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Introduction

Electronic markets and information systems may increase the efficiency with which agricultural commodities are traded in international markets. Electronic markets have had mixed success in the United States, but have been successful enough for some agricultural commodities to suggest they may be useful in pricing commodities across national boundaries. The need for efficient trading systems that are transnational and/or transcontinental seems self-evident given the spatial separation of buyers and sellers. However, the structure\(^2\) of international markets for given agricultural commodities may not lend itself to the introduction of electronic trading unless the current oligopolists and/or oligopsonists support such systems.

On the other hand, electronic information systems have continued to grow in popularity in virtually all sectors. Within the United States and internationally, the use of electronic means to disseminate price and other market information for agricultural commodities and food products is growing rapidly.

U. S. beef exports are an increasingly important component of total U. S. beef sales. In 1991, approximately 1.2 billion lbs. of beef were exported from the United States with slightly less than half of this trade being with Japan (USDA, ERS). U. S. exports of beef continue to increase, and were up by 13% during the first quarter of 1992 over the first quarter of 1991. Most business in the international beef market is done on a personal basis.

\(^2\) The definition of structure used in this paper corresponds to the number of firms participating in the market (both buyers and sellers), the level of competition, amount of product differentiation, etc.
over the telephone. However, the growth of the international beef industry, especially between Japan and its trading partners, suggests that more sophisticated pricing and negotiation methods may be needed in the future to ensure the market and market pricing mechanisms are efficient.

The introduction of commodity futures markets in countries along the Pacific Rim (e.g., Japan and Singapore) suggests that a growing need exists in these countries to improve pricing mechanisms for agricultural commodities through arbitrage (Kolb). If the conditions for success are right, electronic markets may provide a useful tool for buyers and sellers to discover international beef and other commodity prices, as well as being a possible procurement source for raw commodities. If market structure does not allow for the successful introduction of electronic markets, electronic market information systems are being and will be developed to disseminate the information necessary to complete efficient transactions between buyers and sellers.

This paper discusses some of the principle reasons electronic markets for agricultural commodities in the United States have succeeded or failed and how these lessons may apply to the use of electronic marketing in international markets, especially for beef. The paper also describes electronic market information systems for agricultural commodities in the United States, and how these types of systems could be used or possibly modified to provide relevant agricultural commodity price and market information between the United States and other countries.
Agricultural Electronic Markets and Information Systems in the United States

Electronic marketing has been defined as the use of any electronic media (e.g., telephone, computer, television, etc.) to describe and price products (Kohls and Uhl). A more specific definition of electronic marketing was described by Henderson as "... simultaneous trade negotiations among spatially separated buyers and sellers channeled into an interactive central market through electronic communications" (p. 848).

In the past, electronic markets have included telephone bidding systems (teleauctions), computer based systems, and satellite video auctions. Although the technology differs among the systems, they all act as a central "clearing house" for grading, written descriptions, and, in most cases, bidding between buyers and sellers. Henderson stated that, "Much of the interest in electronic markets has stemmed from the belief that by centralizing price establishment while decentralizing product flow, the pricing advantages characteristic of central assembly markets can be achieved without jeopardizing the cost and coordination advantages of direct product transfer" (p. 852).

Achieving a system that allows efficient price discovery for commodities while not actually assembling them to a central location for inspection and grading, or requiring on-site inspection and grading by individual buyers, is expected to reduce the cost of completing transactions. A relatively large percentage of the value of agricultural commodities consists of transportation and transactions costs. For example, between 6%-10% of the value of cattle can be expended completing one transaction (Bailey et al.). Similar costs are associated with completing transactions for agricultural commodities such as beef in international markets. This suggests an economic incentive exists to reduce transaction costs.
for agricultural commodities, and electronic markets may be one method to achieve this goal.

**A Description of U. S. Electronic Markets for Agricultural Commodities**

Several electronic trading systems have been used for a wide range of agricultural commodities in the United States, including meat. While some of these systems remain functional after a number of years, others are not currently operating. Among the most successful U. S. electronic marketing systems are the National Electronic Marketing Association (NEMA) which markets lambs, hogs, and feeder cattle; the Egg Clearing House Incorporated (ECI) which markets shell eggs; and TELCOT which markets cotton in the Texas Panhandle (Henderson; Sporleder).

