# ELECTRONIC MARKETING: CONCEPTUAL, THEORETICAL, AND EMPIRICAL CONSIDERATIONS

by

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# Chapter I

# INTRODUCTION

## 1.1 PROBLEMATIC SITUATION

An electronic market may be defined as a market whose trading arena is some electronic medium.[1] The medium used may be computerized system, teletype, conference telephone or some combination of these or other communication networks (Russell and Purcell). Simultaneous physical proximity of buyer, seller and the commodity being traded is not required. A buyer may be in his home office, a seller may be on the farm and the commodity may still be in the possession of the seller or at some centralized assembly point when trading is consummated. An electronic marketing system utilizing one electronic medium is graphically depicted in Figure 1.1, whereas a multi-medium electronic system is depicted in Figure 1.2. These figures should not be considered an exhaustive enumeration of possible configurations of electronic systems. They should, however, demonstrate the basic ingredients of an electronic marketing system.

Electronic markets are of relatively recent origin and have been gaining increased attention. The first successful electronic market began in 1961 selling slaughter hogs in Ontario, Canada using a teletype communication network (Peer). Similar teletype systems later evolved in Manitoba (Lowe) and Alberta (Hawkins et al.). Conference telephone auctions are being used to sell feeder pigs, slaughter hogs, feeder and

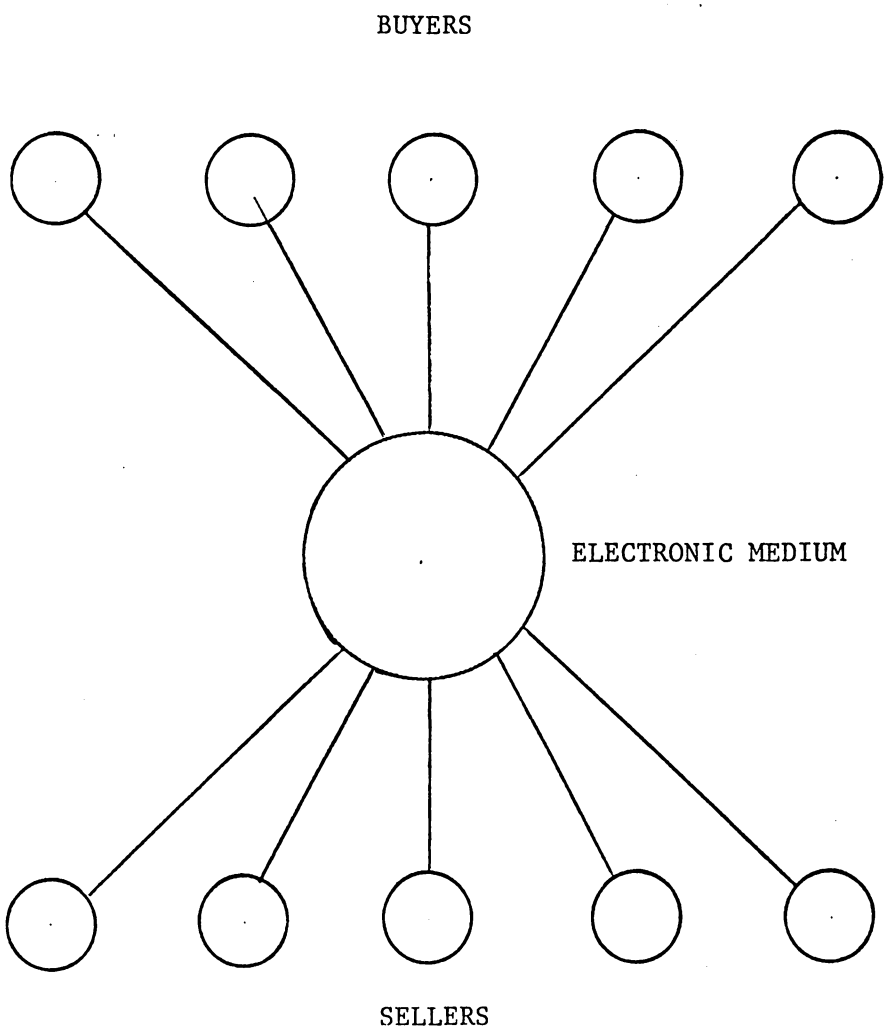


Figure 1.1. Illustration of an Electronic Market Utilizing a Single Electronic Medium

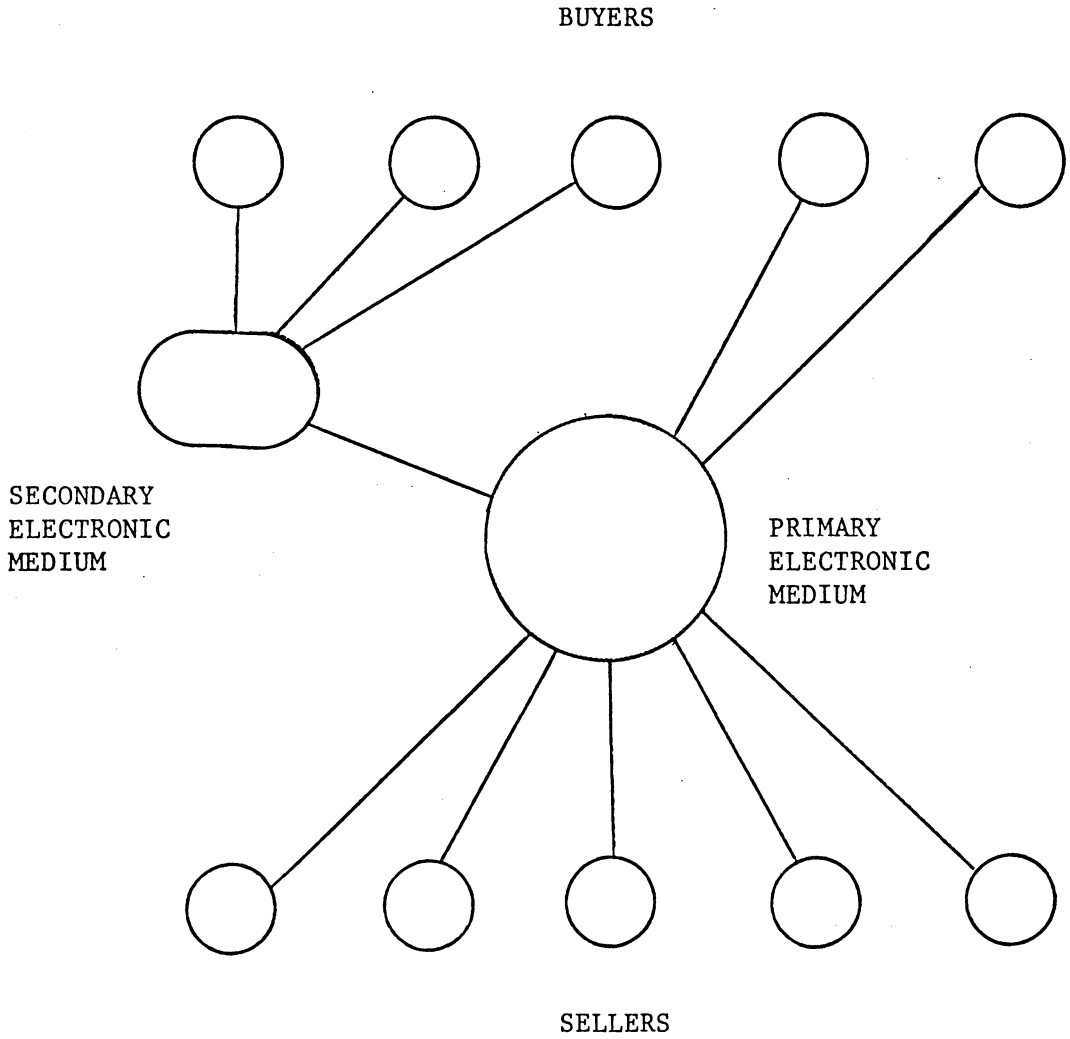


Figure 1.2. Illustration of a Possible Scenario for an Electronic Market Utilizing Two Electronic Mediums

slaughter lambs, and feeder and slaughter cattle in at least eight states (Henderson et al., 1976). Computerized systems have been used to sell cotton (Ethridge; Highley), eggs (Cox; Schwartz), wool (Computer Sciences of Australia), feeder cattle (Glazener; Sporleder), hogs (Baldwin), and lambs (Va. Dept. of Agriculture and Consumer Services, 1980).

Recent literature suggests that, theoretically, electronic marketing has the potential to increase both technical efficiency[2] and pricing efficiency[3] (Ethridge; Henderson et al., 1976; Henderson et al., 1979; Johnson). Research that has tested empirically the theoretical hypotheses indicates that both technical efficiency (Engleman et al.; Glazener; Henderson et al. 1979) and pricing efficiency (Helmreich et al.; Henderson et al., 1979; Henderson and Baldwin; Holder; Lu, 1968; Lu, 1969) can be improved with electronic systems. Technical efficiency is improved by lowering the marketing bill through reduced multiple handling, cross-hauling, number of transactions, and time required. Encouraging the use of value-related descriptive terms, providing accurate and timely market information to all participants, and increasing the number of buyers should improve pricing efficiency (Russell and Purcell).

As Russell and Purcell point out, the existence of successful electronic exchanges, the development of sound theoretical arguments, and positive results from empirical studies do not ensure that a new proposed electronic marketing system will be adopted and prove to be successful. The validity of this statement is exemplified by Virginia's

unsuccessful lamb teleauction in the early 1960's (Holder), little participation on Egg Clearinghouse's electronic marketing system for eggs (Schlei), shutting down a computerized slaughter hog auction system in Ohio due to insufficient consignments (Henderson and Baldwin), and the unsuccessful attempts to sell slaughter cows by computer in Virginia. Electronic marketing is not without it's opponents. David LaFleur, the president of the second largest meat packing company said, "We oppose the implementation of electronic marketing systems at this time and in the near future unless solutions can be found to the many problem areas ..." (Rhodes, 1980, p. 141). Even supporters of electronic marketing reserve the right to be skeptical. "Won't an electronic market solve all the problems? Perhaps it will. However, some supporters think that success is not assured. There are undoubtedly some industry interests who want it to fail. There could be bugs in the present models that will long delay successful trading" (Rhodes, 1979, p. 10).

In short, most analysts feel that electronic marketing has potential if properly designed electronic systems could be implemented. But electronic marketing has both strong support and strong opposition. Beliefs about electronic marketing appear to be based on a combination of facts, suppositions, and ignorance. Future decisions regarding electronic marketing will be important to the nation. The impact of these decisions will be felt at all levels of the marketing continuum -- from producer to consumer.

## 1.2 THE PROBLEM

Very little is known about electronic marketing -- especially computerized electronic marketing. Questions concerning benefits, costs, distribution of benefits, effect on industry structure and needed regulation all remain unanswered (Schlei). Research is needed to provide the information base to help answer these questions. Work needs to be done in the area of system design, in developing conceptual frameworks to determine the feasibility of electronic marketing, and in the implementation of electronic systems. Conceptual, theoretical and empirical work is needed if intelligent decisions are to be made regarding electronic marketing.

## 1.3 WORKING HYPOTHESIS

An increase in the conceptual, theoretial and empirical base of knowledge about electronic marketing will prove useful to researchers, policy makers, and industry participants. The increased knowledge should be beneficial in determining the feasibility, designing, implementing and evaluating electronic marketing systems. The likely effects of electronic marketing on industry structure and on the competitive environment can be more closely examined. The larger base of knowledge about electronic marketing should promote more objective and intelligent decisions regarding electronic marketing in both the private and public sectors.

## 1.4 REVIEW OF LITERATURE

The literature on electronic marketing is both limited and disjointed. To eliminate at least some of this discontinuity, materials which treat electronic marketing in a general context will be covered first. These will be followed by coverage of publications which have tended to concentrate on telephone, teletype, and computerized auctions. In an effort to give a historical perspective, all material concerned directly with electronic marketing in Virginia will be treated last. This historical perspective should prove helpful when empirical work is presented in later chapters. Authors who have tended to concentrate on computerized marketing may also present material of a more general character and vice versa. When a specific article appears to fit under multiple headings, it will be covered thoroughly under what is considered to be the most appropriate heading and cited elsewhere. Although such a system involves judgment, it should still add some order to a largely disjointed set of literature.

### 1.4.1 General

Johnson enumerated alternative methods of selling fed cattle and criteria which should be used to evaluate the alternative methods. The alternative selling methods listed included: terminal or central markets, auction markets, direct selling, country commission firms, packer consignment selling, telephone auctions, telephone direct selling and teletype selling. Computerized marketing is noticeably absent from the list but this is due to the early publication date (1972).

The criteria which were identified included physical or operational efficiency, pricing efficiency, bargaining position, and industry applicability. Operational efficiency was subdivided into direct marketing costs (commissions, buyer's salary, etc.) and indirect marketing costs (transportation, bruise damage, etc.). Equal bargaining power, price being equal to value, all buyers having an equal opportunity to bid on all offers for sale, and equal market information for buyers and sellers were all considered to be important to pricing efficiency.

Johnson then attempted to evaluate the different selling methods with the criteria he identified. Because of strict assumptions that were made in his analysis, the results of his empirical work are not widely quoted. The criteria that he used to evaluate the different marketing channels (or some variation of them) are widely used, however.

Henderson et al. (1976) stressed that many markets are thin -- possessing a low trading volume, a lack of competition among bidders, inadequate information, inaccessibility to traders and/or a high potential for price manipulation. Prices generated from such markets may not be accurate measures of product value. Electronic markets might offer a solution. An electronic market can centralize the price discovery process, help create a competitive market environment, and eliminate the costly and inefficient process of assembling buyers, sellers, and products at a single exchange point. Manual trading systems (telephone matching of bids and offers), telephone auctions, teletype auctions, and computerized trading systems were identified as the major types of electronic trading systems.

Eight necessary conditions for success of electronic marketing were identified by Henderson et al. (1976): potentially competitive markets, trader interest, accurate commodity descriptions, high volume (produced, bought/sold), trader education, performance guarantees, grading systems, and large volume trading. In addition, the authors emphasized that commitment to the electronic marketing system is needed by traders and someone must be willing to furnish capital if an electronic system is to be successfully implemented.

