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SOME CONSIDERATIONS IN THE APPLICATION
OF ELECTRONIC MARKETING TO MEAT

By

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INTRODUCTION

In much of the agricultural community today, there is considerable interest in the concept of computerized marketing, or the so-called electronic commodity market. This interest spans from, at one extreme, those who are advocates of electronic marketing as the solution for a broad array of marketing ills, to at the other extreme, opponents who believe that electronic marketing is little more than an abstract concept that has no practical applicability in "real world" situations. The facts about electronic marketing are these: (1) it is a relatively new marketing technique in American agriculture, (2) it has been made to work quite well in some situations, but there have also been some failures, and (3) we know relatively little, with a high degree of certainty, about the costs and benefits of electronic marketing compared to more conventional methods.

For several years, I have been involved in the pursuit for greater understanding of electronic markets and their potential benefits and costs to the agricultural community. This includes development of a broad theoretical understanding of electronic markets and careful analysis of the operations and impacts of most of the existing electronic markets in North America. These include electronic teletype auctions operated for slaughter hogs in Ontario, Manitoba, and Alberta, Canada; TELCOT, the highly sophisticated computerized market for short-staple cotton in Texas and Oklahoma; and the national computer-assisted nest-run egg market operated by Egg Clearinghouse,

Inc. out of Durham, New Hampshire. I have also been involved in the development of experimental electronic markets, as a means of furthering our empirical understanding of the potentials and pitfalls of this innovative marketing institution. In particular, I am currently working with a large segment of the slaughter hog industry in Ohio and surrounding areas to develop and implement a computerized farm-to-packer hog market and to evaluate the results.

I claim no special expertise in understanding the U.S. wholesale meat market, therefore, I will discuss electronic marketing from the broader, institutional point of view. I will attempt to draw implications for meat marketing, where possible, given my knowledge and understanding of this market. But, my primary intent is to share my knowledge of electronic markets in order to assist this task force in drawing relevant implications for the meat industry.

WHAT IS ELECTRONIC MARKETING?

A comprehensive description of electronic markets has been provided elsewhere (see Henderson, Schrader and Turner, for example). In essence, this is a marketing system in which the negotiation of prices and perhaps other terms of exchange is centralized onto a single, computerized trading floor, while the physical flow of product from seller to buyer occurs in a direct or nearly direct manner following successful negotiations. Potential buyers and sellers do not physically stand on this centralized trading floor. Rather, they participate in the market via various means of electronic communications such as telephones, teletype terminals, computer terminals, or other forms of long distance communications. The market system computer acts as a communications manager as well as performing numerous marketing functions such as matching bids and offers, auctioneering, recording and confirming sales transactions, invoicing, managing traffic, enforcing trading rules, and compiling and disseminating price reports and other market information.

It is important at the outset to distinguish between electronic markets

and computerized information systems. Numerous computerized information systems exist, and others have been proposed, which provide information on sales offerings, purchase requirements, and/or report on transactions after the fact. Those systems, however, do not actually engage in sales negotiations. The electronic market, on the other hand, includes the sales negotiation process as part of the computerized system. As such, price discovery occurs directly on the electronic trading floor, rather than in private negotiations as an adjunct to a computerized information system.

In actuality, one could envision an electronic market as being similar to a trading pit on a major commodity exchange, where buyers and sellers meet face-to-face in a large group and sort out deals from among the offers and bids of numerous participants in a process that is highly visible and competitive. The major difference is, in the electronic market buyers and sellers are not physically present. Rather, they enter the market and engage negotiations through remote communications and a computer manages their interface.

The inherent advantages of electronic marketing follow directly from its basic concept as a remotely-accessed, centrally negotiated sales floor. First, because of its remote access, potential buyers and sellers do not have to physically travel to one central location to meet other participants in the market. As a result, traders achieve the same basic trading efficiencies generally realized in direct trades made via telephone negotiations.

