to introduce electronic marketing. I went to Iowa Beef, and asked them to participate. They had their attorney and consultant there. They said, “Well, we have thought about this, but we have shareholders and have invested a lot in having a superior set of information that relates to the products we deal in, and it wouldn’t be rational, and we couldn’t explain to our shareholders, why we give all this away.” Nothing could make more sense. They were absolutely right as far as I could see. But “yes,” your point is that if we had that system, it would create an enormous amount of information and it would have an enormous “leveling” effect. That is the basis of a lot of our insistence for more disclosure to help resolve unequal information.

Clem Ward: Ted and Jim didn’t report on one section of our report that deals with some marketing alternatives that we talked to packers and feeders about such as closed cooperatives, group bargaining arrangements, and electronic marketing. What we concluded from the interviews we had was that electronic marketing probably wasn’t going to be an alternative that will work in the near future. I had a proposal into AMS 15 years ago to develop an electronic marketing system for fed cattle and was told that politically they couldn’t give it to Oklahoma State where there were larger feedlots. It needed to go to a Corn Belt state, where they had smaller feedlots. There was an attempt, I think, made to do something in fed cattle, and I think there was an opportunity to perhaps do something in fed cattle 15 years ago. But you have to find some way to make the electronic marketing system attractive to a packer to buy the volume he needs in the time frame he wants. If you just sit by that screen every day, all day long, and go back



and forth between getting the within-pen detail you need, getting the lists, and putting in bids, etc., that is just too slow. That is my opinion.

**SESSION 3**

***PRICE DISCOVERY: VERTICAL ALLIANCES AND PRICING TO VALUE***

Chuck Lambert  
National Cattlemen's Beef Association

Steve Meyer  
National Pork Producers' Council

Keith DeHaan  
Director, Technical Affairs  
Beef America

## **Alliances: Why They Occur and How They Help in Beef**

Chuck Lambert

We will discuss first why the alliances are evolving. Cattle-Fax did an analysis about a year ago looking at alternative marketing systems, and that is basically what these alliances are. They are alternative ways of marketing cattle and putting packages of cattle together.

To put some perspective on the magnitude of the challenge or opportunity in the industry, we slaughter 28 million (plus or minus half a million) commercial steers and heifers a year. We have approximately 900,000 cow-calf producers who generate these cattle. The majority of the cattle go through some type of stocker, grower, or wheat pasture operation. About 85 percent of the calves are born in the spring, so stocker operations meter and even out the flow of those cattle throughout the year. Stocker/grower operations add some relatively low-cost forage-based gain.

In a lot of ways, stocker operations are already integrated or tied to feedlots either contractually or in some cases by outright ownership. But more and more, it is on a contractual basis. In some cases, stocker operators are also cow-calf operators who use the stocker operation as a way of managing their forage supply. In good years, they will carry those cattle to yearlings. In years of drought, they will go ahead and move those calves and use the forage supply for the cow herd. So at least in the more arid regions, those stocker operators may well be integrated into a cow-calf type of operation. They are probably the least clearly defined of any of the sectors in the industry.

Basically, 1,100 feedlot operations will market 88 percent of the fed cattle, and 212 feedlots will market about 60 percent of the fed cattle. So if you look at bringing calves from herds of approximately 40 head from all over the country, co-mingling them through stocker operations, and bringing them to the feedlot, then getting the information flows back through the system is a tremendous challenge. This is true even if the information exchange between the feeder and the packer is more nearly complete. There are some technologies on the horizon, electronic ID, etc., and we will hear more about those later. But it is a tremendous challenge when we talk about information feedback to the cow-calf operator and even the seedstock operator. In a lot of ways, managing the seed stock, primarily the bull input into the cow-calf operation, may be a more assessable way of managing and controlling the genetics or targeting these cattle than actually trying to work through these 900,000 cow-calf operators.

At the packer-processor level, three packers handle about 75 percent, and four packers handle 81 percent of the fed cattle slaughter. Then, we go through the retail or HRI, and ultimately we are targeting either the domestic or the international consumer where value determination for quality, consistency, and other characteristics we are looking for in beef is actually determined.

Why have we seen alliances evolve at different stages? In seed stock, Certified Angus Beef (CAB) is in effect an alliance where they are trying to merge like kinds of cattle into some type of branded program. Certified Hereford and other efforts are starting to emerge, and these alliances have been driven or pulled together by seed stock producers. In a lot of ways, their primary motivation is to develop a demand for feeder cattle so they can sell bulls or sell seed stock for their breed, and then develop a brand around that breed identity. That helps ensure quality and increases the consistency, at least within that pool.

We have had some marketers who have evolved as alliances. The Michigan Livestock Exchange is working with an alliance. Most of these alliances are targeting a packer with whom to work. They involve either custom feeding, or, in some cases, pooling of these cattle into feeding units. They are then marketed generally on an individual value basis to a packer. In the case of Michigan Livestock Exchange, they are closely tied to Moyer Packing Company. In the Southwest, the Packerland or the old Sunland alliance with Ralphs is a packer working with a retailer, but it also includes a feeder/packer alliance doing a branded program at the retail level. Keith DeHaan is on the program after me, but Beef America, Farmland, and at least the second tier packers are using, I think, in some ways, alliances to assure themselves of a supply. In most cases it is a way of being able to compete with the big 3 and to assure themselves of supply and, probably more importantly, assure themselves of a supply of a given quality of cattle where they can fit a market niche.

The big commodity product line, which primarily the big 3 packers are doing, is high volume, low cost, and generic commodity-type production. In some ways, alliances and other marketing arrangements may be the new technology that is evolving outside of the mainstream region. The Plains region may be the high volume, low cost commodity production area, and vertical alliances are evolving outside the traditional production area.

During the discussion yesterday, I thought about the technology application--basically boxed beef, irrigation, and feed mills of a size that are working in customer feedyards. Those were the technologies that evolved the feeding industry and the packing industry from the old terminal stock yards and the old Kansas City, Omaha, Chicago area feeding in the farmer/feeder region, and moved that whole industry to the Plains. Either we are at a stage where large packers and feeders are looking for ways of marketing and technology that takes them to the next phase of development, or alliances and some of these different marketing arrangements we have discussed are the new technology. Which is going to take place? Which will rule the future?

Going back to the marketers, some have worked with McDonalds. The primary motivation there is another profit center, but also there is an objective of having less food safety risk by having source-identified cattle. Accountability or a way to trace back is one of the motivations. We are seeing retailers or HRI come back into the system and try to develop alliances. There are different motives by different people in the system to work these alliances including the seed stock people (primarily bull sales and branded

programs) and marketers (a service they can offer to their producers and be a facilitator in the system).

I know of a cow-calf producer who targets the genetics within his herd that will grade Choice. If he identifies those cattle with ultrasound, there is at least a 70-percent probability they will grade Choice. He can put a pen of cattle together that will grade 90-percent Choice at the feedlot. That allows him to custom feed those cattle and target them to a packer/processor, market them to his best advantage, and provide some additional revenues. It was discussed yesterday that the only people who have a vested interest in value-based marketing are the half that have above average cattle. Those people who know they have above average cattle can target those cattle. This particular producer has marketed them on a price grid or a formula for about four years, and now he is starting to “shop” the formula. He is starting to say, “Okay, I know I can produce these high-quality and consistent cattle, now who will pay the most?” This is that long-term price discovery that we talked about yesterday, not day-to-day price discovery. He is looking for the arrangement that his cattle best fit and the one that returns him the best dollar for the type of cattle and for fitting them within the price grid.

I mentioned that McDonalds has at least dabbled with alliances. I know there are some other retailers doing that. In their case, the reason for alliances is primarily quality, consistency, and accountability for the product. They can trace back, in some cases, for known source-identity cattle. Alliances probably now account for a million or fewer of the total 28 million fed cattle slaughtered, depending on when U.S. Premium Beef and the Northern Plains Premium Beef get started and at what volume. Between those two, that would probably add another 1.25 million to 1.5 million cattle in some type of alliance as those closed cooperatives become operational.

In closing, we must recognize why the beef alliances are evolving and what impact they will have. They are evolving as a way to circumvent or go around the traditional pricing system and accomplish the quality control and identification of, and paying for, value that the traditional price-based systems have not been able to realize. These approaches can bring quality control and an ability to target a particular market or market niche. If they accomplish a “consumer driven” status, the long needed tailoring of product offerings to modern consumers is being put in place, at least on a small-scale basis. It is not via the traditional type of price or price discovery, but it is happening--and it will have an impact on the pricing systems of the future.

## Alliances: Why They Occur and How They Help in Pork

Steve Meyer

We have a lot of very important issues on the table. But, there is one thing I have not heard any mention of yesterday or today so far. When we look at pricing mechanisms, price discovery mechanisms, alliances, and all these kinds of things, there is one thing we should keep in mind. The pork industry sees it very clearly, but I can't speak for the beef industry. If there are problems in price discovery, we need to solve those without giving away efficiencies because there is a species out there called chicken. If there is a lever that is driving most of the things we pay attention to, it is the chicken business. They are not going away, they are very good at doing what they do, and they show no signs of backing off. They all announced 7-percent cutbacks last year on the same day and they didn't do anything. They just keep charging along. If you are going to fix this thing and throw efficiencies out, it is not going to be a good situation because we have a very low-cost producer and competitor and in our research with consumers, believe it or not, people like chicken. We can sit here and laugh about it, make fun of it, etc., but *people like chicken*. If you don't believe that, you are in a lot of trouble. I believe it completely. Our research shows very clearly that people like that product. We have to compete with it head-up. It is low cost. So never forget that in all these discussions, we should not be willing to throw the efficiencies away and still say there have been some accomplishments.

In the past, value characteristics of a pig were very simple. He had to be alive, present, and he had to be walking. He had to have some weight (how much didn't matter so long as it was over 150 lbs.). At certain times of the year, the color mattered because his hair might stick to him when he went through the de-hairing machine. He had to be a good hog, whatever that was. And if you had a reputation with the buyer, it helped. But those were the kinds of things that went into value determination. Also, I want you to note that pig I am showing on the screen, then look at this second one.

They are different. For one thing, one is a barrow and one is a gilt. We would like very much right now to raise every market hog as a gilt because they are leaner, more efficient, and they're more heavily muscled. It wasn't intentional, but when I pulled in this clipart, the gilt came out fuzzy. I think that is appropriate for the times, too. It is a little harder to get our hands on these. How was the pig handled before it came to us? What is the size of the delivery unit? Do I cut one check for 200 pigs or one check for 20? That makes a lot of difference in my cost as a packer/processor.

Then there is residue risk. And, how fat is the pig? Recently, that has been our major determinant of value. What is the genetic make-up? Some of these pigs are extremely lean. They win on the fatness criterion, yet if they are carrying that stress gene (which is a part of the genetic make-up), the muscle quality goes in the tank and we have a real problem.

Is this supplier dependable, or does he pit me against my competitor every time I try to buy his hogs? Was the delivery scheduled? Did he call me a couple of days in advance so that I knew how many hogs I would have today and could schedule the right amount for my shift? Did the delivery get here on time after it was scheduled? Also, you have heard of paying premiums for the first hour's kill, etc. That is very important. I would rather not keep those hogs overnight. How were they raised? Although it is not a big deal yet, it may be a big deal here at some point. It is a big deal in Europe. Were they raised in a confinement barn or in a pasture?

Muscle quality is the rising issue. It is the one we are very concerned about, and I am confident that within three to five years, we are going to have a way to measure muscle quality at chain speed in our plants. You are not going to be able to bring me an ultra-lean pig that cuts PSE. He will have to have high-quality muscle because, while leanness is a characteristic that people want in their food, the overwhelming trend right now is they still want it to taste good. What was the hottest cut in the pork complex last year? Bacon. Now there's a health food for you! But it tastes good. They put it on a product that no longer tasted good (hamburgers) so that it will taste good. They have to cook hamburger much dryer than they used to. I have had an Arch Deluxe with and without bacon, and I tell you I will buy the one with bacon. There is a lot more flavor there. It is a flavor profile. We are kind of beyond the fat phobia and folks, to some degree, understand they have to balance the fat in their diets, not in individual foods. If you are just charging ahead with lean, lean, lean, and you forget that it has to taste good, you could be in trouble.

The point is, a pig walks off a truck with all these things of value attached to it, but I don't know if we know how to measure some of them. Without knowing the exact economics of running a packing plant, I am not sure I can put a dollar figure on packers' costs. The folks that own packing plants have not been very forthcoming with telling me that yet (and I am not arguing that they should). They have a lot of things that figure into the value that they place on an animal. We need to understand those. These changes lead to some pretty tough questions.

Were prices ever very efficient transmitters of information? I would argue "yes." They used to do a pretty good job because there was not much information to transfer. There weren't many characteristics. This was not a consumer-driven business; it was a production-driven business. It was for many years. Can prices transmit the information necessary in a consumer-driven business? I would say we are finding that to be pretty difficult. I am a free market economist. I think the prices work pretty well, and I think we need to let prices do what they will. I am not one to throw out the price system, but I am saying this one is having a tough time capturing all the information. Then, when it does, can we understand it? Maybe price has all the information in there, but I can't comprehend it. If I can comprehend it, then I still may not be able to figure out how it got in there in the first place. It is really causing problems and causing people to question whether the system is working. Maybe it is, and we just don't understand how. How do we cope with that?

The price system did what it was supposed to do in the past. I think it did pretty well. But it is really getting overburdened by a lot of characteristics that 1) we haven't had very good measurement for, and 2) we don't know exactly how to evaluate. It wasn't very long ago that we could not effectively measure leanness at chain speeds. We could measure it with a ruler because we measured back fat. There are some packers that still do that, but I would argue that it is not a very accurate predictor. The data show us that. We now have machines that can take 2,000 measurements of a carcass in a split second as the carcass goes across a set of transducers. The technology has provided us with so much more information that we may be burdening a price system that has trouble handling all that information.

On the issue of pricing to value, the problem is that most discussions focus on price and not value. We have a lot of people who have always said the same hog ought to bring the same money. Well, that is not really true because depending on whom you sell that hog to, it is meant to do some different things. The hog's value differs dramatically from value chain to value chain. One of the best examples I know of is selling the same pig to IBP and an identical one to Hormel, two very different companies. IBP doesn't have branded products that it sells in the grocery stores; Hormel has Black Label products and a product called Spam. They buy hogs basically to make those branded products, and they are different hogs.

I came up with an example and I apologize if it is inappropriate. I don't think it is. A two-cycle engine, like on a chain saw, will work at any angle. It has the oil in the gasoline. Most lawn mowers have a four-cycle engine, and if you turn them sideways while they are running, you will have trouble. If they are priced in this fashion, and one person has a level lawn and another person has a steeply sloping lawn, the lawn mower values will differ greatly. The guy with the sloping lawn will say that the 4-cycle has almost no value because that is a close estimate of how long it will last. But the guy with the flat lawn sees them exactly the same--and yet their prices are different. It depends on how the product is used. Saying that price ought to be equal overlooks important things, and I think alliances have a big place in this. If I enter an alliance, I do so willingly, and it reduces the rivalry so that value can replace price as the negotiating point. We can actually get to determining value. We see that happening in the hog industry today. David Kenyon talked yesterday about Smithfield buying over 80 percent of their hogs from 5-8 people. Those are alliances. I don't know that there are any signed contracts on those; they may be handshakes. But they are alliances nonetheless. They have tried to arrive at some concept of value instead of dickering over price.

What are the drivers toward alliances? In our business, one of the big ones is the perceived efficiencies of vertical integration. I say perceived not because I am questioning whether there are efficiencies, but rather because most people probably think they are a lot bigger than they actually are. There are problems with these as well, which is true with any efficiency. You have to negotiate various things, but still, in general, vertical integration has some efficiency gain to it. I don't know if they are as big as some people think they are. Increasingly knowledgeable and sophisticated managers are another driving force. That is both at the production and processing levels. I have been



on hog farms in the last three years and in packing companies in which the managers read the Sloan Management Review and the Harvard Business Review and actually stay up to date on those things. I don't think you would have seen that a few years ago in either sector. They are increasingly sophisticated and good business managers.

Producers now appreciate the value of throughput. On modern hog farms, the plants are efficient. As Dennis DiPietre says, they are high output, low variance systems. In learning that, producers have learned that high output and low variance mean profits. That is exactly what packers have wanted for a long time. They would like much lower variance in the throughput rates of their plants. Everyone appreciates this factor more than they used to.

All are also more aware of the importance of quality to end-use customers. I am using quality in a very general term. One of the things I have tried to do in the last three years is when I say quality, I mean the color, texture, marbling, and flavor of the muscle. If I talk about leanness, I use the word leanness. While there is a push from consumers for a leaner product, leanness in our business is largely a cost issue. Leaner hogs are more efficient at the farm, they are less costly to raise, and they are less costly to kill and process because we throw less fat away. But leanness and quality are very different concepts if you think of them in these terms.

Other industries and countries have taught us. Our move to alliances in the livestock sector comes on the heels of a move to alliances in the car business and all the other businesses in the U.S., which came on the heels of the alliances that existed in the Japanese industries that cleaned our clocks in the 1970s. So, we learn from other people.

Another thing driving alliances is increased willingness of processors to enter production and the related fear that entry causes among producers. There hasn't been a huge run in this direction, but there has been some, Smithfield being the best example. They raise a lot of hogs, and a good percentage of the hogs go through their Bladen County, North Carolina plant. They invested in the Circle 4 project in Utah, which originally had a packing plant. I don't think that has been officially scrapped, but they haven't broken any ground on the packing plant yet. They only have the first 20,000 sows of what was originally planned for approximately 80,000 in the Utah area. But Smithfield was one of the early ones to do that. Farmland is in the production business as well. They are a cooperative, which is a little different, but they are also a packer that is producing. There has been a lot of willingness for processors to get into production in some other species, which has created some fear among producers, and they said we have to do some things to compete with these people.

Alliances are first-hand evidence of what happens when available processing capacity is not sufficient. We ran toward contractual and alliance arrangements in late 1994 and early 1995 in response to \$27 hogs for about three weeks. Was that a knee-jerk reaction? Somewhat. But long term, it still might be the better thing to do. What we saw then was that after five years of plant consolidation in the packing industry and two years of expansion in the production industry, we had a mismatch in the number of hogs that

had to be killed and the number of places we had to do it. The guy with the scarce resource got paid, so packers made out well. I learned one thing from economics class.

Alliances will help discover and enhance value for alliance members, but maybe not for the industry. These could very well be closed systems. They may not share very well. They might find out why packers have been unwilling to share information over the years, and that is because it gives competitive advantage. It would be interesting if the shoe would end up on the other foot. They are value chain alliances, not horizontal bargaining groups. In the past, when producers got together in what might have been called an alliance, it was “let’s all get together and try to hammer the packer.” The idea now is “let’s get together with the packer, and try to hammer the other guys.” It is quite different. We have shifted directions completely for several good reasons. Confrontational business dealings very rarely result in more satisfied customers. It just doesn’t happen that way. You have to have cooperative business dealings in order to do that. Coordination will reduce costs and enhance quality. If any of you are interested, we have copies of that 1992 Pork Chain Quality Audit available. Somewhere near \$12 per head is being left on the table for quality defects, not counting the costs of those throughput variances we talked about earlier.

Farm-level price discovery will be replaced or displaced by alliances whenever they form. I think prices and pricing will be replaced by internalizing the transfer and sharing the end profits in some fashion. I think live prices may be displaced by putting the price discovery burden on the wholesale or retail level. We are seeing a lot of that now. The move to carcass pricing in effect puts the price discovery, at least intermediate and longer term, at the wholesale level. Day-to-day fluctuations will be based on farm-level supplies. Ted Schroeder and Jim Mintert just completed a couple of projects for us that basically say that the short-term price discovery happens at the farm level while longer term price discovery falls mainly in the wholesale level. This is what I think we will find.

The irony is that in the short term, these alliances will depend on open cash markets to set some base value. They will probably still depend on a base value from the Iowa-Southern Minnesota market or some other cash market area to start their value transfer in the short term. I think in the long term, as relationships build, they will probably go away from that and start developing those values internally.

Alliances are currently limited by trust and openness. We simply don’t, as producers (and really as processors), really know how to build these relationships. We are not very good at it; there is a history of often-adversarial relationships that we have to overcome. Regardless of what might be the ideal situation today, there is all this past baggage that both parties carry to the negotiations. Other businesses have had to overcome the same thing over time. It takes a while of working at it. We have some research going on now to try to build some relational models to help people appreciate the relationships that they have to manage in one of these alliances. It is tough to learn how to do that. You are asking people to really change their behavior.

Alliances are a new step in the progression of required skills for producers. First, they were just producers. They had to know pigs, nutrition, machinery, buildings, and ventilation. Then, they were business managers, and this was only about 10 years ago-- not very long. They had to learn how to do business planning, and some still don't know how to do that. They had to be an asset manager and understand concepts like turnover ratios (and vast majorities don't understand that yet). But we are getting there. We are learning.

NPPC's "pork college programs" have been well attended the last four years. People realize they need these skills. They have to learn how to manage people (motivating, hiring, and firing). But becoming a people manager means you have to do something. You no longer have your son and daughter as slave labor. These hired people can leave on their own free will. You have to learn how to manage people. A lot of people don't know how to do that. All of a sudden they have enough hogs that they have to hire labor. They learn labor turnover is very costly, and now they are asked to become a negotiator and a co-manager with equals in an alliance.

That first skill lasted for 100 years, and the last three skills have had to be learned in the last 10 years. You can see we have a big job here. Producers feel the same way about this as I do about computers. Just as soon as I learn how to do something, they bring me something new. Learning these skills will not be optional. I believe everyone is going to have to learn them. Competitors, other meats, and other producers will not allow them to be complacent and to refuse to adapt. People like chicken. Chicken producers are good at what they do. They've captured a lot of those efficiencies we talk about. They don't send signals by prices; they send signals by internal memorandums, and they control by management directive, not by price signals. Whether you like it or not, that can be extremely efficient. A dictatorship is a very efficient form of government. It's not very fair, but it is very efficient. We have to try to capture the efficiencies while still maintaining fairness in our alliances.

## Steve Meyer's Slides

### Past: Value Characteristics Were Simple

- Alive
- Weight
- Walking
- Present
- Reputation
- “Good” Hog
- Color

### Today: Very Complex Value Characteristics

- Handling method
- Size of delivery
- Residue risk
- Fatness
- Genetic makeup
- Dependable supplier
- Scheduled delivery
- Delivery time
- Rearing method
- Lean content
- Muscle quality
- Cooperative supplier

### Changes Lead to Tough Questions . . .

(for participants, academics, and regulators)

- Were prices ever very efficient transmitters of information?
- Can prices transmit the information necessary in a consumer-driven business?
- Can we fully comprehend:
  - The information actually carried by prices?
  - How the information is incorporated into price?
- How do we cope with our inability to comprehend?
- Two premises:
  - The price system did what it was supposed to do in the past.
  - The modern meat business has OVER-BURDENED the price system.

## Pricing to Value and Alliances' Role

(distinct but related)

- Most discussions focus on price, not value.
  - Long-standing calls that “the same hog should bring the same money.”
  - But a hog’s value differs dramatically from value chain to value chain.
    - 2-cycle and 4-cycle mowers sell for \$289 and \$219.
    - Man with level lawn sees their VALUE as equal.
    - Very different relationships between price and value!
- Alliances reduce rivalries so value can replace price as the negotiating point.

## What are the Drivers Toward Alliances?

- Perceived efficiencies of vertical integration.
- Increasingly knowledgeable and sophisticated managers:
  - Production and processing levels.
  - Producers now appreciate the value of through-put.
  - All are more aware of the importance of quality to end-use customers.
  - Other industries and countries have taught us.
- Increased willingness of processors to enter production--and the resulting fear among producers.
- First-hand evidence of what happens when available processing capacity is not sufficient--Fall 1994.

## Alliances Will Help Discover and Enhance Value

(for alliance members, but maybe not the industry)

- Value chain alliances, not horizontal bargaining groups.
  - Confrontational business dealings will not generally result in satisfied customers.
  - Coordination will reduce costs and enhance quality.
- Farm-level price discovery will be replaced or displaced by alliances whenever they form.
  - Replaced: Internalize the transfer and share the end profits.
  - Displace: Put the price discovery burden on the wholesale or retail level.
- Irony: They’ll depend upon open markets for the short run.

## Alliances are Now Limited by Trust and Openness

(we simply don’t know how to build relationships)

- Other industries have overcome this over time.

- A new step in the progression of required skills:
  - Producer--pigs, nutrition, machinery
  - Business manager--business planning, asset management
  - People manager--hiring, firing, motivating
  - Negotiator and co-manager with equals--a new frontier!
- Learning these skills will not be optional--competitors (other meats and other producers) will not allow them to be so.

## Price Discovery Issues and Alliances: An Industry Perspective

Keith DeHaan

I am not an economist. I have little responsibility in the procurement area of our company. I do not represent one of the top three or four beef packers/processors and my Ph.D. is in nutrition and biochemistry, so my viewpoints might have a pretty narrow focus. Seriously, my company has afforded me the luxury of working in various segments of the beef chain, including prior to the plant (where a lot of my experience has been both with this company and my previous employer, Farmland), at the plant level, and downstream beyond the plant. Frankly, I have the best job in the world because it is really an exciting industry once you have an opportunity to have a playpen in all those various segments. So, based on that experience, I would like to share some of my thoughts with you today.

I will start out with this statement: *The beef and pork packing industry is still in a very unsatisfactory condition. There has been no trust formed to advance prices or take advantage of a mythical scarcity to corner the market. The cattle raisers are masters of the situation.* That statement was by P.D. Armour in 1895, and it explains how things have (or is it “have not”) changed in the last 100 years.

There has been a rash of different pricing mechanisms between the packer and producer introduced in the last few years, and the reasons for that were brought out either this morning or yesterday. A lot of those mechanisms came from outside the packing industry and were directed inward. Not all of them were generated by the packer itself. What is the packer’s viewpoint and attitude about those pricing mechanisms? They vary. The attitudes range from apathy to resistance to cooperation. The apathy and resistance are there for various reasons. It could be because those pricing mechanisms may not have reflected that particular packer’s business or business needs very well.

Some of the new pricing mechanisms require a great amount of work. It is simple to take the weight of a group of animals, subtract the shrink, and write the check. But when you have to go through gyrations to tie down individual value, it takes more clerical work and a lot more work all the way around. There may be some other reasons for resistance as well. But we also see a lot of cooperation and creativity. I think that has been pretty exciting. Our head cattle buyer, for example, certainly falls under the latter category.

The current price discovery mechanisms, especially when you talk about carcass merit pricing, involve the USDA report or plant or company (either live or rail basis), which is what most of them are based on today. Those are broken out either by region (as far as the USDA) or by a plant or a company. Also, along with that is boxed beef, and that would be the meat price report of carlot trade, or by plant or company by just boxed beef plant cutout reports. They may represent more true value, but they are not used that much. I hear a lot of criticism of using them as base price mechanisms. One

criticism is that they may not really reflect true value. The other criticism is that they still work off averages. How do you get away from that? To get away from averages, you have to get beyond the box. But there is extreme difficulty for price discovery behind the boxes today. There are a lot of different profit centers between the packer and the consumer, and all the profit centers are attempting to determine value. You have the purveyors, food service, HRI business as well as institutional, wholesalers, retail chains, processors (a mushrooming business in pork and in beef), and the export customer.

All packers that I am aware of are very sensitive on price reporting and believe that they get the brunt of the exposure on price reporting whereas our customers don't have to go through that. We really don't think that's fair. That gives us a very poor advantage in the marketplace.