The authors anticipated that electronic marketing would enhance pricing accuracy, market coordination, marketing efficiency, and equity and fairness. The authors expected farmers to be the major beneficiaries, but believed consumers should realize long-term benfits from improved allocation of resources and coordination in the industries where electronic markets are adopted. Agribusiness firms would lose to the extent that electronic marketing bypasses existing marketing institutions. However, an aggressive and innovative marketing firm could emerge as a significant benefactor if it takes the lead in developing and implementing an electronic market.

### 1.4.2 Telephone Auction Systems

The first telephone auction of a U.S. agricultural commodity was held in 1963. About a dozen packer buyers from Virginia and surrounding states were connected via a conference telephone call for the sale of Virginia slaughter hogs (Engleman). Since then, telephone auctions have

been used to sell slaughter cattle, feeder cattle, slaughter lambs and feeder pigs (Henderson, 1975). Telephone auctions offer many of the advantages of electronic trading but trading is typically slower and they have less selling capacity than computerized trading systems (Henderson et al., 1979). Nevertheless, the advantages have persuaded even individual producers to start their own (Miller).

Helmreich et al. studied feeder calf teleauctions in Georgia. One hundred fifty lots of feeder calves sold through 12 teleauctions during the year 1979 were included in the sample. When teleauction prices were compared with sale barn prices, the mean teleauction price was significantly greater than the mean sale barn price at the 1 percent level of significance (the actual difference was $4.20 per cwt.). An attempt was made to explain the difference between teleauction and sale barn prices with a regression equation. Sex, weight, load size and breed were found to be significant factors. The coefficient of determination was .28. The authors interpreted the statistically significant explanatory variables as evidence of improved pricing and physical efficiency.

Ward gives the history, procedures, and benefits of the Oklahoma slaughter lamb teleauction. The teleauction was started March 30, 1979 by a producer cooperative (OK Sheep Expansion, Inc.). Since its organization, volume has grown steadily when measured by the number of head sold and the number of consignors. During the first year of operation, prices averaged $3.10 per cwt. above Wichita price and $.20 per cwt. above the San Angelo price (the largest lamb market in the nation).

Ward attributes the favorable price to four factors: truckload sized lots, packers can determine the delivery date, lots are uniform and lambs are fresh, and an increased number of buyers. Ward concludes by saying that the teleauction method enables producers to market lambs in a manner that benefits themselves and buyers simultaneously and provides a competitive market.

### 1.4.3 Teletype Auctions

Somewhere between the teleauction and the computerized trading system in degree of sophistication is the teletype auction. Seller consignments are transferred via a master teletype and electronic broadcast repeater to teletype printers located in buyers' offices. Buyers will then bid during the auction by using the special bid button attachment on their teletype machine (Lowe; Schlei; Peer). The method is generally faster than the teleauction, has the capacity to handle more participants, and produces hard copy to both buyer and seller (Engleman).

The earliest teletype auction was organized by the Ontario Pork Producers Marketing Board in 1961 for selling slaughter hogs. It has a provincial monopoly and utilizes the Dutch (descending) auction method. Hogs are sold on a rail grade basis and verified by a government grader (Peer). Manitoba began a teletype auction for hogs in 1965 (Lowe) and Alberta began in 1969 (Hawkins et al.).

Wen-Fong Lu and Lowe found that mean price levels increased when teletype auctions were introduced in Ontario and Manitoba. Both inter-

preted this as increased pricing efficiency due to enhanced competition. The slaughter hogs were priced closer to their economic value which should provide incentive for resources to be allocated more in accordance with consumer desires. Lowe's research also indicated the teletype auction in Manitoba increased intraday price variability. Chang-Mei Lu confirmed Lowe's research and also found that interday price variability increased. Both hypothesized that a more efficient market would respond to larger quantities of market information in a more rapid manner. Increased interday and intraday price variability would be indicative of increased pricing efficiency. Wen-Fong Lu and Peer found smaller price differences between provinces after the introduction of teletype marketing. As this could indicate increased levels of arbitrage, both felt the findings supported the hypothesis of increased pricing efficiency.

When the teletype auction was first introduced, it represented the state of the art of technology feasible for electronic marketing. Such is no longer the case. With the tremendous advances in technology over the past two decades, computers have gained increasing interest. These technological advances are highlighted by the vast increases in computer capability and reliability and the continuous decrease in real cost. The increasing interest in using computers for electronic trading is exemplified by the devotion of only two paragraphs to telephone and teletype auctions in Schlei's twenty-two page 1980 summary paper on the state of the art in electronic marketing.

### 1.4.4 Computerized Trading Systems

Ethridge documented the development of Telcot -- the first computerized market for a U.S. agricultural commodity. Telcot was initiated in 1975 by the Plains Cotton Cooperative Association (PCCA). During the 1979-80 season, Telcot handled more than 1.7 million bales (approximately 11% of the U.S. cotton crop). Nearly 270 gin offices and 40 buyers had terminals. At the beginning of the 1980-81 seasn, there were 350 seller terminals and 55 buyer terminals (Schlei). According to Ethridge, there was limited availability of market price information and a limited degree of buyer competition at the local level before Telcot.

Telcot offers the cotton producer three ways to sell his cotton: forward contracts, regular offer, and firm offer. The forward contracts are acreage contracts at a designated price per pound of cotton produced. The prices are usually quoted in terms of cents above loan value to allow for quality variation. Under the regular offer system, the producer obtains PCCA's estimate of asking price for his particular grade of cotton before deciding to sell. If he decides to sell, bidding is opened for 15 minutes. If the high bid is within $.0025 per lb. of the asking price, the cotton is automatically sold. If the high bid is not within $.0025 per lb. of the asking price, the producer can still accept but must do so within 15 minutes. The computer then prints invoices for both buyer and seller. Under the firm offer system, the producer specifies the price which he will accept. The cotton is sold to the first buyer willing to meet the price. The computer again prints invoices for buyer and seller.

The initial cost for Telcot's computer was about $1 million. Although the cost of software development has not been quantified, the software cost could exceed $1 million. The costs of operating the system are covered by a $1 per bale fee which subscribing gins pay for all cotton they sell and a $500 per month lease which subscribing merchants pay for their terminal, line cost, etc.

Ethridge identified three necessary conditions for successful implementation of an electronic market. These are: a standardized grading system which is acceptable to both buyers and sellers; sufficient volume to make the system cost efficient; and a large amount of capital to get started. Ethridge believes electronic marketing has more potential for improving pricing efficiency than technical efficiency. However, operational efficiency could be improved by making assembly more efficient and by decreasing the number of workers needed to carry out some of the marketing functions. The major gains in pricing efficiency would come through improved market information and decreased local market isolation.

Henderson et al. (1979) reviewed theoretical implications of electronic markets, the experience with electronic marketing, and empirical evidence to date with regard to pricing efficiency, operational efficiency, and industry structure. Based on their theoretical arguments they would expect the widespread use of electronic marketing to result in: (1) improved pricing efficiency, (2) greater operational efficiency, and (3) a reduced rate of economic concentration and integration.

The authors reviewed past experiences in electronic marketing and the limited empirical work that had been done, much of which has been previously covered in this literature review. Supporting evidence was provided for the hypothesis that increased competition leads to greater price variability. An analysis of Urner Berry egg prices reports (a benchmark for privately traded egg prices) both before and after the introduction of electronically traded eggs by Egg Clearinghouse, Inc. (ECI) was performed. A summary of their results appears in Table 1.1. Not only were the short run standard deviation of prices[4] and the frequency of price changes larger for ECI prices, but also the introduction of ECI appears to have raised both the short run standard deviation of prices and the frequency of price changes for the Urner Berry price reports. Table 1.2 illustrates the fact that ECI prices tend to lead Urner-Barry price changes as far as six days in advance. It should be noted that ECI appears to have had these price effects while only representing 2-3 percent of the negotiated egg sales. The authors, however, did not indicate if either the standard deviations or frequency of price changes was significantly different across time.

Glazener did a feasibility study of computerized spot markets for feeder cattle in Texas -- later called the CATTLEX system. She surveyed 1,503 cow-calf producers in Texas to determine their interest in electronic marketing. Based on these surveys, she estimated that 14-18 percent of the producers would use a computerized trading system producing an annual volume of 1.2 to 1.5 million head of cattle and calves. The

Table 1.1 U.S. Grade A Large White Egg Price Behavior (Henderson et al., 1979)

| | Urner-Barry Price Reports | | ECI Prices |
|---|---|---|---|
| | 1969-72 | 1974-78 | 1974-78 |
| Average Price Change (cents per dozen) | 1.16 | 2.32 | 2.18 |
| Frequency of Price Change[a] | .347 | .481 | .687 |
| Short Run Standard Deviation in Prices[b] | 2.09 | 2.19 | 2.47 |
| Long Run Standard Deviation in Prices[c] | 8.03 | 8.46 | 8.43 |

[a]Calculated by dividing the number of changes in the reported prices by the total number of prices quoted.

[b]Calculated on a four week moving average, in cents per dozen.

[c]Calculated across all observations, in cents per dozen.

Table 1.2 Lead-Lag Relationship Between Urner-Barry Egg Price Reports and Egg Clearinghouse Prices for Grade A Large White Eggs, 1974-78 (Henderson et al., 1979)

| Number of Days ECI Advanced Over Urner-Barry | Correlation Coefficient | Number of Days Urner-Barry Advanced Over ECI | Correlation Coefficient |
|---|---|---|---|
| 0 | .916 | 0 | .916 |
| 1 | .900 | 1 | .848 |
| 2 | .822 | 2 | .735 |
| 3 | .712 | 3 | .621 |
| 4 | .599 | 4 | .525 |
| 5 | .506 | 5 | .462 |
| 6 | .442 | 6 | .423 |

strongest resistance from producers arose from grading and commingling issues.

After studying alternative computer systems, Glazener determined a large mainframe computer connected to outlying cathode-ray tube terminals by dedicated phone lines was best. The computer costs for the estimated volume levels ranged from $.19 to $.36 per head. In Glazener's words, these estimated costs appear to make the computer system cost feasible without consideration of potential additional benefits of increased market competition, information and efficiency.

Sporleder elaborated on the CATTLEX system at the national symposium on electronic marketing one year later. Glazener's suggestion regarding system configuration was followed. It was decided to use an English (ascending) auction. Each lot would be offered for 16 minutes with bidding occurring on 8 lots simultaneously. Producers have the option of using a reservation price and can reoffer lots for five consecutive sale days. When lots are sold, the computer prints a confirmation of sale for both buyer and seller.

Under the CATTLEX system, producers with less than truckload lots of cattle to offer, deliver their cattle to an assembly point before they are offered for sale. Producers with truckload sized lots will be able to sell while the cattle are still on the farm. Market information by location, grade, weight, sex and/or age is be available for all participants.

Sporleder identified two necessary conditions for the system to be successful. First, the descriptions of the cattle must be accurate and must be acceptable to both buyers and sellers. Secondly, trader performance is critical. Sellers must deliver the cattle when sold and buyers must accept delivery. Sporleder believes the potential to benefit the feeder cattle segment through electronic marketing is significant. However, only time will tell how acceptable electronic marketing is to the feeder cattle trade in Texas.

Engelman et al. did a feasibility study on using electronic marketing for the wholesale meat trade. They emphasized the increased concern as formula trading has grown at the expense of negotiated transaction prices. As increased formula trading is used in contracts for future sales and purchases, it becomes increasingly difficult to ascertain the value and accuracy of market information. The opportunity for price manipulation increases. After reviewing the successes of electronic marketing (particularly computerized trading systems) and computerized information systems, they examined the characteristics of the meat market. Meat is a high value, perishable product that is already sold by description in a national market. They conclude that the wholesale meat market appears to be well suited to electronic marketing and electronic marketing appears to have the potential to alleviate some of the concerns about the increased use of formula trading.

Albanos and Curtin explained the Computer Assisted Trading System (CATS) at the national electronic marketing symposium. The system, de-

signed to sell wholesale meat, utilizes General Electric's MARK II time sharing network. Initial charges range from $10,000 for a firm with $2 billion in total sales to $500 for a firm with $1 million in total sales. Terminal cost will be $300 a month and time sharing cost will range from $25 to $50 an hour. It was estimated that CATS will cost a large trader about $30,000 per year.

The CATS system divides the country into 10 regional markets which operate simultaneously and independently. Bids and offers are displayed but the computer does not declare sales. Potential traders will contact each other privately through the system for further negotiations. When a sale is consummated, only the final price, volume, and terms of trade will become public. Albanos and Curtin indicated the system could become operational if about 15 large companies decided to use the system. At the time of the symposium, about half of the needed companies were in some version of acceptance.[5]

Schrader reported on Egg Clearinghouse, Inc. (ECI) and its use of a computer in trading nest run eggs. ECI initially began using a computer to compute freight adjustments but is now using it in a bid-offer trading system. With the aid of a USDA-AMS grant, 46 terminals were in use by the end of 1979. However, traders were using the terminals to determine their best alternatives and then telephoning operators at ECI to accomplish trades. Schrader indicated the system would have to be modified to discourage the practice.[6] Trading volume increased from 1972 through 1977, dropped in 1978, and increased again in 1979. Schrader

concluded by saying, "The rules of the game are vastly more important than the gadgets. Payment terms, quality assurance and trading the 'right' products are critical. The exchange must perform a function in the market channel other than the generation of information."

Baldwin explained the Hog Accelerated Marketing System (HAMS) to be used in marketing slaughter hogs in Ohio. The system utilizes a mini-computer with buying and selling terminals connected via dedicated telephone lines. The system has the ability to sell using firm offer, ascending and/or descending auctions. Terminals were located at 17 Producers Livestock Association (PLA) marketing yards, 10 farm sites, and 20 packing plants. USDA grades for slaughter hogs were refined to give more detailed descriptions. The per head computer cost was estimated to be $.65 if annual volume was 500,000 head and $.30 if annual volume was 1.2 million head. This would make the total marketing cost paid by the producer $1.16 to $2.10 per head depending upon volume. Baldwin believed that the system would reward farmers for good breeding and production practices but would probably bring more price variation as the market becomes more discriminating regarding the value related characteristics of a particular set of hogs.