Other electronic markets for agricultural commodities have seem more limited success but have introduced concepts that still provide insights about why a system may or may not be successful. For example, the Computer Assisted Trading System (CATS) for trading meat was developed as a pilot program in the 1970s by the American Meat Exchange (Albanos; Henderson). CATS was developed as a on-line computer system that provided information to buyers and sellers to facilitate private negotiation. Other pilot electronic marketing programs include the Hogs Accelerated Marketing System (HAMS) and the Cattle Exchange (CATTLEX) which were developed at Ohio State University and Texas A&M University, respectively. HAMS traded slaughter hogs while CATTLEX traded
feeder cattle. These electronic markets, CATS, HAMS, and CATTLEX, are not currently functioning.³

The reasons CATS, HAMS, and CATTLEX failed to establish broad acceptance from the livestock and meat community are varied, but appear to be connected with either a problem establishing grades and terms comprehensive enough to complete transactions efficiently, or an unwillingness on the part of buyers and sellers to participate in an on-line bidding system (Albanos). The reluctance on the part of buyers and/or sellers may exist because they do not perceive that a pricing problem exits with current markets, or they are simply unwilling to share information on the prices they pay or receive in an environment where others can share that information such as an on-line computer system (Schrader; Albanos).⁴

During the last decade, satellite video cattle auctions have rapidly increased their sales volume. For example, the largest satellite video cattle auction in the United States, Superior Livestock Auction (SLA), increased its volume from about 250,000 head of feeder cattle offered for sale in 1987 to over 750,000 head in 1991 (Bailey and Peterson; SLA).

Satellite video auction representatives video tape cattle at a ranch or feedlot and prepare a description of the cattle. Each lot of cattle is assigned a number and this number and description is published in a sales catalogue that is mailed to potential buyers prior to

³ Although CATTLEX is not functioning in the United States at the present time, a system similar to CATTLEX is operating in Australia (Sporleder).

⁴ Transactions on these systems were anonymous, but a significant amount of market information is provided during the bidding process since participants know the quality, quantity, and location of the product being sold and the successful bid price.
the auction. During the auction, the video tape of the cattle is shown to buyers who are present in the auction ring and is also broadcast by satellite transmission. An auctioneer solicits bids from those who are present at the auction's central location while buyers in remote locations may telephone bids into the auction. Buyers are responsible for transportation costs when buying cattle at a satellite video auction.

The success of video cattle auctions in the United States, while computer trading systems for feeder cattle have failed, suggests a problem with consistent grading standards exists for some commodities. This results in a need for potential buyers to visually inspect the commodity before placing a bid on it. In this case, a partial visual inspection is provided by the video tape of the cattle.

**Benefits Derived from Electronic Marketing of Agricultural Commodities**

Several studies in the United States have suggested that prices received by sellers using electronic markets are higher than those received using other pricing methods. Bailey et al. found that net prices (bid price minus commissions, transportation costs, and weight loss) received and paid by sellers and buyers, respectively, at video cattle auctions was higher than net prices received and paid at traditional regional auctions. This price difference was roughly equal to the savings realized by buyers and sellers from reduced transportation and transactions costs.

Schrader reports analyses of prices received through the ECI for eggs that suggest that prices were slightly higher through that system than traditional pricing methods. Rhodus et al. examined prices received through the HAMS electronic market and found them to be about $1/cwt. higher than at the large hog market at Peoria, Illinois. Russell's
analysis of prices received for lambs in the NEMA system and Mahoney's study of prices received through CATTLEX both indicated that prices were higher in electronic marketing systems than traditional pricing methods.

Given the results of these studies (i.e. Bailey et al.; Schrader; Rhodus et al.; Russell; and Mahoney), one must ask why buyers are willing to pay higher prices when using electronic systems than they do when they using conventional pricing methods. The results reported by Bailey et al. suggest than a reduction in transactions costs is a major reason for this phenomenon. However, increased competition is also suggested as a reason for higher prices in electronic markets than in other markets.

If the level of competition does affect market prices, one would expect large buyers, if they possess market power, to use markets where competition is keen less than markets where less competition exists. This notion is weakly supported by Bailey and Peterson's results that indicated that some large cattle buyers had reduced their use of cattle video auctions during the last few years. This also implies that electronic markets for beef between the United States, Japan, and elsewhere might ultimately serve only as residual markets rather than primary markets, since buyers would seek other sources of supply at lower prices first. However, if market power is weak or nonexistent participants may be forced to use an electronic marketing system, if one is implemented, to remain competitive.

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5 Market power is defined as the ability to influence market price by output choices on the part of the firm.
Possible Barriers to Implementing International Electronic Markets for Beef

Several barriers may prevent the implementation of electronic trading systems in international markets for agricultural commodities like beef, especially between the United States and Pacific Rim countries. The first is market structure. Most transactions for beef traded between the United States and Japan are currently completed by individual oligopolists in the United States and oligopsonists in Japan by telephone and facsimile (Haggard). Three firms in the United States market over 70% of the beef sold in the United States each year (USDA, P&SA). On the other hand, 75%-80% of the imported beef purchased by Japanese firms is procured by approximately one dozen firms, and one Japanese company purchases about 30% of all beef imported from the United States (Haggard).