It is difficult to associate all sales back to an animal or group of animals. You can keep the integrity of a producer's group of animals together through slaughter and into the coolers with no problem, but when they get into the fabrication, they become parts. There you lose the integrity. So if you lose the integrity, you lose the ability to maintain identity.

I am sure the big 3 have a lot more product codes than we do. But my point is that there are a lot of products across which we can try to capture all the information. It can be done, and it is done like we do research, and that is by sampling. Is the industry changing to look at some of these things beyond the box? Yes, I think so. The evolution of beef processing and packing will influence price discovery in the future. There is going to be a lot more specialization in our business. It is starting to go that way. We as a midsize to small player in the industry are going to be focused in a very particular arena, and we will be focused differently than the big 3. There are other packers who will be doing similar things.

Packers are removing profit centers downstream. This is happening very rapidly. IBP, for example, is going to become, if it is not already, the world's largest patty manufacturer. They are already very involved and significant in roast beef. Excel has been in the case-ready business for some time, and they are going to be a very big player in that as well as being involved in further processing. Monfort and Packerland are involved in further processing. The margin potential is better the closer you get to the consumer. All of these things, as you start removing those profit centers, are going to allow for a better price discovery mechanism all the way to the consumer.

The cowboy's math psychology of a price grid is "if grading of a producer's mix of cattle equals the average plant grading, then the grid price is equal to the live rail price." My purpose for this illustration is that the packer wants to make those value-based pricing decisions reflect his business. Most often, they do reflect his business. That is why you start to see a lot of differentials in these grids from one packer to another. What is our attitude about all these things, like alliances, in front of us today? I can't speak for the other packers, but I can certainly speak for us. We certainly like them for various reasons.



Consistency. Somebody showed that inconsistency is one of our major problems in the beef industry. We have been involved in alliances, involved in value-based marketing, and we are getting more consistent cattle out of them. We like that because it saves us money. Inconsistency is expensive. For example, 1) “out” cattle are expensive; 2) the more inconsistent your product mix is, the more effort and more expense you will have to go through to sell those cattle; 3) changeover between grades is expensive; and 4) returns or refunds, because you have products that didn’t meet your customer’s expectations, are expensive. The number one reason we like value-based marketing systems and alliances is because of consistency. We hope it will get better as time progresses and we hope we get better at doing what we do with them.

Improved quality grades. Our quality grades have improved. If you know a little bit about our business, quality grade is what makes or breaks us. A lot of our movement is into the hotel/restaurant business, where quality grade dictates how much money you make in that industry. Alliances have improved our quality grades.

Improved value. We are getting fair returns on our premium investments. When we offer a premium for whatever reason, we want a return on that investment. We are getting that.

Reduced financial risk on non-conformance. That is important too. If you are paying an average price for the entire pen, and you have “out” cattle, you are taking a risk. You are going to get your nose bloodied. The tradeoff is you may not get as much potential income by not taking as much risk (and we can live with that), but you don’t get as many bloody noses either.

One man’s value-based marketing arrangement is another’s captive supply problem. That was addressed yesterday. Captive supply is the future for a company like ours. We embrace it, we want it, we need it, and we have to have it. We are not going to play in the commodity world in the future. We can’t. The reason we can’t is because we cannot compete with the big 3 in that marketplace. So we have to deal with those kinds of things. I like what Steve Meyer said about alliances and working together because it makes sense for packers our size. Now you understand the incentive to get involved at the producer level.

Let’s discuss what impact these alliances have on our business. We think that in the beef business, there will be greater segmentation at the producer level. We are already starting to see it. There will definitely be more specialization. That means that when a cow-calf producer makes a breeding decision, he knows where that product will end up. He doesn’t necessarily know what packer it is going to, but he understands what kind of marketplace it will end up in. We think these alliances provide momentum towards true carcass merit pricing. I am not saying we have true carcass merit pricing today, but we are a lot better than we used to be. I believe that in the future we are going to be better than we are today. It definitely improves the information flow. That has to be positive. Information is powerful if you decide to use it. We do have a lot of

producers in this industry who have started to use the information available to them. It definitely increases efficiency. Again, I like what Steve Meyer said: In a lot of cases, alliances can improve product quality *and* increase efficiency. I think with those things in mind, alliances can definitely upgrade the total beef industry and move it forward.

## Questions and Answers

Question: Steve, you talked about quality grade and leanness as two specifics that are very important, but I want you to address how long it is going to be before 56 is the top “lean level” that packers want.

Steve Meyer: I don’t know the answer to that. Grids have been generally based at about 49 percent for a long time. There has always been some suspicion that if the distribution starts shifting, then they will make 52 the base. I think if they’re competing for hogs, though, and the base bid will change when that improved leanness and competition for it happens, then I’m not sure it is a problem. If the base bid stays like it was and they just shift premiums and discounts, then I think that *is* a problem. If that product has value and it is a competitive market, the base bid on it should change too. We can argue whether it is competitive or not, but it has been pretty competitive so far. Does that answer your question?

Question: Partially, we are paying for up to 60 percent lean today on pork. How long before that base becomes 56 or 55?

Steve Meyer: I think David Kenyon mentioned yesterday that Smithfield has a cutoff level beyond 16 millimeters. Anything less than 16 doesn’t get any premium. That is the reason. They’ve found that those 12-millimeter, very lean hogs were the bulk of their muscle quality problems. The answer to your question is that if we select for both characteristics, we can get 60 percent lean hogs and have good muscle quality. In the past, we have only selected for one characteristic. But when we started research with the genetic improvement sire program 4 years ago, we identified sire lines that will sire lean hogs that have high-quality muscle. Anyone studying genetics knows if you select one thing, you will get that and nothing else, and other things can go in the tank. I think it is important to select for both leanness and quality. To get that done we have to get it in the price and price discovery process.

Question: How important is accountability in alliances in relation to quality grade? Would that accountability pass the price and incentives back to the producer level?

Chuck Lambert: In some ways, I think accountability will be the price of admission. If a retailer, a processor, or purveyor puts their brand on a product, they are not going to assume all the risk from quality and production management variability. In order to participate in those types of branded and targeted programs, I think, as a producer, you will have to bring that accountability to the table. If we evolve to a two-tier market, whatever the premium in that branded program is will be yours to partly share as a reward for bringing accountability to the table. I don’t think we will see branded programs without that accountability built into it.

Keith DeHaan: I totally agree with Chuck Lambert’s comments. We are in fact exploring ways of accomplishing just that. Applying it back to the feedlot and/or ranch is difficult, but it has to happen. It is encouraging to see some of the efforts taking place

now. As we put more branded programs together in our company, we will have more involvement and accountability from a quality standpoint back at where the cattle are being produced.

Question: Steve, it seemed like you included alliances with companies like Carrolls Foods and Smithfield along with groups of producers who are trying to do things together to be competitive as a network in dealing with a volume of hogs. Can you separate those out, talk about where they fit, and what the future might hold for the producer regarding volume and marketing alliances?

Steve Meyer: If I lumped those together, I certainly didn't mean to. I see true alliances, like I said, as referring to vertical arrangements. Producers getting together to produce hogs, market hogs together, etc., we term networking. And some of those networks have been established to get more volume. I argue that unless they also change the hogs they are raising, they are merely transportation networks. They may save on transportation costs. If they get together and start changing the hogs or raise them differently, then they are a marketing network. It really does, or can, result in different kinds of hogs. So I separate those two. We have gone through about five years where producers have seen a lot of benefits from cooperative arrangements at the horizontal level, capturing new technology, improving genetics, improving market clout via volume, etc. But I think the next step is where those people could do some things to coordinate vertically that involve cost savings, quality control, and product enhancement beyond where we are now. So I guess I see them as separate things at this point.

Question: We heard Keith DeHaan's point, which was very telling, indicating that one producer's strategic alliance is a another producer's captive supply. We also heard Jerry Grinnell say yesterday that they are looking into some hog procurement programs in the Midwest. As they develop, I guess I am curious about what Grinnell sees as his role, if any, in monitoring these arrangements.

Jerry Grinnell: I am not sure that monitoring alliances fits within the purview of Packers and Stockyards.

Wayne Purcell: I have a feeling his question may go a little beyond that. What you are doing is formally colluding, aren't you, in a sense, when you form alliances? It is going to be a difficult issue, I suspect, to decide what is anti-competitive behavior in an agreement that is designed to get people to work together. That is where we are going, isn't it?

Question: What in the statute says that you can't do that vertically? I know horizontal collusion is obviously prohibited, and is obviously considered anti-competitive. But in choosing to have a contract with my supplier, I'm not sure if I see that going afoul of the laws or even of the case history.

Wayne Purcell: Jerry, can you recall any of the language of the statute that deals with the vertical alliances as specifying what is appropriate and what is not?

Jerry Grinnell: I don't think it is specific to vertical versus horizontal arrangements.

Steve Meyer: It is just that you can't have preferential dealings. The Packers and Stockyards Act says that. You saw the things that are the value components of the pig. David Kenyon had a list of items regarding the value of these alliances to packers. If we say that we are going to price hogs to value, which we have argued all the time, then now are we going to turn around and say we are going to price hogs to value but only if the value is a response because of producer volume or ability to bring quality consistency, etc.? These things are value as well as low levels of back fat. I'm not sticking up for the big guys; I am just saying if you are going to price to value, you have to price to all the value characteristics, not just some of them.

Clem Ward: The antitrust case history doesn't deal very well with vertical arrangements. It says very little. Most litigation and most of the antitrust acts deal with horizontal behavior. Price difference or price discrimination is a separate issue. For example, if there is a small independent hog producer in Iowa who has been paid less for the hogs he brings to market, even if they are better quality, and a larger producer who is getting paid a premium for large numbers of hogs, even if the quality may not be as good, that is a separate issue. Whether or not that is done with a vertical arrangement may not matter.

Wayne Purcell: The petition that is now in the Federal Register that was mentioned yesterday would constrain how these vertical arrangements could be priced or handled, and it is getting to this issue on the cattle side.

Question: From the processor's side of it, there is another one that never gets mentioned. Robinson-Patton basically says that as a processor when I offer products or services to my customer, I can put all kinds of cost-justified differences in. If you buy 20 million lbs. out of this schedule, this is the price that is scheduled. If all you have done is advertise, you can get this kind of rebate and those kinds of things. But I have to be willing to offer it to everyone. The offer may exclude a number of people. They are simply not big enough to get in to do those things, but it has to be freely offered. But it is very much a vertical transaction, and it doesn't appear from the P&SA standpoint that there are restrictions. If it is freely offered so that a producer or network coming in with this number of hogs and meets those conditions, does the packer have to be willing to deal with them?

Wayne Purcell: Basically his question dealt with the notion that from a processor's viewpoint, going up through the system, to customers and buyers, there are different arrangements made based on different cost considerations, etc. Then he said he wonders whether or not, when we get back down to the producer level interacting with the processor, that same type of consideration is going to be there. If there is a cost justification, can you offer different prices, for example? Robinson-Patton works backwards down toward the producer as well as forward up toward the processor as a customer. The answer is yes, I think. Historically, there has always been a difference between what the courts define as price discrimination and what an economist sees as

price discrimination. I think generally all the court rulings have always been that you can't do different things with regard to prices unless you can justify them in terms of different costs of serving that market or that need.

Comment: But isn't the principal issue that it is "freely offered"? The gentleman making the comment mentioned that. He has no problem paying different prices. Nobody else is going to have a problem with that. Every buyer and seller has an opportunity to participate in that transaction, at that price, given the description.

David Kenyon: I think this goes back to Steve Meyer's picture about all the items that went into the value of the hog. We can't measure all those.

Wayne Purcell: So, if you can't measure them, how do you bring them into a consideration of whether or not there is justification for price differences?

David Kenyon: I am talking about when P&SA starts investigating and says that these price differences can't be justified.

Audience Comment: P&SA actually can't because they can look at the packer's books and determine some of the differences, different costs, etc. But in the marketplace, you and I can't decide the value of throughput variation in a packing plant because we don't know the economics of the packing plant.

David Kenyon: But I would also argue that you can't measure the true value and quality.

Audience Comment: The gist of this is that packers can measure some of them pretty well. I don't know them, but then we have to ask, "Did they get paid more than they were actually worth, or less?" They are not usually known as benevolent sorts. So, I don't think they would pay more than they were worth.

David Kenyon: All I'm saying is that in a economic and pricing sense, you get some pretty poor decisions because they are not measuring all the values. Because of standard business practices, the packers have come to understand those values are present, and they are worth what the marketplace will pay for them. But if you try to do it the way economists do and run regressions, you will never find it.

Wayne Purcell: It is hard to bring any closure to this issue.

Question: Does the packing industry offer the same formula arrangement to all producers producing the same volume?

Steve Meyer: I don't know the answer to that. I would argue that it goes back to the access issue. In our testimony to the Secretary's commission last year, part of what we said was "let us know what is required to be involved in marketing arrangements, and then producers can decide whether or not they want to meet those criteria." We think that open information and access to those criteria are important. I don't know the answer.

Audience Answer: No. They don't necessarily pay the same thing.

Question: Isn't that price discrimination?

Audience Answer: Maybe it's an hour or two difference in the phone call. Maybe the person delivering the product is willing to do something that the other person is not willing to do. You have to take those things into account as well. Whether that person has exactly what the other person has to offer is a difficult issue to answer. When the packer puts the hog on the table and does a cutting test for you, the cutting test for him may be totally different. So, maybe when it goes to the cutting table, his hogs are performing much better and he gets more value. But, it is really hard to quantify or qualify what "exactly the same" is.

Keith DeHaan: Depending on my situation as a packer, the same hog is worth a different amount at 9:00 this morning and 1:00 this afternoon.

Question: On the formula, on the discounts, the premiums?

Keith DeHaan: The premiums and discounts are basically in the grid of prices. The question is what is the base price. The base price is where the negotiating in terms of paying for these other factors such as timing and willingness to work with the packer gets done.

Question: I was just talking about the formula arrangement's actual premiums and discounts applied to the hog.

Keith DeHaan: Those are published.

Question: I assume that in some of the alliances, you are using the quality grading system for determination of value. There has been a lot talk about getting rid of the grading system or changing it a lot. Do you as a packer feel comfortable with it? I don't hear that much from the packers.

Keith DeHaan: The question is in reference to the quality grade, especially now in formula pricing and alliances. What is our attitude on the quality grade system? This might surprise you, but we are quite indifferent to it. It is really our customer that is currently demanding it. We are comfortable with it. We certainly challenge academia to give us something better. You are going to listen later to Mohammad Koochmaraie give you one possibility. But we are pretty much indifferent because we will supply what our customer wants us to supply. Can we live without it? Yes. It would be especially easy for a company like ours who will probably brand someday, but we don't really have an opinion one way or another whether it is good or bad. We are just a processor, and we do what our customers want us to do. I can't speak for the entire industry because I'm sure each processor you ask would give you a different answer.

Wayne Purcell: Keith DeHaan made the point that discussion of grades and grading is what is coming up in the next session after the break.

Question: I would like the panelists to comment on the difference between the cattle industry and hog and poultry industries when you basically produce the type of cattle that fit the producing environment. The cattle industry is broken up into a lot of different sectors and it will be that way because the land the cattle are raised on is scattered throughout the country. How do you think non-price coordination is going to work when you look at all the alliances? One type of beef branding that has worked the best is the Certified Angus Beef, and that is the most open of any of the alliances. How do you think the problems of different cattle in different areas are going to be overcome without having an open market?

Chuck Lambert: We will never be as consistent as pork and poultry. I don't know that we necessarily have to be, but I do think that within product lines, we can improve the consistency. We talked yesterday about three or four quality lines or product lines. Not all environments are suited to producing the same type and quality of product. I think we will have more consistency within environments, and we have to come to the realization that, as we look at price differences or value differences, what is optimal in one region may not be optimal in another region. But within those environments, we can and will evolve to more standardization or consistency. I don't think we need 84 breeds and exponential numbers of potential combinations to fit those environments. We need different managed targeted breeding systems that will work within those environments. This will evolve into use of sires that will fit some targeted consumer niche, and there are three or four of those different targets (from grinding/processing to prime exclusive hotels/restaurants). But the idea that we can produce everything in every region, bring them all together, and let the packers sort them out into quality groups at 400-head per hour isn't consistent with meeting consumer needs and quality consistency within those product lines.

Wayne Purcell: Even if you go to non-price means of coordination, it is a whole lot tougher in cattle than it is in pork or poultry. Does that mean it is more important for the pricing mechanism to do its job of achieving vertical coordination in beef and cattle than it is in the other sectors? What does it mean?

Steve Meyer: I think you do have a huge problem in beef. I have lived in Texas and Iowa and have visited other parts of the country. All the cows are vastly different. Let no one be under any illusion, however, that because we can put hogs in a building, we can standardize them. We are still dealing with a biological creature that has a probability distribution to it, and when you go into those buildings, the modern way of doing it is "all in, all out." The "all out" part of that means you pull a lot of highly variable product variation out of those buildings. Our basic philosophy is much like Chuck Lambert's. There is always going to be a distribution. We need to reduce the distribution of variability as far as economically possible, and then we need to be a whole lot smarter about trying not to shove round pegs into square holes when we start trying to put product into different niche markets. But I don't think we can ever be what the



poultry industry is, not that they have eliminated variation. They haven't. It's just that you can't see 3 percent of a 4-lb. bird, but 3 percent of a 1,000-lb. steer is a large amount. I can see that with my naked eye. I think poultry probably has as much of a percentage variation as any of the species; it is just harder to see it.

Chuck Lambert: But they also produce a 2½-lb. bird for the fryer market, and they produce an 8-lb. bird for the McNugget market. They don't try to put those 8-lb. birds in the retail case, and they don't try to make McNuggets out of a 2½-lb. bird. They standardize, and they target within those product lines. They match the genetics to the end product.

Wayne Purcell: Keith DeHaan, please pursue the point you made about captive supplies. We will have a session on that this afternoon, but it is an issue that is traumatizing the cattle sector in many ways. You said you liked captive supplies. You said you had to have them. Why is that the case, where do you see captive supply use in the future, and why is it so important?

Keith DeHaan: It is certainly important to us because we are starting to see a lot of specialization in our industry at the cow-calf level, feedlot level, packer level, and maybe downstream toward the consumer somewhat too. We are focusing on what we do best, and we are trying to build our future. We can only do that if we have a very specific animal that fits into the criteria of our marketplace. How do you go about getting that animal? You try to be creative and work in partnerships with the people that supply the product. Our cattle buyers have to go to pens of cattle and pick those out just by looking at breed, color, finish, and typical live animal characteristics. You can't afford to do that with the kind of marketplace we are trying to be directed to in the future. It cannot be done. There is still too much uncertainty. You can do a lot of that selecting if you have enough cooler capacity and want to start sorting the cooler, but we are not big enough to have the kind of capacity necessary to pick out our end product for our particular end use from a widely varying set of carcasses. So to accomplish our goals, we have to work in partnership with the people that will produce what we need for our marketplace. I don't care what you call it, but we call it what we think it is--captive supply.

Audience Comment: I think there is a difference in the descriptions of captive supply. When you talk about Keith DeHaan's form of captive supply, that is a captive supply that benefits the consumer and the producer. It provides incentives. The captive supply that P&SA is concerned about is the non-competitive captive supply. An example is the IBP formula where both producers and consumers are coming up short. I just want to make that distinction. Captive supplies are not all bad. Some of them are very good and are necessary in accomplishing a goal in meeting the consumer demand.

Wayne Purcell: Just to expand on that a bit and make sure we are clear on what you are saying, you think there is negative price impact associated with captive supplies and that is the bad part of it. You don't see anything wrong with specification of quality considerations, if that is a part of it, which Keith says he has to have. If you talk to the Kansas State University and Oklahoma State University people who did the interviewing

and looking at price discovery in cattle, I think you will find that the pricing and transfer arrangements that have come closer to pricing to value, or have at least a premium and discount-type of schedule, have in some instances been called captive supplies. What we are saying is it has two faces.

Audience Comment: One thing about the captive supply issue is we are never going to agree on whether this is price positive or price negative. We have been fighting on that subject and will always disagree. But one of the things we keep avoiding is the simple question of the formula arrangements that are there today that are based on somebody else's market. If, on Monday morning, all of us who still sell live cattle on averages are gone, where will you find your market? The easy answer to that is, "We'll get closer to wholesale price." Let's start talking about that. I would like to hear you three speak to that. I agree in a sense that selling on averages is this, that, and another, and I see all the problems and benefits, but you can't play semantics with this. You have to have something to price your cattle on. For folks like us who feed cattle and sell on a live basis, what are we going to use to base our price on?

Keith DeHaan: I am not an economist, but I have been truly amazed at how much ingenuity and resourcefulness there is in the beef industry as well as the pork industry. Price discovery happens. It is amazing how it happens. When we wake up on some future Monday morning and all cattle are value-based priced, we are still going to have a price discovery mechanism in place. My thought for our company is that we will probably use it downstream. We will use a mechanism downstream, closer to the final consumer, and bring it back down to the live level because there will be a lot fewer kinks in the chain to be able to draw that back. But if not, I'm sure there will be other pricing mechanisms in place.

Chuck Lambert: I think there are some mechanisms in place at the present time with independent sellers of cattle that are being negotiated on a regular basis. I think there is some kind of equilibrium level to how much is going to become captive and how much is going to stay on the open market. If I put myself in the position of the next guy to sign a contract, the volume of trade being negotiated that my contract is based on is the key. If it is too small, I won't sign the contract. That tells me that somewhere there is probably equilibrium. When the contracts run out and are up for renewal, the buyer says, "I'm not comfortable with this anymore and I'm not going to sign the contract." There are companies that do business and know the profitability of the entire business and come to some way of sharing that profitability. It is an evolutionary process. It could not happen tomorrow. Ten years from now, it might happen very easily. You might actually be "friends" with your packer.

Wayne Purcell: And 10 years from now, it may be that prices will not be tied to live prices at all, no matter what the percentage of the total kill is in the "negotiated" base. We have heard today that price discovery is moving higher in the system, up to the wholesale level, in pork. That could happen in beef where fed cattle transactions are tied to boxed beef values and the producer, like Paul Engler says, is being paid on the value of what goes out of the packing plant rather than estimates of what is going in.



## **SESSION 4**

### ***BEEF QUALITY: GRADES, TENDERNESS, AND PRICE DISCOVERY ISSUES***

Mohammad Koohmaraie  
Meats Unit Research Leader  
U.S. Animal Research Center

Darrell Wilkes/Max Garrison  
Integrated Beef Technologies/Micro-Chemical

Barry Carpenter  
Director, Livestock and Seed Division  
AMS, USDA

## **Beef Tenderness: Regulation and Prediction**

Mohammad Koohmaraie, S. D. Shackelford, and T. L. Wheeler

### **Beef Quality**

#### Why Concentrate on Meat Tenderness?

Consumers consider tenderness to be the single most important component of meat quality (Figure 1). This fact is easily confirmed by the positive relationship between the price of a cut of meat and its relative tenderness (Savell and Shackelford, 1992). Unfortunately, inconsistency in meat tenderness has been identified as one of the major problems facing the beef industry (Morgan et al., 1991; Morgan, 1992; Savell and Shackelford, 1992; Smith, 1992). Uniformity, excessive fatness, and inadequate tenderness/palatability were all part of the top 10 quality concerns of the beef industry (Smith, 1992). A recent survey reported that consumers were dissatisfied with the eating quality of beef prepared at home more than 20% of the time (Miller, 1992). One supermarket chain that asks customers to return any meat they are not satisfied with had \$364,000 worth of meat returned in a three-year period, 78% of which was due to tenderness problems (Morgan, 1992). The real magnitude of the tenderness problem is realized by considering the fact that only .1% of unhappy customers actually complain or return the product (Wilkes, 1992). This happens despite the technology that has been developed to improve the consistency of meat tenderness (e.g., postmortem aging, mechanical tenderization, electrical stimulation, and addition of plant enzymes).

The beef industry relies on the USDA quality grading system to segment carcasses into groups based on varying levels of expected meat palatability. However, the results of numerous investigations of the relationship between marbling and beef palatability indicate that, although there is a positive relationship between marbling degree and tenderness, juiciness, and flavor, this relationship is weak at best (reviewed by Parrish, 1974). There are far too many carcasses with tender meat that are discounted and far too many with tough meat that are not discounted under the current USDA quality grading system (Wheeler et. al., 1994; Figure 2). MARC data indicate that fat content of a steak (marbling) is unrelated to meat tenderness (Figure 3). Thus, the inconsistency in meat tenderness is due to a combination of our inability to: 1) routinely produce tender meat and 2) identify carcasses producing tough meat. In addition, as the beef industry moves toward leaner slaughter animals, the resulting genetic and management modifications could cause additional tenderness problems. It is sobering to recognize that the only time the tenderness

of meat is known is when the meat is eaten by the consumer and, if the meat is tough, then it is too late. It has been demonstrated that consumers will pay more for steaks that are known to be tender (Boleman et al., 1995), thus, the cost of predicting meat tenderness can be recouped. In addition, consumers consider tenderness to be the major determinant of eating quality of meat, thus, it is essential to develop methodologies to objectively predict meat tenderness to supplement or replace the current USDA quality grading system. The objective of this manuscript is to summarize our research results and plans relating to regulation and prediction of aged beef tenderness. We recognize that palatability has several components which include tenderness, juiciness, and flavor. It is a combination of these eating attributes that determines the degree of eating satisfaction. The reason that we have concentrated our research efforts on tenderness is that experimental data indicate that there is twice as much variation in tenderness as in juiciness and flavor (Table 1).

Table 1. Means and variation in palatability attributes of beef rib steaks at seven days postmortem

	Standard	Coefficient of
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n = 1,667	Mean	deviation	variation
Tenderness	4.77	.80	16.8
Juiciness	5.07	.41	8.1
Flavor intensity	4.82	.32	6.6

#### What Are the Causes of Tenderness Variation?

To reduce variation in tenderness of aged beef, one must first understand the mechanisms involved. If the causes of variation are identified, then it may be possible to manipulate the process advantageously. Therefore, it is imperative to determine the biological factors regulating meat tenderness. Over the years, a number of parameters, including amount and solubility of connective tissue and amount of intramuscular fat (marbling), have been associated with meat tenderness. Utilizing the data from the Germplasm Evaluation project (GPE), Crouse and coworkers (unpublished data) determined that connective tissue and marbling combined only accounted for 20% of the observed variation in meat tenderness (Figure 4). Therefore, we could not account for 80% of the variation in meat tenderness. In 1984, a project was initiated at the MARC to determine factors regulating tenderness of aged beef. A graphic illustration of the results is reported in Figures 5 and 6 (for review, see Koohmaraie 1988, 1992a,b, 1994; Koohmaraie et al., 1994). Based on these results, we hypothesized that differences in the rate and extent of postmortem tenderization were responsible for variation in the tenderness of aged beef. Hence, it was decided that progress toward identifying factors regulating meat tenderness was dependent upon understanding how meat tenderizes during postmortem aging.