Henderson et al. (1981) reported on the HAMS project at the end of the experimental period. HAMS was operational for 31 weeks - from November 10, 1980 through June 12, 1981. During this period, almost 190,000 head of market hogs were sold averaging about 1,300 head per day. At this volume, marketing costs including yardage, handling and

computer systems were in the $2.60-$3.10 per head range. Had volume reached the 3,600 head per day hoped for, marketing costs would have ranged from $1.25-$1.50 per head which would have been lower than conventional auction and terminal auction costs.

Prices on the electronic exchange were consistent with theoretical expectations. The price of hogs traded over HAMS averaged $.18 below Peoria quotes when normally Ohio hog prices are $.80 to $1.10 below Peoria. In 9 of the 31 weeks, prices were actually higher than Peoria. The authors did not indicate if the differences were statistically significant. For 5 weeks immediately following the experiment, Ohio hog prices averaged $.19 below their historic relationship with Peoria -- a loss of $.91 per cwt. Prices also reflected operational efficiencies. Lots of 50 head or more received an average price advantage of $.56 per cwt. over smaller lots while on farm sales averaged $.50 per cwt. more when compared to all sales. Pricing accuracy was reflected in a $.505 per cwt. differential between grades. Out of 52 detectable inflection points in price trends in the eastern corn belt, HAMS' prices led 13 times, occurred concurrently 32 times, and lagged only 7 times. Interday variability within the week was larger in HAMS than in the private treaty market prior to the introduction of HAMS.

Despite apparent price advantages, the project did not attract sufficient sales volume to maintain long term buyer interest or to allow the system to operate on a commercial basis. A more complete assessment of participant attitudes is in progress.

### 1.4.5 Electronic Marketing in Virginia

Conference telephone auctions began in Virginia (Davis; Engleman) and have since been used to sell slaughter lambs, feeder pigs, slaughter hogs, feeder cattle, and slaughter cattle in the state. Holder assessed the benefits of the sheep and lamb teleauction in Virginia and West Virginia. Comparing lamb prices before and after the introduction of the teleauction by using two different single equation econometric models, he found the teleauction raised the entire price structure for Virginia/West Virginia prime and choice lambs between $.70 and $1.53 per cwt. depending on the model used. He attributed this increase to five major reasons: more buyers; buyers can bid from their offices; lambs move in efficient truckload units; buyers receive fresher lambs; and producers have more control. In summary, Holder felt the teleauction had an effect on operating efficiency, pricing efficiency, market power and producer control.

In June, 1978 the Virginia Department of Agriculture and Consumer Services in cooperation with the Cooperative Extension Service at Virginia Tech, submitted a project proposal to USDA-AMS. The project's objectives were:

1. To develop the local and statewide organizations to operate a centralized electronic marketing system,
2. To develop operating procedures between buyers, sellers and a central electronic marketing association that would be responsible for slaughter cattle and cows,

3. To identify the benefits and costs of an operating state-wide central electronic marketing system, and
4. To evaluate the feasibility of alternative computer systems for centralized electronic marketing of livestock.

The project was funded. Based upon the early completion of objective four and the promising outlook for computer sales, a supplement to the original project was submitted and funded. The primary objective of the supplemental proposal was:

> To plan, oversee, guide and conduct a six-month trial period involving sales of slaughter cows and market lambs over a computerized electronic marketing system. The two tests will be conducted concurrently.

Later funded projects included as objectives the further expansion, education and promotion of electronic marketing.

As part of the original project, Russell and Purcell administered a mirror-image[7] survey to 83 Virginia slaughter cattle producers and 20 Northeastern packers. Areas of agreement and disagreement along the interface were examined. Based upon this study, the computerized system was designed. Details of this process will be covered later in Chapter III. However, the study did suggest six steps that should be followed when introducing an electronic system for cattle in the southern and eastern states. They include:

1. Mirror-image surveys should be used to examine areas of agreement and disagreement along the marketing continuum.
2. Present auction markets should be involved.

3. The electronic system should be operated by a private non-profit group with a board of directors which represents the producer groups and marketing agencies who will use the system.
4. The electronic system must be capable of operation at relatively low per unit costs.
5. Early educational effort should stress the implications of thin markets and the ability of electronic markets to add more buyers.
6. Efforts should be made to establish a coalition of interests and to involve potential participants early in the development process.

Chieruzzi compared the costs of computerized and conventional auction marketing systems for slaughter cattle in Virginia.[8] She examined aggregate total slaughter cattle marketing costs and cash costs incurred during the sales across scenarios where nine, sixteen and forty-one markets participated. Under these scenarios, the computerized auction became advantageous when 14 percent, 9 percent, and 9 percent of the state's cattle were sold by way of computer, respectively. Comparison of cash expenses required the making of many assumptions -- head sold per week, sale days per week, number of seller terminals, number of buyer terminals, connect time per lot and lot size, etc. Making reasonable assumptions regarding these parameters when selling slaughter cows, she determined the breakeven point for cash expenses was slightly more than 4,200 head per week.

Chieruzzi concluded that total marketing cost for slaughter cows is generally lower for computerized sales (assuming a minimal volume) than for conventional auctions. However, most of the cost savings accrue to the packer buyer by avoidance of expensive travel. She attributes much of these results to the fact that cull cows would be traded in such small lots. She further suggests that the comparative cost advantage of computer trading would be much greater in livestock such as slaughter lambs or feeder pigs.

The articles reviewed illustrate many of the benefits of electronic marketing as well as many of the obstacles which will impede successful implementation of electronic marketing systems. Most authors agree that electronic marketing has the theoretical potential to increase pricing and technical efficiency in many circumstances. Studies of electronic systems have generally supported these theoretical expectations. However, the writings also suggest that electronic marketing is not feasible in all circumstances and that some industry interests may oppose electronic marketing.

As this literature review exemplifies, the research in electronic marketing is just beginning. Computerized marketing is relatively new and recent interest in thin markets merely fuels debates. It may be many years before all of the questions about electronic marketing are answered, but recent technological advances and federal funding for pilot projects give an unparalleled opportunity to begin serious inquiry.

## 1.5 OBJECTIVES

The objectives of this study are:

1. To build a theoretical base from which the broad issues of electronic marketing may be examined.
2. To conceptualize, articulate and illustrate the issues involved in determining the feasibility and design of an electronic marketing system.
3. To examine the costs of electronic marketing both theoretically and empirically.
4. To explore the relationships between price level and variability and electronic marketing.
5. To demonstrate, theoretically and empirically, a means of evaluating an electronic marketing system.

## 1.6 THE FORMAT

Chapter I is designed to set up the problem, state the working hypothesis and objectives of the paper, give the format of the paper, and review the relevant literature. The literature review in this chapter is designed to give a broad perspective. Additional literature will be discussed in following chapters.

Chapter II is designed to give a theoretical base upon which to build. More specific theoretical arguments will occur in later chapters. Chapters III through VI are concerned with system feasibility and design, cost, price, and evaluation aspects of electronic marketing, respectively. Each will include theoretical and empirical work as well as citing any relevant literature. Chapter VII will summarize the previous six chapters.

## 1.7 FOOTNOTES

[1] It is important to make the distinction between an electronic marketing system and an electronic information system. The former utilizes the electronic medium as an arena to consummate trades. The latter utilizes the medium as a vehicle to transfer information. In an information system, trades will be completed via some other system, medium, or vehicle.

[2] Technical efficiency is concerned with the ability of the marketing system to move the raw product to the finished consumer good with the lowest possible marketing cost. It is an output/input relationship with a higher ratio indicating greater efficiency (Purcell, 1979; Kohls and Downey).

[3] Pricing efficiency is concerned with the ability of the marketing system to provide to the consumer the product in the time, form, and space he or she desires. It is a measure of the responsiveness of the marketing system to consumer direction (Purcell, 1979; Kohls and Downey).

[4] The authors are using the short run standard deviation of prices as an indication of price nervousness. Price nervousness is defined as price variability around a general point of market equilibrium rather than instability of market equilibrium prices over time (Henderson et al., 1979).

[5] Early in 1981, USDA-AMS funded an experimental test of the system. As of September 9, 1981 there are still problems in gaining the necessary volume to make the system feasible.

[6] USDA-AMS did not continue funding after December 31, 1980 because of the disappointing volume.

[7] A mirror-image survey involves the use of paired questions to examine key areas of concern along two related stages of economic activity in a marketing system. A more detailed discussion is given by Purcell (1973).

[8] The computer program used in Virginia was originally written in ALADDIN because of the nice debugging properties the language possesses. As programs were debugged, they were gradually rewritten in FORTRAN (a much more efficient language for operational purposes but more difficult to debug). This conversion process was about 50% complete when this study was done, which means the computerized costs were biased upward.

# Chapter II

# THEORY

## II.1 INTRODUCTION

Many alternative paths could be followed in developing a theoretical base from which to examine electronic marketing. It could be approached from a welfare economics, financial investment, behavorial, or technological viewpoint. This chapter will concentrate on the theoretical relationships between electronic marketing and marketing efficiency, although different orientations will be alluded to in this and other chapters.

Kohls and Downey define agricultural marketing as the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production until they are in the hands of the ultimate consumer. Breimyer (1973) defined agricultural marketing as everything that happens between the farm and consumer. I shall use the definition advocated by Purcell (1979) that agricultural marketing is the set of economic and behavioral activities that are involved in coordinating the various stages of economic activity from production to consumption. Also, the approach throughout the text will use a systems orientation recommended by Purcell (1979), Codwin and Jones, Shaffer, and Kohls.

In this chapter, an ideal marketing system will first be examined. This will be followed by some common system shortcomings including a brief literature review on thin markets. Possible solutions to these marketing problems will then be examined. Next, the theoretical implications of electronic marketing regarding both pricing and technical efficiency will be covered.

## II.2 THE IDEAL

A marketing system may be defined as a system of interrelated economic activities. These activities are sequential (Breimyer, 1976; Kohls and Downey) and need to be coordinated (Kohls and Downey; Purcell, 1979) if commodities are to move from producer to consumer in an orderly fashion. A number of mechanisms exist to achieve this coordination. Price is a major coordinator for most U.S. agricultural commodities (Tomek and Robinson). Managerial direction is used in vertically integrated industries and state direction is used in socialist countries.

The economic stages of activity in a marketing system are graphically depicted in Figure 2.1 (Breimyer, 1976; Purcell, 1979). The arrows indicate the sequential nature of product flows. The economic stages of activity are also depicted in Figure 2.2 except the arrows now indicate the multidirectional informational flows needed to coordinate the system.[9] An outside information base is used to illustrate the informational interactions between the marketing system and other forces

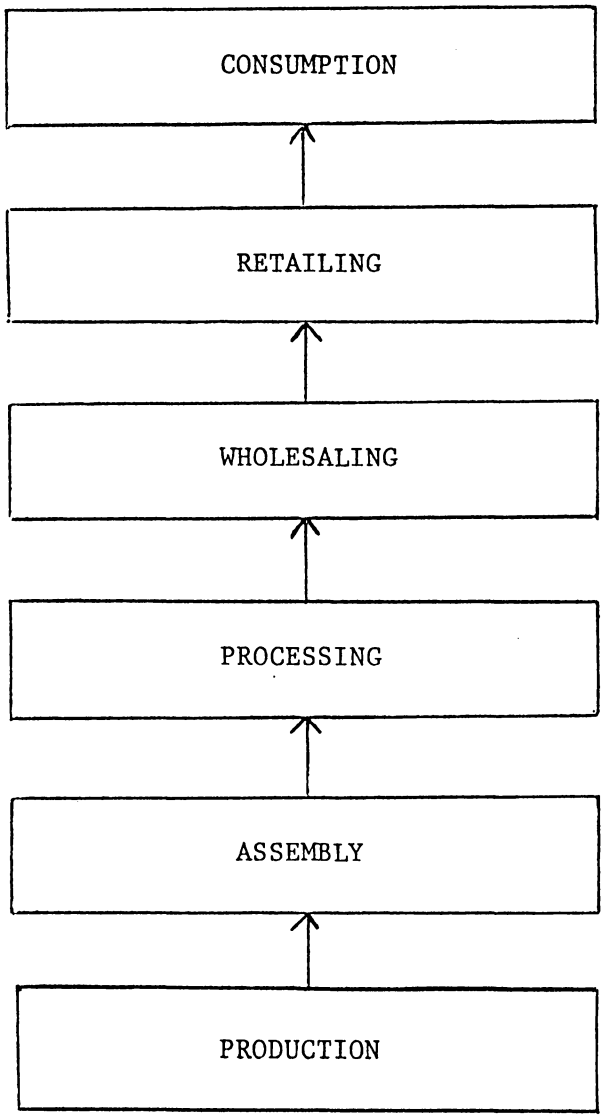


Figure 2.1 Economic Stages of Activity in a Marketing System with Arrows Indicating Sequential Nature of Product Flows