Second, because price negotiations occur in a highly competitive, centralized arena, the ability of a dominant trader to unduly influence price and other terms of exchange is sharply reduced compared to the typical one-on-one nature of direct, private negotiation. As a result, prices tend to be much more accurate representations of market-wide supply and demand conditions. That is, prices and other terms are determined primarily by the impersonal forces of the marketplace, as reflected by numerous potential buyers and sellers, each

striving to make the best deal possible given their individual assessment of market conditions, rather than unduely reflecting the individual assessments of only the two or three traders who typically participate in any one direct, privately negotiated sale.

An additional point can be made with regard to the efficiency of trader communications in the electronic market relative to direct trades negotiated by telephone. When computer terminals are used for communication purposes, electronic data rather than voice are transmitted. Each bit of electronic data can be transmitted on a one cycle audible response, whereas about 3,000 cycles of audible response is required for voice communications. As a result, a substantially larger volume of electronic data can be transmitted in the same communication space that is required for a lesser amount of voice communication. Because of this, data can be transmitted much more rapidly electronically than by voice. My observation has been that, where computer terminals are used for marketing communication, communication time required for sales negotiation is cut by about one third compared to conventional voice communications. This represents another fairly substantial source of potential efficiency gain for the computerized marketing system.

HOW DOES ELECTRONIC MARKETING WORK?

As of yet, there is no single, standardized model for electronic marketing systems. Each of the currently operating systems is somewhat unique. It does not appear likely that any two electronic marketing systems would be identical, given the various and unique characteristics of different commodities or products, industry conditions, location and size of traders, and the nature of the marketing problems which an electronic exchange is developed to mitigate. However, they all incorporate several basic features: (1) simultaneous negotiations among numerous traders, (2) remote trading, (3) description selling, (4) performance guarantees, and (5) sufficient trading volume.

There are several methods used for simultaneous negotiations over price and, in some cases, other terms of trade among large number of remotely located traders. Typically, offers of sellers are flashed instantly across the electronic communications system to numerous buyers who in turn, competitively bid for those offers. Or, buyers' bids to purchase are flashed instantly to numerous sellers who then competitively offer to fill those bids. Or, both bids and offers are flashed across the system to all traders, with sales being consummated when a bid and offer match or as bids and/or offers are adjusted by traders in response to trades offered from the other side of the market. The actual bidding process varies, in different systems, from sealed bids to both ascending and descending auction procedures.

All electronic markets provide some means of remote access by traders. The more technically sophisticated systems provide individual computer terminals for traders to use while other systems depend upon various combinations of computer terminals, teletype communications, and telephone communications with computer operators.

Products sold on electronic markets are inevitably sold by description rather than by personal inspection, although the opportunity for buyers to personally inspect sellers' products generally exists if a buyer so desires and is willing to bear the expense for such inspection. In virtually every system that is operating for agricultural products today, provisions are included for an independent or third party to varify the description of the product being offered by the seller. Usually, this third party inspector is a government employee, although it could be any third party acceptable to both buyers and sellers. In some systems, third party inspection is mandatory before a product can be sold whereas in other systems this is an option with the traders and used primarily where a lack of mutual trust exists or where buyers and sellers are unknown to each other. The TELCOT marketing system is an example of the former and the Egg Clearinghouse is an example of the latter.

For some products, electronic classification techniques are being rapidly developed which can substitute for personal inspection. These offer the potential to remove descriptive variability due to human error, and are highly compatible with computerized trading systems. The Danes, for example, are currently using electronic instruments to classify pork carcasses. The Australians are very close to having a similar system perfected for beef carcasses. And, in the United States, electronic classification of cotton is an accomplished fact.

It is not necessary for products traded across an electronic system to be uniform in description or to fit into a limited number of uniform descriptive categories. Cotton, which is being most successfully traded over an electronic system, is characterized by more than 4,000 descriptive variations. Because a large volume of information can be communicated and digested in a computerized system with great speed, electronic markets lend themselves exceptionally well to the marketing of heterogeneous products. The important factor is consistency of description, not the amount of variety in products traded. That is, the method and terminology used to describe the products must be consistently applied in order that all traders have a reasonably accurate understanding of the characteristics of each product traded.