Given the relatively small number of market players, cooperation from this group would likely be necessary if an electronic market or information system designed to trade beef in an international market (e.g., between the United States and Japan) were to survive. Consequently, these firms must perceive an increase in market efficiency that more than offsets any loss that may occur as a result of less secrecy in their transactions. The principle benefit that would accrue to users of such a system would be an improvement in the price discovery process. Some of the U.S. meat packers now "fax" price lists once per week to customers in Japan (Haggard). An on-line system that would update prices continuously would aid firms in adjusting prices and strategies more rapidly than they are currently.

Other issues include the problem of overcoming language barriers in implementing an interactive system and in developing an international grading system for beef and other
agricultural commodities. Besides market structure, grading is likely the most difficult problem facing an interactive trading system for agricultural commodities. Products that are relatively homogeneous or have precise grading specifications, for example #2 yellow corn, could be traded electronically more easily than nonhomogeneous products like beef. In a market where product consistency is a problem, buyers must rely either on visual inspection or on the reputation and/or guarantee of the seller. This suggests that better international grading standards and specifications would need to be developed for beef if it were to be traded on an international electronic marketing system.

**Possible Improvements in Current Electronic Information Systems**

Some industry experts believe the most immediate need in international beef markets is more and better price information. Price quotations for beef and other meat products are usually provided by subscription services either by mail, wire service, or facsimile (Albanos). Price information disseminated by mail is declining while wire service and fax reception are increasing.\(^6\) Prices in the U.S. beef market can change rapidly during the course of a given business day. Improving the timeliness and quality of the information received by beef buyers and sellers may improve the efficiency of international beef market.

Subscription services generally publish and disseminate daily price summaries for different meat cuts and carcasses. Daily summaries may mask large moves by certain companies during the course of the day, and may eliminate some market opportunities for other traders. Another possible scenario is to record information manually and update price

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\(^6\) One subscription service, the Meat Sheet, provides facsimile service to about 50% of its customers, including several in Japan (Albanos).
summaries during the day in a computer system that could disseminate the information. Finally, a system that continuously updates price information for beef and other meat products could be developed. Currently, no on-line system similar to an electronic market exists that records and updates transactions as they occur in the beef market either within the United States or internationally (Albanos). This implies that market information on beef prices is slow for market participants, as a whole, compared to other commodities such as those that can be traded using futures contracts.

Would an International Electronic Market for Beef Be Viable?

Conventional wisdom suggests the operation of an electronic market is expected to work best if a large number of buyers and sellers participate. However, some economists believe it may be possible to achieve a reasonably active market even if the market is dominated by a monopolist supplier or a monopsonist buyer (Sporlede). Examples of markets that appear to be functioning well, but which are dominated by oligopolists or oligopsonists, can be found in futures markets. One example would be crude oil futures contracts and another live cattle futures contracts (Gorham). This suggests that the successful operation of a market pricing system, such as an electronic market, may be more complex than the simple existence of a large number of potential participants.

Beef descriptors that are accepted internationally are a major issue that would need to be resolved before an electronic marketing system could be established. This problem could possibly be dealt with by expanding the application of the International Meat Purchase Specifications (IMPS). This system does provide specifications for particular cuts of meat and gives numbers to the cuts. If the IMPS system were expanded to include specifications
for subcuts (cuts within a particular cut specification) the information could possibly be made specific enough to facilitate electronic trading (Sporleder).

Language differences can pose significant problems with an international electronic trading system since simultaneous translation is difficult to achieve. However, a system that relied heavily on numbering to designate grading specifications and prices, and icons to facilitate operations and utilities within the system may be best. One international trading system that functions on these principles was developed by the Chicago Mercantile Exchange and is called GLOBEX. GLOBEX was designed to trade futures contracts after normal trading hours specifically to expand the international market for U. S. futures contracts.\footnote{Both agricultural commodity contracts and financial futures contracts are traded on GLOBEX.}

Those electronic marketing systems for agricultural commodities that have been the most successful in the United States have those that were sponsored initially by suppliers and/or buyers in the industry served by the electronic market (Henderson). Electronic systems for pricing and information may evolve in the international beef industry as the market expands and more players and countries become involved.

Market participants must perceive a need and an economic benefit from participating in international electronic markets and information systems. The most urgent need in international markets for agricultural commodities appears to be in improving information systems, but electronic marketing systems will likely evolve over time.

Buyers, sellers, and consumers should all have an interest in efficient markets. Research has provided a significant body of evidence that electronic markets can help
enhance market efficiency in agricultural commodity markets. Methods for improving pricing within markets, such as for beef, should be encouraged, including an investigation of the possibility of trading agricultural commodities through an interactive electronic system. The academic community can provide support to this process by examining and reporting the efficiencies and economies that are present in existing electronic marketing and information systems, and suggesting different methods for grading commodities that will facilitate efficient trade. The business community can aid this process by examining possible alternative methods for grading and pricing commodities, including methods that use electronic systems.
References