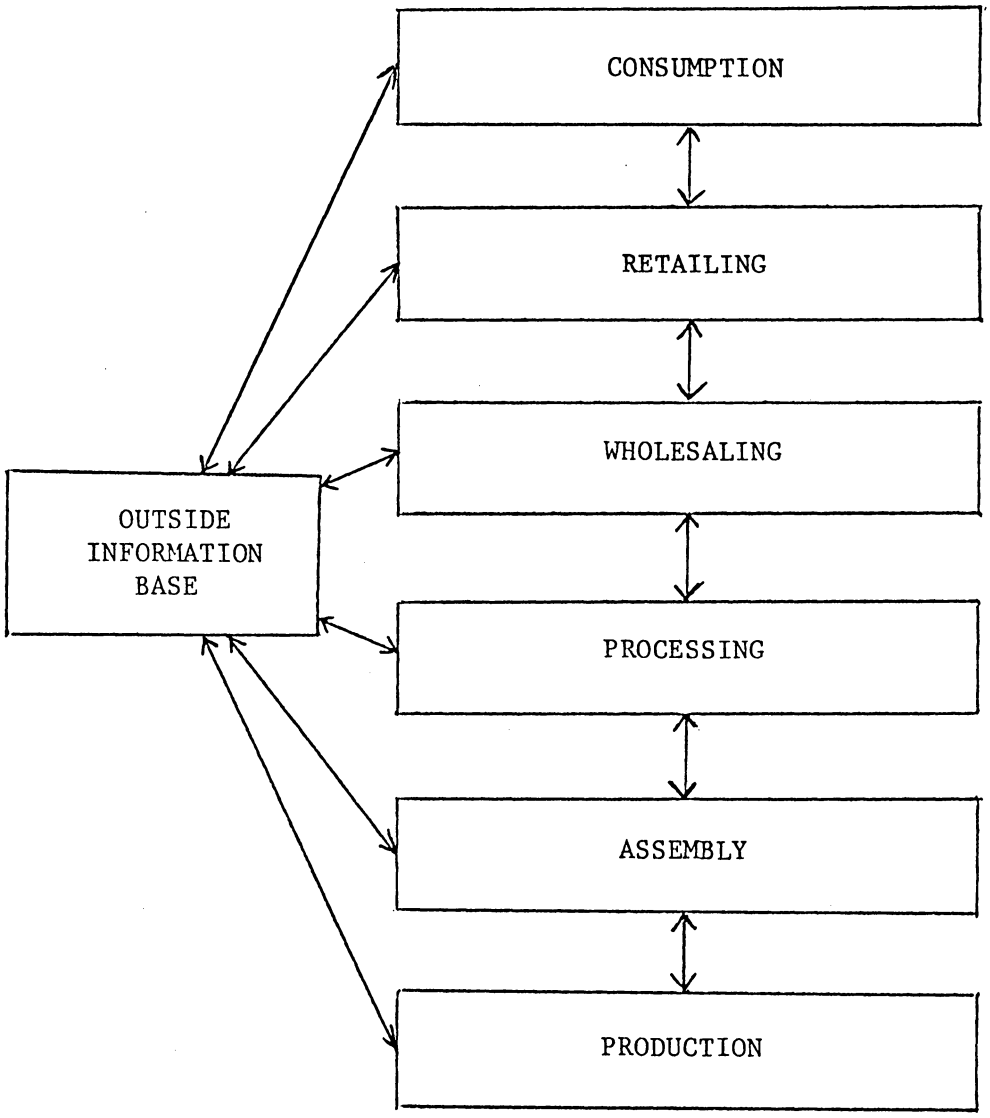


Figure 2.2 Economic Stages of Activity in a Marketing System with Arrows Indicating Multidirectional Information Flows

outside its boundaries -- government and other marketing systems, for example. All marketing systems will not possess all of the economic stages. Some commodities may not need processing. Other commodities may be assembled at the production level. The stages may even be different for the same commodity produced at spatially separate locations.

Regardless of the number, type, or organization of a particular marketing system's economic activities, the marketing system must achieve high levels of vertical coordination if it is to approach some conceptual ideal (Purcell, 1973). Knowledge of the economic environment, effective communication, and the presence of economic incentive are all necessary for high levels of coordination along the vertical continuum (Purcell, 1979). The failure of technically related market participants to coordinate economic activities will create inefficiencies. The presence of effective coordination should benefit all, as each could receive economic reinforcement from decisions made which are more in tune with system needs.

To achieve high levels of vertical coordination, system participants must be well informed and have the ability to react to differing market signals. This implies that market information must be transmitted in a clear, accurate, and timely manner. Interlevel goals should be as harmonious as possible. Market power along the interface should balance (or at least differing levels in power should not be exploited). Action should not be unduly impeded by artificial restraints.

An ideal agricultural marketing system is both technically and price efficient. The product moves smoothly from producer to consumer with the use of the fewest possible inputs for a given level of output. Information flows freely up and down the continuum, is understood by all participants and is acted on at each economic stage by well informed decision makers. In addition, the system freely exchanges information with relevant parties outside its system boundaries. It is responsive to consumer direction and allocates resources accordingly. In short, it supplies the consumer the product in the form, time and space he or she desires at the lowest possible cost.

## II.3 COMMON SYSTEM SHORTCOMINGS

Unfortunately, the ideal system above has never existed and will not exist in the foreseeable future. Technical and pricing efficiency may be competing objectives in some circumstances. An industry with large economies of scale and few participants could be one example. Cost savings will accrue to large firms but a decrease in the number of firms may lead to undesired monopolistic practices. Formula trading may provide another example. Formula trading is a cost efficient method of forward pricing but as the number of negotiated trades falls, questions may be raised about the value and quality of market information. Inadequate market information, unequal bargaining power, interlevel goal conflicts, and ignorance will all impede marketing efficiency. Recently, increasing interest has concentrated on the thin market phenomenon and its impacts on marketing efficiency.

### II.3.1 Thin Markets

Thin markets are generally characterized by low trading volume and low levels of liquidity in which individual offers to buy or sell can exert undue influence on price or other terms of trade (Hayenga et al.). A market may be thin because of a limited number of transactors, scale economies or diseconomies, and/or a high cost of arbitrage over space or time (Caves). Vertical integration and long term contracts (especially formula trading) are often involved. Thin markets do not necessarily result in unsatisfactory market performance. However, concerns are often voiced regarding the potential for price manipulation, the quality of market information, the representativeness of transacted and reported prices, and the risk of not having sufficient buyers or sellers at any particular time to ensure an equitable price (Hayenga).

Probably no commodity has gained as much attention regarding thin market concerns as the carcass beef market. Reports by the U.S. General Accounting Office and the U.S. House of Representatives both expressed concerns regarding the reliance on formula trading and the potential for price manipulation. However, significant market failures, whether price manipulation or the inappropriateness of reported prices have not been found (Rhodes). Yet, charges and counter charges continue to abound.

The wholesale beef market is not the only agricultural market considered to be thin. Eggs, broilers, butter and cheese, pork, and some of the fruit and vegetables provide other examples (Hayenga). The de-

gree of concern about these thin markets again varies tremendously across individuals and commodities.

It should be remembered that a market does not have to be thin at the national level for spatial concerns to exist. Holder reports that one buyer bought seventy percent of all lambs sold in Virginia and West Virginia during the years 1969 and 1970. Spatial problems may be even more severe at the local level for some situations. A local auction market, selling slaughter cows, provides an example. A small graphically isolated market may have a difficult time attracting sufficient buying power for a truly competitive environment. Producers, typically selling small lots of cows, feel they cannot afford to transport them to a more competitive environment. The cows may be sold at discounted prices, assembled into larger lots, and transported to larger auctions for resale. Such practices may help explain why Virginia cow prices average $2.00 per cwt. below the national price even though it is a deficit state in terms of beef production[10] (Russell and Purcell).

### II.3.2 Other Reasons for System Shortcomings

Thin markets are not the only cause of imperfect interlevel coordination. Conflicting goals between technically related economic levels, which extend beyond the normal buyer-seller conflict, will not be conducive to effective coordination (Purcell, 1973). The goals of a hobby farmer may conflict with the goals of a profit maximizer at the next

level in the marketing continuum. Similarly, the lack of effective grades which identify important value-related characteristics of the product will hinder the transmission of clear, accurate and effective price signals from consumer to producer.

Participants in the marketing continuum need to be well informed about what is going on in both the horizontal and vertical dimensions of the marketing system. Failure to be well informed increases the likelihood decision makers will send false signals to others, fail to receive signals and/or misinterpret signals sent to them. This is especially true in a time of highly variable prices which can "hide" price signals and lead to decreases in the levels of vertical coordination which is achieved. Unequal bargaining power, unequal access to information, and inadequate information also can foster inefficiencies in the marketing system.

This is certainly not a complete enumeration of things that may cause a lack of coordination in the marketing continuum. One would have to examine the fields of psychology, sociology and others as well as economics to approach a complete enumeration. The discussion here has focused on some of the more important and widely discussed sources of market imperfections with the purpose of establishing a framework within which the implications of electronic marketing can be examined. Emphasis will be on how and why electronic marketing could contribute to solution of some of the highly visible market problems, given that moves

to an electronic marketing system is but one of many ways to attack barriers to vertical coordination in our marketing systems. However, other proposed solutions will be discussed, so that a careful examination of possible solutions can be made.

## II.4 PROPOSED SOLUTIONS

### II.4.1 Vertical Integration

Trifon defined vertical integration as the ownership or control by one company of enterprises in different stages of production or distribution, where each stage yields a salable commodity. One of the major incentives to vertically integrate is the failure of the marketing system to coordinate the different levels in the marketing continuum. Caves lists six reasons or incentives for firms to vertically integrate. They are: transaction costs, heterogeneous preferences of buyers, access to information, risk aversion, lender's risk, and avoiding or promoting noncompetitive prices.

Purcell (1979) gives five economic motivations for vertical integration:

1. The ability to control the rate and timing of raw material and product flows.
2. The ability to control quality.
3. The direct contact with the consumer market, which can help to eliminate or reduce the time lag in adjusting production to changes in consumer buying patterns.

4. The elimination of part of the moving, hauling, handling, and transferring that occurs in an exchange system.
5. The reduced costs, due to increases in both technical efficiency and communication, which can accompany a move to integrated structures.

Purcell also listed barriers to vertical integration which include the large capital requirements, legislation that hinders mergers and acquisitions, public attitude towards corporate giants, and insufficient management ability to visualize and manage a large scale integrated operation.

Studies have been completed which indicate that vertical integration can decrease the total marketing bill (Nelson; Williams and Farris). Authors hint that when the interface between stages in the system is characterized by oligopoly-oligopsony or bilateral monopoly, public interest may be increased by vertical integration (Hoffman; Knutson; Nicholls). Market risk should be lowered along an integrated continuum and, in almost all cases, increased interlevel coordination is not only possible but likely.

Vertical integration is not a panacea for all marketing ills. Important marketing information can be removed from public scrutiny. Some of the thin markets of today, discussed earlier, are the direct result of increasing levels of vertical integration (Duffy; Newsome; Schrader, 1979). Monopolistic power may be increased through vertical integra-

tion.[11] Industries which integrate vertically may form conglomerates with huge economic networks. Caves questions whether the private gains which spur vertical integration also create social gains or externalities costly to society.

### II.4.2 Contractual Arrangements

Contractual arrangements may increase vertical coordination, lower marketing risks, and decrease transaction costs. Market-specification, resource-providing, management and income-guaranteeing contracts (Kohls and Downey) approach vertical integration and as such will not be discussed in this section. Forward pricing arrangements which utilize a specified price or a price based on the future value of some third report or series (formula pricing) are widely used. The contracts may be either negotiable (futures contracts trading on organized exchanges, for example) or nonnegotiable. Price might not be the primary objective. Firms may use contracts to guarantee quality and volume of a particular input or sales volume and market share of a particular product. Contracts may be used to decrease financing costs or to attract additional capital. With the many and varied purposes for which contracts may be used, it is not surprising to note the increasing utilization of contractual arrangements along the interface in the marketing continuum.

Like vertical integration, contractual arrangements may also create concerns. The potential loss of market information to other market par-

ticipants and to the public is one concern.[12] Another concern focuses on the potential use of contracts to either gain monopolistic power or exploit already held power. As with vertical integration, a comparison of private benefits, system benefits, and social benefits and costs is needed to truly assess the effects of the increasing use of contracts. Theory will give insight but only empirical work can provide the answers.

### II.4.3 Improvements in Price Reporting

Various ways of improving price reporting systems have been recommended by a number of interests. Debate has been especially strong in the wholesale carcass beef industry where concern has been expressed about the representativeness of price reports published by the National Provisioner with what has become known as the Yellow Sheet. Seventy percent of the steer and heifer and carcass beef sold is tied to the Yellow Sheet prices while trades reported to the Yellow Sheet represent only about 2 percent of all volume (Rhodes, 1979). As yet, no statistical proof has been found that the National Provisioner has misreported prices or that the average negotiated price was significantly different from either the Yellow Sheet price or formula prices (Rhodes, 1979).

The absence of statistical proof in beef or other industries does not lessen the theoretical arguments for improving price reporting. Mandatory reporting, mandatory response, and mandatory confirmation (li-

censing) have all been suggested at one time or another. Drastic changes such as banning formula trading and minor changes such as improving information on volume and price dispersion have been proposed. Grades which accurately reflect value related characteristics of the product are essential for good price reporting.

Improvements in price reporting systems should improve pricing efficiency in the marketing systems.[13] As participants receive more accurate and timely market information, communicative efficiency increases. Imbalances in the information possessed by different levels in the continuum decrease. The number of erroneous reactions to incomplete and/or inaccurate market information should fall. In short, the consumer should be more able to receive the product in the time, place and form he or she desires.

The consumer may not receive the product at least cost, however. Many of the improvements suggested to improve price reporting systems do not come without costs. Increases in technical efficiency may come with decreases in pricing efficiency. For example, formula pricing lowers both the cost of searching for information and transaction costs, which can increase technical efficency, but the use of formula pricing by large numbers of traders may lower the value and reliability of market news and decrease pricing efficiency. Hence theory cannot provide definitive answers to questions of whether selected changes should be made. If the benefits of improving the pricing system are larger than the

costs, it should be adopted. If not, the improvements should not be made. But the benefits and costs are often difficult to measure or quantify.

### II.4.4 Legislation, Research, Teaching and Extension

It may seem unusual to group research and legislation in the same section. They should, however, go hand-in-hand. Poorly written, poorly timed, or poorly conceived legislation can introduce system inefficiencies. Legislation written with overdue regard for politically powerful special interest groups or specially timed for political expediency can be disastrous. The political process is necessary to determine the value judgments which economics cannot or should not decide. However, legislation should still be written in a logical and systematic framework and based upon the best available information. Research is critical in such a process.

Research can also be directly useful to system participants -- especially when communicated effectively by a good teaching and extension effort. An improved understanding of the marketing system will increase system efficiencies. Production, assembly, processing and transportation can and has become more efficient through research, teaching and extension. Continued investments in research, teaching and extension should continue to improve pricing and technical efficiencies for agricultural marketing systems.