Of course, many products are perishable and can change condition between the time they are offered by a seller and the time delivery is made to the buyer. All existing electronic markets for perishables include some procedure for adjusting terms of sale for in-transit changes in product condition. These include such things as a predetermined schedule of premiums and discounts, reinspection by a third party at point of designation with buyer right of reject if product specifications differ appreciably from origin specifications, and the use of arbitration committees, usually made up of one buyer, one seller, and one independent party, to settle delivery or other buyer-seller disputes.

Another important feature of electronic marketing is some means of warranting trader performance. Obviously, any system of remote trading is dependent upon buyers and sellers actually doing what they agreed to do. Purposeful malperformance must be precluded to the extent possible. There are numerous instruments available to assure trader performance. Contracts between the marketing agency and potential buyers and sellers, which spell out the obligations of all parties, are generally used. In some cases, bonding or prepayments are required from all or certain high risk traders. In other cases, membership fees are collected from all potential traders and used for indemnity purposes. Another option is for the marketing agent itself to guarantee performance through supporting market operations.

There are two essential considerations related to trading volume on an electronic market. One is operating costs. As with anything that requires capital facilities, per unit operating costs decline as volume increases. Electronic markets are no exception. However, compared to central assembly markets, capital investment in electronic markets appears to be substantially less, thus requiring less total volume to achieve reasonable per unit operating costs. Our work on an electronic marketing system for slaughter hogs in Ohio, for example, suggests that for about \$325,000 in capital costs a computerized marketing system can be constructed that will have sufficient capacity to market the volume of hogs that is more conventionally sold through 40 or more marketing yards. Conservatively figuring a per-yard capital cost of \$25,000, this suggests that the capital requirements needed for the electronic system are less than one-third of that required for an assembly market system. Of course, compared to direct, privately negotiated sales where few if any capital facilities are required, enough electronic trading volume must be achieved to realize efficiency gains in communication sufficient to offset the higher fixed costs.

The second volume-related factor is pricing accuracy. Clearly, a most compelling feature of any centralized sales negotiation process, including electronic markets, is the reflection of marketwide conditions in the determination of prices. When adequate volume is being priced in a competitive sales arena, we are fairly confident that the resulting prices are accurate, that is, are reflective of a market clearing or market equilibrium level which equates the quantity supplied with the quantity demanded at the time of transaction. Such prices are generally considered to represent "true market value." With sufficient trading volume being so priced, other transactions which are priced on the basis of the centrally-negotiated transaction prices also tend to be reasonably reflective of true market values.

At this point, we have no clear evidence of what constitutes sufficient trading volume for pricing accuracy. Economic theory is silent on this point, as it assumes all market prices are negotiated. We do not yet have enough observation of different electronic marketing systems to develop an empirical feel for this issue. The Ontario hog marketing system, which prices virtually 100 percent of the slaughter hogs sold in that province over an electronic exchange, stands at one extreme. It has become the pricing basis for hogs throughout Canada. The Egg Clearinghouse in the U.S. stands at the other extreme, with perhaps two to three percent of the negotiated egg sales represented. Egg Clearinghouse prices have clearly become a factor in egg price determination, but this market does not yet reflect sufficient volume to be generally accepted by traders as the major determinant of true market value.

This pretty well summarizes the general features or characteristics which, based upon my observations, are important to the successful operation of an electronic market.

APPLICABILITY OF ELECTRONIC MARKETING TO MEAT

Next, a brief comment on the consistency of the important electronic market design features with conditions in the wholesale meat industry, as I perceive them. Remote trading by long distance communication certainly appears to be a norm in this industry. Thus, it would appear that this would not be a constraint upon the application of electronic trading to meat.

Centralized price negotiation appears to be clearly inconsistent with current meat trading practices. The dispute over negotiated versus formula-priced sales aside, it seems reasonably clear that very little if any meat is currently being priced in a centralized price negotiation arena.

Selling meat on description rather than on a personal inspection basis again appears to be a norm in this industry. While some degree of standardization in descriptive terminology would probably be necessary for the successful trading of meat over an electronic medium, it seems doubtful that there would be more than the 4,000 or so permutations of descriptive information which have been successfully computerized in the electronic cotton market.