The phenomenon of the improvement in meat tenderness with postmortem storage was first described over a century ago. For many decades, meat scientists from throughout the world have conducted research to identify the mechanism(s) of improvement in meat tenderization with postmortem storage. Collectively, these results indicate that there are small, but significant, changes that occur in the muscle that result in tenderization. The following are known about meat tenderization during postmortem aging:

- 1) Tenderization occurs because of degradation of a few structural proteins by endogenous enzymes (this process is called postmortem proteolysis and is the reason for aging meat). These proteins are responsible for maintaining the structural integrity of the muscle.
- 2) Differences in the rate and extent of postmortem proteolysis is the major source of variation in the tenderness of aged beef (Figures 5 and 6).
- 3) Current data suggest that of all the proteolytic systems endogenous to skeletal muscle, the only enzyme system involved in meat tenderization is the calpain (calcium-dependent) proteolytic system.
- 4) The calpain system has three components: a low-calcium-requiring enzyme ( $\mu$ -calpain), a high-calcium-requiring enzyme (m-calpain), and an inhibitor (calpastatin) which specifically inhibits the activity of the calpains. Calpains have an absolute dependency on calcium for activity.
- 5) Postmortem tenderization occurs fastest in pork followed by lamb and then beef (Figure 6, Item #2).
- 6) Although most beef responds to postmortem storage (i.e., tenderization) the rate and extent of tenderization varies such that some beef does not benefit from extended postmortem storage.
- 7) To improve the consistency of meat quality with respect to tenderness, if at all possible, beef should be aged at least 14 days, lamb 10 days, and pork 5 days. Tenderization during aging occurs at the same rate for vacuum packaged subprimals as for dry-aged cuts or carcasses.



## How Can We Insure Tender Meat?

Based on our knowledge of the mechanism of postmortem tenderization, we have developed a process that ensures meat tenderness (for review, see Koohmaraie *et al.*, 1993). Calpains require calcium for activity. But conditions in postmortem muscle are not always optimum for calcium to be available to activate calpains. But exogenous calcium can be added to meat, thus, activating calpains and inducing more rapid and extensive tenderization. The process, known as Calcium-Activated Tenderization (CAT), consists of injection-marinating cuts of meat (either pre-rigor or post-rigor) with 5% (by weight) of a 2.2% solution of food-grade calcium chloride. To facilitate marination, cuts are vacuum-packaged and stored for seven days prior to consumption. For best results, commercial automatic pickle injectors should be used to ensure uniform distribution of the calcium chloride throughout the cut of meat. If at all possible, one should avoid use of hand held injectors. The process is more effective in prerigor (the first 3 hours after slaughter) meat, but can be used up to 14 days postmortem. It will not affect meat that is already tender; thus, it will not make tender meat "mushy." At the recommended levels of calcium chloride, the process has little effect on other meat quality traits. The process is effective in all cuts of meat regardless of species, breed, or sex-class. The process is also effective in cuts of meat expected to be unusually tough, such as meat from sheep and cattle fed  $\beta$ -agonist, old cows, Brahman cattle, callipyge lambs, and round muscles from bulls. It has been tested under commercial conditions in a large beef processing facility.

Restaurant and supermarket consumer evaluation studies (1,001 participants) have indicated that consumers prefer calcium-injected beef over non-injected control beef due to improved tenderness with no change in flavor desirability or juiciness (Table 2). Supermarket shoppers, given the option of selecting steaks labeled "tenderness and juiciness enhanced with the addition of up to 5% of a solution of water and calcium chloride" or control steaks with the same label without the above statement, chose the calcium added steaks 71% of the time (Miller *et al.*, 1994). Fresh pork and chicken products are routinely injected with various ingredients to improve tenderness, juiciness, and flavor. Consumer perception of calcium-injected meat should not be a concern. In fact, CAT probably has a positive effect on beef acceptance due to the health benefits of a calcium-added product. The CAT process has enormous potential to help the beef industry in its effort to reduce variation in beef tenderness. In our opinion, there are no barriers to commercial application of the CAT process for ensuring desirable meat tenderness regardless of the product source. We continue to work closely with interested parties to help them implement this process. Meanwhile, we continue to seek a long-term solution to tenderness variation problems by looking for ways to produce tender meat and to identify tough meat.

Table 2. Effect of postrigor calcium chloride injection on consumer evaluation of beef steak palatability

n = 1,001	Control	CaCl <sub>2</sub>
Tenderness	5.1 <sup>b</sup>	5.8 <sup>a</sup>

Juiciness	5.8	5.9
Flavor desirability	5.8	6.0

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## Can We Reduce Tenderness Variation Through Genetic Selection?

Many scientists and producers have suggested that controlling the genetics of the slaughter cattle population would entirely solve the beef industry's tenderness problem. We agree that genetics makes a significant contribution to the total variation in tenderness as tenderness differs among and within breeds. However, genetic analyses indicate that environmental factors make a larger contribution (more than twice) to variation in tenderness. Thus, it may be more efficient to improve tenderness through management and processing procedures than genetic selection.

Traditional animal breeding theory indicates that the most effective genetic selection is made through progeny testing. While progeny testing may not be a practical method to improve tenderness due to the time (it would take 35 years to improve shear force by 1.0 pound [0.45 kg] via selection for marbling or 11 years via direct selection for shear force) and expense required to develop and evaluate progeny, we wanted to determine how rapidly tenderness could be improved through progeny testing. The rate of genetic improvement in a given trait is a function of the heritability of the trait, the generation interval, and the selection differential. MARC data indicate that the maximum selection differential that could be imposed for tenderness is relatively small. In fact, the distributions of shear force values overlap for the progeny of the toughest and most tender 10% of sires (Figure 7). Moreover, if we culled the toughest 10% of sires we would only decrease the frequency of shear values above 4 kg from 20% to 16% (Figure 8). Thus, extreme culling would have to be imposed to eliminate all tenderness problems through genetics.

Undoubtedly, it would be impossible to select heavily for tenderness without compromising other economically important traits. It appears to us that the beef industry should 1) exploit breed complimentary and heterosis through crossbreeding to balance production, carcass, and meat traits and 2) use appropriate production, processing, and evaluation procedures to guarantee tenderness.

## **Predicting Beef Tenderness**

Based on current knowledge, no single trait consistently explains greater than 50% of the observed variation in tenderness of aged beef. To improve our chance of developing a method for predicting beef tenderness, we are using several approaches in addition to those based on calpastatin. We have collected data on a large number of carcasses in order to develop a tenderness prediction model. Because the value of the loin and rib drive the value of beef carcasses, we chose to predict the tenderness of top

loin (longissimus muscle) steaks. Moreover, because most rib and loin cuts are aged for at least 10 days postmortem with the national average being about 19 days, we chose tenderness at 14 days postmortem as our endpoint for prediction. For this project, we used Warner-Bratzler shear force, a mechanical measure of tenderness, as our index of tenderness. Ultimately, models will have to be tested against consumer ratings.

Ideally, we would like to be able to measure (predict) meat tenderness with a rapid, automated, tamper-proof, noninvasive, accurate instrument. Numerous technologies have been investigated including ultrasound, elastography, near-infrared (NIR) spectroscopy, and video image analysis (VIA). None of these technologies have successfully predicted meat tenderness because these technologies are all based on indirect measurements that are not capable of sensing the subtle changes in raw meat that are responsible for variation in cooked meat tenderness. Thus, we chose to mostly measure traits thought to be directly involved in tenderness variation.

**1. Predicting Beef Tenderness Indirectly with Carcass Traits.** After studying sources of variation in tenderness of youthful, grain-fed beef (the majority of block beef in the United States), we, and others, have found that marbling will account for, at most, 15% of the variation in aged beef tenderness. Other carcass traits, proposed to be related to beef tenderness, such as skeletal and lean maturity, fat thickness, carcass weight, and lean color, texture, and firmness, are even more weakly related to aged beef tenderness. Concomitantly, our data indicate live animal performance traits such as slaughter weight, weight per day of age, average daily gain, and time-on-feed will not account for a significant portion of the variation in aged beef tenderness. The one historical trait that will consistently explain a large percentage of the variation in aged beef tenderness is the percentage of *Bos indicus* inheritance in the cattle. Numerous experiments have demonstrated that the frequency of unacceptably tough meat is greater for cattle possessing high levels of *Bos indicus* inheritance (Koch et al., 1982; Crouse et al., 1989; Wheeler et al., 1995). However, most research indicates that cattle containing 25% or less *Bos indicus* inheritance are similar to their *Bos taurus* counterparts in palatability (Crouse et al., 1989; Johnson et al., 1990). Thus, if one adheres to sound crossbreeding principals, the production advantages of *Bos indicus* crossbred cattle may be reaped without compromising product quality.

**2. Calpastatin-Based Methods of Predicting Beef Tenderness.** As noted above, our studies have indicated that differences in the rate and extent of postmortem tenderization are responsible for variation in tenderness of aged beef. Furthermore, our results have demonstrated that the calpain enzyme system is responsible for the changes that result in meat tenderization. Thus, our approach to tenderness prediction has been to identify a trait that measures the capacity of this enzyme system. The principle regulator of the calpain enzyme system, in postmortem muscle, is its endogenous and specific inhibitor called calpastatin. In several studies (Whipple et al., 1990a,b; Shackelford et al., 1991a,b) designed to determine the biological reason for differences in meat tenderness between *Bos indicus* and *Bos taurus* cattle, it was determined that calpastatin activity at 24 hours postmortem (referred to as postrigor calpastatin) would explain a greater proportion of the variation (up to 44%; Figure 9) in aged beef tenderness than any other

trait measured in those experiments. In a subsequent experiment (Shackelford et al., 1994), postrigor calpastatin was shown to be highly heritable (heritability = 0.65). Furthermore, the genetic correlation between postrigor calpastatin and Warner-Bratzler shear force was 0.50. Collectively, these results demonstrate that selection against postrigor calpastatin activity could result in improved meat tenderness. Furthermore, it suggests that postrigor calpastatin activity could be used as a predictor of beef tenderness. Unfortunately, current methods of calpastatin quantification are laborious and time consuming. However, in cooperation with the National Livestock and Meat Board, we have developed a rapid method (ELISA) for quantification of calpastatin (Doumit et al., 1995). This method was used to test the efficacy of postrigor calpastatin as a predictor of beef tenderness. Results indicated that calpastatin ELISA accurately predicts calpastatin activity. However, calpastatin alone cannot predict meat tenderness accurately. Therefore, calpastatin alone does not account for sufficient variation in meat tenderness (about 30-40%) to be a practical single-trait predictor of tenderness. These results should not be interpreted to mean that calpastatin is not a significant determinate of beef tenderness. To the contrary, calpastatin is the single-trait with the greatest effect on meat tenderness.



Because of the apparent importance of calpastatin in regulating the tenderness of aged beef, we initiated a project in which we, for the first time, successfully cloned and sequenced bovine skeletal muscle calpastatin. Additionally, we have localized the calpastatin gene to chromosome 7 of the beef genome and, more importantly, we have demonstrated that the calpastatin gene is polymorphic (i.e., there are several forms of the calpastatin gene). We had hoped to exploit the polymorphisms in the calpastatin gene to develop methodology for predicting tenderness of aged beef and to genetically select for tenderness. These goals could be accomplished only if the polymorphisms in the calpastatin gene were associated with variation in tenderness of aged beef. If the polymorphisms in the calpastatin gene are not associated with variation in tenderness, then the polymorphisms would not provide us with any useful information. Unfortunately, the data collected in our laboratory indicated that there was no association between polymorphisms at the calpastatin loci and tenderness of aged beef (Lonergan et al., 1995). It is important to recognize that lack of an association between a polymorphism in the calpastatin gene and tenderness of aged beef does not mean that calpastatin is not related to meat tenderness. It simply means that there are different forms of the calpastatin gene and that they are not related to expression of the protein (calpastatin). The level of this protein, however, is highly related to tenderness of aged meat. We also have a project underway to determine the genomic organization of the calpastatin gene. These studies should provide information about the regulation of calpastatin gene expression and how to manipulate it.

**3. Predicting Beef Tenderness with Multiple Traits.** We then evaluated the possibility of combining other traits with calpastatin to increase the predictive accuracy. The dependent variables that we used to predict meat tenderness included historical data about the cattle (age, time-on-feed, dietary energy density, percentage *Bos indicus* inheritance, etc.), live animal performance data (average daily gain and weight per day of age), pH and temperature at 3, 6, 9, 12, and 24 hours postmortem, and the following traits determined at 24 hours postmortem: calpastatin activity, myofibril fragmentation index, fragmentation index, osmotic pressure, water-holding capacity, sarcomere length, and standard carcass grade traits (quality and yield grade factors). These traits were selected because they are the traits that are most commonly thought to be responsible for animal-to-animal variation in the tenderness of youthful, grain-fed beef. Other traits, such as collagen (connective tissue) amount and solubility, and fiber type and size, were not included in this experiment because we have a substantial amount of data that indicates that variation in these traits is not related to variation in the tenderness of youthful, grain-fed beef. We were able to explain 70% of the variation in tenderness using multiple traits. However, we soon realized that it would not be feasible to make all the measurements needed for that level of prediction accuracy under commercial conditions. At that point, we came to the conclusion that indirect measurements would never be

sufficiently accurate and amenable to industry application. Thus, we have concluded that accurate prediction of tenderness would require measuring tenderness directly.

**4. Shear Force-Based Classification of Beef.** The best direct measure of tenderness with the best chance to be successfully adapted for automated, on-line tenderness measurement was Warner-Bratzler shear force which is routinely used by meat scientists to measure meat tenderness. To be successfully adapted, shear force would have to be measured early postmortem (when grading is normally done), be automatable, make the measurement in the 15 to 20 minute time frame that was available, and be accurate enough to provide useful classification of beef based on tenderness.

We have determined that the tenderness of beef longissimus measured directly by shear force at 1 day postmortem is strongly related ( $r = .75$ ) to tenderness of longissimus muscle at 14 days postmortem (i.e., if a carcass is tough initially, it will be tough after aging). Analysis of day 1 shear force on 268 steer carcasses indicated that we can accurately segregate cattle into three expected aged longissimus muscle tenderness groups (guaranteed tender, probably tender, and probably tough). The success rate of this procedure was 85%, which was much higher than the present quality grading system (50%). This procedure allows for the creation of a tenderness grade that contains 100% tender beef. In contrast, 10% of upper Choice carcasses (Modest and Moderate marbling scores) are relatively tough.

Having found day 1 shear force to be successful, we started making the modifications to the normal Warner-Bratzler shear force procedures that would speed up the process to fit the time constraints in the packing plant and to make it easier to automate. These modifications were made by utilizing rapid cooking technology that already existed in the food service industry and by changing the sample from the steak that is sheared from six, 1/2-inch diameter cores to one, 1-cm thick slice. The modified shear force segregated 275 carcasses into the three grades with 90% accuracy (Figure 10)

Shear force could be used to segregate carcasses into any number of expected tenderness groups. But if the industry were to use a tenderness-based classification system, we suggest a system that includes three tenderness grades (Figure 10). The highest grade would consist of carcasses that are already acceptably tender before aging. These carcasses could be identified as "Guaranteed Tender" and would be appropriate for the HRI trade. The middle grade would consist of carcasses that are not tender before aging but that will probably be tender after aging. These carcasses could be identified as "Probably Tender" and would be appropriate for the retail trade. The lowest grade would consist of carcasses that are extremely tough before aging and that will probably still be tough even after extensive aging. These carcasses could be identified as "Probably Tough" and would require tenderization before marketing.

It appears that any individual consumer has a threshold for acceptable meat tenderness. Meat below the threshold would be unacceptable and above acceptable. However, this threshold may vary with the eating circumstances (i.e., restaurant or at home). In addition, the threshold for acceptable tenderness will vary for different consumers. For these reasons, a simple acceptable/unacceptable grading system is not sufficient. More than three grades may attempt greater classification than is needed or feasible. The proposed three grades would allow the identification of meat that is clearly unacceptable in tenderness that would be discounted in price or targeted for the CAT treatment. The top grade would represent meat that would be acceptably tender to almost everyone. The middle grade would be for meat that encompasses the range between individual consumers for acceptably tender meat (i.e., the lower boundary would be equal to the least tender meat that a consumer considers the threshold for acceptable and the upper boundary would be the most tender meat that a consumer considers the threshold for acceptable).

Because day-1 shear is a much better predictor of aged longissimus shear force than any visual, physical, or chemical measurement heretofore examined, we believe that day-1 shear force could be used as a tenderness grading criterion. Thus, we have outlined an automated system for measuring shear force at 1 day postmortem at commercial beef processing speeds (Figure 11). This procedure would decrease the value of a portion of the product and would be more expensive than the present quality grading system. Based on a rough cost estimate, this procedure would require a \$9/cwt increase in the price of ribeye and striploin to recoup reduced value on a portion of the product.

However, the incentive to use a tenderness-based beef classification system is to avoid discounting carcasses that have tender meat, but not enough marbling to grade USDA Choice, market classes of beef with more consistent tenderness that will better meet consumers' expectations, and to provide a class of meat that can be guaranteed to be tender. If we can assume that guaranteed tender is worth as much as USDA Prime, probably tender is worth as much as USDA Choice, and probably tough is worth as much as no-roll, the average value of beef would increase considerably. We estimate that about 30% of carcasses would qualify for "guaranteed tender," 65% would qualify for "probably tender," and 5% "probably tough," although about 13% of the "probably tender" carcasses would actually be "tough." Current grading provides 3% USDA Prime, 20% Top Choice, 35% USDA Choice, 35% USDA Select, and 7% No-Roll. Tenderness classification should increase average carcass value to the packer and provide consistent and known tenderness to restaurant and retail segments that could be marketed and priced accordingly. Research indicates consumers would be willing to pay more for guaranteed tender meat (Boleman et al., 1995).

**5. Whole-Genome-Linkage-Scanning for Markers Associated with Beef Tenderness.** Genetic maps are rapidly being constructed as a basis for identification of markers associated with Quantitative-Trait-Loci (QTLs) for use in Marker-Assisted-Selection (MAS) in cattle breeding programs. Several hundred markers spaced randomly throughout the cattle genome have been identified, sequenced, and used to trace the inheritance of DNA segments from parent to offspring in cattle families designed for development of a linkage map. A linkage map characterizing heterozygous, well-spaced markers enable efficient selection of markers for identification of QTLs segregating in cattle resource populations. Resource populations are well defined large families of animals having traceable heritage through pedigree analysis and segregating alleles of genes affecting phenotypic characteristics of interest (i.e., meat tenderness, carcass retail yield, etc.). These resource populations may be derived from within breed, breed crosses, or interspecies crosses. However, the type of resource population used or constructed will influence the level of heterozygosity within parental genomes. Several hundred more markers must be available for parental screening for a within breed (such as Angus or Hereford) search of QTLs than for an interspecies cross (such as Brahman x Angus) search due to the lower level of heterozygosity in the purebred genome. Depending on the objectives for use of the marker information, resource populations must either be created in a research setting or identified in the field from cattle populations currently in production.

Evidence is growing that we will be successful in identifying markers with proximity to loci having substantial effect on economically important traits. For instance, in plants (tomatoes, corn, soybeans), several QTLs have been identified and markers implemented through MAS to improve disease resistance and drought tolerance in breeding programs (Tanksley et al., 1982; Paterson et al., 1990). Markers for several debilitating human diseases have been discovered and are used for genetic screening and parental identification purposes. Recently, a region on pig chromosome 4 was shown to contribute to breed difference in growth rate, fatness, and length of the small intestine. A region on cattle chromosome 1 may contain genes responsible for "polledness." Information will soon be released detailing the identification of markers flanking QTLs responsible for milk component and yield variation within elite dairy families. Based on these discoveries, and those that are sure to follow, it is reasonable to assume that MAS for economically important traits will be implemented in both beef and dairy cattle selection programs in the very near future.

Strategies for identifying loci affecting economically important traits, in the examples cited above, have relied on the concept of "whole-genome-linkage-scanning" (Andersson et al., 1994). This concept is contrary to the "candidate gene" approach in that it allows, at the DNA level, an assessment of genetic variation at multiple intervals simultaneously with phenotypic records across all regions of the genome flanked with markers. Because of their ease of use, high utility and high throughput, microsatellites are the current marker of choice in whole-genome-linkage-scanning. They allow rapid efficient dissection of a plant or animal genome into interval parts for determining their direct contribution to variation in quantitative and disease related traits. A method of searching for markers involves the use of a large number of half-sibs from interspecies backcrosses involving only a few sire families. To discover what region(s) of the genome are contributing to meat tenderness, phenotypic observations on tenderness (i.e., shear force) will be collected and associated with variation at the DNA level. Once found, markers for meat tenderness can be implemented in various MAS schemes and the gene(s) responsible determined.

## **Conclusions**

Undoubtedly, variation in tenderness of aged beef at the consumer level must be controlled to improve customer satisfaction with beef. It has been shown that consumers are willing to pay more for higher or guaranteed tenderness. Several processes can be implemented immediately to reduce this variation, while others require further research.

Over the years, numerous factors have been reported to affect tenderness of aged beef. We must sort through those factors and determine which factors are most relevant. Those factors determined to be of most importance for controlling variation in meat tenderness should then be established as Critical Control Points. Critical Control Points would likely include some or all of the following: genetics, male sex-condition, age, time-on-feed, type of ration, implant protocol, pre-slaughter handling procedures, slaughter/dressing, electrical stimulation, chilling, postmortem tenderization technologies

(CaCl<sub>2</sub>-injection, blade tenderization, etc.), and aging. Hazard analysis for these critical control points could be implemented immediately.

In addition, our data suggest that even if all critical points are controlled, we will still have tough beef. Within all breeds, there are animals that will not produce tender meat even when the best processing procedures are followed. This means that we must develop methodology to identify such animals. Thus, we must be able to predict tenderness of aged beef prior to slaughter or during the time normal quality grading occurs. We believe the best prediction of aged beef tenderness will be obtained from shear force at one to four days after slaughter. Combining the ELISA for calpastatin activity with shear-force may increase the prediction of tenderness. Early postmortem shear force can be used to segregate carcasses into aged beef tenderness groups with 90% accuracy. Because this method is invasive and results in devaluation of one top loin steak per carcass, some have argued against this method of tenderness-based classification. However, a prediction method that is highly accurate should not be discarded simply because it is invasive. Rather, this system should be compared to noninvasive systems on a cost/benefit basis. Beef that is classified into tenderness groups would meet consumer expectations better because they would more consistently get what they paid for.

Genome mapping and other projects to identify markers associated with tenderness of aged beef are progressing rapidly. Once these markers are identified, they could be used to: 1) select for tenderness, 2) sort feeder cattle to optimize quality and yield, and 3) to predict tenderness. However, markers may only be useful within the family that was generated. But, by sequencing the location of these markers in the cattle genome, the identity of the gene(s) affecting beef tenderness will be determined. It is only at this level of knowledge that we truly can maximize the genetic effects on beef tenderness. One never knows what the future holds. Maybe the identity of these genes will allow us to sort cattle into expected tenderness groups prior to slaughter. When knowledge of genetics is combined with critical control of environmental sources of variation in tenderness, we should be able to consistently produce tender beef.

### **Literature Cited**

- Andersson, L., C.S. Haley, H. Ellegren, S.A. Knott, M. Johansson, K. Andersson, L. Andersson-Eklund, I. Edfors-Lilja, M. Fredholm, I. Hansson, J. Hakansson and K. Lundstrom. 1994. Genetic mapping of quantitative trait loci for growth and fatness in pigs. *Science*. 263:1771.
- Boleman, S.J., S.L. Boleman, J.W. Savell, R.K. Miller, H.R. Cross, T.L. Wheeler, M. Koohmaraie, S.D. Shackelford, M.F. Miller, R.L. West and D.D. Johnson. 1995. Consumer evaluation of beef of known tenderness levels. *J. Anim. Sci.* 73(Suppl. 1):13.
- Crouse, J D., L.V. Cundiff, R.M. Koch, M. Koohmaraie and S.C. Seideman. 1989. Comparisons of *Bos indicus* and *Bos taurus* inheritance for carcass beef characteristics and meat palatability. *J. Anim. Sci.* 67:2661

- Doumit, M.E., S.M. Lonergan, J.R. Arbona, J.Killefer and M. Koohmaraie. 1995. Development of an ELISA for quantification of skeletal muscle calpastatin. *J. Anim. Sci.* 73(Suppl. 1):166.
- Johnson, D.D., R.D. Huffman, S.E. Williams and D.D. Hargrove. 1990. Effects of percentage Brahman and Angus breeding, age-season of feeding and slaughter end point on meat palatability and muscle characteristics. *J. Anim. Sci.* 68:1980.
- Koch, R.M., M.E. Dikeman and J.D. Crouse. 1982. Characterization of biological types of cattle (Cycle III). III. Carcass composition, quality and palatability. *J. Anim. Sci.* 54:35.
- Koohmaraie, M. 1988. The role of endogenous proteases in meat tenderness. *Proc. Recip. Meat Conf.* 41:89.
- Koohmaraie, M. 1992a. Role of the neutral proteinases in postmortem muscle protein degradation and meat tenderness. *Proc. Recip. Meat Conf.* 45:63.
- Koohmaraie, M. 1992b. The role of Ca<sup>2+</sup>-dependent proteases (calpains) in post mortem proteolysis and meat tenderness. *Biochimie.* 74:239.
- Koohmaraie, M. 1994. Muscle proteinases and meat aging. *Meat Sci.* 36:93.
- Koohmaraie, M, T.L. Wheeler, S.D. Shackelford and M. Bishop. 1994. Beef tenderness: Regulation and Prediction. *Proc. NCA Cattleman's College*, pp. 27-35. Reno, NV.
- Koohmaraie, M, T.L. Wheeler and S.D. Shackelford. 1993. Eliminating inconsistent beef tenderness with calcium-activated tenderization. *Proc. Nebraska Seedstock Symposium.* pp. 14-15. Kearney, NE.
- Lonergan, S.M., M.D. Bishop and M. Koohmaraie. 1995. Relationship of restriction fragment length polymorphisms in the bovine calpastatin gene to muscle calpastatin activities and meat tenderness. *J. Anim. Sci.* 73(Suppl. 1):62.
- Miller, B. 1992. Understanding consumers. *Beef Today.* 8:40.
- Miller, M.F., S.Y. Gilbert, K.L. Huffman, L.L. Hammon and C. B. Ramsey. 1994. Consumer acceptance in a retail store of calcium chloride injected beef. *J. Anim. Sci.* (Submitted).
- Morgan, J.B. 1992. Tenderness problems and potential solutions. In: *The Final Report of the National Beef Quality Audit--1991*, pp. 180-187.
- Morgan, J.B., J.W. Savell, D.S. Hale, R.K. Miller, D.B. Griffin, H.R. Cross and S.D. Shackelford. 1991. National beef tenderness survey. *J. Anim. Sci.* 69:3274.
- Parrish, F.C. 1974. Relationship of marbling to meat tenderness. *Proc. Meat Ind. Res. Conf.* p. 117-131.
- Paterson, A.H., J.W. DeVerna, B. Lanini and S.D. Tanksley. 1990. Fine mapping of quantitative trait loci using selected overlapping recombinant chromosomes, in an interspecies cross of tomato. *Genetics* 124:735.
- Savell, J. and S.D. Shackelford. 1992. Significance of tenderness to the meat industry. *Proc. Recip. Meat Conf.* 45:43.
- Shackelford, S.D., M. Koohmaraie, L.V. Cundiff, K.E. Gregory, G.A. Rohrer, J.D. Crouse and J.W. Savell. 1994. Heritabilities and phenotypic and genetic correlations for bovine postrigor calpastatin activity, intramuscular fat content, Warner-Bratzler shear force, retail product yield, and growth rate. *J. Anim. Sci.* 72:857.
- Shackelford, S.D., M. Koohmaraie, M.F. Miller, J.D. Crouse and J.O. Reagan. 1991a. An evaluation of tenderness of the longissimus muscle of Angus by Hereford versus Brahman crossbred heifers. *J. Anim. Sci.* 69:171.