## II.5 ELECTRONIC MARKETING AND TECHNICAL EFFICIENCY

By not requiring the physical presence of buyer, seller and product to consummate a trade, electronic marketing may offer the opportunity to reduce the total marketing bill for the product being electronically traded. Technical efficiency can therefore be improved by reducing the costs of marketing. Transportation costs can be reduced by providing a more direct route between buyers and sellers. Transaction costs should be reduced by allowing buyers to bid at their home offices, producing time, travel, salary and/or commission savings. Assembly costs would likely fall with the selling of efficient size units. These factors could and probably would be accentuated in small spatially separated markets. In such cases, one could also see a reduction in the number of ownership transfers and cross-hauling with the associated costs.

With computerized marketing, other cost savings are possible. The vast and increasing ability of computers to accept, process and store large quantities of information allow it to perform other functions as well as trading the commodity. Participants in the system could utilize the computer to handle their accounting needs. Bills, statements, checks, invoices and contracts can all be printed quickly and easily -- lowering both personnel needs and the probability of mistakes being made. Market news can be distributed via the computer terminals at low cost since the data can be accessed selectively. Market analysis information can be generated quickly, accurately and efficiently. The myriad

of alternative uses is constrained only by the programmer's imagination and ability and development costs.

Electronic marketing does involve additional costs which must be compared with the benefits produced before definitive statements can be made regarding technical efficiency and electronic marketing. Increased telephone expenses, the cost of developing and maintaining software, hardware costs (buying, leasing, and/or time-sharing), office space and/or additional personal may be involved, depending on the type and size of system involved.

For electronic marketing to increase the technical efficiency of a marketing system, the associated benefits must be greater than the associated additional costs. Theoretical analyses will not tell if electronic marketing increases technical efficiency. The answer (to be determined empirically) will be dependent upon the current marketing system and the particular electronic system used for comparison. However, since most of the authors mentioned in the literature review at least assumed it was possible for electronic marketing to be cost efficient, I shall assume likewise for the remaining portion of this section.[14]

The distribution of cost savings and possible cost increases along the vertical continuum is important. Even though a particular electronic system may reduce the total marketing bill, those savings may not be evenly distributed among participants. There might be cost increases for some participants. Chieruzzi indicated that most cost savings ac-

crue to the buyer. Such an argument is intuitively appealing when one considers the savings from more direct transportation routes and from allowing the buyer to place bids from his or her home office. Whatever the case, the distribution of marketing costs will be important in system design and in establishing fee structures.

Figure 2.3 illustrates the effects of an increase in technical efficiency created by electronic marketing throughout the marketing continuum assuming benefits initially accrue to the wholesale level and constant marketing margins. Let D = demand, S = supply, Q = quantity, UT = unit of time, and P = equilibrium price. The superscripts F, W, and R refer to the farm, wholesale, and retail levels respectively. Demand is primary at the retail level with wholesale and farm demands derived. Similarly, supply is primary at the farm level with wholesale and retail supplies derived.[15]

Before the introduction of electronic marketing, equilibrium quantity is $Q^F$ with equilibrium prices at $P^R$, $P^W$ and $P^F$. With the introduction of electronic marketing, assuming it increases technical efficiency and these benefits accrue at the wholesale level, the supply curve at the wholesale level will shift downward and to the right to $S^{W'}$. Since supply at retail is derived from supply at wholesale, the shift from $S^W$ to $S^{W'}$ will be accompanied by a shift from $S^R$ to $S^{R'}$. Supply at the farm level will not be affected by shifts in supply above it because it is the primary supply. Wholesale and retail supplies are derived from

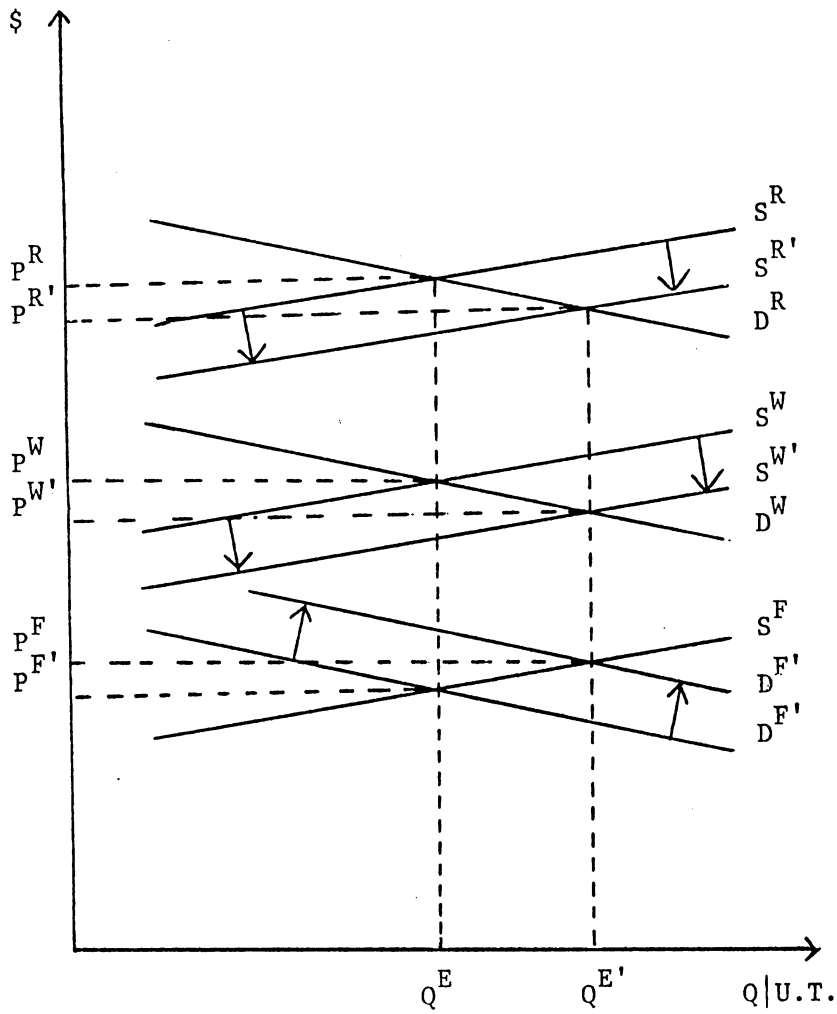


Figure 2.3 Effect of an Increase in Technical Efficiency at the Wholesale Level on Equilibrium Price and Quantity, Assuming Constant Marketing Margins

farm supply and not vice versa. Since demand at the farm level is equal to the maximum price that can be received at the retail level minus the minimum price at which other resources would be provided, $D^F$ will shift upward and to the right to $D^{F'}$. The new equilibrium prices are $P^{R'}$, $P^{W'}$, and $P^{F'}$.

Theoretically, electronic marketing should increase equilibrium quantity and price at the farm level while decreasing price at the wholesale and retail levels, given the assumptions employed here. Most firms probably face increasing rather than constant marketing margins (Purcell, 1979). Relaxing the assumption of constant marketing margins would complicate but not change the directional impacts. All curves would still shift in the same direction. However, the graphical depiction would become more complicated as demand and/or supply curves at different economic levels would no longer be parallel.

Assuming all of the efficiency impacts accrue initially at the wholesale level may be unrealistic. If electronic marketing increases technical efficiency for the system as a whole, equilibrium quantity will increase and price at the retail level will fall -- the directional moves of prices at the wholesale and farm levels are not theoretically deterministic. However, given Chieruzzi's argument about most cost savings accruing to the buyer, the assumption may not be unduly unrealistic. Even given the simplifying assumptions of the model, it still gives insight into the effects of cost efficiencies with electronic

marketing. Impacts will be felt at all levels of the marketing continuum.

## II.6 ELECTRONIC MARKETING AND PRICING EFFICIENCY

Many factors or characteristics of electronic marketing can increase pricing efficiency. Increasing the number of buyers and/or sellers, providing timely and accurate market information, increasing emphasis on value related characteristics of the product, and possible structural changes are some examples. This section will first concentrate on those factors which would tend to increase pricing efficiency and then on factors which could decrease pricing efficiency. Implications across equilibrium price and quantity will then be examined.

Conference telephone trading systems have the capacity to handle 20-25 participants simultaneously. Computerized trading systems can handle hundreds or even thousands of buyers and sellers simultaneously. For many commodities, prohibitive transportation costs would limit the effective number of participants. However, significantly greater numbers of buyers and sellers could be brought into the trading arena via an electronic medium for most commodities (at least the potential is there). By increasing the number of traders, the probability that any one participant could unduly affect price or other terms of trade is reduced. Prices would move toward more competitive levels, resources would be priced more in accord with their true value, and pricing efficiency would be improved.

More accurate and timely market information could be readily available for the use of all participants. If market power discrepancies exist because of the possession of differing informational bases, the discrepancies could be reduced or eliminated. Uncertainties could be reduced and more accurate and timely market analysis could be made. Coordination would be improved and pricing efficiency increased.

Trading by description would place an increased emphasis on grades that identify important value related characteristics of the commodity. Buyers would be more able to reward and discount commodities in accordance with their perceptions of value and what is in demand at the point of final consumption. In turn, producers would be more able to recognize price signals and adjust production accordingly. Communicative efficiency would increase along the continuum with increased coordination and pricing efficiency likely.

By increasing access to spatially isolated markets, the widespread adoption of electronic marketing may encourage structural changes. According to Henderson et al. (1979), this increased access "should moderate the magnitude of risk associated with potential market foreclosure, reducing the exit rate of small and/or geographically remote producers and mitigating the need for both producers and handlers to engage long term contractual or other integrative arrangements."

The widespread adoption of electronic marketing might eliminate stages within the marketing continuum. For example, with the product moving more directly to buyers, the intermediate assembly functions required under present systems could become unnecessary. Hence, the marketing continuum may be both broadened horizontally and shortened vertically. By broadening the continuum horizontally (or at least slowing the tendency for the continuum to become more narrow), interlevel market power should more nearly balance. By shortening the continuum vertically, price signals are more likely to be accurate. Both structural changes should increase pricing efficiency.

It is difficult to imagine situations where electronic marketing could not increase pricing efficiency, but a few scenarios could possibly can be visualized. A beginning electronic system might not be as pricing efficient as the present marketing system. Reasons could include insufficient volume, low numbers of buyers and/or sellers, lack of confidence in the system, and/or system or organizational flaws. Short run pricing inefficiencies could also be introduced by more variable prices until participants have time to adapt. Lastly, there is always the possibility that small spatially separated producers could band together and exercise monopolistic power[16]. Such power could be either countervailing (Gailbraith) or exploitive depending upon the structural characteristics of the next level in the continuum. With the possible exception of pricing problems in new electronic systems, it is unlikely any of the other scenarios would develop to create severe problems.

Electronic marketing should increase price nervousness but the effects on price levels is less certain. Price variability around general points of equilibrium (price nervousness) should increase as prices adjust to new information more rapidly and as commodities are paid more nearly their true economic value. Theoretical expectations regarding price levels are dependent upon assumptions about current market characteristics.

Assuming monopsony in the input market, theory suggests that electronic marketing could increase both equilibrium price and quantity. This is exemplified in Figure 2.4. Let X = a variable input, U.T. = unit of time and P = equilibrium price. The superscripts C and MS represent conditions of competition and monopsony, respectively. Assuming pure competition in the product and input markets, the value of marginal product curve would be the industry input demand curve. Equilibrium price and quantity is determined by the intersection of supply and demand or at $X^C$ and $P^C$ in Figure 2.4. The input received the market value of its marginal product. Now, assume pure competition in the product market but monopsony in the input market. The firm's value of marginal product curve would equal its marginal revenue product curve. The industry supply curve would be the firm's average expense of input curve which implies the firm's marginal expense of input curve would be above it and increasing more rapidly. The firm would purchase $X^{MS}$ of the input and would pay a price of $P^{MS}$. The difference between $P^C$ and $P^{MS}$ is often known as monopsonistic exploitation (Ferguson and Gould).

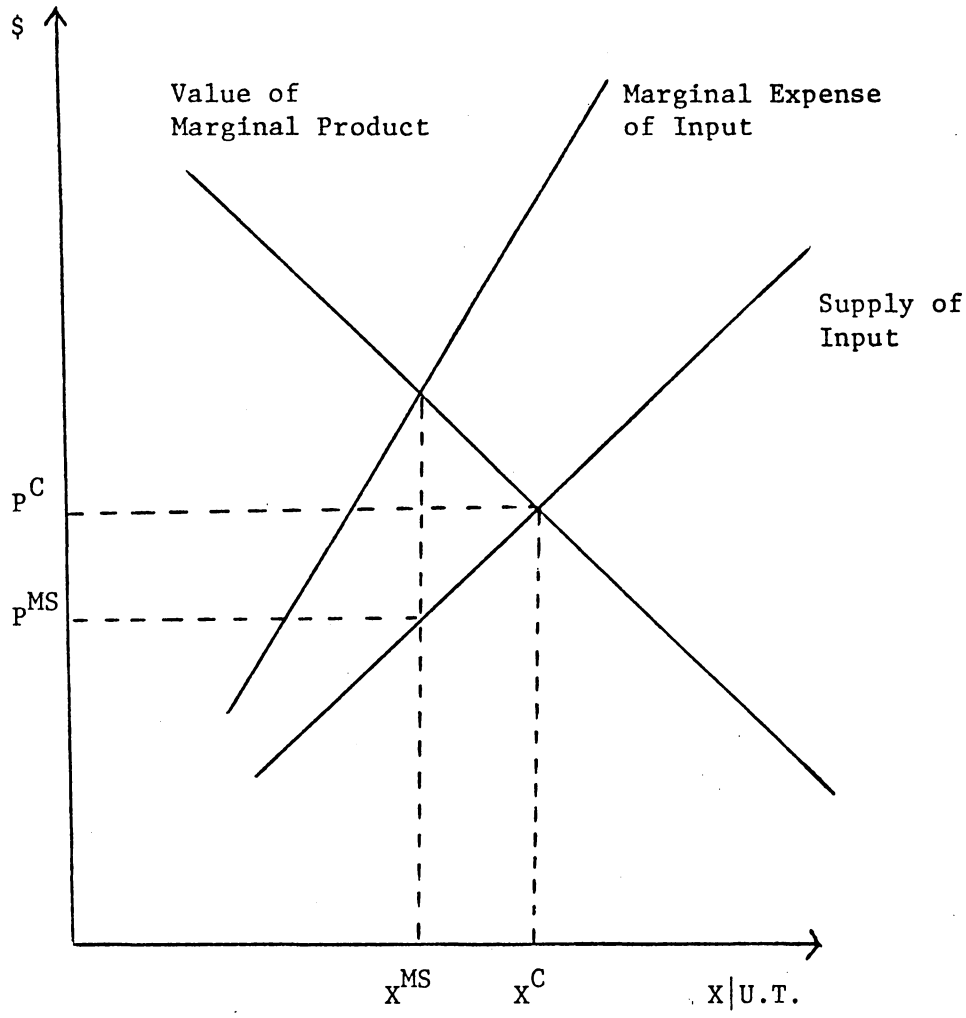


Figure 2.4 Monopsonistic Exploitation

Therefore, if a monopsonistic situation existed prior to the introduction of electronic marketing, theory suggests that both equilibrium price and quantity may be increased by the introduction of a sufficient number of buyers into the market. For more complex situations such as oligopsony, additional assumptions must be made to trace the effects of increased competition through electronic marketing. Generally, price should rise when more competitive environments are established.