Given that a considerable amount of meat trading apparently occurs by long distance telephone communication today, it would seem that a relatively high level of trust exists among traders in this industry. Therefore, it would not appear to be difficult to develop some system of performance guarantees which would be acceptable to most traders in the industry and that is generally consistent with current trade practices.

There are few apparent conclusions that I can draw with regard to achieving adequate volume on an electronic meat market for efficient and effective operation. First, as discussed earlier, I do not know what volume of trading is necessary on an electronic market in order to achieve either maximum trading efficiencies or optimum pricing accuracy.

Secondly, I can only speculate on the extent to which an electronic market would be used by meat traders on a voluntary basis. Clearly, the volume of meat being traded at wholesale in the United States is considerably more than adequate to support an electronic marketing system if we use the volume of trading on the Ontario Pork Producers Marketing System and TELCOT as guidelines, that is, an average of 75 transactions per day or more. That level of trading would represent just slightly more than two percent of the apparent daily truck load trades of wholesale meat in the United States (Engelman, et al). However, given the size and diversity of the wholesale meat industry in this country, it is doubtful whether the Ontario hog marketing and TELCOT experiences provide a very definitive guide on necessary trading volume.

My general observation has been, if an electronic marketing system is designed consistent with user needs, buyers readily see the procurement advantages in being able to buy from a broad collection of market offerings at one central location and that sellers quickly perceive the advantages of selling in a more competitive environment than is typical of privately negotiated trades. Thus, once the volume committed to an electronic system is sufficient to attract trader interest, additional trading volume builds rather quickly. Conceptually, I see no reason why a similar trading experience could not be achieved in the meat industry, although it is difficult to make a confident prediction about future trader behavior in any market.

Additionally, there is the question of how the initial volume, sufficient to attract trader interest, is obtained. In virtually every operating system that I have observed, there has been some type of support activity provided during the start-up period in order to generate adequate initial volume to attract subsequent trader interest. These have included financial subsidies (either public or private, or both), market support activities by a few large traders in the industry, and in the case of the Ontario hog system, a public mandate.

The point that needs to be emphasized concerning the design of an electronic market, and its potential application to meat, is flexibility. Because of the large capacity and high speed with which modern electronic communication and computing systems can communicate and process data, an electronic system could be designed to meet almost any set of trading rules or industry conditions. For the most part, existing trading procedures can be incorporated in the rules and design of an electronic marketing system. An electronic market does, of course, require uniformity in trading rules and procedures across the market. This means that, in actual application, some traders must modify their practices to conform with industry norms in order to participate.

POSSIBLE IMPACTS OF ELECTRONIC MEAT TRADING

Finally, let me turn my attention to the question, "what would most likely be accomplished by the application of electronic marketing to meat?" First and foremost are implications for meat prices, pricing accuracy and price reporting. In fact, the greatest expected impact of electronic marketing stems from its ability to put the price discovery function into an arena characterized by competitive, impersonal, and visible interaction among numerous buyers and sellers. At the same time, electronic marketing offers the capability of maintaining the benefits of efficiency in physical transfer of products from sellers to buyers and improved seller-buyer communications and coordination that are associated with privately negotiated direct sales. Thus, the electronic market can be characterized as a method for maintaining physical transfer and coordination efficiencies while enhancing the process of competitive pricing vis-a-vis private, direct sales.

Because participation in price negotiations from both sides of the market is substantially expanded, the resulting prices reflect the supply and demand

expressions of large numbers of market participants. This means that prices become more accurate and thus more efficient in their role of allocating resources and products among alternative users, and provide a more reliable indication of true market values.