- Shackelford, S.D., M. Koohmaraie, G. Whipple, T.L. Wheeler, M.F. Miller, J.D. Crouse and J.O. Reagan. 1991b. Predictors of beef tenderness: Development and verification. *J. Food Sci.* 56:1130.
- Smith, G.C. 1992. Improving the Consistency and Competitiveness of Beef. The Final Report of the National Beef Quality Audit--1991.
- Tanksley, S.D., H. Medina-Filho and C.M. Rick. 1982. Use of naturally-occurring enzyme variation to detect and map genes controlling quantitative traits in an interspecies backcross of tomato. *Heredity* 49:11.
- Wheeler, T.L., L.V. Cundiff and R.M. Koch. 1994. Effect of marbling degree on beef palatability in *Bos taurus* and *Bos indicus* cattle. *J. Anim. Sci.* 72:3145.
- Wheeler, T.L., L.V. Cundiff, R.M. Koch and J.D. Crouse. 1995. Characterization of biological types of cattle (Cycle IV): Carcass traits and longissimus palatability. *J. Anim. Sci.* 74:1023.
- Whipple, G., M.Koohmaraie, M.E. Dikeman and J.D. Crouse. 1990a. Predicting beef-longissimus tenderness from various biochemical and histological muscle traits. *J. Anim. Sci.* 68:4193.
- Whipple, G., M. Koohmaraie, M.E. Dikeman, J.D. Crouse, M.C. Hunt and R. D. Klemm. 1990b. Evaluation of attributes that affect longissimus muscle tenderness in *Bos taurus* and *Bos indicus* cattle. *J. Anim. Sci.* 68:2716.
- Wilkes, D. 1992. Introductory remarks; issuance of the challenge to the workshop participants. In: G. C. Smith (Ed.) Improving the Consistency and Competitiveness of Beef. The Final Report of the National Beef Quality Audit--1991. p. 92.



## Value Differences Within Grade

Max Garrison

As you know, in our current industry, we have two different camps. First, we have the commodity camp, and these producers are after a fair average price. That is why they are in business and producing. We also very clearly have the quality camp, and these producers are basically trying to put a value on what the variation is around the average. If they can do that and they can predict it, they would like to get paid for the correct value.

The company I work with has been supplying the feedlot industry for about 25 years with different types of technology. We have clearly stated our position in today's industry--and that is that we want to give our customers a marketing alternative. That doesn't mean all of our customers are going to endorse the quality camp, nor does it mean that everyone is going to stay in the commodity camp. We, as a vendor to the industry and a manufacturer of technology, are trying to give them a choice. That is the reason I know a little bit about this. Most of you probably know Darrell Wilkes from various circles. He was to speak on this issue but is unable to get here because of weather problems in Denver. He has worked very closely in some of our developments and programs.

This display shows how you can translate value variation into a dollar value. This is a Choice 750-lb. carcass with differences in yield grades of 1.5, 2.5, and 3.5. If you use the OSU boxed beef calculator that has been available to use for a number of years with some recent revisions, that change in per-head value is about \$50 from a 1.5 to a 3.5. We know we have a distribution of yield grades within the population of the kill. If you take as a basis the prices from a publication that reports different grid prices available, that variation is \$30 between a 1.5 and 3.5. There are very distinct value differences across yield grades, and there is a very definite distribution of yield grades within any set of cattle that we kill.

This display is a depiction of the quality grade differences within grade. This translates out to a Choice-Select spread of \$5.11 per cwt. You notice that this was #21497 publication, so it is my understanding of this publication that these spreads between grades were by survey rather than what comes to us by way of the USDA. Again, you can see a very clear difference between a Prime and Standard, and, of course, the Choice-Select total difference is \$38. That \$38 translates to \$5.11 per cwt. on a 750-lb. carcass.

This display shows a value grid from public information, which is the Record Stockman, and it shows \$5.11 for yield grade 3A Select versus the Choice. If we use as a par value in this grid the Choice yield grade 3A, we will get paid based on what our price discovery method is in the premiums and discounts. It will be zero for Choice yield

grade 3A and move away from that in positive and negative terms depending on what that carcass turns out to be.

This display conveys that in a commodity-type environment, we take a steer that is a Select yield grade 2 on this price grid and he would get a discount of \$3.11 per cwt. off the par price, or about \$23 per head. Take the same steer and put him into a quality camp environment where the cattle are being priced off a grid. Maybe they have some other specifications they are trying to meet such as wanting cattle with marbling at a certain level or better, yield grade 2 or better, etc. They are source verified, which means I can trace back and get all the information on the cattle as far as the ranch and certainly through the feedyard for residue work, etc. They have been on feed at least 120 days. Carcass weight is 650-850 lbs. with a specified ribeye range. Under this specification, that steer is worth \$15 more in this example. So if that steer is marketed in a commodity program, he will be worth \$23 less than par. If I put that same steer into a lot where I have a grid program tied to quality and yield measures and I get paid on value, I will get a \$15 per-head premium.

This display conveys that there is about \$15 available from public price reporting which we just used to determine those values. If the minimum specs are marbling of 50 or better, yield grade 2, you may or may not be able to get additional value and additional premiums if you meet specs from alliance A to alliance B. There are different alliances available. Alliance A may be black in color plus some other specs. Alliance B may have some other specifications, but you can develop a value-based system off of a public reported price.

What Darrell wanted to say with this display is that in the 1995 beef consumer satisfaction study, quality grade was about the only significant measurement that tied back to consumer satisfaction. If we take the best 100 cattle, the failure rate (being unacceptable to the consumer according to meat scientists' measures of tenderness, etc.) varies tremendously. For high Choice, it is not bad, but for Select and low Choice, the failure rate averages 23.7 percent.

There is a huge difference in the value of cattle. The differences we get paid are not enough. Darrell says the premiums/discounts are about 1/10th of what they need to be in order to change our population of cattle, our management strategies, etc., and in order to give consumers what they are asking for. The lesson is that the quality grades don't tell the whole story. There are a lot of other things we need to measure and manage. I think we can make progress, but we still have a lot of work to do.

## Grade Changes in the Current Environment: Procedures and Possibilities

Barry Carpenter

We have had a lot of questions about what we do, why we do it, whether it is worth anything, etc., and I appreciate the opportunity to give our perspective about what we see the grading system doing and what it takes to change it. Can the USDA make significant changes to the quality grade standards of carcass beef? Yes, we can. But that is just the beginning of the story. I need to give you some background.

As I travel around to industry meetings and talk with producers, feeders, and packers, I am shocked at the lack of information those players have on how our system works, what it can and can't do, and what it is and isn't intended to do. It has been around for a while. It is a voluntary service. This group probably knows that very well, but the consuming side certainly doesn't know that. When we talk about grades being voluntary, people ask, "Is it not required?" No, it isn't. It is a voluntary service, and those of you in the business know that we charge a user fee to run it. It is an evolving program.

Some say it isn't an evolving program because it hasn't changed since 1920. But it *has* changed. Some of those changes have involved a major struggle, but it has changed. One thing to remember is we are now operating under the Agricultural Marketing Act of 1946. That is our enabling legislation and sets parameters for what we can and can't do. The Secretary of Agriculture, through his personnel, can do certain things. The Act requires us to facilitate marketing. It also obligates us to provide the service as long as somebody wants it. Those are two key issues, and they play into the whole evolution of this system. We can move as fast or as slow as the industry is willing to move as long as we can defend a position that we are in fact facilitating marketing.

We actually grade 96 percent of the federally inspected steer and heifer slaughter in the U.S. Some 35 percent are sold on a dressed carcass basis, and in all fairness, there are a variety of terms under which those carcasses are marketed. I would be exaggerating considerably if I said they were directly related to the actual true value at the consumer level. But it is a start, and it is an area that does attempt to make a move toward value-based pricing. We think the grading system is a reliably accurate predictor, unbiased, and commercially viable. Our cost is less than 1/10 of a cent per pound on the carcasses we grade. It certainly fits into the efficiency needs in the industry.

What if a new beef quality grading system was developed? If it was more accurate than our grades, continued to be unbiased in application, and was commercially viable, could we change the grade system? Absolutely. But, there are some barriers. The first thing we have to do is decide what we are going to consider and who the customer is of the grading service. Depending on which of these segments I talk to, they feel like it is their system, they own it, and they ought to be able to dictate what it should be. The reality of it is, the system would still be facilitating marketing, which is what our

charge is. We don't see ourselves serving independently any one of those constituents but are in fact serving that entire marketplace.

What is the purpose of a quality grading program?

- to segregate beef supply into groups with similar attributes of palatability
- to segregate the beef supply by major determinants of value (and that comes from the consumer level)
- to provide for accurate market reports
- to provide a language for trade in this industry

If we agree that consumers are our customers, quality grades were developed to segregate beef based on expected palatability. If we determine that the consumer is the customer and that is where the value is determined, then we need to work back from there, and most consumer studies I have seen talk about palatability: tenderness, flavor, juiciness, etc. That is what is really determining the value when it comes to the quality aspect. Then our decision becomes easier. We are going to try to get the best system out there. It sounds very easy, but all segments have a say in our policy. I think this recent grade change we made on B-maturity carcasses made that very apparent. Any strong opposition to a new system will likely prevent implementation or at least delay it and/or cause significant modifications. If we then implement the system and it is not used, it is a useless system. If I came here today and said we have found the system that will identify value, and we will implement it on Monday, and the industry says they don't want any part of it, they will not use it and it is of no value. We are then doing nothing to carry out our responsibility to the marketplace because it is a system that is on the books that never gets used. Those are some of the issues we have to deal with in making a policy decision.

How does a grade change happen? It is not a great mystery. It may be complicated, but it is not a great mystery. To give you an idea of how this process takes place, we look at new research, industry practices, consumer preferences, and some of our own initiatives. If we see a need for a grade change, we will put out an advance notice to that effect and we get comments. Once we have those comments back, we will propose something, get more comments, and then do a final revision. In a time context, most of those comment periods are in the 30-90 day category. If it is a very controversial type of issue that needs to be evaluated closely, it will be in the 90-day category.

One change that has taken place is our standards are no longer in the Code of Federal Regulations (CFR). They are now, after this last change, just Department standards. Our ability to make these grade changes is going to be much more streamlined than it has been in the past. We still have all the comment periods so that we have input from the various segments of the industry. Once we get a final standard, we will publish it in the Federal Register, even though it is not a part of the CFR, to make sure it gets extensive coverage in all segments of the industry, as well as other sources including the internet. We do development work, training of our personnel, try to communicate this to all our partners, and then we do implementation.

As you can see, changes follow the formal process. Our policy is shaped by public comments, but changes often come from the industry. Virtually all of the grading standards over the years in any of the species have been generated from the industry side. So, the question may actually be, “Can the industry change?” I feel we are ready to make a change that the industry wants.

What needs to happen? You must clearly define the value of the beef industry. The value is not what we have in the cattle, but what the beef is worth to the consumer. The emphasis I’ve heard here this morning is on a need to determine that value, not necessarily what it costs to produce the product. What needs to happen for change? You identify the value. As I said earlier, 35 percent of cattle are marketed on a carcass basis, while 80 percent of the hogs are marketed that way. Even though hogs are marketed based on a fat-lean ratio, they are beginning to move on the quality dimension in pork as we heard this morning. But as you can see, there is a lot of room for the beef industry to change to get closer to the true value of the carcass and send that message back through the marketing chain to the producer.

How do we get there? Again, you need to define quality through the consumer.

Can we make any changes? We can make any change the industry is prepared to make. With that said, administrations change and all segments of this entire industry (consumer through to the producer, the entire marketing chain) have some say. They are all a part of this process. As administrations change, viewpoints change. But when all is said and done, if there is a consensus and a pulling together, I don’t believe there are any barriers, regardless of which administration you are dealing with, to a change involving a consensus developed by the industry.

## Questions and Answers

Wayne Purcell: This issue is becoming contentious within the industry. There is a perception that we need to be consumer driven, and the National Cattlemen's Beef Association has that as a working objective. To do that, you have to get an accurate and complete indication of consumers' satisfaction. Are there questions?

Question: One of the criticisms I have heard of the system you are proposing, which I personally think is great, is the cost of taking that one steak out. What is that cost, Dr. Koohmaraie?

Mohammad Koohmaraie: I have two estimates that show the cost of an automated system versus the cost of a semi-automated system. The cost is about \$4.32 per carcass.

Audience Comment: So in essence what the packing industry has to figure out is whether or not they can sell meat in these categories, those market niches, where they know what the tenderness is for an added \$4.32 per carcass.

Audience Comment: The other thing I've heard people say is, "Who is going to buy guaranteed tough meat?"

Mohammad Koohmaraie: Who is buying Standard and Select right now?

Question: Isn't it true that if you know for sure it is guaranteed tough, then there are other tenderness mechanisms you might be able to employ on that meat?

Mohammad Koohmaraie: First of all, as an industry I hope no one will pose that question. That is, we don't want to use something right now just because it is going to show us which ones are the bad ones. What do we do with our bad ones right now? If you made the decision to remove those so the consumers would not see them, you can market them differently. First of all, there are people that will buy tough meat at a discounted price. Secondly, there are a number of technologies available, one of which we have developed, which is basically based on the knowledge we have on the tenderization process. We know what causes tenderization. We have identified an enzyme system that is responsible for that tenderization process. That enzyme has an absolute dependency on calcium. If injected with calcium, it will dramatically improve tough meat.

Question: If you can identify those that are tough, and find out why, you can eliminate them the next time around. Isn't that what the industry needs to do longer term? Aren't we thinking short term and not long term?

Mohammad Koohmaraie: I'd like to say yes, but I doubt if you can ever remove all the variation. The genetic component of meat tenderness in a purebred population is 30 percent of the reason for variation in tenderness. For a crossbred population, genetics counts for 46 percent of the variation in tenderness. So that means 70 and 54 percent

respectively is through non-genetic factors. I doubt if you will ever be able to get away from that completely. You can reduce it by using the right sires, etc., but I don't think you can eliminate it.

Question: Hamburger? Is that an acceptable use for that tough meat?

Mohammad Koohmaraie: Grinding is obviously the most successful way of tenderizing meat!

Question: There is a proposal that has received a lot of attention to essentially abandon the current USDA quality grades. I would like to hear your thoughts on that more concretely.

Mohammad Koohmaraie: My job as a scientist is to provide information and to let you decide what to do with that information. These data clearly say that as you go from traces of marbling to modest marbling, the level of consistency in the final product improves. You clearly reduce the level of variation in tenderness when you go from low marbling to higher marbling scores. That is the good thing about it. The bad thing about it is if you look at carcasses with traces of marbling, only 86 percent are acceptable. We were not capturing the value for breeds with good tenderness scores in the low Choice marbling. If you want to increase the efficiency, there are breeds that excel in producing retail meat product. We know what those breeds are, but they don't marble well. At the same time, they may eat well. The current system discriminates against those, and as a whole, it reduces the efficiency of beef production.

Question: Concerning the sample you took from the carcass, why did you sample at that point in the carcass, and does it help on the rounds and chucks?

Mohammad Koohmaraie: We don't classify the entire carcass. We classify only the middle meat. There is some muscle that, regardless of where it comes from, is guaranteed tender. I have not seen and will never see tough tenderloin. It will be tender regardless of the animal it comes from. Our classification is only designed to segregate those middle meat muscles. It in no way reflects the rest of the carcass. So if you have a tough strip loin and a tender strip loin, those differences are not necessarily translated to the rest of the carcass. We are trying to increase our sample size to make sure that is accurate. We are only classifying middle meat.

Question: If I am a consumer that never buys middle meats because I can't afford them, and buy sirloin tip roast, you haven't solved my problem that sometimes it's very tough and other times quite tender.

Mohammad Koohmaraie: That's right. In fact, we are working on that right now. That is one of the cuts that varies tremendously. Hopefully, we will have some sort of solution for it. If you look at the total variation of the middle meat, it is about 4 to 5 times larger than any other muscle. The size of the variation is much smaller in other muscles.

Question: What do you think the probability is of other less invasive techniques of determining meat tenderness, such as connective tissue probe and some of the other techniques being advocated, being developed?

Mohammad Koohmaraie: Based on the relationship of the texture of the raw meat and the texture of the cooked meat, I can't see developing any technology that works at chain speed that would be a good method. For example, I have a piece of steak that is very tender once I cook it, and another steak that is very tough after I cook. If I measure the shear force of those two before I cook them, they could be identical. Therein lies the problem because the relationship between tenderness measures for the raw and cooked meat is not good at all.

Question: It sounds like it takes 25-40 years for us to breed tenderness into our meat, and some of us might not be around that long. Since we perceive tenderness to be a big problem with our market share, are there other methods we can use to improve tenderness in meat, such as different feed additives or any way that we handle cattle? Have you done any tests on that?

Mohammad Koohmaraie: No, we have not done those types of tests.

Question: How about genetic engineering? How far away are we from genetic engineering our cattle?

Mohammad Koohmaraie: We were the first research center to publish the first cattle genomic map. The second phase of the project is to identify the genetic marker that is associated with economically important traits, and obviously, one of them is tenderness. We are now in the third year of the project. That is an upcoming part of the project, and we hope to have some good information within the next 3-5 years, and you can use those genetic markers to set up management programs. Let's say I have two animals after 14 days post-mortem; one of them is sometimes very tough and one of them is very tender. Those animals start at the same point. If I could eat them right at slaughter, they would be the same. We know what causes that tenderization process. One long-term objective is to develop a system to activate that enzyme system because that enzyme system is involved in regulating the post-mortem changes. So if you shut that enzyme system down, you get a lot of lean, but at the same time, you get a toughness problem. That is why when you go too far for leanness, you get a toughness problem. Ideally, you would like that to switch. You would like to turn that around before you slaughter the animal. But those are all long-term solutions.

Comment: It seems like I have heard other scientists talk about other means of tenderization.

Mohammad Koohmaraie: High voltage electric stimulation and guaranteed aging, for example. If you can identify those products that are most likely tough, then blade tenderization or marination can work. There are ways to manage those if you can identify them and sort them out.



Paul Engler Comment: Fortunately, I have been a member of a group of cattle feeders in the U.S. who tried to attack this tenderness problem. Recognizing all the problems that have been brought up as far as timeliness, Brad Morgan from Oklahoma State University has been a technical advisor for our group and he shows one slide that captures it all. It breaks down the various sectors in the industry starting with the cow-calf operator. There, the main thing we need to do is along the genetic lines, and we haven't got time to do that as the only solution. Then, we move to the feeder sector where we know, nutritionally, there is a correlation with high-energy rations and length of time on feed as far as the tenderness of the animal. We are probably doing all we can in that area. We know that stress enters into the equation, so there are probably some things we can do to help that at the feedlot level in handling our cattle. Then, in the packing sector, there are lots of things that can be done. Stress is also a factor there. The second thing is electro-stimulation. That technology goes back to the 1970s. It has not been generally accepted. The reason they give for not using it is the safety aspect. Aging is a factor in tenderness. Calcium injections can be important. I don't know why all this is not acceptable. Mechanical tenderness is another means of tenderizing beef. Then, at the consumer level nothing is being done. We have tried to concentrate our efforts on things we can influence.

Wayne Purcell: I think there is actually some research out there on how you hang the carcass that affects tenderness. Regarding our discussion yesterday on getting some closure on some things, we have universal agreement on one point that has been made here: If you grind it up, you can chew it. That is encouraging, isn't it? The problem is, we just found out the ground product is going to be sold for \$.55 as the Big Mac within the next few weeks. That doesn't finance a robust, viable, and growing cattle industry.

Question: Is there an economic price paid by the packer for selling tough meat? I don't know that that price gets borne by the packer. I think it is borne by the industry.

Max Garrison: You can't differentiate, as a consumer of fresh beef, what is tough and what isn't. They have put it all in the market, and the people who get the tough cut may quit buying beef. The packer never pays the price for that, I don't think, except in a very indirect way.

Audience Comment: I do think that is one of the missing links from the consumer back through the system. The industry as a whole takes the rap in consumption rates and dissatisfaction with the product, but the message doesn't get carried back through the system. It may go back one level. If I buy it at Safeway, I may decide that since I got a tough steak from Safeway, I will go somewhere else to buy steak. But that is probably just the luck of the draw. That is where it stops, and it needs to go all the way back. Until it does, you aren't going to see a significant improvement. Wherever the value is added to this carcass, there should be some way for producers to capture that value.

Wayne Purcell: Several of us in the room have been worrying about the demand side of this equation for many years, and I think a lot of us would argue that you have seen the

demand for beef decline every year since 1979. Of all the things you can identify that have been reasons, I think inconsistent quality is at or near the top of that list. I believe you are absolutely right when you imply that the entire industry suffers from this. We need to keep in mind that in the final analysis, the residual claimant in the industry is the producer, and they are the ones that suffer the most because some of them are the ones who will get run out of business. We lost the equivalent of over 300,000 average-size beef cow producers from the peak in numbers in 1975 at 132 million to the low of the herd in the early 1990s just above 95 million. If you put it into that context, you will appreciate a bit more what the industry has gone through.

Chuck Lambert: If you are a high-volume, low-cost operator, being a part of a shrinking industry really doesn't bother you. There are people making good money in the sheep industry, those that are still surviving.

Wayne Purcell: The inflation-adjusted price for beef is now making a new low every year. But, frankly, if you are in the middle of this industry and can extract your margin, that doesn't impact you directly in the short run. What it impacts, ultimately, is the price paid for cattle at the bottom end, and it impacts on the producer.

Question: I received a call about two weeks ago from a retailer that has five stores. He had three problems: 1) he was getting 20 percent of what he ordered from CAB; 2) the commodity beef he was getting was not of good, consistent quality, and he received consumer complaints. The CAB was also getting some complaints because it was tough because it wasn't getting the necessary aging; and 3) he couldn't identify what was good and what was bad. So I went to the store and looked at the meat counter. When I was in high school, I was a meat cutter, so I can look at a T-bone and tell the age of the animal. I looked in the meat case and saw meat that was real attractive, but on the commodity side, there was B-maturity product everywhere. My question is "What is the discount to B-maturity to the producer, and what does the packer discount to the retailer?" I have the answer to one question. The retailer pays the same as for all other meat. It is a no-roll product. The problem is that grading is voluntary. They can utilize the best parts that advantage them, and opt out of the parts of the grading system that don't advantage them. In other words, if Choice brings a premium, then they will use that part of grading. But on the B-maturity and the others that get a discount, they do not utilize that part of the system. It seems to me that if a producer is going to take a major discount on B-maturity, for example, the consumer should also get that benefit.

Barry Carpenter: Basically, we do put a grade on about 96 percent of the carcasses, so the ungrades, no-rolls, maturity, etc., are around 4 to 4.5 percent. Where that goes and how it gets into the marketing chain is a more significant problem. A mandatory system would cause us to put Standard on those, for example. There should be more responsibility on the part of the consumer or the restaurateur in what they try to buy and try to serve. But I think until the buyer can give us the power to say that all they want is the Choice, top-Choice, and highers, or whatever the certified Angus beef is, because that is what it takes to satisfy their customers, and they're not going to pay the price for the others, then we are going to be stuck in this average price dilemma.

Question: How much will blade tenderization lower scores on average across the board?

Mohammad Koohmaraie: I can't quote by exactly how many kilograms, but it is effective across all muscles. It is a physical way of disrupting the texture. It's not a total solution, but you clearly do get improvement. But there are a significant percentage of steaks that go into retail that are mechanically tenderized. The problem is they do it regardless of whether or not it needs to be tenderized. We do not know which ones need to receive treatment and which ones don't.

Audience Comment: So a retail chain which has a policy that all beef will be blade tenderized does have the ability to put out every product which is more tender than its competitor at an added cost.

Question: Your samples were all aged 9 or 14 days on Select and Choice, but in the actual retail store experience there are customers who never see that level of eating quality. There is no aging per se; it is just whatever length of time it happens to take to get there before it goes off the shelf. What is the typical time, and has any tenderization actually occurred in the normal process? Or is the degree of toughness higher in the retail stores than what we saw on your display?

Mohammad Koohmaraie: The National Quality Audit shows that the time involved ranged from 3 days to 97 days. The average was 17 days. So it depends on the time of year. A friend of mine, a scientist at Texas Tech, was telling me the worst time of year to buy meat is around a holiday such as July 4 or Labor Day. There is so much demand, and there is lots of meat that comes directly and quickly from the packing plant. The time we have the greatest demand is the time we provide the consumer with the greatest inconsistency.

Question: Were the data you put up that showed the relationship between marbling and tenderness derived from cattle that graded in a conventional commercial situation?

Answer: Yes. Monfort Packing Plant in Grand Island.

Question: Should we work on going to the best breeds?

Mohammad Koohmaraie: I can't advocate removing a particular breed. All I can offer is the data showing the variation, and you make the decision. If I lived in a tropical part of the country, I don't think I could stay in business not having the tropically adapted breeds. You ought to be able to stay in business, and raise that breed of cattle. In the packing plant, we should be able to tell which is bad, and remove those. So, I agree with what Paul Engler said. There is not much you can do before slaughter. The only thing you can do is 2 or 3 days before slaughter control the level of stress. You can control how long the animal is transported, stressed, etc., but that is about all you can do. But there is a lot we can do with the technology after slaughter.

Question: In Canada, they are working with an instrument grading system, etc. How much inquiry from producers in the U.S. have we had for that, and to what extent have you investigated that instrumentation system?

Mohammad Koohmaraie: We have been staying up to speed with what is going on around the world in instrumentation. We have a different philosophy that some may not agree with. We don't see much merit in developing a machine that is going to measure marbling. Quite frankly, we have been evaluating marbling and dealing with concerns about inconsistency in applications of the system we have for 30 years. We don't need a machine that is going to try to replace the limitations of an existing grading system that can only do so much because it *is* based on marbling--and marbling is not enough. It is still an indirect measure. We need a totally new and direct system. So, the extent that we look into automation, machinery, equipment, or the non-human element needs to be getting to actual and direct measures of tenderness and palatability.

Audience Comment: I think you have to remember, though, that a very large component of instrument grading is to get an accurate prediction of red meat yield, not a quality grade. I think that system has a lot of merit because it reduces the variation within a yield grade category.

Mohammad Koohmaraie: There is no question that in the yield area, anything you can do to get an accurate indication back to the producer and pay for the value, similar to the pork industry, has merit. There is technology that is looking very bright in that area. I don't think it will be up to commercial viability very soon, but there is some potential. However, in the quality area, we may be chasing down the wrong road if we are just working on mechanical ways to measure marbling.



**SESSION 5**

***CASH-FUTURES CONVERGENCE AND PRICE DISCOVERY***

Rob Murphy  
Research Economist  
Chicago Mercantile Exchange

Tommy Beall  
Director, Livestock Marketing  
Continental Grains

**The 'New' Live Cattle Futures:  
Delivery Process, Basis Performance and Price Discovery**

Rob Murphy\*

## **Abstract**

This paper examines changes to the Live Cattle contract that were implemented with the June 1995 expiration. The logistics of a carcass-graded delivery are described. Inclusion of a buyer's option to have delivered cattle carcass-graded rather than live-graded was found to have a greater impact on the basis than the other major change, reduction of the quality grade requirements. Convergence to the cash value of the underlying product has improved over time. The level of the basis has shifted, becoming more negative. Standard grade cattle and those producing heavy carcasses have been the largest source of discounts to delivering sellers. The contract changes have slightly increased the within-month basis variability, however the between-month basis variability has been reduced substantially. The potential for price distortions should be lower under the new contract due to large increases the capacity of the delivery system and the larger variety of animals that are now deliverable. Additional enhancements have been proposed (and are currently awaiting CFTC approval) which will further the new contract's role as a value-based price discovery vehicle for the cattle industry.

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\* Economist, CME Commodity Research Department. Views expressed in this paper are the author's only and not necessarily those of my employer.