In summary, theory suggests that electronic marketing has the potential to increase pricing efficiency. Few scenarios exist in which pricing efficiency would be lowered. Price variability would increase and commodities would more nearly receive their true economic value. Prices would tend to rise if an uncompetitive environment existed previously.

## II.7 FOOTNOTES

[9]It is important to recognize that a marketing system is generally a subsystem of a larger marketing entity. For example, the marketing system for U.S. beef is a subsystem of the larger marketing entities for U.S. meat, U.S. food, U.S. agricultural production and world agricultural production. In general, when discussing a marketing system, I will be talking about a subsystem at the commodity level. This should not be interpreted as meaning ramifications will not be felt outside this commodity subsystem.

[10]The fact that Virginia auction markets weigh livestock when they arrive at the stockyards could explain part of this difference. Buyers may be uncertain whether the livestock in question were weighed 2, 6, or 10 hours previous to sale. One would expect this uncertainty to be reflected in lower prices.

[11]Vertical integration has no power dimension unless linked to some degree of horizontal power. A farmer selling his produce at a roadside stand is never accused of possessing undue monopolistic power -- though he is a vertically integrated entity (Breimyer, 1976).

[12]Negotiable contracts will actually add to the informational base. Such is the case with actively traded futures contracts.

[13]This assumes that the participants understand the information and are able to react to it.

[14]Many of the authors not only assumed it was possible for electronic marketing to increase technical efficiency but indicated it was probable (Ethridge; Engleman et al.; Glazener; Henderson et al., 1976; Henderson et al., 1979; Johnson).

[15]For a more detailed treatment of derived demand and supply curves see Friedman and Marshall.

[16]This has always had an extremely low probability in the past. If producers were to sell through marketing organizations which utilize electronic marketing, this probability could be significantly increased.

## Chapter III

## SYSTEM FEASIBILITY, DESIGN, AND IMPLEMENTATION

### III.1 INTRODUCTION

Chapter II delineated the theoretical potential of electronic marketing to increase the technical and pricing efficiency of a marketing system. Theoretical potential, in and of itself, is insufficient to guarantee the future success of a particular electronic trading system (Russell and Purcell). A prospective electronic marketing system must be determined feasible, designed and successfully implemented. The purpose of this chapter is to examine these necessary conditions to the success of an electronic marketing system.

Figure 3.1 presents the conceptual framework for determining the feasibility, design and implementation of an electronic marketing system. Theory from the fields of economics, finance, organizational behavior, and other disciplines guide the development and methods used in mirror image surveys and technical studies. Output from these studies can then be used to determine the feasibility of a particular system or aid in determining the best system out of a set of alternatives. Should it be determined that electronic marketing is not feasible the process stops. If, however, electronic marketing is determined feasible, additional research should be completed to aid in system design. When the electronic system has been designed it must then be successfully imple-

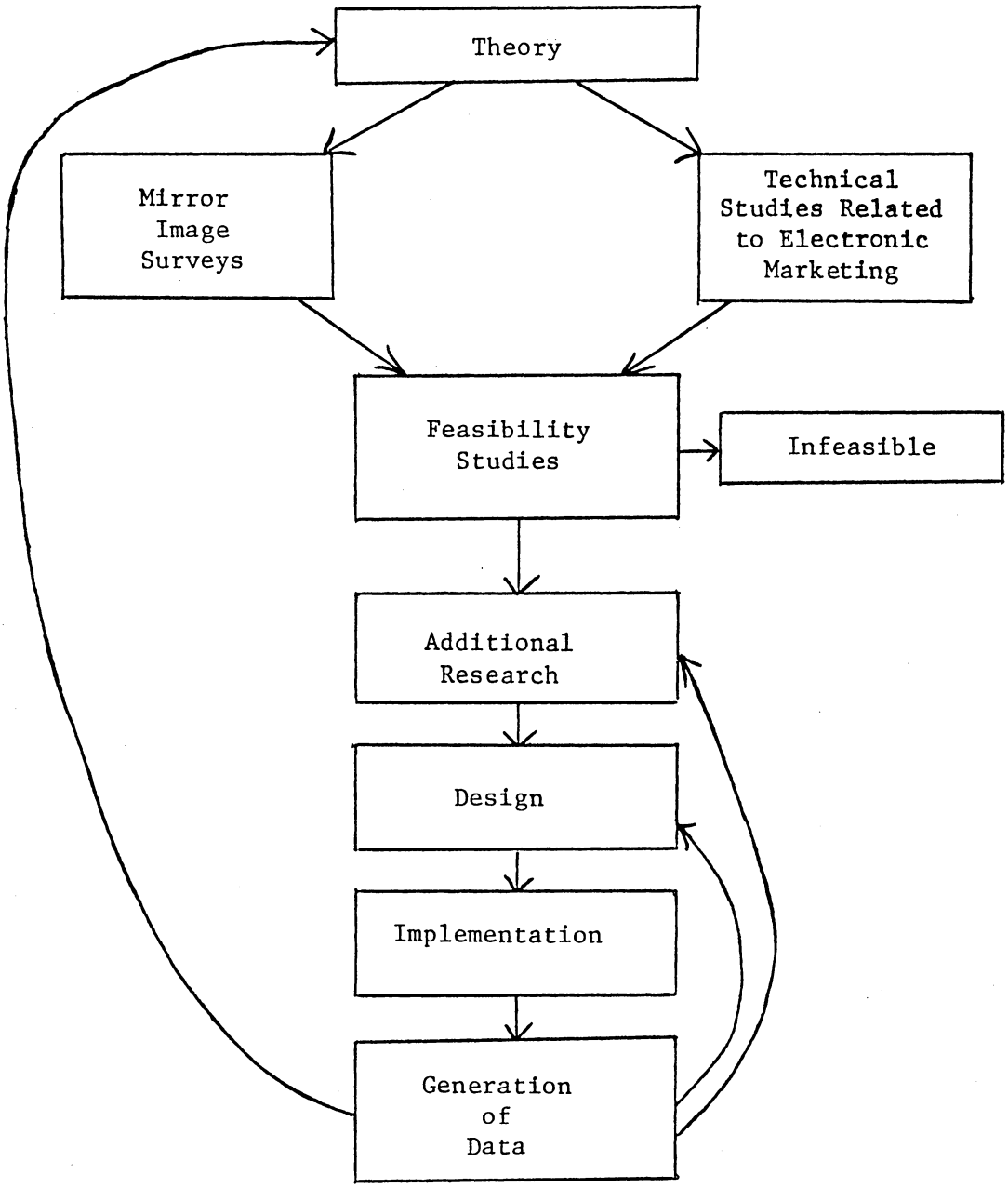


Figure 3.1. Conceptual Framework for Determining the Feasibility, Design and Implementation of Electronic Marketing System.

mented. The operating trading system would then generate data useful in additional research, system redesign and in modifying, validating, or rejecting current theories.

The sequential relationships established with the conceptual framework (Figure 3.1) will be used as a pattern by which this chapter will be organized. Relevant theory will first be discussed, to be followed by the other factors in the conceptual model. At all appropriate stages, the experiences and knowledge gained by participation in the design and implementation of the computerized trading system utilized by Electronic Marketing Assn., In. (EMA) will be shared.[17] Attempts will be made to generalize this knowledge across potential systems and commodities. Such generalization should be of use to others determining the feasibility, design and/or implementation of future electronic systems.

## III.2 THEORY

Determining the feasibility of a proposed electronic marketing system is an investment decision under conditions of risk and uncertainty. Implementing a new electronic system involves motivational factors. Neither the investment decision nor the implementation process can be separated from system design. This section will examine theoretical foundations of the investment decision and potential trader motivation.

### III.2.1 The Investment Decision

Average rate of return, payback, internal rate of return and net present value methods are often utilized in making investment decisions. The average rate of return and payback methods are easily computed but are simple measures which do not provide maximum information. The internal rate of return method is computed by determining the discount rate which equates the net present value of cash outflows with cash inflows. Let $C_t$ = the net cash flow in period t, r = the internal rate of return, and n = the last period. The internal rate of return for an investment is found by solving the equation 3.1 for r.

$$(3.1) \qquad \sum_{t=0}^{n} \left[ \frac{C_t}{(1+r)^t} \right] = 0$$

The investment is made if the internal rate of return is greater than the cost of capital.

The present value method is also a discounted cash flow method. However, instead of solving for the internal rate of return, it discounts net cash flows by the required rate of return (i). If the net present value (NPV) is greater than zero, the investment is made (assuming unlimited capital). Algebraically, the net present value method can be represented by equation 3.2.

$$(3.2) \qquad NPV = \sum_{t=0}^{n} \left[ \frac{C_t}{(1+i)^t} \right]$$

Theoretically, the net present value method is superior. The internal rate of return method can give multiple rates of return (Iorie and Savage) and it implicitly assumes that cash receipts are reinvested at a rate of r. The net present value method offers increased flexibility (it is possible to use different values of i for different values of t) and allows no possibility of multiple answers (Van Horne).

When risk is introduced, two difficulties arise. One involves the need to determine the expected cash flows, and the other deals with how the investors' preferences towards risk affect the investment decision. Bayesian analysis (Fidman et al.) and simulation (Hertz) are often used to determine expected cash flows. The expected utility theorem considers the investors attitude toward risk, equates the utility of a risky prospect with its expected utility, and assumes the investor is a utility maximizer (Anderson et al.; Van Horne; Von Neumann and Morgenstern).

To date, most electronic systems have been developed by groups of individuals (coops, for example) or by government entities. Elicitation of risk preferences in such situations would be difficult if not impossible because of the large number of participants. The limited experi-

ence with electronic marketing makes the determination of probabilities associated with alternative cash returns more complicated. As time and experience increase, more reliable probabilities can be generated across systems, commodities and participants. With this, the quality of the investment decision regarding electronic marketing should improve.

### III.2.2 Motivation

Trader motivation is important in any electronic marketing system, but is particularly important in designing and implementing a new electronic marketing system. Most theorists, writing on motivation, have concentrated on employee motivation within an organizational framework. Although most participants (or potential participants) of an electronic marketing system would not be expected to be an employee in the system, many similarities exist between traders using an electronic system and employees of an organization. Profits would be expected to motivate participants in an electronic marketing system just as wages would be expected to motivate employees. Participants in an electronic marketing system invest time, money and possibly their reputations into the success of the system. Organizational employees make commitments of time, training and possibly their future mobility to the organization. Just as a well designed trading system can motivate potential traders to participate, good job design can encourage prospective employees to apply for jobs. The personal characteristics of administrative personnel involved in an electronic marketing system can encourage or discourage

trader participation. Similarly, the leadership style of a supervisor can motivate employees to work efficiently or inefficiently. Because of these similarities and others, it is possible to adapt theories from organizational behavior to problems encountered in designing and implementing an electronic marketing system.

Contemporary theories of motivation can be divided into four categories: content, process, reinforcement and integrative. Content theories are concerned with factors which initiate motivated behavior. Theories championed by Maslow, Herzberg et al. and Alderfer would fall in this category. Process theories are concerned with the choice of behavorial patterns. Theories proposed by Tolman, Vroom, and Adams would be considered process theories. Skinner's reinforcement theories (1969 and 1971) deal with factors which increase the probability that desired behavior will be repeated. Integrative models (such as those of Szilagyi et al. and Porter and Lawler) combine content, process and reinforcement theories into an integrated framework (Szilagyi et al.).