This expectation regarding pricing accuracy is supported by the results of several carefully designed analyses of the Canadian electronic-type hog marketing experiences. Because the Canadian experience covers 18 years of operating history, it provides the best environment for empirical examination and has, therefore, been the focus of most empirical investigations. Both J.C. Lowe and Wen-Fong Lu found a statistically significant increase in the number of traders participating in market price negotiations on the electronic market system compared to private treaty sales, which were largely characterized as bid-acceptance pricing systems. That is, in most private treaty sales in that industry, buyers post bid or purchase prices and sellers essentially decide whether to or not to sell at that price. Whereas, in the electronic market a large number of buyers bid competitively for the various offerings of different sellers.

Lu also found that a statistically significant decrease in the difference between transportation costs and average provincial prices was associated with the introduction of electronic marketing. Chang-Mei Lu found a statistically significant increase in both intraday and interday price variability in the electronic hog sales, compared with direct private sales. Both of these findings are indicative of improved price arbitrage and thus greater pricing accuracy as a result of centralized price negotiations in the electronic market.

In a study of the impact of telephone auction selling on prices in the Virginia and West Virginia lamb market, Holder reported evidence of improved pricing efficiency or greater pricing accuracy associated with enhanced buyer competition

in that market. While telephone auctions do not include all the features characteristic of electronic markets, they do centralize the price negotiation process for numerous traders over a single conference telephone arrangement. Thus, the pricing impacts of telephone auctions should be similar to our expectations under computerized markets.

Based upon these studies, it is not only a theoretical expectation but also empirically supportable, that centralized price discovery will generate more accurate and representative prices. That is, more accurate prices come about because of greater competition among traders in the market, improved price arbitration, and a balancing in market power among the participants in the price negotiation process.

Because pricing occurs in a central arena, it is much easier to observe the resulting transaction prices, thereby substantially strengthening the relevancy of price reports. The problems of sampling for price in a large number of widely diverse and dispersed private sales and generating meaningful and representative marketwide averages and ranges from this sample disappears when the price negotiations among a large number of traders occurs in an observable, centralized arena. Thus, to the extent that price discovery and price reporting are major problems in the meat industry due to the dominance of privately negotiated direct sales, the electronic marketing mechanism would appear to be an attractive alternative.

The impact of electronic marketing on trading costs and market efficiency in the meat industry is more difficult to project. It appears that the current direct marketing techniques used in this industry have made for quite efficient physical transfer of products from seller to buyer. Likewise, given that most sales negotiations already occur by long distance telephone, it would appear that relatively little savings in travel costs for buyers and sellers to meet in the marketplace could be eliminated by electronic marketing. Nominal

efficiency gains might be achieved from more rapid communication utilizing electronic data rather than voice communications. Some coordinative efficiencies might be gained in that traders would be exposed to a broader array of people on the other side of the market than they currently face in typical private dealings, thus allowing actualization of some trades between less distant trading partners than now occurs.

An electronic market could also impact upon market accessibility. Conceptually, a centralized electronic market should be more readily accessible to smaller and more remotely located traders because numerous trading possibilities can be found in one place and entering that trading floor is relative simple and inexpensive. This expectation tends to be borne out in at least one empirical investigation. Chen, in an evaluation of trading on a voluntary electronic hog market in Manitoba, found that producers who marketed through the electronic system operated significantly smaller hog enterprises, on average, than did producers who sold through private treaty. This finding suggests that electronic market systems indeed provide viable access for smaller traders compared to a direct selling system.

CONCLUSION

In summary, I would conclude that, while we still have only a limited number of actual experiences with electronic marketings of agricultural products, empirical observation supports our theoretical expectations with regard to the conditions that are conducive to the successful operation of an electronic market. These include remote trading among buyers and sellers, centralized price negotiation, description selling, performance guarantees, and an adequate volume of trading. All of these conditions, with the exception of centralized price negotiation, currently seem to be trading norms in the wholesale meat market. Additionally, facilitating the centralization of the

price negotiation process would appear to offer the potential of appreciably mitigating the pricing problems in this industry which are associated with dependence upon privately negotiated direct sales. It does appear, therefore, that electronic marketing is at least deserving of consideration in this industry. The final tally of benefits and costs from implementing an electronic marketing system for meat, of course, can not be made until such time as a well-conceived and designed system is implemented and given a fair market test.

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