## ***I. Introduction***

Live Cattle futures have traded at the Chicago Mercantile Exchange (CME) since November 1964. This contract was the first where the underlying commodity was a living animal and initially there was much skepticism as to the viability of such a contract. Much of the concern was focused on the ability to successfully deliver the physical underlying at contract maturity. However, the Exchange had expended a great deal of effort in developing a “fair and workable program” for delivery (Tamarkin). On April 26, 1965 two loads of cattle were successfully delivered at the Union Stockyards in Chicago. With this, a new risk management and price discovery vehicle was established for the cattle industry.

For the next 30 years, delivery against the CME’s Live Cattle contract involved transfer of live animals from the seller to the buyer at a stockyard with USDA personnel serving as an outside evaluator to ensure that the delivered cattle met the contract specifications. Delivery points were added and deleted, specifications were altered, but the delivery mechanism remained essentially unchanged. The industry, however, changed dramatically during this time. Direct private treaty sales between feeders and packers increased and fewer cattle passed through the stockyards on their way to slaughter. Quality of the final product gained importance in the face of an increasingly discriminating meat consumer. Consolidation occurred in both the feeding and packing sectors. Exotic breeds and changing feeding practices made it more difficult to predict carcass performance from visual examination of the live animal. All of these industry developments worked together to push the stockyard delivery system toward obsolescence by the early 1990s.

In the late 1980s, the number and frequency of complaints about the stockyard delivery system increased. Most were coming from the long side of the market, which complained that CME-delivered cattle did not meet the contract specifications for quality grade when the cattle were killed. The Exchange explored several alternatives to the stockyard delivery system: feedlot delivery, cash settlement, and “backup” grading of delivered cattle. After considerable debate and industry consultation, the Exchange opted to amend the physical delivery process to allow delivery to occur at a packing plant and have the final settlement based on the actual carcass results. The June 1995 contract was the first to expire under the new carcass-grading provisions.

This paper explores the effects and implications of this important change in the delivery provisions of the Live Cattle contract. In what follows, the terminology “old contract” is used to refer to the contract rules in effect prior to June 1995 and “new contract” refers to the rules pertaining to expirations since June 1995, inclusive. A year and a half of expirations under the new contract has provided an abundance of data with which to work.

## ***II. Specifics of Carcass-Grading: How does the system work?***

Live grading of cattle deliveries at the stockyard is still the default delivery method. Carcass grading is an option that the buyer may select in lieu of live grading.

When a long (buyer) is assigned a delivery certificate tendered by the short (seller), the long must indicate to the Clearing House the mode of delivery he desires: carcass-graded or live-graded. If the buyer wants the cattle live (he may want to put the cattle back on feed or take them to a non-CME plant), he is not required to do anything other than be prepared to accept the cattle at the stockyards six business days from the date of original tender. If he desires a carcass-graded delivery, he must find a packing plant that will handle the slaughter and grading of the cattle. The CME maintains a list of packing plants that are approved to receive deliveries. All of the approved plants within 150 miles of the delivery point stockyards are eligible to receive the delivery. The long contacts one or more of these plants and asks if they can handle his CME delivery and obtains bids for the carcass beef that will result. If the long and the packer agree on a price and day for the delivery the long reports this information back to the CME Clearing House.

Next, the Clearing House informs the short that the long has requested a carcass-graded delivery at the specific plant on the date determined by the long and the packer. The short then contacts the packer to arrange the time of delivery to fit the packer’s kill schedule for that day. On delivery day, the short loads between 38,000 and 42,000 pounds of cattle onto a single truck and ships them to the packing plant. The short pays the trucking expense. At the packing plant, representatives of USDA’s Meat Grading and Certification Branch are present for the unloading. The cattle are unloaded, weighed, and given a visual examination by USDA. This visual exam is conducted to determine general compliance with contract specifications. If an animal is not a steer, is crippled or unhealthy, or possesses a significant amount of dairy or Brahman influence it will be removed from the delivery unit at this point. Once the load has passed



the visual exam, the delivered cattle are sealed as one group in a pen to await slaughter. At this point, ownership passes from the short to the long.

As the delivery cattle are moved into the slaughter line, USDA maintains identification of the animals. Inside the plant, the first and last carcasses of each delivery unit are marked as soon as the hide is removed. Near the hot scale, a CME carcass tag with a unique lot and carcass number is applied to each carcass to assure accurate identification for grading. The carcasses move to the cooler. Ownership of the carcasses now belongs to the packing plant according to the cash deal previously arranged between the packer and the long. The long's ownership of the cattle is brief; he takes possession of the live cattle from the short to fulfill his futures obligation and then turns the carcasses over to the packer to satisfy his cash market obligation. The long will be paid by the packer for the carcasses and the long will pay the short (through the Clearing House) for the cattle that were delivered.

After at least a 24-hour chill, the carcasses will be brought past USDA meat graders on the plant's normal grading line. The graders will record the quality and yield grades assigned to each carcass and check the carcass weight. Any carcasses initially grading in the top 1/3 of the Select quality grade will be held an additional 24 hours for regrading. The additional chill might increase the degree of visible marbling and make the carcass eligible for the Choice grade. Once all of the grading information for a lot is complete, USDA personnel will report the results back to the Clearing House. This information is usually complete within three business days of the slaughter date.

The Clearing House calculates the delivery invoice that indicates exactly how much the long will pay the short for the delivered cattle. The base price is the futures settlement price on the date that the certificate was tendered. To this base price, adjustments are made to reflect the quality of the actual cattle delivered. Better-than-par cattle bring prices above the settlement price and worse-than-par cattle bring a net price below the settlement price.

Seventy-four percent of Live Cattle deliveries have used the carcass-grading option since the contract was revised (Table 1).

### **III. The Current Premium and Discount Schedule**

Current Live Cattle specifications define the par delivery unit as 55% Choice, 45% Select, Yield Grade 1, 2 or 3 cattle that yield 63% and produce carcasses between 600 and 900 lbs. Prime cattle are considered equivalent to Choice in calculating the percent Choice in a load. Loads with more than 45% Select receive a discount based on the live weight equivalent of the Choice-Select boxed beef spread reported in the USDA's *National Carlot Meat Report* (the "Blue Sheet") for the day of slaughter. Loads with more than 55% Choice get a premium based on the same spread. Cattle grading below Select are discounted 25% of the settlement price.

Yield Grades 1, 2 and 3 are all considered par with no premium or discount applied. Yield Grade 4 (Y4) cattle are discounted \$20 per cwt. or 30% of the settlement price, whichever is greater. Yield Grade 5 (Y5) cattle are discounted \$30 per cwt. or 40% of the settlement price, whichever is greater.

Carcasses weighing more than 900 pounds or less than 600 pounds are discounted 20% of the settlement

**Table 1. Number of Live Cattle Deliveries by Month and Type Since June 1995.**

Delivery Period	Carcass Deliveries	Live Deliveries	Total Deliveries
June 95	82	10	92
Aug 95	333	100	433
Oct 95	57	133	190
Dec 95	408	6	414
Feb 96	118	0	118
Apr 96	189	49	238
Jun 96	222	0	222
Aug 96	347	344	691
Oct 96	88	4	92
Dec 96	4	0	4
Feb 97	37	23	60
Totals:	1885 (73.8%)	669 (26.2%)	2554

**Table 2. Average Per Load Statistics for Carcass-Graded Live Cattle Deliveries, June 1995 Through October 1996 (a load contains approximately 34 head).**

Delivery Period	% Choice	% Select	% Sub-Select	Hot Yield	# of Y4's	# of Y5's	# Over 900 lbs	# Under 600 lbs
June 95	53.7	44.0	2.3	63.7	1.89	0.18	1.57	0.02
Aug 95	42.8	48.2	9.0	63.8	0.96	0.02	1.35	0.12
Oct 95	55.6	41.5	2.9	63.5	1.23	0.04	0.49	0.35
Dec 95	38.9	51.4	9.7	63.1	0.78	0.05	1.25	0.31
Feb 96	53.7	43.0	3.3	63.5	0.91	0.02	0.77	0.44
Apr 96	43.0	50.1	6.9	63.2	0.78	0.06	1.22	0.30
Jun 96	45.3	50.8	3.9	62.6	0.91	0.03	0.65	0.13
Aug 96	45.4	48.5	6.1	63.7	0.76	0.02	2.32	0.11
Oct 96	42.9	53.8	3.3	62.7	0.66	0.01	1.08	0.18
Dec 96	a	a	a	a	a	a	a	a
Feb 97	b	b	b	b	b	b	b	b
Overall Avg.	44.3	49.1	6.6	63.3	0.89	0.04	1.35	0.21

<sup>a</sup>Insufficient deliveries

<sup>b</sup>Delivery information not complete at this time.

price.

Delivery units with an actual average hot yield greater than 63% receive a premium equal to the number of percentage points the actual hot yield exceeds 63% times the settlement price. This premium is applied to every pound delivered. Delivery units with below-par hot yield receive a discount calculated in a like manner.

A par delivery unit is allowed up to 20% liver condemnations. Liver condemnations in excess of 20% bring a discount based on the liver value reported on the Blue Sheet for the day of slaughter.

#### ***IV. Proposed Changes to the Premium and Discount Schedule***

Some delivering shorts have complained that several of the discounts contained in the contract are excessive and out-of-line with the cash market. Unfortunately, market-based premiums and discounts for many carcass attributes are not publicly reported. When the new contract was designed, the only market-based quality grade value available was the spread between Choice and Select boxed beef values. For characteristics such as sub-Select, Y4, Y5 and over- and under-weight carcasses, no market-based values were available so the discount was intentionally set at the largest value ever expected to occur. The reasoning behind this was that if these discounts were set too small, then the delivery against the futures contract would be the preferred means of disposing of these "out-cattle" in certain market conditions.

Initially, most of the attention focused on the 25% discount for sub-Select cattle. The designers of the new contract did not expect a high incidence of Standard grade cattle in CME deliveries due to the severe discount they would receive. However, it soon became apparent that significant numbers of Standard cattle were being delivered and the large discount was burdensome to the delivering shorts. Shorts complained that they were not intentionally including Standard cattle in delivery units; it was just impossible to accurately identify Standards on the hoof.

Table 2 gives a summary of the average characteristics of the cattle delivered in CME carcass- graded deliveries since the new contract's inception. This table demonstrates that, in certain delivery periods (e.g., August and December 1995), Standards (sub-Selects) were a problem in delivery units.

The ideal solution would be to set the futures premiums and discount at levels identical to those in the cash market to minimize basis distortions. Recently, USDA began surveying packers weekly on their premiums and discounts and releasing the compiled results in a new report entitled *National Carcass Premiums and Discounts for Slaughter Steers and Heifers*. With the advent of this new information source, the Exchange moved quickly to incorporate these market-based premiums and discounts into the contract. In early January 1997, three months after the first release of *Premiums and Discounts*, the CME submitted a proposal to the CFTC to accomplish this end. These changes, if approved, will base the discounts for

Standards, Y4s, Y5s, and carcasses between 900-950 pounds on values listed in the most recent issue of the report. Thus, the discounts for out-cattle will flex with market conditions and, hopefully, minimize basis distortions.

In addition to making the out-cattle discounts market-based, the proposal also seeks to add premiums (based on the same report) for cattle grading Prime as well as Yield Grade 1 and 2 cattle. Including a full range of premiums and discounts will make the contract truly a value-based risk management tool.

## ***V. Performance of the 'New' Contract***

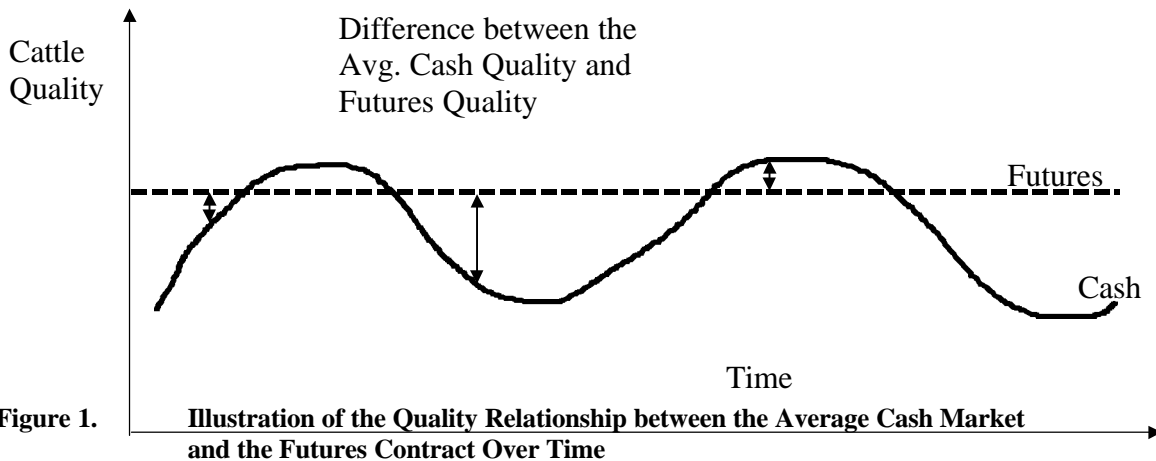
### **A. Convergence**

The recent February 1997 contract was the 11th to expire under the new carcass-grading option. Enough data has accumulated to begin to make some preliminary evaluations of the performance of the new contract.

An important performance measure for hedgers is the degree of convergence between the futures and cash prices near expiration. In order to properly evaluate convergence, it is necessary to compare the futures price to the cash price *for the identical grade of cattle*. Unfortunately, the cash market does not produce visible prices for specific grades of cattle; the only available price is the average cash market price.

Since the quality of the average cash cattle can vary widely, the difference between the average cash price and the price of the futures contract can vary significantly. This is illustrated in Figure 1 where cattle quality is plotted against time. The futures contract represents a consistent quality of cattle and thus is represented in this figure by a horizontal line. The fluctuating cash market quality is illustrated by the wavy line. At certain times, the quality difference between the average cash market and the futures specifications will be wide, resulting in a large price difference. At other times, this difference will be small. Simply comparing the average cash market price to the futures price to draw conclusions about convergence is incorrect and misleading.

One way to judge convergence is to compare the delivery period basis (difference between the average cash market price and the futures price) to the average premium or discount (average adjustment) assessed in deliveries on the contract. The average adjustment is an indicator of how much the quality of delivered cattle deviated from the par contract quality. Assuming that the delivered cattle are a representative sample of all cattle encompassed in the average market price, the futures price with the adjustment applied should be comparable quality-wise with the average cash market cattle. The futures price should also be adjusted for transportation costs incurred by the short in making delivery and the difference between actual shrink the short will incur in a delivery and the standard pencil shrink applied in cash transactions.



Typically, a short will have to transport the cattle less than 100 miles to the packing plant chosen by the long. For a trip of this distance the cost of transport will be approximately \$0.50/cwt. and the cattle could be expected to shrink about two percent. Thus, in a futures delivery, the short gains a two percent shrink advantage (common cash market pencil shrink is four percent) which translates to about \$1.30/cwt. in a \$66 cash market. Subtracting the transportation cost leaves an expected basis of \$0.80/cwt. That is, if there were no quality differences between the futures specifications and the average cash market cattle, we would expect the basis to be about +0.80.

The short, in most cases, cannot be exactly sure how the delivered cattle will grade. He faces a grading risk that is inversely related to how well he can predict the quality of his cattle. Since most people are risk averse, this grading risk would be expressed as an increase in the futures price, all other things equal. That is, the grading risk will cause the risk averse delivering short to require a higher futures price. Thus grading risk would be expected to decrease the basis. For the sake of this analysis, the grading risk borne by the short is assumed to reduce the basis by \$0.30/cwt. (the “grading risk premium”) leaving the expected basis at \$0.50.

Table 3 presents the data for the convergence analysis. The weighted average basis (WAB) is the mean difference between the average cash market price for beef steers and the futures settlement price (cash-futures). Daily basis observations are weighted by the number of head sold in the cash market on the corresponding date in this calculation. The WAB only includes days during the delivery period where a certificate could be tendered (the tender period) as these are the only days when arbitrage between the cash and futures is possible. For simplicity, the expected basis is estimated to be \$0.50 for all contract months.

The difference between the expected basis and the observed basis should be due to differences in quality between the par futures specification and the average cash market steer (the quality deviation). This difference is compared to the average delivery adjustment. The amount by which the average delivery adjustment differs from the measure of quality deviation is the quality adjusted basis. If all of the assumptions are correct, the quality adjusted basis should equal zero when perfect convergence of the futures to the true value of the cash product occurs.

As Table 3 illustrates, the quality adjusted basis shows a greater deviation from zero in the early delivery periods. Non-zero quality adjusted basis can be caused by two things: the use of incorrect assumptions or mistakes by market participants in judging the appropriate basis level. The greater deviation in the early months suggests a learning process by which market participants gradually are becoming more familiar with the new contract and are getting better at trading the futures to a level commiserate with the quality difference between the cash and futures animals. Assumption error is also possible. The grading risk “premium” was subjectively set at a fixed level (+\$0.30), but it is more realistic that this amount fluctuates.

For example, the short's grading risk is greater in times where the Choice-Select spread is wider, because a mistake in estimating cattle performance will have a greater impact on the net price from the delivery.

In all, this convergence exercise is useful because it illustrates that the new cattle contract has undergone a learning phase and is beginning to price the value of the par animal with increasing accuracy. This has important price discovery implications that will be covered in a subsequent section.

## B. Basis Stability

Predictability of the delivery period basis is directly related to the hedging usefulness of a futures contract. Futures on non-storable products, such as cattle, typically have a more erratic basis than futures on storable products where storage arbitrage can put limits on the magnitude of the basis (Kolb).

The Live Cattle contract is designed to alleviate some of the unpredictable basis behavior inherent in non-storable futures. The contract has a relatively long delivery period (normally about 12-15 business days) that runs concurrently with trading. This creates a three week period where arbitrage can be conducted between the cash and futures, thus producing stability in the basis near expiration.

**Table 3. Comparison of Average Basis, Average Delivery Discount, and Quality Adjusted Basis for June 1995 - February 1997 (in \$/cwt.).**

Contract	Weighted Average Basis (WAB)	Net Shrink Advantage, Transport Cost and Grading Risk Premium (Expected Basis)	Difference Between Expected Basis and Observed WAB	Average Delivery Adjustment	Basis After Accounting for Quality Differences (Quality Adjusted Basis)
Jun-95	0.96	0.50	0.46	-1.41	1.87
Aug-95	-0.41	0.50	-0.91	-2.29	1.38
Oct-95	-0.93	0.50	-1.43	-0.77	-0.66
Dec-95	-1.14	0.50	-1.64	-3.46	1.82
Feb-96	-0.50	0.50	-1.00	-0.82	-0.18
Apr-96	-0.56	0.50	-1.06	-1.79	0.73
Jun-96	-0.89	0.50	-1.39	-2.13	0.74
Aug-96	-1.88	0.50	-2.38	-1.86	-0.52
Oct-96	-1.40	0.50	-1.90	-2.49	0.59
Dec-96	-0.76	0.50	-1.26	a	a
Feb-97	-0.92	0.50	-1.42	b	b

<sup>a</sup>Insufficient deliveries

<sup>b</sup>Data not complete at this time.

Outside of the delivery period, there is nothing to constrain the movement of the futures price relative to the cash price. The futures price represents the market's best estimate of the cash price of cattle (identical in quality to the futures contract) on First Notice Day (the first day that a certificate can be tendered). If prices are expected to trend steeply, then the futures price will be far from the cash price outside of the tender period. Conversely, if prices are expected to stay in a narrow trading range, then there might be little difference between the cash and futures prices outside of the tender period.

Table 4 gives the weighted average basis and the standard deviation of the basis during the tender period for each expiration since June 1995. Table 5 gives the same information for expirations prior to June 1995. Several observations can be made with regard to the basis under the old contract versus the new contract. First, the basis has become more negative. The average level of the basis under the old contract was -\$0.37. Under the new contract the average level of the basis has been \$-0.77. However, in the first new contract expiration (June 1995) the basis was abnormally large (and positive). Excluding this outlier puts the average level of the basis under the new contract at \$-0.94.

It is interesting to investigate the cause of this downward shift in the basis. There were two major changes in the contract beginning with June 1995: 1) the par specification was reduced from 100% Choice to 55% Choice and 2) buyers were given the carcass-grading option. The reduction in the quality grade specification would be expected to raise the basis. Since the new contract represents a lower quality animal than the old contract, it should trade at a lower futures price. A lower futures price in basis calculations

**Table 4. Mean Basis and Standard Deviation of the Daily Basis During the Tender Period, June 1995 Through February 1997 Contracts.**

Delivery Period	Tender Days	Total Cash Steers Reported During Tender Period	Mean Basis	Standard Deviation of Daily Basis
Jun-95	15	320,595	0.959	0.502
Aug-95	14	232,833	-0.408	0.668
Oct-95	12	198,782	-0.930	0.705
Dec-95	14	171,398	-1.135	0.242
Feb-96	13	277,447	-0.503	0.481
Apr-96	12	181,235	-0.559	0.440
Jun-96	10	141,253	-0.886	0.477
Aug-96	15	314,291	-1.883	0.445
Oct-96	13	172,341	-1.397	1.155
Dec-96	11	135,171	-0.759	1.018
Feb-97	9	198,681	-0.919	0.523
Average:	12.545	213,093	-0.765	0.605
Standard Dev.	1.876	62,076	0.678	0.176
<b>Excluding June 1995:</b>				
Average:	12.300	202,343	<b>-0.938</b>	0.615
Standard Dev.	1.792	54,475	<b>0.423</b>	0.266

makes the basis more positive.<sup>1</sup> What occurred, however, is that the basis became more negative. This indicates that the carcass-grading option had more of an impact on the basis than did reducing the quality grade specifications. The addition of the carcass-grading option raised the futures price relative to the cash price. This is consistent with the earlier observations about the futures price needing to be higher to compensate the short when his grading risk was increased.

Within-month variability of the basis appears to have increased slightly with the new contract. The average tender period basis standard deviation was \$0.48 under the old contract and \$0.61 since June 1995. Between-month variability of the basis has been reduced considerably. The standard deviation of the average monthly basis was \$0.83 under the old contract and \$0.42 under the new contract (excluding the June 1995 outlier).

The between-month basis variability is very important to hedging success. Large variation in the level of the basis each month makes it difficult to formulate an expected forward price when placing a hedge. From the data in Table 4, the 95% confidence interval for the mean monthly basis, post-June 1995, is -\$0.64 to -\$1.18.

The excessive between-month basis variability under the old contract had two likely sources: 1) occasional difficulty in assembling deliverable loads and, 2) uncertainty associated with live-grading. In certain market conditions under the old contract it could be difficult to assemble a significant number of loads that would grade 100% Choice. This could allow occasional market distortions that would cause the futures price to diverge from the economically justified value of the underlying. This is no longer a problem with the new contract, as *any* Choice-Select mix is allowed in the delivery unit. The proposed changes make this even less of a problem by making even the out-cattle economically deliverable.

<sup>1</sup> This result may explain the June 1995 outlier. Market participants, lacking actual experience with the new contract, may have assumed that because the quality grade requirements had been relaxed, the basis should become more positive.

**Table 5. Mean Basis and Standard Deviation of the Daily Basis During the Tender Period, February 1990 through April 1995 Contracts.**

Delivery Period	Tender Days	Total Cash Steers Reported During Tender Period	Mean Basis	Standard Deviation of Daily Basis
Feb-90	16	204,640	-0.363	0.366
Apr-90	17	219,918	0.632	0.565
Jun-90	17	341,484	1.434	1.051
Aug-90	17	271,413	-0.449	0.325
Oct-90	18	240,305	-0.241	0.155
Dec-90	17	208,254	0.946	0.637
Feb-91	13	207,553	0.288	0.480
Apr-91	12	220,157	-0.036	0.233
Jun-91	10	170,495	0.107	0.482
Aug-91	15	309,599	-1.600	0.824
Oct-91	14	259,243	-2.815	0.939
Dec-91	9	114,060	-0.740	0.691
Feb-92	9	123,938	-1.042	0.244
Apr-92	13	176,946	-0.314	0.457
Jun-92	12	227,704	0.762	0.247
Aug-92	11	261,769	-0.163	0.189
Oct-92	15	258,940	-0.167	0.280
Dec-92	12	163,343	-0.098	0.639
Feb-93	9	159,578	-0.550	0.290
Apr-93	14	249,249	0.168	0.315
Jun-93	13	265,749	0.716	0.372
Aug-93	12	233,615	-0.156	0.283
Oct-93	15	281,999	-1.123	0.511
Dec-93	12	239,148	-0.643	0.590
Feb-94	10	210,440	-0.976	0.197
Apr-94	15	219,731	-0.678	0.286
Jun-94	14	248,667	-0.019	0.672
Aug-94	13	199,433	-1.546	0.649
Oct-94	11	232,782	-1.438	1.032
Dec-94	14	250,990	-0.427	0.176
Feb-95	11	201,971	-0.880	0.426
Apr-95	9	136,130	-0.557	0.690
Average:	13.09	222,164	<b>-0.374</b>	0.478
Standard Dev.	2.60	49,557	<b>0.827</b>	0.247

Accurate estimation of carcass attributes from observation of the live animal is difficult and inexact. Because of this, the buyer in a live-graded delivery assumed considerable grading risk. This risk is presumably larger than the grading risk assumed by the short in a carcass-graded delivery because the long has no prior information on the cattle. By contrast, the short is the one that selected the feeder cattle and the feeding regime that were used to produce the finished animal. It stands to reason that the short should have better information as to how the cattle should grade than a buyer who was assigned delivery from a seller he does not know. The change to carcass-grading essentially shifted the grading risk from the long to the short. Since the grading risk should be smaller for the short than the long, this change should remove uncertainty from the system. The quality risk of a delivered product is most appropriately borne by the entity that produced it.

### C. Grading Results

The per-load averages for several important attributes were given in Table 2. Results are not given for December 1996 since only 4 contracts were delivered and disclosure of this information could reveal results for an individual operation. February 1997 results were not available at the time this paper was prepared.

The grading results reveal several important facts about the cash market cattle relative to the futures contract. With respect to quality grade, the delivered cattle fall ten percentage points below the par percentage for Choice. Standards comprised more than six percent of the load on average while the futures contract does not allow any Standards at par. Delivered cattle tend to yield better than the par yield of 63 percent. Overall, the delivered loads have averaged less than one Y4 per load. Under the current contract one Y4 is allowed at par. This non-discounted Y4 will be eliminated with the proposed changes. The incidence of Y5 cattle and carcasses under 600 pounds is very low. Heavier-than-par carcasses occur much more frequently, averaging more than one per delivery unit.

Thus, it is easy to conclude that the average cash market cattle are below the par specification. It is not surprising, therefore, that the futures contract trades at a higher price than the average cash market. It should be pointed out that the usefulness of the futures contract is not diminished simply because it calls for a slightly higher quality product than is produced in the cash market, on average. This simply shifts the level of the basis but does not affect its variability. It is the basis variability that is directly related to the contract's usefulness in managing price risk. Indeed, it would be a frustrating exercise to attempt to exactly match the contract specifications to the average cash market. Instead, it is better to get reasonably close and then let the market adjust the futures price to the appropriate level.

#### **D. Commercial Long Participation**

Groups representing cattle producers have, for some time, sought ways to get more participation in the Live Cattle contract by long hedgers. This revolves around the idea that long commercial hedgers have a greater incentive to stay long in the futures market during price declines than long speculators. Thus, in theory, one would expect futures prices to be higher and less volatile in markets with more long commercial participation.

Exchanges also desire a large number of commercial participants on both sides of the market. Commercials, because they have a cash position, have more incentive to use a particular market than do speculators. A speculator has many different markets available for his investment dollar. In non-trending climates, speculators will be quicker to defect to other opportunities than will commercial participants.