A modified version of the Porter and Lawler model of motivation is depicted in Figure 3.2. E1 is the perceived probability that the effort required will result in the desired performance. This perceived probability is modified by both the individual requirements and the system characteristics. E2 is the perceived probability that the desired performance will result in economic rewards, noneconomic rewards, and/or equity goals. Economic incentive must certainly be a primary considera-

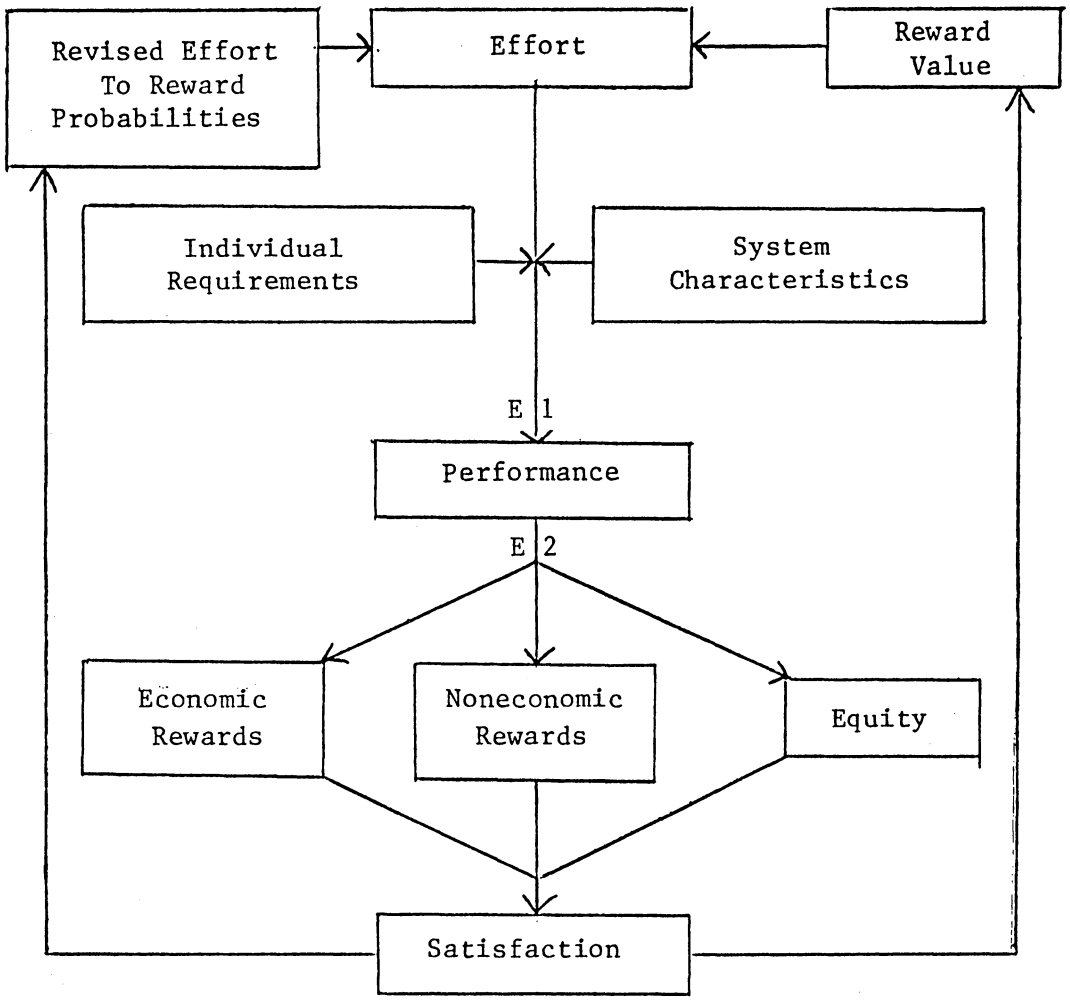


Figure 3.2. Modified Porter and Lawler Model of Motivation Used in Designing and Implementing an Electronic Marketing System

tion, especially in the long run. But, social reinforcement (either positive or negative) can be very important to a beginning electronic system. Equity considerations can also be very important. From the satisfaction (or dissatisfaction) received, the participant determines his or her future effort by revising the effort to reward probabilities and by weighting the rewards by his or her individual reward values.

The Porter and Lawler model illustrates many important considerations when designing and/or implementing an electronic marketing system. The path from the participant's effort to desirable rewards must be well defined and understood by all. The individual requirements should not unduly restrict the potential trader's perceptions of his or her ability to participate. This has implications regarding the type of performance guarantees, procedures, hardware, and software utilized by the system. Similarly, the system characteristics should be such that they instill a high degree of confidence in the individual that the system can and will be successful. The perceived probability that the required effort will result in the desired performance is likely to be highest if potential participants are involved in the earliest stages of system design. Such a policy will not only increase the quality of decisions in system design, but has an educational dimension as well.

Potential traders must also see positive reinforcement accruing to them when the system is successful. An educational effort needs to underscore the potential benefits accruing to traders should the system

prove successful. If feelings of inequity exist with the present marketing system, the educational effort should draw upon these feelings to promote electronic marketing. Continued participation by a trader will, to a large part, hinge on individual satisfaction received from previous participation. This exemplifies the importance of successful sales -- especially the first few sales when uncertainty concerning the system is highest.

Although many of the details will be covered later in this and other chapters, it should be noted that the experiences in designing and implementing the system currently used by FMA have supported the Porter and Lawler model. Industry leaders were involved early in the process which paid dividends in system design, implementation and education. Seminars were held to train buyers which increased their confidence that they could use the computer terminals. Producer meetings were held to explain the system. Potential trader benefits were explained to all. The first slaughter lamb sale went smoothly and the program has shown continued expansion in sales volume. The first slaughter cattle sale was characterized by hardware, software and assembly problems. To date, slaughter cattle have still not been successfully sold via the computerized sales.[18] Although, insufficient evidence exists to substantiate the Porter and Lawler model, the experiences with FMA support it. Certainly, the model is a useful conceptual guide in designing and implementing an electronic system.

Finally, it should be observed that the Porter and Lawler model of motivation is for individuals, not groups of individuals. Individuals can and do have different needs, goals and perceptions. What motivates one, may not motivate another. For this reason, input received should be representative of all potential participants. In this way, a system can be designed to accommodate the widest base of trader needs and concerns. Mirror image surveys are a tool which can be used to examine different needs and attitudes along the interface in the marketing continuum.

## III.3 MIRROR IMAGE SURVEYS[19]

A mirror image survey involves the use of paired questions to examine key areas of concern along two related stages of economic activity in a marketing system. Information from such surveys can provide invaluable insight so necessary to perform an accurate and objective feasibility study for a proposed electronic marketing system. Such surveys provide a useful vehicle to examine the attitudes of buyers and sellers towards the present marketing system, their awareness of the value-related dimensions of the product, their ability to identify important dimensions of the pricing process, their attitudes toward product liability and when it should change, and their perception of the organization that should operate an electronic marketing system. It should then be possible to estimate the level of participation for a proposed electronic marketing system.

To illustrate the use of mirror-image surveys and to demonstrate the information that can be gained from such a technique, the surveys used to design EMA's computerized trading system will be discussed. In the spring of 1979, twenty northeastern packers and eighty-three producers of Virginia slaughter cattle were interviewed using the mirror-image technique. An attempt was made to interview the entire population of packers which purchase Virginia slaughter cows. The producers were selected by a stratified random process to insure adequate representation by beef cow-calf producers, cattle feeders and dairymen. A copy of the survey administered to producers with a summary of their responses is found in Appendix A. Similarly a copy of the survey administered to packers with a summary of their responses is found in Appendix B.

When the interface between the producer and packer surveys was examined, areas of agreement and disagreement were found. It was discovered that both the producers and the packers interviewed dealt in slaughter cattle of roughly the same weights. Both felt they received (paid) a fair price for their slaughter cattle and were generally satisfied with the convenience of the current marketing (procurement) system. For a ten-hour period, each expected about the same amount of shrink for slaughter cattle on a liveweight basis and neither expected tissue (carcass) shrink to be a problem if the cattle were sold on the rail. Both felt slaughter cattle could be sold (bought) effectively by description and indicated they would be willing to sell (purchase) slaughter cattle using descriptive terminology they identified. Both producers and pack-

ers identified essentially the same carcass characteristics that should be used when cattle are sold on a carcass basis and both felt that the trend towards electronic marketing was desirable.

Both producers and packers wanted to see auction markets involved and a third party to do the grading. They both preferred that each set of cattle be auctioned separately rather than let the high bidder take his pick of lots. Producers and packers agreed that, depending upon the nature of the problem, either the manager of the marketing organization or its board of directors should settle any disputes that might arise.

The producers and packers interviewed did not, however, agree on other issues. A large majority of the responding packers wanted to see changes in the present procurement system, whereas producers were almost evenly split on the issue. Most packers had purchased cattle on the rail (on a carcass grade and weight basis), and all would have allowed producers to observe their plant operations whenever they chose. In contrast, most producers had not sold cattle on the rail and indicated that visiting the packing plants would not have changed their often negative attitude about selling on a carcass basis. Both producers and packers agreed that truck loads of commingled cattle would be worth more but disagreed on the magnitude of the increased value.

Producers and packers disagreed as to what was the single most important determinant of value (besides liveweight) for both slaughter cows and fed cattle. When asked to rank variables which could be used

in describing slaughter cattle, little agreement was found between the individual rankings selected by producers and packers. When, however, the top five descriptive variables chosen by producers and packers were compared, the differences were smoothed considerably. Producers wanted to see a written contract (bonded or unbonded) used by the participants of an electronic marketing system, while packers generally preferred an oral agreement be used. Producers wanted to see title to the slaughter cattle (and liability for death loss, etc) change when the cattle were delivered to the assembly point, whereas packers did not want it to change until the cattle were loaded on the buyer's truck.

The majority of producers did not have objections to regressive bidding, while packers were evenly divided on the question. Producers preferred cattle be sold on the farm and delivered to an assembly point on a day the buyer specified within a week of purchase. Producers wanted to see competitive bids on each animal or groups of like kind rather than competitive bids on an average animal with premiums and discounts tied to some market report. Packers were evenly divided on the issue. Assuming an electronic marketing system with ten or more buyers, producers did not feel sufficient competition would exist to insure that bid prices would always be indicative of true slaughter value. In contrast, almost all packers (95 percent) felt sufficient competition would exist in such a system.

Producers and packers disagreed as to who should own, control and finance an electronic marketing organization. Producers felt the organization should be owned and controlled by both producers and packers. Packers were evenly divided between producer owned, third party owned and indifference. Producers felt that both producers and packers should share in financing the organization while packers thought the organization should be producer financed.

The surveys gave a broad understanding of the needs, desires and biases of the producers and packers interviewed. They suggested characteristics which the electronic marketing system should and should not possess, and identified some gray areas with no clear-cut answers. Such data are critical in a feasibility study.

Since the USDA funded experimental projects carried the implicit assumption that electronic marketing was feasible, no feasibility study was performed which utilized the survey results. The results were, however, used extensively in designing EMA's computerized trading system. Although data collected from mirror image surveys are critical, a feasibility study must also draw on the information contained in technical studies.

## III.4 TECHNICAL STUDIES

Technical studies, as used herein, refer to all scientific analyses, both theoretical and empirical, having applicability to electronic marketing.[20] Studies concentrating on cost, pricing implications, feasibility and/or distributional impacts of either electronic marketing in general or specific electronic systems provide examples. Likewise, studies estimating the efficiency, capacity and/or flexibility of different hardware and software configurations constitute examples of technical studies. Just as mirror image surveys are needed to discern the attitudes, goals and perceptions of potential system participants, technical studies are needed to determine the particular electronic system which will provide the greatest benefits at the lowest possible cost.[21] Examples of specific technical studies would include those studies reviewed in Chapter I. With information from both mirror image surveys and technical studies, one has the necessary data to complete a thorough and accurate feasibility study.

## III.5 FEASIBILITY STUDY

Feasibility studies are designed to determine the economic feasibility of a particular project or investment. Such questions as: will it yield a profit?; which alternative is the most profitable?; or will the non-profit venture generate sufficient revenues to become self-sustaining?

All are appropriate questions for a feasibility study to answer. Feasibility studies directed toward electronic marketing may be simple or complex depending on the purpose of the study. Beginning a new teleauction may be relatively inexpensive and a related feasibility study could be more abbreviated or in some cases even eliminated. Designing and implementing a computerized electronic marketing system can involve hundreds of thousands of dollars and should necessitate a more complex feasibility study. Between these two extremes lies an almost infinite number of questions, regarding electronic marketing, which feasibility studies could address.

This section will identify those factors which should be included in a feasibility study directed towards computerized trading systems. Feasibility studies concerned with designing a new computerized system as well as those considering using FMA's computerized trading system will be addressed. It is hoped that many other alternative questions would involve a subset of the feasibility study concerned with the design of a computerized system. If true, this section should have more widespread applicability.

Table 3.1 presents a generalized outline of a feasibility study for beginning a new computerized electronic marketing system. The outline is divided into environmental conditions and factors exerting a more direct influence. The current marketing situation, goals and objectives and resources available are classified as environmental conditions. To

Table 3.1. Generalized Outline of a Feasibility Study for Beginning a New Computerized Electronic Marketing System

I. Environmental Conditions

A. Current Marketing Situation

1. Competitive environment
2. Product grades and standards
3. Assembly procedures
4. Attitudes of market participants towards the present marketing system
5. Willingness of producers to organize for a common purpose
6. Strength of any opposition to electronic marketing

B. Goals and Objectives

1. Of the proposed electronic marketing system
2. Of the feasibility study

C. Resources

1. Net worth and liquid assets
2. Expertise and industry contacts
3. Potential for state, federal, or industry grants
4. Other support by industry groups or government entities

II. Directly Influencing Factors

A. Product Supply

1. Seller identification
2. Initial volume
3. Potential volume
4. Time frame

B. Buying Strength

1. Buyer identification
2. Initial interest
3. Potential interest
4. Time frame

C. Structure of Selling Organization

1. Profit or nonprofit
2. Type of ownership
3. Coop or non-coop
4. Management and control

D. Equipment

1. Computer

a. Mini, Macro, or Main frame
b. Own, lease, or time-sharing
c. System configuration

Table 3.1. (Continued)

2. Terminal

   a. Type
   b. Brand
   c. Ownership arrangement

3. Communication Network

   a. Dedicated vs. nondedicated
   b. Owned vs. leased

E. Procedures

1. Product description
2. Performance guarantees
3. Auction characteristics
4. Size of lots
5. Time of sale
6. Means of access
7. Control features
8. Contractural arrangements

F. Financial

1. Investment capital needs
2. Operating budgets
3. Cash flow analysis

III. Summary

A. Evaluate Each Feasible Alternative

   1. Financially
   2. Ease of industry acceptance
   3. Adaptability to future growth and/or unanticipated changes

B. Make Recommendation

assess the current marketing situation, the present competitive environment must be examined to see if problems are evident. The adequacy of product grades and standards and the effectiveness of current assembly procedures must be examined. The attitudes of market participants towards the current marketing system must be obtained as this may be indicative of initial support for a beginning electronic marketing system. The willingness of producers to organize for a common purpose is important and efforts should be made to determine the degree of their willingness to organize. Finally, likely opponents to electronic marketing should be identified, their bargaining strength estimated, and their probable objectives considered in developing an educational program.

The goals and objectives of the proposed computerized electronic marketing system and of the feasibility study should be explicitly stated. Both human and capital resources available for the development of the computerized system should be inventoried. Expertise and industry contacts should not be overlooked. Potential for outside support from grants, personnel, publicity, etc. should be evaluated and sought. In some cases, the feasibility study might only show the system feasible contingent upon the support of one or more of these agencies or groups.