One driving force behind the contract changes implemented in June 1995 was a desire to bring more long commercial participation to the market. In the past, long commercials were reluctant to hold positions in the spot month because the quality risk involved in taking a live-graded delivery was large. The carcass-grading option was designed to solve this problem.

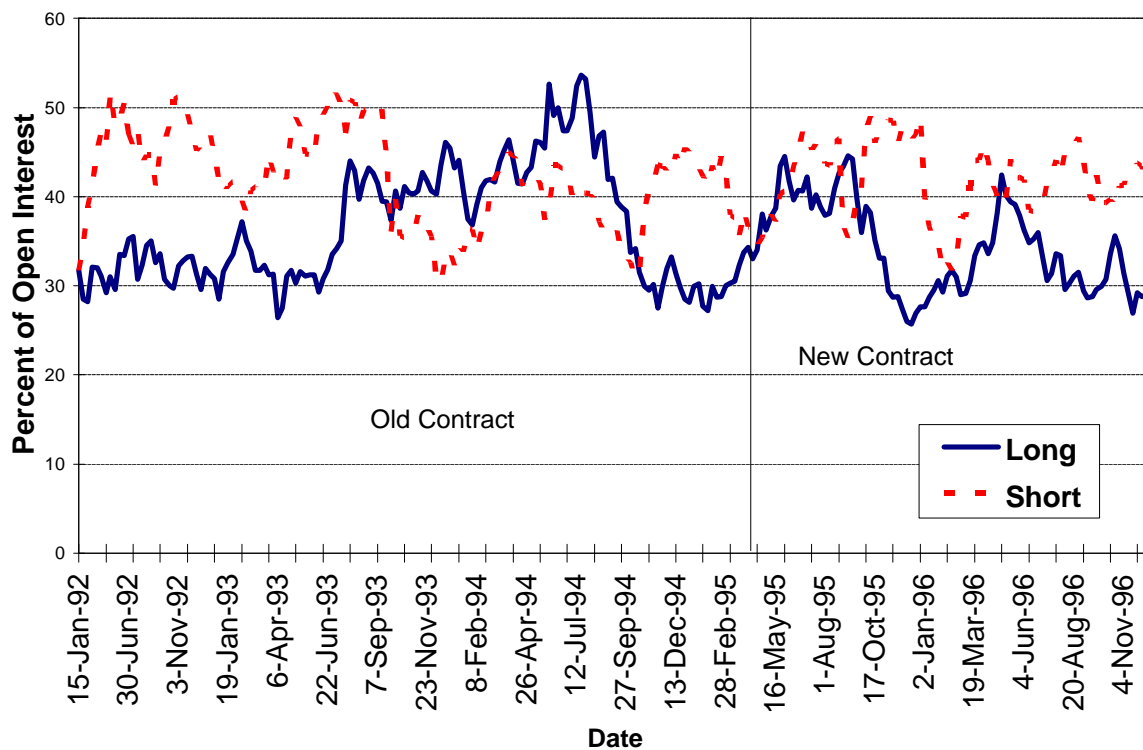
Figure 2 plots the percent of open interest held by large commercial longs and large commercial shorts in Live Cattle futures from 1992 through 1996. These data are derived from daily reports required by the CFTC for traders holding more than 100 contracts after a trading session. Generally, commercials have shown a greater tendency to be short in this market. A vertical line indicates where the June 1995 contract became the spot month. There appears to be little difference in the pattern of commercial participation before and after the new contract was introduced. To date, the change to carcass-grading probably has done more to strengthen the willingness of the existing commercials (and speculators) to hold long positions than to increase their numbers.

### **VI. Price Discovery Implications**

#### **A. Pricing Performance**

Prices are formed in the Live Cattle futures market in a highly visible and competitive way. The futures market has traditionally served as an important information source since most of the cash trade is conducted by private negotiation. It is safe to assume that nearly all cattle feeding operations of any size have computer screens capable of displaying futures quotes. The daily opening of the Live Cattle futures market is closely watched as an indicator of how the cash market will trade during the day.





**Figure 2. Commercial Large Trader Positions as a Percent of Open Interest in Live Cattle, 1992-1996.**

Studies have found that new information is often first registered in the futures market (Koontz, *et. al.*; Hudson and Purcell; Oellermann, *et. al.*). With low transactions costs and easy access, the futures market is the natural venue for those who seek to profit from proprietary information. The futures market attracts and condenses information into prices that are then observed by cash market participants.

Given the futures market’s significance in price discovery for live cattle, it is important to determine how the recent changes in the contract will affect its pricing performance. By moving to a system where almost any type of beef steer is deliverable, the potential for a buy-side distortion of the market has been virtually eliminated. However, the current contract contains some discounts that are larger than the corresponding discount in the cash market. These cattle are not economically deliverable and, in theory, the short should be reluctant to deliver these types of cattle. This problem has been addressed with the move to market-based premiums and discounts currently awaiting CFTC approval. Regardless, these out-cattle are but a small percentage of the overall cattle population. The change from requiring a 100% Choice load to allowing any Choice-Select mix at a market-based differential is enough to make buy-side distortions unlikely.

The change to carcass grading has made distortions arising from the sell-side equally unlikely. This change has made longs much less likely to fear being assigned a delivery. The long knows that he will pay the short, and the packer will pay him, based on the same set of information: the actual grade and yield results of the carcasses. The addition of packing plant delivery has also greatly expanded the capacity of the system to process deliveries. Twenty-two packing plants are currently approved to process deliveries and most have chain speeds sufficient to process seven or eight contracts of cattle per hour. The CME’s analysis (in its recent CFTC submission) suggests that, conservatively, the changes instituted in June 1995 have increased the capacity of the delivery system nearly four-fold. Thus, from the perspective of the mechanics of making and taking delivery, the new contract should eliminate any possibility of congestion in the delivery process that could distort prices.

The change that has had the most important influence on the pricing performance of the contract is the reduction of grading uncertainty brought about by carcass-grading. In the past, uncertainty associated with live-grading made the cattle contract “fuzzy” with respect to its specifications. With the new contract, a commercial can take a long position and be relatively sure that, if he stands for delivery, he will get cattle that grade in accordance with the specifications or have a fair market adjustment applied. The move to

greater use of market-based premiums and discounts will further enhance the contract's ability to reflect the true value of the product described in the specifications.

In the tender period near a contract's expiration, the futures market is discovering the value of cash cattle since, by tendering, a short can "sell" cash cattle at the futures price. Outside of the tender period, the futures price is the market's best estimate of the value of cash cattle on First Notice Day. Contained in the proposed changes recently submitted to the CFTC is a request to move the last trading day to the end of the month. This will add five tender days to each contract. By extending the tender period (and reducing the non-tender period), this change should be positive for price discovery in the cash cattle market.

It is also important to consider how changes to the contract will affect commercial participation. Purcell has argued that commercial participants have better fundamental supply/demand information about the cash commodity and that efforts should be undertaken to increase their participation in the futures market. It is fairly straightforward to assume that allowing carcass-graded delivery should increase the willingness of commercial longs to participate in the market.

On the short side, carcass-grading has taken away any advantage that delivering shorts had in being able to deliver sub-par cattle on the contract. Also, a large portion of cash cattle are sold "on the average" and not on a value-based system. Producers who sell cattle this way may find the basis more difficult to predict than under the old contract where the "fuzziness" in the grading caused the contract to be more representative of the average quality production than the quality defined by the specifications. Basis variability for producers who sell on averages will be directly related to the quality of the average cash market cattle. In times when the average cash market quality varies little, the basis for these cash transactions will be stable. However, the basis stability comparison between the old and new contracts that was presented earlier in this paper used average cash prices and found significantly less between-month variation under the new contract. Further, this was during a period of extremes in cash cattle quality caused by unusually high feed grain prices. This implies that even average price sellers should experience less basis variability under the new contract, once they recognize that the level of the basis has shifted. Thus, it appears as though the new contract should encourage greater use of the futures by both long and short commercials. If these participants do have an information advantage, as Purcell has suggested, then this should result in improved price discovery under the new contract.

## **B. Value-Based Pricing**

The fact that the new contract represents a move to value-based pricing is significant to its usefulness as a price discovery vehicle. Economists and leaders in the cattle industry have frequently noted the need for the cash cattle pricing system to reflect the differences in value between individual animals (Cattle Buyer's Weekly). Failure to reward good quality and punish poor quality sets up a situation where the consumer's wants are not transmitted down the marketing chain. Failure to communicate these desires down to the seedstock producer is one reason beef has lost market share to competing meats over the last decade (Smith).

Because the futures contract is based on a narrowly defined par specification and contains market-based premiums and discounts for deviations from par, it is unquestionably value-based. However, this has only just recently become possible with the advent of the *Premiums and Discounts* report. Much work can still be done in this area. For example, it is widely recognized that the small premiums paid by packers for Yield Grade 1 and 2 cattle are far below what is justified by the increased cutability of these types of cattle (Dolezal). The industry needs to begin negotiating these premiums to bring them in-line with the true value differences represented by different grades. When this occurs, more appropriate values will be reflected in *Premiums and Discounts* and thus in the futures contract without any need for rule changes and regulatory approval. Basing the Live Cattle contract's premiums and discounts on cash market-reported information gives it the structure necessary to accommodate the more accurate value pricing that is expected to occur in the years ahead (CattleFax). The industry can stop focusing on whether the futures contract should contain a discount of x or y percent, and instead concentrate on negotiating appropriate cash market premiums and discounts. The CME and the industry should work with the USDA to make sure that any improvements in cash market value-based pricing are reflected in the *Premiums and Discounts* report.

The high visibility of the Live Cattle contract creates the potential to bring value-based pricing to a wide audience. If the proposed changes are adopted, it will be possible to calculate a daily value grid reflecting the actual prices that will be paid for all combinations of quality and yield grades in a CME Live Cattle delivery. Table 6 is an example of such a grid that was calculated during the February 1997 delivery period.

The base price for this grid is the daily nearby futures settlement. The Choice-Select differential comes from the current day's Blue Sheet, and the current issue of *Premiums and Discounts* supplies the remaining differentials. During a delivery period, the prices in this grid are real; if a short tenders a certificate on that day he will be paid according to the grid.<sup>2</sup> Shorts contemplating delivery can use this grid in making delivery decisions. This brings to light another benefit inherent in the new contract: it encourages producers to think about the quality of the animals they produce.

Since the cash market currently discovers prices only for the average cash market animal, the new futures contract, by directly pricing a specific quality animal and facilitating the pricing of many other qualities via the grid, should greatly enhance price discovery for fed cattle. Unfortunately, some have recently suggested that the futures contract would better serve the industry if it were to switch to an average pricing scheme (Continental Grain). It would be a mistake to forgo a successful value-based price discovery vehicle in order to create a futures market that relies on average pricing, a system that is widely criticized as being detrimental to the long-run health of the entire industry.

**Table 6. A Delivery Value Grid Generated from Futures Prices and USDA Reports for February 19, 1997 (in \$/cwt).**

	Prime	Choice	Select	Standard
Y1	72.37	68.77	66.78	51.63
Y2	71.85	68.26	66.27	51.11
Y3	71.29	67.70	65.71	50.55
Y4	64.09	60.49	58.50	43.35
Y5	60.67	57.07	55.08	39.93

## VII. Summary

This paper described the new delivery procedure for the Live Cattle contract that was implemented with the June 1995 expiration. Two major changes were made: the quality grade specification was reduced from 100% Choice to 55% Choice and the buyer was given the option of having the delivered cattle carcass-graded rather than live-graded. The carcass-grading option was found to have had more impact on prices than did the relaxation of the quality grade specification.

In the first 11 expirations under the new contract rules, the average quality of the delivered cattle has been below the contract's par specification. This is largely responsible for the contract trading at a consistent premium to the cash market. Evidence was presented that suggested that, initially, the new contract did not converge precisely to the value of the underlying. Convergence has improved in recent expirations suggesting the market experienced a learning period and now is trading at levels close to the value of the cash commodity in the delivery period.

The basis has undoubtedly become more negative since the new contract was adopted. Within-month variability in the basis has increased slightly with the new contract, but between-month basis variability has been cut almost in half. There has been no significant change in the percentage of large long positions held by commercial entities under the new contract.

The CME is currently seeking CFTC approval to alter the contract to allow for a wider range of market-based premiums and discounts for non-par cattle. With these changes, the contract will have the characteristics of a value-based price discovery vehicle. This, along with the improved value assessment afforded by carcass grading, will enable the Live Cattle futures contract to perform badly needed price discovery and pricing-to-value functions for the cattle industry. With the design and offering of this new contract, the CME clearly believes that the future of the beef industry lies in increased usage of value-based marketing. As the industry makes this move, the futures contract will be correctly structured to perform its risk management and price discovery functions efficiently and effectively.

<sup>2</sup> Assuming that the cattle produce carcasses within the par weight range and yield 63 percent.

## References

- Cattle Buyer's Weekly*. S. Kay, ed. October 7, 1996.
- CattleFax, *The Future of Price Discovery in the U.S. Beef Industry*. 1996.
- Continental Grain Co. "Cash Settlement of the Chicago Merchantile [sic] Exchange Live Cattle Futures Contract" proposal distributed to the cattle industry, November 1996.
- Dolezal, G. H. "Grid Pricing — The Known and Unknown." Texas Cattle Feeders Assn. special publication, 1996.
- Hudson, M.A. and W.D. Purcell. "Price Discovery Processes in the Cattle Complex: An Investigation of Cash-Futures Price Interaction." Virginia Ag. Exp. Stn. Bull 85-12, Fall, 1985.
- Kolb, R.W. *Understanding Futures Markets* New York: Simon and Schuster, 1991.
- Koontz, S.R., M.A. Hudson and P. Garcia. "Dominant-Satellite Relationships Between Futures and Selected Cash Prices for Live Cattle." NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. Chicago, IL, April 22, 1987, pp. 331-345.
- Oellermann, C.E., B.W. Brorsen and P.L. Farris. "Price Discovery for Feeder Cattle." *Journal of Futures Markets*, 9(1989):113-121.
- Purcell, W.D. "IRS Policy on Hedging vs. Speculation: Possible Implications to Market Efficiency and Price Discovery in Cattle Markets." in *Pricing and Coordination in Consolidated Livestock Markets* W.D. Purcell, ed., Research Institute on Livestock Pricing, Blacksburg, VA, 1991.
- Smith, R. "Corners of Beef Industry Starting to Respond to the Competitive Rules of the Marketplace." *Feedstuffs*, vol 69, no. 4, January 27, 1997, p.1.
- Tamarkin, B. *The Merc: The Emergence of a Global Financial Powerhouse*. New York: Harper Collins, 1993.

## Experiences of the Cattle Feeding Sector

Tommy Beall

I will present a somewhat different perspective than Rob Murphy has presented. He went into some detail to show that the new contract for the last year and half has worked pretty well, but I think it should be recognized that most of the major users of live cattle futures contracts have had some serious problems trying to use the contract. I believe that is partly the reason we have seen the CME offer the changes to the contract they now have before the Commodity Futures Trading Commission (CFTC). If people were satisfied, if they were using the contracts more, and if it worked for us as a hedging device as it was intended, then I don't think anyone would be asking for changes to begin with nor would there be any reason for the CME to propose new changes. In fact, a year ago, we met with a large group of users and, at that time, pretty well identified some of the problems created in the contract we switched to in June 1995. The delivery process didn't work and some of the premium and discount schedules didn't fit what we were producing and selling. Now, a year later, we have some proposals from the CME on the books. The contract has not worked real well for us as users. But we are absolutely guaranteed to have this current contract for 12 more months or at least one more year, irrespective of future changes that might be made. That is because changes can be made only on the next futures contract to be put up and traded--and we are already trading June 1998.

Our use of the contract is for risk management. At these meetings, we talk about everything from quality to value to price determination, but the primary use of the futures contract is risk management. When we buy and sell cattle on the market, price discovery and value are determined by supply and demand, but the use of the futures market is essentially for risk management. Clearly, there is a lot of risk in the business to try to manage. The past two or three years have shown us that.

I believe it is appropriate to say what our business objectives are. We are cattle feeders, not traders or speculators. We are in business to feed cattle. First of all, our objective is to be a low-cost producer. We have found that if we can manage our costs and produce a product that is a competitive cost product and, first and foremost, manage that part of our business more successfully over time, then maybe we can concentrate on the product value. Another objective is to develop our people. A third is to grow as a business over time. One of the most important objectives, obviously, is to manage our risk. If we can't do that, then we probably aren't going to accomplish the other three objectives in the long run.

This doesn't fit exactly into the futures market topic, but I think it does help to put some of the industry climate into perspective. Perhaps it applies more to the value aspect of our business than the futures market, but when we start talking about determining value, sending messages back down through the system, and revolutionizing our product, I think we need to look realistically at the climate we are dealing with. Consider that there are 900,000 cow-calf operations, about 34 million beef cows, and an average size beef cow herd of 38 head. If you take the total steer and heifer slaughter (about 28-29 million head) that is an average of 32 head per cow herd. That is a little bit inflated because the cattle coming from the dairy industry (probably 2 million cattle) are included in that as well as imports from Mexico (approximately 1 million). If you subtract those, we are down to under 30 head of slaughter cattle per cow herd. A number of beef cow operations are over 500 head. If you kill all of a 500-head cow-calf operation, a year's production at one packing plant, that is not an hour's kill at one plant for one day of sexed cattle. Beef cows in herds over 500 head are only about 15 percent of the herd. Also, we should recognize the cows that were bred to produce the cattle we are killing today were bred 2-3 years ago. Given the culling that has gone on in the past 2 years, about 30 percent of those cows are already dead and gone.

As a feeding industry with about 40,000 feedlots in the 13 major states, we have an average pen size of 200 head. It is pretty simple to see the math in that. You have average numbers of steers and heifers coming out of cow herds of about 28 head if they happen to sell all their production at one time. That means that in every one of our pens, on the average, there are about 7 ranches involved. So, the process of identification of value and sending these messages back to revolutionize the genetics we are producing isn't going to be an easy task. I'm not saying it won't be accomplished, but I'm not sure it will be accomplished in my lifetime. We are looking at a long-term process to change the genetics that will affect the bottom line of our product.

The basic purpose of the futures market is to provide a trading vehicle to hedge price risk. That is the primary use of the futures market. I don't know of any commodity futures market which, if it doesn't do that, has very much use in the business. As users, there are only three things that we ask of a contract: 1)

adequate volume to do business; 2) we expect it to reflect the majority of the product we are trying to hedge with it; and 3) we would expect a predictable, consistent basis. If it doesn't do those things, obviously it is not going to be used very much by the commercial hedgers and users of that contract.

The contract we have now is pretty well understood by most of the major users. There are a number of problems with it. There are a number of reasons it doesn't work, and there are reasons we went to the CME a year ago and suggested very strongly that we have some problems.

One is the delivery process. Part of the problem I have with the delivery process is that I don't know of any single thing that does more to run the business off and away from futures than just the delivery process itself. In the spot month, I don't know a lot of speculative longs, whether meat traders, pure speculators, funds, etc., who will stand firm in the front month with the risk to take delivery of cattle. They get out because they don't want to receive cattle at Amarillo, Texas, more so than whether the cattle fit their specs, etc. We have delivered a lot of cattle over the last year and a half, and over the last number of years in total, and I can tell you the delivery process isn't a very fun deal on our side either. It is not the way we want to sell cattle and it's terribly inefficient. If you take all those deliveries Rob pointed out, it only amounts to about 6,000 cattle every 2 months. That is pretty insignificant.

One of the most glaring problems we have with the current contract is that the CME has set contract specs for above average cattle. Anytime you do that, several things result. One is you have a smaller economic deliverable supply. Convergence won't happen either, of course, because you don't have the cattle that fit those specs that were set above industry average. What goes along with that is that we have discounts specified in the delivery process (carcass basis) that are above actual market values (of the discounts). Discounts in the current contract, in premium and discount schedules, primarily discount schedules, are substantially bigger than what we experience in the normal market and bigger than virtually any way cattle are sold, whether on a value grid, sold in the beef, or however they are sold. The futures contract discounts are well above the normal industry discounts that we experience in the market. They also don't have the normal allowances, which is typically the plant averages and all the things that go along with that. So, you have contract specs that are above average cattle and discounts that are bigger than anything we experience in our normal cash market.

We have talked a lot the last two days about the variability in our product. That is obviously a problem, and it will always be there. It is in the packing plant, and in every cow herd in the country (even those 28-head cow herds), you get variability. It is within every pen of cattle we feed. You also have regional, seasonal, and weather variability in every market. To try to find a contract that matches that variability is obviously not going to be very easy to do.

One of the greatest problems we have and one of the main barriers to accomplishing what we have talked about the last two days (and it applies to the futures contract as well) is identification of value. We have heard people talking about the difficulty of quantifying value of a carcass with the hide off. You look at the carcass and try to measure it. It is a much tougher task when you look at the live animal and try to pick out of a pen of cattle which one is the sub-Select, which one is a dark cutter, which one has a carcass weight of 900 lbs. instead of 890, etc. All those things determine value. Then we are asking ourselves to go back and identify those same things in a 700-lb. steer we bought 4 months ago, then to send a message back down to the producer of the 700-lb. Steer, and then do that with a 500-lb. calf. Before we ever change some of the things we are talking about, we first have to identify where the value is. We are learning how to do it reasonably well at the carcass level, but to move backwards down the chain toward the cow-calf producer will be very difficult. Maybe some day we will be able to, but the trouble today and in the foreseeable future is identifying value in cattle. If we haven't identified what value is and then try to send some kind of message back, it is not an easy task. We have the same problem in delivering cattle. If you have a pen of cattle that is 35 percent Choice, that pen of cattle is not deliverable, obviously, but that 35 percent of the pen is 100 percent Choice. The trouble is trying to pick out which cattle make up that 35 percent. The task is not as easy as we try to make it.

Part of the problem is that value is a very complex subject. It is not a simple price grid; it is a number of grids. Each head of cattle falls somewhere on a grid, and there is a series of grids, whether it is a heifer that happens to be a heavy weight that is also a yield grade 4, or whatever. All those have value. The industry produces a few of those. There are a lot of yield grade 3s, low Choice, and high Select. But value is a very complex subject. A lot of the industry has tried to simplify that, and in some cases maybe oversimplified it, thinking that grade is value. There are a lot of other complex issues other than grade. A few years ago, we were saying that getting rid of the fat was where the value was. We found that

economically speaking that wasn't all true. In reality, value is very complex. Trying to quantify that in a futures contract is more complex.

Given those problems, this is basically what the result has been. We have a limited economic deliverable supply because we have set the contract specs above our average cattle and higher than industry averages. All of that has limited the economic deliverable supply of cattle. We have a premium futures contract that, with nearly record large deliveries in the last year and half, has not accomplished convergence. We have basis variability that, as a user, has been very difficult to deal with.

Three years ago we had a contract that didn't work very well either. We had a contract then in which more of the risk was on the long. They didn't know what they were going to get, we couldn't produce what the contract specs were, and the live delivery system didn't work very well. Now we have a contract going to carcass deliveries and given where we have set the specs, we have shifted all that risk to the short. The long has become an arbitrageur. He sells cattle to a packer, puts them on a typical standard industry formula, and he has arbitrage with not much risk involved. The person who takes a risk in that position has essentially become the short. There are very few people and players who can realistically contribute to the delivery process. There are probably 3-6 feedlots of significant size and interest to really try to force convergence on the short side. We have not had much success doing that. There are not very many of us. And realistically, there are not very many longs willing to take the other side of it, willing to stand in and take the 100-300 loads of cattle they will get, make an arrangement with the packer to sell them, and somehow force convergence, which is kind of the reason for that whole thing. While we have a big futures market with quite a few players, there are very few people who can actually have a significant impact on the delivery process itself. I'm not sure what the data have shown; it was not real conclusive. There has been a big change, but I know in our case and for other users like us, we have used the contract less partly because of lack of convergence and increased basis risk. We basically use the contract to manage risk. If there is more basis risk than there is price risk, we don't use it. We have significantly cut our use of the futures market during the last year and a half.

This is not hard data, but on this graph, we have numbers of cattle on the vertical axis and value (if there was some way to quantify that) on the horizontal axis. Basically, the cattle would be distributed around an average. The average value of cattle with the average price would basically be reflecting where the biggest volume is. Whether that is the average price we sell cattle for, or whether our cattle are representative of a plant average, or an industry average, that basically is the way the market works today. When we have a futures contract where the specs are set higher than where our average value is, we have contract specs out in the "tail" of the distribution and average cattle in the middle. To see where the deliverable cattle are, essentially it is these cattle out here in the tail of the distribution that is the deliverable supply (the cattle you can deliver at par). Anything under that are going to be discounted back to the average market. Essentially, all the cattle from the average market to lower quality cattle are not deliverable. Or you would be pretty stupid to deliver because they would bring less than you can sell them for in the cash market. The difference between those is essentially the basis we have ended up with. We can deliver the cattle from now on, and because of the structure of the average market and where the futures market specs are set, delivery is not going to force convergence.

That is also true within a packing plant for average cattle in the industry. One of the things we did was take a plant-average set of cattle and hypothetically deliver it. If you are on a formula, your base price is either the average cash market or it's a plant average. We took that average and hypothetically delivered it to see if our industry is being represented in the delivery specs and to see what the results would be. The result was pretty consistent. The average discount of that plant average set of cattle was between \$30 and \$40 per head. I don't know if that was representative of the industry in total. Packing plants in Kansas and Texas were used, which may not be representative of all packers or all areas, but that was the result of delivering the plant average type of cattle under the existing live cattle futures contract specs . . . a \$30 to \$40 per-head discount.

We took the Texas cash price and dealt with that basis. I show here each futures contract up to expiration, and during the time that it was the spot month. Generally, it has followed some of the trends in the cash market and also points out some of the price risk we have to survive the last couple of years. What it doesn't entirely show is some of the bigger distortions in basis. We broke that down to just the difference between cash price we have had on a weekly basis and where the futures market has been on a weekly average. I appreciated Rob's comments that the basis has gotten better over time, that people have learned how to use it, but in our experience it has not improved substantially. As we have gone through the last several months of expirations, although we have enjoyed some increase in overall prices, we have not had a very predictable basis or good convergence. Futures have converged to about \$2.00 above our cash market

quite consistently in the last week of each expiration. But in terms of a consistent, predictable basis during the delivery period, essentially it has gone from -\$5.00 to +\$5.00. At expiration, it has been from -\$1.00 to -\$2.00.

I think it is important to talk about quantifying premiums and discounts in a delivery. This is basically taking a load of cattle and looking at the impacts of different variables that we are dealing with. If you have a 1-percent change in the dressing percent, say par is 63 percent, and we delivered cattle that yielded 64 percent, it is a \$1.00 premium. Of course, it works in reverse if you go down. If they were at 62, you would take \$1.00 less than par. If you delivered 1 yield grade 4 animal, it would affect the whole load of cattle by \$.60 per cwt. It basically reduced the value of that load of cattle by \$.60 per cwt. If you deliver 1 sub-Select, it will discount the whole load of cattle by about \$.50 per cwt. If you have one heavyweight in that load, it can reduce the whole load of cattle by about \$.40. If you could somehow increase the average grade of that load of cattle by 10 percent, this is using a \$5.00 spread between Choice and Select (a typical average), it would only increase the value of that load \$.29 per cwt.

Based on today's pricing system, quality grade is not the most important price variable we are reacting to. Let me give you two examples. In lot #1, we hypothetically delivered a load of cattle, 34 head, 53-percent Choice, close to par. We had 1 sub-Select because in plant averages, sub-Selects are about 5-10 percent of most plant averages in the country, so we included 1 in both of our lots of cattle. No other discounts are assumed. Because of that, that load of cattle would have been discounted from par about \$5.60 per head. We also delivered a load of cattle that was 20-percent higher grade, 73-percent Choice. Within that, we assumed a discount on 1 yield grade 4 above par and 1 overweight (which could be the same animal). That one animal (1 yield grade 4 or 1 heavy weight) more than offset a 20-percent higher average grade of the cattle. That discount was \$10 per head for that load. To increase our average cattle by a 20-percent grade, that would be a very big challenge in itself. Maybe you could do that in a pen of cattle, or some small feedlots could do it with all their cattle. But for Continental Grain to do that with our cattle would be almost impossible. For the industry as a total, I think it would be a big challenge.

Let's look, hypothetically, at what would be ideal for a futures contract. What would we as users look for in all the changes we could make to make an ideal contract? First of all, we would want it to converge to our average market because that is what we are hedging. We would like to have no deliveries, for both the long and the short, and no comedown or expiration limits. Expiration limits have been a problem for all of us trying to use the contract going into the delivery month. Ideally, with convergence to the average market, if we had cattle that were of higher than average value, there would be a positive basis. If they were lower than average value, there would be a negative basis. Those two things are predictable. Those are two things we can estimate and forecast. One of the key things needed by the industry is to be able to trade options through contract expiration. It destroys the use of options to have to get out of them at the end of the previous month or the first of the month before you actually get into deliveries. Since we are idealizing, we would like to see a contract that we can trade every month without having the off-month basis distortions.

Rob talked a bit about where they were heading. We have a current contract that started in June 1995, and it has had some real problems. We now have a CME proposed change that is at the CFTC awaiting their decision. There has been a lot of discussion in the cattle industry about looking at a cash settled contract which many have felt certainly has some merit. The CME proposal is not without some concerns. One is the spec limit increase. As long as we have a contract that we recognize has not worked very well, increasing the spec limits of 600 contracts (equivalent to 20,000 head of cattle) is probably not the right thing to do until we see a contract that does work.

The value grid is the biggest problem we have with the contract. We have nothing against value-based marketing or going to more of a value-based grid. We have done a lot of that ourselves and we intend to do more of it in the future. But our concern is that where cattle are not sold on a negotiated grid today, the CME grid that is currently being proposed for use as developed by the USDA is not based on actual trade. It is a Monday morning survey of seven packers. They fill out the premiums and discounts based on whatever reasons they employ. The reporting of that is purely voluntary. It is certainly questionable whether it could continue. It has been a concern of ours. We have been in situations where we would be expecting to hedge thousands of cattle not knowing if we would have the same premium-discount schedule three months from now. If three of those seven packers chose to quit doing it, we will have problems. I would guess that the first time they get investigated with regard to use of that grid, they will probably quit reporting it. I would be very concerned as a hedger whether we even have a grid long enough to settle the first contract. It is not trader volume weighted. If we ever got to the point where we were determining the value of cattle based on a negotiated publicly available grid, clearly that would be something we could



incorporate into a cash settled or delivery mechanism. There is no history of a USDA price grid. It only started in October 1996. There is no backup if it were to discontinue. We could, in fact, find ourselves being hedged in a contract with no specs if they quit reporting all of a sudden. But the grid the USDA is publishing weekly essentially starts at a zero base. That is not the way cattle are typically sold in most value-based markets, and it does not represent actual market values of cattle getting sold on grids or any other way.

Let me conclude and point out some of the things we have looked at in our interest in perhaps going to a cash settled contract and some of the benefits that could be accomplished from that. One of the biggest things is it gets the delivery system completely out of it. It takes the delivery risk out for the long and would certainly attract more interest in long business for the contract. We are not interested in selling cattle to the futures market or delivering cattle. It is not necessary. The only reason we would ever deliver cattle is to force convergence. If that can be done without deliveries, we would certainly welcome that.

Another benefit would be guaranteed convergence to cash. One of the major benefits of cash settlement is that it is guaranteed to go to cash or whatever that cash index is. The last trading day and the last tick of the futures, futures will be equal to cash, so it guarantees convergence.

A third benefit would be minimum predictable basis. It goes along with just the cash settlement theory. If there is an average cash market that is within the range of where cattle sell in the country, then clearly convergence will occur and in a predictable manner. It would be the same base price as what value formulas are based off of today. I don't know one single formula or value based formula today that is not based off of either plant averages or average cash markets in the country. The only thing we would be asking is to have a futures market that is essentially based off the same base that the cash formulas are using.

Increased spec limits would be another benefit. I think if we have a contract that was not open to distortions, where we can get through the delivery process, it would certainly be no problem to increase spec limits to whatever level they wanted. That would get rid of all the "comedown" rules, at least until the final week of expiration.

We could trade options through expiration of the futures. The only way to do that is through a cash settled contract. That is one of the clear and larger benefits of a cash settled contract. With convergence, one of the things we would expect to see is increased commercial use of the contract. And in closing, we can say that we would certainly like to see some of these changes that would be positive for the live cattle contract.

## Question and Answers

Question: Robert Murphy, one of your last slides had some interesting prices, which I assume are calculations from the National Carcass Premiums and Discounts report.

Rob Murphy: That was part of it. That was just an example. I took one day last week and, assuming that we had the proposed changes in place, calculated the price grid.

Question: Can you contrast how the National Carcass Premiums and Discounts are collected with the series of premiums and discounts we are using for the lean hog contract as we approach expiration? Then, address whether that report is a valid enough report to raise premiums and discounts. With a new contract in the current proposal, could that be the base for a cash settlement contract using the premiums and discounts?

Rob Murphy: The second part of that question was, "Could the report that you get the premiums and discounts from be a good basis for a cash settlement contract?" You still need to get the base price somewhere. That has been the big stumbling block in cash settlement. For the cattle contract, you have to have an appropriate base price index. We haven't determined a good way to do that yet. We are not opposed to cash settlement. We invented cash settlement, we use it probably more than any other exchange does, and we just don't feel this is the right market. The fed cattle market has structural characteristics that make cash settlement very difficult. NCBA has recently appointed a working group to look closer at cash settlement, and we welcome that. Maybe there will be some innovative ideas from that, and I think that is what it will take to get cash settlement in live cattle.

Question: Since the grid is a grid of intentions that has no reflection on what actually happens in the cash market, how do you avoid manipulation? Should that have been fixed in the first place before it was submitted to the CFTC?

Rob Murphy: There are several weapons we can use. Before you manipulate something, you have to have the incentive to manipulate it. Premiums and discounts usually represent approximately 3-5 percent of a typical delivery. But there is a lot of difference between incentive related to premiums or discounts and something that influences the value of the entire product or entire load, and that value is tied to the base price. So, first of all there is a reduced incentive. Secondly, if you look at these reports over time, you see that the premiums and discounts don't change. What changes is the Choice to Select spread, and everything else seems to be based on that. This is good from our point of view because if all of a sudden a packer wanted, for some reason, to manipulate this grid report, he would have to submit an outlier, which would send up a flag. I think the fact that there is not a lot of variation from week to week is going to make it very easy to monitor.

Audience Comment: If a packer decided not to report, that is another form of manipulation.

Rob Murphy: Indeed. We realize this grid is not perfect, but I disagree with Tommy Beall's comments that it could disappear. I don't think that is going to happen. I think the industry has asked for this loud and clear. My discussions with USDA suggest that there is a lot interest in this grid, and I don't think the industry will let it go away. I don't think we will wake up one morning and the packers will not report on the grid. We considered this when we wrote the rule language for submission to the CFTC. We wrote it in such a way that says the most recent version of the report will be the premiums and discounts that will be used. If they decide not to report, the premiums and discounts are still there. We are not left with a contract without premiums or discounts; they are just fixed at the last report that came out.

Question: If you go to a cash settlement, doesn't the grid become a non-issue because you no longer have delivery? Discounts on the grid are a delivery penalty. If you specify Choice yield grade 3, and go to cash settlement, what is the problem?

Rob Murphy: It depends on which mode of cash settlement you use. If you use some type of average pricing scheme where you take all the prices and average them together, you are right. The grid wouldn't apply. If you find a way to cash settle to specific quality and yield grade, then the grid probably would apply. So it is a difference in the way a cash settlement is handled. You can have cash settlement and still have value-based pricing to a specific quality and yield grade, and the industry needs value-based pricing for more effective price discovery.

Audience Comment: We sell a lot of cattle on a yield-only beef market. I think those types of sales are 40 percent of the total trade. It is very simple to convert all that back to a cash equivalent depending on what the yield or dressing percent was. If we ever get to a point in the industry where we are selling cattle on a negotiated grid, it would be quite simple. There will be base, and I guess that base is what determines what could be included in a cash settlement price. We have felt that as the industry evolves and if we had cash settlement in place, it would be very adaptive to a grid approach. The same thing applies to that base grid price that we would do today with a beef price; just convert it back to a live basis.

Question: Tommy Beall, you just said something in your presentation about a price grid that the USDA is proposing. It is the grid the USDA puts out but it's not necessarily what we proposed. It is here if you want to use it.

Tommy Beall: The reason we supported the USDA proposed grid was primarily for market information. There is not any of that market information that has been very publicly available. All of us that sell cattle on a grid or a number of grids get some of that information all the time. I think the industry is going in that direction and I think we all try to go that way. If we could get packers to bid like that in Texas, it would happen very quickly down there. The problem is not so much that the cattle feeders are not willing to sell them like that, but packers won't bid that way. We have very much supported the intent of the USDA grid. We would like to see it developed further, made more usable and certainly more meaningful, and reflect average markets more than what it does today. Our concern is the use of the grid. Two weeks after it was put out, the CME included it in a proposal to the CFTC to change the futures contract. I think this is a very delicate situation. With the blame, investigate, and sue attitude we have in our industry now, I don't think it would take very much of an investigation of the packers, and watching them try to support what they turned in, for them to quit doing it. We would like to not see them quit doing it. We very much encourage it, but whenever the use of that is in a futures market and determining premiums and discounts of the futures contract, my attitude is that with the delicate situation, we could very easily lose the grid entirely.

**SESSION 6**

***CAPTIVE SUPPLIES, PRICE REPORTING,  
AND IMPLICATIONS TO PRICE DISCOVERY***

Ted C. Schroeder  
Agricultural Economist  
Kansas State University

Paul Engler  
President  
Cactus Feeders

Wayne D. Purcell  
Agricultural Economist  
Virginia Tech

## The GIPSA Research Findings and What They Mean to Price Discovery

Ted C. Schroeder

Captive supply, as we know, takes many forms. In general, we are talking about cattle placed under some sort of control of the beef packer prior to the time they are actually being processed. The three primary forms we have identified over time are formula marketing agreements, forward contracting, and, of course, packer feeding. I think in the future with all the things happening in the industry, our definition of captive supply (if we continue to use that term) is also going to have to change. Alliances are in and of themselves a different form of non-cash transaction, and the same problems that we have with captive supply in the forms I just identified are going to be there in alliance-type relationships as well. So, this is not something that is going to go away. This issue is going to manifest itself in different ways. It is going to continue to be a significant way that we trade cattle or a way that we move cattle from feedlots ultimately to the retail outlet. The issues are here and obviously will still be of interest to most of you.

I want to tell you what captive supplies don't do, and then we can talk about the issues. Captive supplies don't cause the price changes you see on this graphic. These are fed cattle prices from 1979 through 1996 with a forecast for 1997. The other line is beef production. The kinds of major declines we see in beef prices, such as since 1993, have not been associated with captive supply. Let's not even talk about that. It is so obvious. The correlation between these production and price series is strong, and it is negative, of course. As production goes up, price goes down. Captive supply has very little to do with this. Captive supply is something else. It has to do with price discovery, with some short-term, marginal differences in prices across pens, across producers, or across dates.

With that said, here is what captive supplies, as GIPSA defines them, have done over the past 7-8 years on an annual basis--not much. They stayed fairly constant, at about 20-25 percent. Going back to the previous graph, obviously captive supplies have not been correlated with those major price moves. They may correlate with something else, but not those price moves. Packer feeding has been maintained at 3-5 percent. Nothing really exciting is occurring on an annual basis in these captive supplies over the last 10 years. It is not a new issue. We have been studying this for 10 years, and in terms of annual variability, it hasn't changed much. What *does* cause concern is when we go to week-to-week kinds of analyses and start to examine what is happening within the year. This may be where a perception of the problem starts to occur.

The data shown here are just Kansas weekly contract and formula shipments as reported by AMS during 1996 on a weekly basis. The average is about where the GIPSA data on captive supplies are, about 20-22 percent of total fed cattle movements. But during some weeks, captive supplies, in Kansas at least, reached as high as 40 percent. During some other weeks, they are as low as 10 percent. It is that variability that may raise some concern, with the concern being what that variability causes. When there is

40 percent “captive,” the market environment is different--or at least that is what we hear. That difference in the environment and the impacts are the bigger issues. I will summarize briefly what I consider to be the two empirical studies that have looked at this in the most depth on a transaction basis.

There have been other studies that examined various aspects, but I am focusing on these two studies in particular because they both use transactions data. I was involved with both of them so I know a bit about both studies. They were for different time periods, and these were periods when captive supply levels were different and the market environments were a little different. They cover different locations. The first study was actually just a Kansas study, which only dealt with a set of Kansas feedyards. The second study was a national study, the GIPSA study, which Clem Ward detailed yesterday.

I want to point out why we go to transactions data. We feel fairly strongly that transactions data are the correct data and that we need to stay with these in examining the day-to-day market impacts of changes in captive supplies. In the discussions in this conference, I keep hearing more and more that the transactions data are what is important in price discovery. Price discovery occurs in pen-to-pen transactions. So I would be real critical at the start with anything that uses aggregated data or monthly kinds of relationships to examine the impacts of captive supply. I don't think that is where the action is with captive supplies. The transactions are where it's at, and that is why we have to use those data. That is why it is fairly expensive research to undertake. Transactions-level information is very expensive to obtain and manage or even know what to obtain. The inconsistencies in collection across buyers and sellers are quite immense, as we found in the GIPSA study. But, nonetheless, if we are going to make any headway, we have to go to that level. That is the nature of the beast.

What is it that affects transaction prices? There is a myriad of things. If we want to attribute all price discovery variability to captive supplies, we all know that is not the case. Let's review what belongs in a model that is trying to explain variability in transaction prices. If we try to do a decent job of identifying the impacts of captive supplies, independent of everything else that is happening or after adjusting for everything else that is happening in that market that day, we have to have all the relevant economic factors in there. We have received criticism for some of the variables we put in these models. Some of them may have been wrong as it turns out. I will happily entertain any debates on modeling. My contention is, “Tell me what I can do better.” I welcome that.

If you are collecting transactions data over time, you have to have something to adjust for changing market conditions, i.e., changing supply and demand conditions in general. So, the two major things we have always put in these models are cattle futures and boxed beef values as price determinants or factors that affect transaction prices for fed cattle.

Then you have some pen attributes. There is a host of pen attributes that belong in a model trying to describe what is affecting transactions prices. We have talked about some of these and some may be more important than others, but both of the studies I am referring to have used predominantly all of these characteristics measured in fair detail on those individual pens of cattle. We have to account for weight, grade, sex differences, pen size, etc. If we don't do that, we are going to capture something other than the effects of captive supplies, price effects that should be attached to some other attribute, and attach them to captive supplies. So we need to have everything in that model that is relevant. There *are* cattle and pen attributes that must be covered. If all of this is not done, then the model is not correctly specified.

Thirdly, there are the market environment variables. This is where, among many others, captive supplies shows up as one of the factors. But notice there are a lot of others. Clem Ward pointed out yesterday that a variable, "feedlots selling the cattle," (i.e., where that feedlot is located) actually has a bigger impact on the net price received, than the captive supply. We have to keep in mind that we have a whole bunch of pricing factors there, and all of them in some fashion impact the discovered price. Not only do all of them impact it, but also if you remember yesterday's "fuzzy" graphs, they also affect the fuzziness around the eventual discovered price. The amount of information we know on all these attributes, how we can measure it, how we can use it, is going to be affecting the fuzziness. I would contend that this is probably the level, in terms of marketing and environment factors, where the market-level fuzziness is going to manifest itself. It is in knowledge of these variables, especially in knowledge of what are the marketings in the region, what are captive supplies, number of active bidders, etc., that influence the market environment on that day. That is probably going to affect price as much as anything, the knowledge that traders have, on either side, packer-buyers or cattle feedlots. I haven't heard much discussion here about how captive supplies affect beef packers. As a matter of fact, in the discussions we talked about when Clem Ward, Jim Mintert, Derrell Peel and I interviewed, we found that sometimes packers even say, "When there is captive supplies, I don't know what is going on very well. I don't always know if packer A or packer B is in the market. When I'm out bidding myself, I have to try to ascertain that." So the information or information needs aren't just all at the feedlot level. Packers often need information too. Both have some information voids when we trade cattle in that way.

In the model, transaction price is a function of all the variables mentioned. The whole model has to have all this information in it. Any missing relevant variable or economic factors in a regression model is a problem. We have to have all relevant information in there. Clem Ward went through the results much more deeply and much more comprehensively yesterday. But to review what he said, we need to recognize that he didn't mention our 1993 study where we found that captive supplies depressed price by \$.15-.31 per hundredweight. The impact of captive supplies was significant statistically, and economically you have to decide whether it is very important. That *is* a significant number, at least in some sense, because it could be up to \$3.00 to \$4.00 per head. That was the total price impact. In the study we did for GIPSA, those numbers need to be converted back to a liveweight basis. Yesterday Clem reported on a dressed

weight basis. These are the liveweight equivalents. A 1-percent increase in contracting reduced cash price of cattle about \$.02-.03 per hundredweight. A 1-percent increase in packer fed delivery went from an increase in price of \$.13 to reducing price by \$.19, both per hundredweight on a live basis. Finally, a 1-percent increase in marketing agreement deliveries was associated with a \$.04 to \$.26 per-hundredweight increase in live cattle price.

Keep those numbers in mind. Remember all these factors that are affecting price. Across these two studies, let me provide some insight into what is more important than these variables. Tommy Beall highlighted some of these, but let me reiterate. About a 1-percent change in dressing percent is a bigger deal than captive supplies. In one of these studies, marketing the cattle on Wednesday, Thursday, or Friday had a bigger impact on price than captive supplies did relative to marketing those same cattle on Monday of that week. Getting a few more bids, I think, may be more important because captive supplies and bidding may be related. When captive supplies are high, perhaps the bidding level and bidding activity are down. The bidding goes down in number or changes in nature. But it may change the number of bids by 3 or 4. Some say, "I don't even get 3 or 4 bids per pen." As it turns out, when we did our 1993 study, there was one feedlot manager who routinely got from 9 to 12 bids in western Kansas on pens of cattle, not 9 to 12 different bidders, but his negotiation strategy was such that he went back and forth several times with different packers. That was his strategy. It worked for him, apparently. That was in sharp contrast to another feedlot for the same study, same time period, same basic location, which sold everything on the first bid. He sold every pen in that yard, a fair-size yard, on the first bid. The guy who solicited 9 bids during that period got a higher price. He was focusing on merchandising cattle, and that's what he was good at. Obviously, he's a real cattle trader. The other guy didn't want to waste time doing that. He had a comparative advantage of running other things in the yard, not marketing cattle. For him, taking a small price hit was apparently worth it.

But remember the key message here: there are things other than captive supplies in price discovery that impact the prices. Look at the number of head. The difference between selling a 100-head pen versus a 200-head pen is a bigger deal than captive supplies. Increasing the dates between purchase and delivery is more important. Go down the list. There are a whole lot of factors that affect price, and it is difficult across the market as a whole for any individual on any day to contend to me that, "I saw price decline X cents, and I know it was because of captive supplies." I find that really hard to stomach because I have a hard enough time finding *any* impact with these complex models. I don't know how anyone can look at a day's prices and state those conclusions. How do they control for all these other factors--day of the week, feedyard location, etc.? But what I do hear and what I do listen to and think may have some merit is that those individual feedlots that are located in places where they can't attract active bidders on every day of the week, for whatever reason, may get hurt on price. Location, type of cattle they have, etc., are all important and perhaps they haven't befriended the right cattle buyers, etc. Whatever it is, those individuals are the ones who I think have the most at stake here, the ones who are losing the most, and they may be the ones who are



raising the most ire about it at the cattle feeding level. It may be those feeders who feel “pressured” into captive supplies to guarantee access to a market outlet.

I am not sure I understand yet all the concerns cropping up in other parts of the sector regarding captive supplies. Nonetheless, there are probably people affected differently. Our models look at average price on a transaction-level basis, but they don’t discern very well across feedlots. In fact, it’s more than that. The large feedlots in our studies get a lot more weighting because a feedlot that is selling 2,000 head per week is showing up with 20 observations a week (or 15, depending on lot size), and the feedlot that only sells occasionally is showing up very seldom in the dataset. So our data are weighted more toward large yards. That’s the nature of it. We haven’t done much separation by yard size as to whether that matters. A key point, though, is that there is much more than captive supplies going on around all of the feedlots.

Talking about the strengths and weaknesses of the studies would take more time than I have right now, but certainly, these studies that have been done have some strengths. The transactions data and some other things made them as good as we could have done at this point in time. We are still learning, and we learn every time we do these studies. They also have some weaknesses. We are not going to say we are done. We have not done the last study on captive supplies. We don’t know that all the time periods examined are the right ones. It is probably an ongoing thing. We always have weaknesses in economic modeling. We take results from a model that we know is not a completely accurate 100-percent depiction of day-to-day reality, but it is as close as we can get. Don’t ask it to do more than it can do. That is the nature of economic modeling, the nature of our science.

So what does this mean for price discovery? Price declines a little bit when captive supplies are high. The studies are starting to become consistent about that. Why? There are a lot of reasons. One is because captive supplies help beef packers reach capacity, help them ensure supply, so they are apparently less aggressive when they have a lot of captive supply cattle to draw from. That could decrease price some on a day-to-day basis. A point that Wayne Purcell made in a conference several years ago was that we need to remember captive supply existence may make the overall or average cattle price higher than had we not had any captive supply at all because of the reduction in daily kill level variability for packers. Variability, we know, raises packer operating costs significantly, and that is a motivating factor in the use of captive supply arrangements. Individual captive supplies might impact day-to-day transaction prices, but we can’t tell what general price levels would have been had there been no captive supply arrangements in the market at all. We can’t tell that because we don’t have that observation to look at.

Secondly, captive supplies have not increased during the last 10 years. The mix has changed, and I think the mix is important because price discovery may be changing as we move from cash contract and basis kinds of negotiations to formula agreements that are based on some plant average or some weekly average price. So that trend has some concern associated with it. We don’t know how thin a market has to be before it has

liquidity problems and cannot be effective in price discovery. But there can still be variability because of access--or lack of access--to information, not necessarily because of the thin market.

I sympathize with feedlots with few buyers. If you are in a location that is not strategic, it is not good. You will have to do something about it. We have to find some ways to group market, perhaps, and there are a lot of group marketing efforts going on. Let's encourage that. Let's help these producers who are out in remote locations that can't find opportunities. Some of them have actually said, "Heck with it, I'm going to use formula arrangements." I don't know that that is terrible. If I don't have a comparative advantage for marketing cattle, why not use a formula? I'm not sure it is that bad for the industry as a whole. If you think about it, someone who can't discover price very well and is actually not very good at it, should maybe get out of the price discovery process and move over to using a formula. Actually, it may be more efficient for the market as a whole if they let better-informed and/or better-prepared feeders do the price discovery.

The last comment is that the asymmetry of information definitely occurs here. It is pretty apparent that large packers know more about captive supplies than feedlots and less is known at the smaller feedlots about all parts of price discovery, including captive supplies. We can address this more. It has come up time and time again, and it comes from needing more symmetric information. It has shown up in the concentration task force reports and other places. I think the key for us is to figure out what the nature of the information needs to be, how much of it can be voluntary and how much of it will have to be mandatory, and how much of it needs to be detailed information about a packer's business versus market-level kinds of relationships. I don't have the answer to those, but I think those are the questions we need to address. And we don't deal with those important issues when we are preoccupied with captive supplies.

## **Captive Supplies and Price Reporting: An Industry Perspective**

Paul Engler

It might be interesting to this group for me to relay a bit of the history of the so called IBP-Cactus formula. Actually, Cactus had a packer relationship prior to the IBP arrangement, and that was Swift Independent, which had a plant within half a mile of the old Cactus yard. That arrangement was more of an alliance than what we have experienced with IBP because Swift at that time owned half and we owned half of the cattle. We were partners. It was a very successful program, profitable, and we had excellent cooperation and dialogue between the Swift people and our management. Each month, at least two or three of the Swift people would come out from Chicago for a meeting to discuss our buy, our markets, etc. When Swift got sold, that deal unfortunately went out the window. But it set the tone that there really is a possibility that packers and feeders can get together and have a good relationship. We dispelled what I call the old “screwie, screwor” relationship, so we were very comfortable with it. Of course the reason we were comfortable with it is because they trusted us and we trusted them. I think that more than any single thing has characterized our relationship with IBP.

Some of this is obviously a result of my experience in working for IBP for a period of time. I was very comfortable with them. I knew we could create the credibility and the trust necessary to carry on an alliance-type of arrangement. That can't be overemphasized. Incidentally, our arrangement with IBP goes back 10 years, it has met the test of time, and it has been good. We have been very successful in building a customer base around the fact that our customers have the availability of a formula-type arrangement. Cactus feeds roughly 50-55 percent of the cattle under its own ownership, and the balance is made up of customers in a typical custom cattle feeding arrangement. For our customers, I believe one of the main attractions in feeding with Cactus is the fact that they have access to formula-type selling. They have learned through their procurement practices, etc., to capitalize on that aspect of it.

The other part of our history that may be of significance to you is that I felt for a long time that we had to get to a value-based system. The inequities involved in live average selling were just overwhelming. I haven't changed my mind. I still believe that is true. I attempted about 10 years ago to form a group marketing arrangement through the Texas Cattle Feeders Association. We worked hard on it. There was a very dedicated group of people on that committee. We did some economic research to at least ascertain the feasibility of a cooperative type of selling arrangement, and we felt we were on pretty solid ground. We wanted to also incorporate, and our eyes were probably bigger than our stomachs, but at that particular time, there wasn't enough interest. We got ready to go with the program, then all at once, cattle started making \$100 per head. I felt our chances of success in getting participation in the program were virtually nil. Someone who wanted to kill the program wanted to put it to a vote before the association. I said, “One way to kill the concept, at least, is to put it to a vote. It will die and never be resurrected

again.” It’s like trying to sell bathing suits on the 20th of January with the wind and snow blowing. You wouldn’t sell very many bathing suits. So we tabled it.

However, I was so anxious to move to some type of value-based system for our company that I paid a visit to Dakota City and sat down with the IBP people, and we worked out the formula arrangement. I was concerned about the arrangement possibly being in violation of some of the interpretations of the law. So we went to Packers and Stockyards and told them what we intended to do, and they approved of that arrangement. They also left us with the understanding that they would continue to monitor and watch what we were doing.

This deal has lasted longer than I expected because as I said, if it is a good deal for Cactus, then more people will get on similar programs. Then, as more people get on, the less value it will be to us. Whether or not we have reached that point, I can’t tell. I can’t tell any better than the economists here at what level captive supply really has impacted the market. I do know that at the time I was at IBP, I thought 90 percent of their beef was sold on the yellow sheet. There wasn’t anything worse in the industry at that time. The 10 percent of the beef sales set the price for the other 90 percent. It was a millstone around their necks for years. The packers didn’t like the deal, and then one day they decided that was not the way to go. They started relying on USDA market reports, etc., and obviously that was a step in the right direction. But I think it is a prime example of how you can become a slave to an unnegotiated system of selling.

Two years ago in January, I called IBP and said I was concerned. I believe the formula is in the ditch. This was prior to any of the adverse publicity that has occurred since. It didn’t seem to be a big issue, but I thought it would be, particularly with the downswing in cattle prices. I said that we had better go to work and come up with another plan to get around the criticisms that the cattle on an unnegotiated basis (captive supply cattle) are a big factor in price discovery. They took issue with me. They thought everything was fine and could not perceive some of the problems that have since come up, such as public criticisms, etc. So we finally convinced them that at least we ought to put some effort into trying to design something different. He said, “What do you want, Paul.” And I said, “What I want is some type of program where I am paid on what comes out of the packing house and into the trucks instead of what arrives on a live basis coming into the packing plant.” It’s very simple. I think there is all kinds of potential for that sort of thing. It might be in terms of alliances, etc., but I think there is real potential.

Unfortunately, we have not been able to get that job done, but we are not going to stop trying. I not only think it is in our best interest, but also in the best interest of the industry that a program like that is designed and carried out.

I definitely think the WORC proposal is a very dramatic step in the wrong direction. If the industry goes that way with regulation, we are going to have extremely serious repercussions. Last summer, John Lacy, president at that time of the NCBA, called me up wanting to know whether or not I would serve on a special task force committee to attack some of the problems of the industry. He said his telephone rings

constantly with members calling him requesting him to do something to prevent them from going broke. I asked him what he thought we should do. He didn't know, but said we had to do something. So, we have met, and I agreed to serve on that committee called the Market Resource Task Force. Several people here have participated. I think the impact of what we have been able to accomplish in those committee meetings has been under-emphasized and unpublicized. It is extremely important. When we got together I thought the first thing we had to try to do was break down this adversarial relationship that is so prominent in our industry. I don't think you can ever accomplish a lot of good for your industry as long as you have that kind of relationship. A lot of people think that the customer of the feedlot is the consumer, but I have never viewed it that way. My customer is the one who writes the check, the packer. I don't see how we can get much accomplished in any kind of business where we have such an adversarial relationship with the customer.

In our Market Resource Task Force, we had packer representation, purveyor representation, and we had retailer representation. What really gives me hope that we are going to work out of this wilderness, so to speak, is that I finally saw the light at the end of the tunnel. I see that each sector in the beef industry is sincerely concerned about market share. It is the first time in my life I have seen the packer really concerned about beef's loss of market share. Now we have ground to do some things together to help us.

Which direction we decide to go in price discovery is going to continue to be a challenge. I am a strong advocate of value-based marketing. I think if there is one single thing we could do to accelerate progress and maintain market share in the meat protein market, it would be to turn the industry into some type of value-based system. If that were to occur, we would see dramatic change. In the meantime, we can accelerate to help the industry move that way. A possible alternative in price discovery is the boxed beef futures contract. I have felt strongly for several years that a boxed beef contract would certainly solve a lot of the problems we discussed this morning with the live cattle contract. If we could standardize the specs on a boxed beef contract, we would certainly bring in more participation from the standpoint of the long hedger. We would automatically get more retailers, purveyors, etc., in the market. It would give all types of arbitrage opportunities with packers and even feeders. I believe one of the best methods we have in agriculture today in terms of price discovery is in grains at the Chicago Board of Trade. I would guess that probably over 60-70 percent of the grains traded in the U.S. is traded on the basis of the Chicago Board of Trade discovered prices. It's open and visible, and you automatically have price discovery each day. If you know your basis, which isn't hard to determine, it is pretty consistent with the ups and downs. I have often thought that could conceivably be a dimension that the boxed beef contract could bring to us. You still have price discovery from the point of the exchange. I certainly wouldn't give up on that.

Group marketing would certainly help in price discovery. There is a movement afoot in the Texas Panhandle to explore group marketing concepts. Just recently, there is a proposal from an electronic marketing program there, and it has some possibilities. Obviously, any type of program like that has to have deliveries. We all seek level

playing fields. That is one of the reasons we have to have price discovery and price discovery in a good manner. But we also have to look at leverage. That is one thing about the concentration of the packers. They have the power, and the only way to fight power is with power. So some type of effort like that would probably make a good contribution to the industry.

Something was said yesterday about price discovery being a public good, and I think that has a lot of significance. I am no different from most of you. You would probably like to see the government as far away from your business as you can. But we have to remember the article in the Constitution of the United States that says Congress has the ability to pass laws to promote the general welfare of the public. If we are not able to get the right type of price reporting and have to go to mandatory price reporting, I don't think we have to be ashamed of ourselves if we are not successful in getting it on a voluntary basis. Realistically, you probably won't get it on a voluntary basis.

Obviously, the phrase "captive supply" was not the best choice of words to use. I don't feel like I'm a captive by any means. Maybe "formula-type yield" is a better term. I think the "captive" terminology creates the wrong impression for a lot of people.

## **Executive Summary of The Role of Market Information in Price Discovery and Market Structure\***

Wayne D. Purcell

Purcell documents some recent changes in terms of the state-level support for the combined federal and state market activities. States like California and Washington have dropped their contribution altogether, and he raises the question about whether or not the informational needs of producers, especially smaller producers, will be met in the future. There is a related argument that is coming to the fore that says that private firms can and will provide information and that public taxpayer dollars do not need to be spent on these types of collection and dissemination activities.

Purcell suggests that the debate needs to be broadened on at least two fronts. First, there needs to be a revitalization of the notion that public involvement in market news activities is justified because there is a public good dimension to these activities. The public receives a benefit that would not be there if it were left to the private sector. The second, and perhaps more important, reason is that the adequacy of the market information base, the effectiveness of price discovery, and the organizational structure of the marketplace are closely intertwined. He notes if there is interest in keeping the type of traditional marketplaces we have seen, marketplaces which are price driven and characterized by separate ownership at the various levels, then effective information is going to be a necessary condition to effective price discovery in that type of industry structure.

He proceeds to look at the two issues, the public good issue and the issue regarding effectiveness of price discovery, in the chapter. The public good issue is the older line of support that has been used in past years to rationalize the public involvement in market information. Purcell looks at some of the available research in this arena and points out that a number of researchers have argued that the process of reaching a market-clearing price is quicker and more effective when information is more nearly adequate. He also raises the question as to whether the typical decision maker in an industry that is being served by the private collector and disseminator of market information might get less information than from the current USDA system. He notes that the USDA, since it does not need to respond to a profit motivation or to some preset return on investment, would tend to gather information so long as the marginal value to the decision maker and to society exceeds the marginal cost of collecting and disseminating. But if a private firm is involved, there is a profit wedge that gets driven into that process, and the private firm might collect and disseminate less information. The private firm will collect so long as marginal revenue exceeds costs of collection and dissemination plus a prorated return on investment.

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\*This is a summary prepared by Wayne Purcell of Chapter 5 in *Price Discovery in Concentrated Livestock Markets*, the book that was distributed at the conference.

Turning to the second issue, Purcell argues that there is a relationship between adequacy of information about the market, price discovery, and market structure. He traces a thread of thought in the agricultural economics literature that goes back to the 1950s. A number of researchers in the decades of the 1950s, 1960s, 1970s, and 1980s had said that if the price-based, open exchange system did not improve the inter-level coordination of activity and move toward a consumer-driven status, those price-based systems would be replaced by vertical integration and other forms of vertical coordination. In the late 1990s, Purcell suggests, that is precisely what is happening. In cattle, it is the controversial captive supplies and the emerging vertical alliances that are replacing or at least changing the level of reliance on the traditional market price system. In hogs, the vertically integrated operations of some of the larger processors and the contractual production programs that parallel what has gone on for a long time in poultry seem to be documenting the tendency to move away from failed price-driven systems to achieve the needed levels of coordination. Purcell notes that other researchers have indicated that there are powerful reasons to move to non-price means of coordinating technically related stages of activity in the livestock meat production and marketing system if the traditional price system fails to achieve that coordination.

In looking ahead, Purcell notes that the controversy surrounding the collection and dissemination of information in recent years is not going to go away very readily. But if we don't make progress toward better grades, better descriptive terminology, and the reporting of price differentials that are tied to final-use value, then there is a clear incentive for the systems to change. Purcell notes that when the traditional pricing systems are not effective, it will be the lack of inter-level coordination (the wrong quality, high levels of quality variation, poor or unscheduled timing of the quantity flow into the processing plants) that will then drive the processor toward coordination by non-price means. It will be a failure of the pricing system and of price discovery that drives that change. He notes that we need to move toward a more effective price discovery process, and this means moving to a situation where all significant value-related dimensions of the product offering must be brought into the pricing process and then reported in some depth in detail. Market information is critically important to effective price discovery in that type of setting, and the price-based marketing systems are likely to disappear if information is inadequate.



## Questions and Answers

Question: If you took a map of the Panhandle of Texas and drew a circle within a 60-mile radius, you would have a very large number of cattle and four packing plants. In your graph showing 25 percent of non-cash or captive supply cattle, there seems to be a presumption in the way you described them that there is an equality in the way that divides up among the packers, and that is not in fact the case. In that particular area, in one given week, one of those packers may have over 50 percent of the cattle in a situation where he doesn't have to bid on them. It very much changes the way the other packers have to respond to the cattle that are available. When that drops, as in the last two weeks, that is a function of the "fuzziness" around those supply and demand issues in general. But when that level of captive supplies does drop, there are feedyard managers that see a white car pull up at 6:00 a.m. that has three letters on the side that say IBP, and they will tell you that the "public good" from their point of view is going to be much better that week. I would like you to respond to that.

Wayne Purcell's synopsis: Paul Engler, would your observations that this may not be making a lot of difference to price still hold if you recognize that there is a great variability across those four packers in terms of how many cattle or what percent they have in captive supply?

Paul Engler: I didn't intend to say that 25 percent represented every packer's average captive supply level on any given day or even over any given year. In fact, Mintert and Schroeder put up some data yesterday that showed that the larger packers tend to have larger percentages of captive supplies than smaller packers do.

Comment: Across the four large packers in the Texas Panhandle, that percentage on a weekly basis can change fairly drastically. Where there is not equal competition for the cattle, no need to go out and claim in the cash market the same percentage of the kill that they need, does that not have price ramifications?

Ted Schroeder: We are just talking about semantics there. It really doesn't matter in terms of the conclusions we draw from the studies because what we are doing in those studies, especially the GIPSA study, is looking specifically at each individual packer's captive supplies and how their level of captive supplies is affecting the transaction prices that particular packer is paying. So those differentials in captive supplies are incorporated into those analyses by the fact that we were examining each individual packer's captive supply levels with each price transaction we were analyzing. When you take price as a function of all those attributes, one of the attributes is precisely what you described. Certainly, we know that the captive supply amounts vary considerably, and they are very dependent upon which packer it is, even on which packer has the majority of the "money" to pay on any given day. Precisely the concern you noted is, I think, where the major concern around captive supply surfaces. At times a particular packer, maybe even two in a given region, is not actively in the cash market as strongly as he would be were he not relying on those captive cattle. That is the nature of the entire

study and exactly what we were analyzing. Whether we have adequately captured that or not is open for debate, but the study was a massive effort with a huge number of transaction prices, and it captured the impact of those variable captive supply levels at individual plants or firms.

Wayne Purcell: Ted, can you tell him how high at the extreme the weekly percentage of captive supply might have gone for a particular plant in that study?

Ted Schroeder: I believe the highest is around 60 percent. I don't remember what it was for that particular year, but I think if you use the P&S data over a six-year period, monthly average data, there are some plants that have had 50-70 percent in captive supply for some individual months.

Wayne Purcell: Ted is saying that if there is an impact there, whatever its form and its nature, the research would have picked it up. If transaction prices were low because a plant, in a particular week or month, had 60 percent of its cattle "captive," the model would pick up that impact. The analysis wasn't done with any sort of averaging. It was plant by plant, then firm by firm, and looked at individual transactions in the presence of all the varying levels of captive supplies, and there is no big impact according to the research.

Question: What was the coefficient on a 1-percent increase in captive supply?

Ted Schroeder: We have three different forms of captive supply, and during the period that GIPSA studied, a 1-percent change in any of those is a very significant change because during that time period the averages were around 5 or 6 percent for each of those 3 types of captive supplies. So a 1-percent change in total cattle, for example, in marketing agreements is actually a 25-percent change in the underlying marketing agreement amount, if you will. It is a 1-percent change in total marketings going into marketing agreements, but it is a 25-percent change in total marketing agreement cattle. The magnitude on marketing agreements was the largest negative one. It is somewhere between  $-\$.13$  and  $-\$.25$  per cwt. But be careful. We cannot extrapolate in any of our economic models out beyond what our dependent variables like captive supplies were in terms of ranges. I don't ever want to take a coefficient that I have estimated with the explanatory variable--such as marketing agreement cattle--ranging between 2 and 7 percent and extrapolate it out to 40. No economist would do that. We are not done with this issue, I would add. This analysis needs to be ongoing, and I hope we can continue to have a dialogue with the Packers and Stockyards to be able to continue to have some of the academe around the country utilize the ongoing data collection and do more analysis like this. Someone needs to. I am not contending we know the final answer; we just know what happened during this time period. I am pretty confident that we know what happened during the time periods we studied.

Wayne Purcell: Ted didn't give you much detail on the 1990 study that was mentioned earlier. Rodney Jones, who was here earlier, did that study. I helped finance it through the Research Institute on Livestock Pricing because we wanted to put someone in the

field at the feedlot level and capture transaction data across several feedlots for a six-month period and account for the quality factors, grade factors, etc., and see what impact captive supplies had on price. I think it was the first really good piece of work done, and the Kansas State folks did that. That was anywhere from about \$.15 per cwt. to \$.35 per cwt., negative for a 1-percent change in captive supplies. A small economic, but statistically significant, negative impact was found in some cases.

Question: Wayne, you suggested that private firms delivering price discovery information had a higher cost because they need to make a profit. In that, did you take into consideration that possibly government-operated functions have a lower efficiency in operation. If private firms are more efficient, that overcomes the “profit” problem.

Wayne Purcell: I didn’t say or mean to imply private sector firms would not collect as much information because their costs were higher. I implicitly assumed their cost of collecting and disseminating might be the same as the USDA, and I think that is a very difficult assumption to defend on the part of a private firm because of the massive size, scope, and possible low-cost nature of the USDA effort. I find it unlikely, but possible, that private firms could collect and disseminate more efficiently (at lower cost) than the USDA. The only reason a private firm with a profit need and a return on investment *would* still collect as much information as the USDA would be if the private firm’s cost of collecting and disseminating is in fact sufficiently lower to more than offset the profit need. Then, you get back possibly to pursuing the information down to its same declining marginal value as you get with the USDA or some public agency. That is an excellent point. If you can find a private sector firm whose costs are that much lower, after you cover the 20-25 percent needed return on investment, etc., then you can build the argument that they would collect and disseminate information at the same level as each added piece of information tends to decline in marginal value.

Question: Paul, you state that the best thing that could happen in the industry is if we would go to 100 percent value-based pricing. You have been trying to do that for a number of years and trying to organize other people. It has always broken down, so you have always had to go do something by yourself. What specific drawbacks would there be to government interference here or do we just have a general philosophical bias against government interference?

Paul Engler: I don’t know if we are trying to start a second revolutionary war or not.

Comment: If we continue losing market share, I think we need a revolution.

Paul Engler: If we start talking about supply and demand working like it should, generally speaking, it works better without government interference. I hate to see us get into a mandated situation. The other thing in our industry compared to other agricultural sectors is the fact that as a general rule we have been freer of government regulation than some of the others. I think that is one of the reasons we still, with all of our problems, are probably in better shape than some of the other sectors. Personally, I would be against that sort of thing. As badly as I would like to see the change, I value my independence.

Wayne Purcell: If we go into value-based marketing, Paul, in your opinion, at what level will it come from when we finally get there? Who will have to be the catalyst?

Paul Engler: The packer, obviously, could do more than we can because there are fewer buyers, etc. They could achieve that virtually overnight. The thing is that they need to see a reason to do it, and they do not always see it as we do.

Question: Wayne, in the example you were using, you were looking at industries that, perhaps because of ineffective pricing systems that do not price to value, started responding in non-price ways and changed into industries where basically everything is moving to contractual arrangements or close to vertical integration. Can you give me an example of an industry either in or outside agriculture where that would be the case?

Wayne Purcell: Pork. I don't think there is any question but what Smithfield's motivation to move toward primarily integrated production and also control the genetics in the contract units they buy from was prompted by the inability to control quality when they bought hogs on the open market, and a failure of the pricing mechanism to accomplish the needed level of quality control and coordination. They went around the pricing system totally, replaced it, and displaced it. I think if you pursue that case study, you find also that the profit opportunities they now know are present and know are huge at the top end when they started catering to a changing consuming public have driven the change. A particular example you can see is their (Smithfield's) ability to get into the Japanese market. They did not get into the Japanese market until they made those changes, got control of the genetics, and were able to achieve a higher level of quality control. It is of huge importance to them, and the profit incentives to coordinated actions up through the system are so large that they will not be denied, in my opinion.

Question: Is there another commodity, not meat?

Wayne Purcell: Yes, in vegetables and other food groups. Tomato production up and down the east coast has basically gone totally in the hands of a controlling firm where there is no negotiated or transaction price left for the tomatoes. It is all quality controlled, involves controlled production practices, all the way up through to the retailer for some of the same reasons. I don't think a lot of the problems we are facing are unique to meats. I think the consolidation we have talked about is widespread and the concentration has occurred in virtually every food and fiber commodity that I know of in the U.S. In many instances, it has been for pricing reasons--or because the traditional pricing systems were ineffective. We have a family farm in Virginia that spent the money to get the research done to develop a particular type of soybean with a particular oil level of a certain quality so they could export it to Japan. There was no way the pricing mechanism and its lack of differentiation for any oil quality, etc., would ever have prompted that type of investment. So they went around the price system and got it done. There are lots of case studies.

Question: I hail from the Midwest where we are very fortunate to have our share of pretty good cattle. A lot of the yards in the Midwest turn out a pretty good number of Choice cattle, maybe as much as 70 percent Choice cattle. But if I was in a western yard and I turned out on average 40 percent Choice cattle, what incentive would I have to go to a value-based system?

Ted Schroeder: Where is all the carcass pricing predominantly going on? Most of it has been going on in the northern sector, in Nebraska, where more of the cattle are Choice.

Audience Comment: If there is no economic incentive there to benefit from those pricing arrangements, alliances, etc., it is not going to happen. If I can't profit from that scenario, why would I enter into that arrangement? That may relate to the objective of what that particular enterprise is, but so far it hasn't. That tells me that the proper incentive isn't there for those people. That is because of a lot of the issues we have talked about so far surrounding pricing to value. When the signal is not there and the effective pricing systems aren't there, there is no incentive to get involved and change what you produce.

Audience Comment: Talking about the Midwest, you are insinuating that they sell on formulas. Most cattle I am aware of in the Midwest sell on a yield-only (dressing percent) beef price, that is not a formula. Grade is not an issue with that. It has been my impression that a lot of reason the cattle sell in the Midwest by yield only is because packers want to buy that way. The live cattle buying down South has served packers quite well, apparently.

Paul Engler: If you could find a very simple definition of value-based marketing, it is where the true value of the animal is determined at each point of sale. If we had value-based marketing in the Texas Panhandle, I am going to tell you, there would be a huge differential in prices paid for feeder cattle. So if that is true, then the proper economic incentives are going to be downstream where hopefully you raise the quality of your overall cow herd.

## A CALL TO ACTION: THE NEEDED AGENDA

Steve Kay, *Cattle Buyers Weekly*

I feel I am about to attempt the impossible. I have listened for a day and a half to the most distinguished group of speakers I have ever heard in a room this small, and I congratulate Wayne Purcell on putting together a remarkable program. I think it has been an exceptionally valuable forum for discussing some of the main issues that face the beef industry as we move into the 21st century. I have been writing *Cattle Buyers Weekly* for 10 years, and on a weekly basis I talk to 20 to 40 people about marketing and related issues. It sometimes takes me a day and half to sift through that material, synthesize it, and write it. So I am not quite sure whether I am going to do justice to what I have heard over the last 24 hours.

In studying the industry the last 10 years, I certainly don't underestimate just how difficult it is to move the industry from where we are now into a position of where I think we pretty much know we want to be. There are considerable differences of opinion even in this room, but my key message to you is they can be resolved, and they will be through communication. Yesterday, Clem Ward really made me sit up in my seat for a number of reasons when he was talking about concentration. Concentration is still an important issue, as is captive supply. He then made a comment during the question and answer period by saying, "Well, you know the bigger question is beef demand and loss of market share." And the hairs on the back of neck went up because that was the first time I heard loss of market share in this proceeding, and it was mentioned subsequently. I am very glad it was because, as Paul Engler so eloquently put it, I can't help feeling had we not lost market share annually since 1979, price discovery, packer concentration, and captive supply would probably not exist as issues. We would not be sitting here today. We would be out there getting on with our alliances and we would be finding out what the consumer really wants. We would be spending money on research and development of those new products that consumers want. But we are not at that point, so we are still consumed with dissecting these issues. I believe the issues emerge, in the final analysis, because of loss of market share.

If you consider that in 1995--these are Andrew Gottschalk's figures--you took the level of expenditures on beef compared to what was spent in 1985, \$8.7 billion was lost in just one year. To me it is no wonder that every sector feels pressure on margins. All the industry has done, however, is point the finger at others, notably the packer and retailer. But believe me, as Paul Engler and others have also pointed out, they are now just as concerned about that loss of market share and (as Keith DeHaan pointed out) just as concerned as everybody else is. I believe the packer now is at a point in the history of the packing industry where he is more open to change than he ever has been. As I have seen over the last 10-15 years, the reason for that is he has invested literally billions of dollars in plant and equipment. He literally has a vested interest in maintaining a viable industry from the seedstock level up, and he is very concerned about the likely decline in

supplies over the next 5-7 years. As I say, he is more concerned than ever in resolving the key issues, particularly the continuing loss of market share.

As you know, we are losing market share because of perceptions by consumers of high prices, and a perception of “high” prices means lack of perceived product value as it moves to the consumer. And as we have heard before, the other issues relating to weak demand are lack of consistency and lack of convenience that we really haven’t talked about at all but are very important issues. Steve Meyer said (and I think the pork industry has done a much better job in dealing with this issue) that the meat industry really has to develop some kind of communication within the industry and some kind of cooperative business dealing to satisfy consumers. We are all out of a job if we don’t satisfy consumers because, as we all know, they will eat chicken.

Those changes must be producer driven. I have heard for 10 years producers complaining about lack of power to the packer. I think that is baloney. Producers have all the power in the world; they are just not using it. If anybody leaves this room thinking that producers don’t have the power to make the changes, I have failed in my job in telling you what I have learned. As we have heard, Kansas producers are perhaps on the verge of entering into a marketing agreement that may deliver 1 million cattle or more to packers. As Paul Engler summarized, Texas cattle feeders are also at the point of establishing a system that could deliver 3-5 million cattle perhaps electronically, I hope electronically, for reasons I will mention. So we already have several million cattle that are in marketing agreements. We now have 35 percent of cattle being sold on a carcass basis. So we are already down the road towards value-based marketing. I sometimes think we lose sight of that. We lose sight of it because there are producers who are resisting these changes, who still want to sell cattle on a traditional basis. I believe they have a place in the industry, but it is up to them to decide whether they want to continue working in that system or whether they want to follow the path where the industry can and must go. How do we get there?

As Wayne Purcell said yesterday afternoon, the traditional price discovery system will be replaced if it doesn’t reflect value. We need to move forward and get some issues out of the way so that we can move ahead because those issues are constraining us, and I really believe that concentration and captive supply in particular are secondary issues. Communication is essential. We need to get all sectors around the table to come up with a more united industry-wide strategy and to resolve the loss of market share. As Paul pointed out, and I had the privilege of providing input to the NCBA’s Market Resource Task Force, the task force came up with the concept of having a quarterly beef summit. It arose out of the fact that we had this unique gathering of people, and I think we got more accomplished than anyone could have imagined because people were prepared to listen. They were open, and they began to trust each other. Only through that trust can you begin to resolve issues, and I believe we *can* resolve them.

Beyond that, I believe we need much better price information. That is the point I have gotten out of the last two days. I think we need much improved retail prices, we need a boxed beef futures as some people mentioned, we need a better handle on food

service prices (menu prices right through to the price of ground beef), and we need better export pricing. We are moving on a lot of these fronts, and I think that's great. We need to involve all those prices in a pricing system, and I would suggest that the industry seriously look at putting up \$1 million to \$5 million as an economic incentive for somebody within the industry or outside the industry to put together one or more new pricing systems far beyond the boxed beef-type bridge that we have now. Those systems would be tested commercially and implemented within the next five years. We must go beyond the box to establish value, and obviously, such a move would require input and cooperation of all sectors, but if we had a common agreement as to what we want to do, I have no doubt that we can get there very quickly. I was impressed by Ted Schroeder's comment in saying that we lose a tremendous amount of information because we sell live. There is no doubt in my mind that we need to move to a value-based marketing system as quickly as possible. I believe, like many others, that we have to have it in the public sector. I think that is a very crucial point in the "public good" notion that Steve Koontz and Wayne Purcell pointed out. Privately run is not going to work. It is gratifying that Barry Carpenter reassured us that the USDA is ready to change. They will embrace any change the industry is ready to take up, so again, it is up to producers to drive the changes.

Let me make some secondary points on the question of mandatory reporting. I believe if the industry really wants to discuss it, it has to address it now and then lay it to rest. Electronic marketing has been covered so well. I am a very strong advocate of electronic marketing, particularly on the meat side. I think there is a system that was developed in the late 1970s by Dr. Bill Albanis that really needs a very serious examination again. As Steve Koontz said, financial securities are traded electronically. Why don't we look at that? Let's put aside some money and look at how we would apply it to the meat industry and to live cattle in particular.

We obviously need a more objective grading system. We need other technologies such as tenderness probes or the like to really move beyond the subjective kind of grading and evaluation of carcasses so that by and large we get beyond that human element and people feel more comfortable in the actual determination of value.

Beyond that, it is going to be meaningless unless we take radical steps in terms of pricing, which I have heard again as a key message coming out of the conference, and that is the need to target. We have to segment our market. We know that we don't have one beef market--we have many beef markets. But we have to segment and target those markets, and we have to do the same with our pricing structure. I believe we can. It will be complicated, but no prices are equal. I think Steve Koontz made the comment that all prices are not equal and yet we are still selling the majority of our live cattle on that basis. It has to stop. We have to target products to specific consumer markets and send those signals back to the producer. We need a new pricing system, I believe, that starts with a high-quality market--white table cloth, the top end of retail, and export. Then there might be a mid-range market--from food service all the way down to the grind. Even in grinding beef, there are many different degrees. We need to separate those.



As the industry establishes those targets, it is absolutely essential to develop an industry-wide system that uses the data we are going to find at the packer level (and I am presupposing that we are going to buy and sell cattle on an individual carcass basis), but that is not going to mean anything unless we establish an industry-wide data transfer system all the way back to the seed stock level. I believe that can be done relatively quickly, but the industry must actually get together and discover and develop the mechanism by which that is going to happen. We can't just have NCBA doing it with their carcass information; we must have a "whole industry" approach.

My final message to you is that I believe we know what we want to do. We have to get people together, we have to trust people, we have to get everybody involved, and we have to persuade every producer in the U.S. that the change does not come from academics or journalists, it comes from them, the producers.