Product supply, buying strength, structure of the selling organization, equipment needs, procedures and financial considerations are all classified as directly influencing factors. Seller identification, estimates of the initial and potential sales volume and the likely time

frames are necessary to estimate product supply. Similarly, buyer identification and estimates of the initial and potential purchase volume with their likely time horizons are necessary to assess buying strength.

The structure of the selling organization could be correctly classified as a directly influencing factor or as an environmental condition depending on whether a new organization must be established to sell electronically or whether a previously organized association will handle the function. Regardless, at some time or another, decisions must be made reagrding whether it is to be operated for profit or at cost, the type of ownership arrangement, whether it is to be a cooperative or not, and who will manage and control the association.

Decisions must be made regarding the type of computer, terminal and communications network to utilize. Ownership, leasing and time-sharing alternatives should be evaluated. The benefits and costs of dedicated and nondedicated communication networks need to be compared. Brand decisions must be made considering costs, service arrangements and reliability. Such evaluations should not be taken lightly as decisions made will affect cost, flexibility and reliability of the computerized system. Procedural alternatives must also be examined. Choices must be made regarding product description, performance guarantees, auction characteristics, size of lots, time of sale, means of access, control features and contractual arrangements. Throughout the study, investment capital needs should be considered, operating budgets prepared and cash flow analysis performed for each likely alternative.

Each feasible alternative should be evaluated financially. The net present value technique should be utilized. Based upon the financial evaluation, as well as factors such as ease of industry acceptance and adaptability of the system to future growth and/or unanticipated changes in market factors, a recommendation should be made.

An organization interested in using EMA's computerized trading system would not have to follow all of the steps in Table 3.1 to generate an effective feasibility study. If the organization was already selling the commodity through a teleauction, it may only have to consider buying strength and financial considerations within the directly influencing factors. If a new organization with no selling experience was considering EMA's trading system, much of the work concerning equipment, procedures, and financial matters in the feasibility study will be simplified. Even though feasibility was assumed in the four USDA-AMS pilot projects, future electronic systems (or expansion of present systems in an unfamiliar direction) should face the close examination of a feasibility study.

## III.6 INFEASIBLE SYSTEMS

If the feasibility study indicates electronic marketing is not feasible at the current time, then the process described in Figure 3.1 stops. This naturally assumes the feasibility study was based on sound assumptions and accurate data. It does not indicate that electronic

marketing will never be feasible. Attitudes, marketing conditions and technology change across time. Should future situations warrant a new feasibility study, one could be performed at that time. It should be noted, however, that there is no reason to believe that electronic marketing should be used across all commodities in all situations. An infeasible conclusion from a well designed feasibility study should be accepted until circumstances indicate otherwise.

## III.7 ADDITIONAL RESEARCH

If the feasibility study indicates that electronic marketing is feasible, it will usually point to additional research that needs to be done. Generally, this research is needed to provide answers which will fine tune the system. For example, the feasibility study may not indicate whether a Dutch (descending) or English (ascerding) auction system is to be used. Similarly, the feasibility study may not indicate the programming language to be used in writing the software. A multitude of questions will generally need to be answered before moving into the design phase. Whether the additional research needed to answer these questions is slight or extensive, it should be performed.

## III.8 DESIGN

The design of an electronic marketing system may be subdivided into organizational, hardware, software and procedural design. There is no single optimal design across commodities and different marketing situations. The optimal design will be contingent on a variety of factors, including: the commodity involved, expected volume levels, the progressiveness of market participants, current marketing procedures and customs, perceptions of the current marketing system, the degree of market power held by current market participants, past, current and expected government actions, and the amount of investment capital available. However, the absence of an optimal universal design does not preclude a particular system design (or parts of it) from having widespread applicability. Even electronic marketing systems which prove to be unsuccessful can provide valuable insight to future designs.

This section will describe the organizational, hardware, software and procedural design of the computerized electronic marketing system used by Electronic Marketing Association, Inc. (EMA). Reasons for the design decisions will be fully discussed. Insight gained through the process will be shared. Regardless, the experiences gained from EMA's computerized trading system should prove useful to future designers of electronic marketing systems.

### III.8.1 Organizational Design

Electronic Marketing Association, Inc., located in Christiansburg, Virginia, is a nonstock corporation. As stated in the articles of incorporation, it was formed for the purpose of:

1. encouraging and promoting more effective marketing of agricultural products through the use of electronic marketing;
2. providing electronic marketing services to those involved in marketing agricultural products;
3. organizing and operating the agricultural marketing services in such a way that no part of the net income of the corporation shall accrue to any member or other individual; and
4. possessing and exercising any and all other powers conferred by law on like corporations.

A copy of the articles of incorporation may be found in Appendix C. Incorporated in February, 1980, its original board of directors consisted of the advisory committee from the electronic marketing project. Hence, industry leaders were involved from the beginning.

EMA is an association of associations. It provides electronic marketing services to its member associations but does not get involved in performance guarantees, quality control, handling of funds, etc. It is left to the member associations to provide these functions. This allows EMA to concentrate on electronic marketing without becoming overly involved in details better left to others. It also allows other associ-

ations to utilize the services of FMA and still maintain their preferences regarding terms of trade, etc.

A copy of FMA's bylaws may be found in Appendix D. The working agreement used between FMA and member organizations may be found in Appendix E. Membership voting rights and representation on the board of directors is based on participation. Voting rights and representation is a function of sales volume which allows those who use the system to control it (subject to some restrictions specified in the bylaws). Such a policy is helpful in attracting new associations to utilize the services of FMA. As specified in the working agreement between EMA and its member organizations, an association's buyers list is kept in strict confidence.

The factors which have proved beneficial to FMA include:

1. the involvement of industry leaders early in design and development;
2. the concentration on computer aspects of the sale, while allowing each member organization of EMA to focus on procedural aspects;
3. tying membership, voting rights and representation on the board of directors to participation; and
4. maintaining confidentiality of member organization's buying lists.

### III.8.2 Hardware[22]

EMA's computerized trading system is a remote access, time-sharing system utilizing the services of the INFONET Division of Computer Sciences Corporation. EMA also owns telephone equipment which can link as many as 18 buyers (via a conference telephone call) to the computerized sale or can be operated independently, as a teleauction.

The INFONET Division of Computer Sciences Corporation currently has sixteen computer systems located in five geographically dispersed computer centers. The computer centers are 100 percent compatible which provides redundancy in the unlikely event the computer center EMA was using should fail.[23] INFONET has sustained a reliability rate in excess of 99.6 percent, guarantees the network will be available at least 97 percent of the time (except for four hours on Sunday), and guarantees a response time within 3 seconds 90 percent of the time.

INFONET's communication network allows access to the system through local telephone calls in many cities throughout the world and through free In-Watts service throughout the United States. The network will accommodate a wide variety of terminals ranging from 50 to 9,600 bauds. EMA presently recommends Texas Instruments Model 745 for its buyers because of the reliability, portability, and low cost of the terminal and wide access to service centers. If a participating marketing group or buyer prefers another type of terminal, EMA's system would allow such.

Utilizing a time sharing system has allowed EMA to implement a computerized trading network without incurring the high fixed costs of obtaining and maintaining a computer. The minimal fixed costs (manager salary, office equipment, terminals in the central office) are then shared by many users which allow computerized electronic marketing systems to be feasible at much lower levels of sales volume. By using a commercial vendor, access to multiple computer centers is acquired resulting in important redundancy features.

Flexibility is maintained by the acceptance of a wide variety of computer terminals, the world wide communications network, the use of commercial phone lines in accessing the computerized system and EMA's telephone conferencing equipment. New participants in the computer sales can be added quickly and efficiently without the sometimes long delays of providing dedicated telephone lines. Small buyers who purchase infrequently can gain access to the system through the teleconferencing equipment. In short, the hardware used by EMA has proved to be reliable, flexible and cost efficient in its first year and half of operation. Such characteristics would be beneficial to any electronic marketing system.

### III.8.3 Software

The software for EMA's computerized marketing system is both complex and highly flexible. The programs were written by INFONET person-

nel in accordance with specifications suggested by the mirror image surveys and other research. An effort was made to keep the original programs as simple and as flexible as possible. Such a policy allowed the original software to be developed in less than three months and the first computerized sale to be held in less than five months from the time the decision was made to develop a computerized marketing system. Enhancements, with the related increase in complexity, were added later.

The software packages currently have the capability to sell slaughter lambs, slaughter cows, fed cattle, feeder pigs and feeder cattle. The auction process may be either progressive (English) or regressive (Dutch). Buyers may bid a preset increment by pressing a single key or may type in their bid. The software allows the start-up time, declaration of sale or no-sale, starting of bidding on the next lot and stopping of the sale to be controlled by either a control terminal (usually located in EMA's office) or the computer.

Most of the sale parameters are completely variable to be set at the control terminal located at the EMA office. A list of these parameters include: sale date, starting, bidding increment and dropping increment times, reservation and starting prices, sale order, bidding and dropping price increments, and messages. A description of these controllable parameters and their control mechanisms are given in Table 3.2. A definite terminal hierarchy exists. Terminals logged on with a selling identification number are only allowed to enter prospective lots

Table 3.2. A Description of the Controllable Parameters of Electronic Marketing Association's Computerized Trading System and Their Respective Control Mechanisms

| Controllable Parameter | Parameter Description | Control Mechanism |
|---|---|---|
| Bidding Price Increment | A buyer may bid a preset increment above the last price appearing on his/her terminal by pressing the escape key on his/her terminal. This preset increment is called the bidding price increment. It may range from $0 to $999.99. | control terminal |
| Bidding Time Increment | Bids may be received on any lot until a predetermined amount of time elapses without additional bids. At this time, the sale will be consummated if the last bid is above the reservation price or cancelled if below the reservation price. This predetermined time increment is called the bidding time increment. It may range from 0 to 999.99 seconds. If set at zero, the control terminal rather than the computer, declares the end of bidding. | control terminal |
| Dropping Price and Time Increments | Until an initial bid is received, price will drop some predetermined increment upon the elapse of some preset amount of time. This will continue until a bid is received or the lot is cancelled. The amount price drops is called the dropping price increment and may range from $0 to $999.99. The time parameter is called the dropping time increment and may range from 0 to 999.99 seconds. | control terminal |

Table 3.2. Continued

| Controllable Parameter | Parameter Description | Control Mechanism |
|---|---|---|
| Messages | Any message the control terminal wishes to send to buyers and sellers on the system. The message may range from 0 to 500, 80 character lines. | control terminal |
| Reservation Price | The minimum price which will be accepted to consumate a sale. Lots not receiving bids at or above this price are cancelled. The reservation price may range from $0 to $999.99. | seller or control terminal |
| Sale Date | The date of the sale. | control terminal |
| Sale Order | The order in which the lots will be offered during the sale. | control terminal |
| Starting Price | The initial price at which a particular lot will be offered. This price may range from $0 to $999.99. | control terminal |
| Starting Time | The starting time of the sale. | control terminal |

for sale into the system and to monitor the actual sale. Terminals using a buying identification number are only allowed to obtain listings of lots to be sold or previously sold and to bid during the auction. The control terminal can enter lots, obtain and edit listings, set up and control sales, generate reports, send messages, add new identification numbers and passwords or delete old ones, and make programming changes. The terminal hierarchy increases the security and integrity of the system by not allowing terminals to be used for purposes for which they were not intended. Allowing the control terminal increased flexibility permits quick action if EMA determines such action is needed.

In addition to electronic marketing functions, the software has the capability to keep records for feeder cattle, feeder pig and slaughter lamb auction sales. The program will print pen sheets, sales orders, bills, seller statements and checks as well as calculate commissions and generate summary statistics. The record keeping program can be interfaced with a computerized sale or operated independently. A more generalized program to be used during regular weekly auction sales is currently being developed.

In summary, the success of EMA's software development suggests five factors which should aid in the successful development of software for future electronic marketing systems. They are:

1. Mirror-image surveys and technical studies should precede the development of the software. This will ensure that the resulting

program will more closely fit the needs and biases of system participants.

2. To encourage quick and efficient program design, effort should be made to keep initial computer programs as simple as possible.
3. Since many questions will remain until the system becomes operational, initial computer programs should be as flexible as possible.
4. To increase the security and integrity of the system, a terminal hierarchy should be established. This hierarchy should at least include control, buyer and seller classifications.
5. The control terminal should possess the ability to direct the system in the event quick and decisive action is needed.

Considering these five factors will allow future designers to avoid potential problems. The cost of software design should be lowered. The likelihood that the software will form the basis of a successful computerized electronic marketing system should be increased.

### III.8.4 Procedures

Procedures used by a particular electronic marketing system may vary across commodities or trade groups. As such, a specific procedural design is less likely to have general applicability than either organizational, hardware or software design. This is especially true when transferred across systems. Nevertheless, to demonstrate a successful

procedure, EMA's computerized slaughter lamb program utilized by Eastern Lamb Producers Coop., Inc. (ELPC), will be discussed. It should be remembered that this specific procedure is but a small subset of the population of possible procedures.

ELPC holds a slaughter lamb sale each Friday, at 11 a.m if there are sufficient consignments. There are usually enough lambs to hold a weekly sale except for the months of December, January and February when low numbers usually allow sales once or twice a month. Lambs from Virginia, West Virginia, Kentucky and North Carolina are sold by description, on estimated grades and weights, while still on the farm.[24] During the sale, bids are received on a state grade called Blue O (top choice and prime lambs with an estimated hot yield of 50 percent or better) with predetermined discounts for lower grades, heavy lambs, bucks, etc. After the sale, the buyer calls ELPC and chooses a pickup date within seven days of purchase. On the designated pickup date, producers deliver their lambs to an assembly point where the lambs are graded by a state grader and weighed. Buyers will then pay, and producers will receive payment based on, the actual weights and grades of the lambs.

The computerized portion of the sales procedure begins when the lambs are entered into the system via an "entry" program. This usually occurs Thursday evening or early Friday morning. Each lot is entered individually by answering computer prompted questions regarding weights, grades, number of head, location, reservation price, etc. After consul-

tation with ELPC management, EMA will organize the sale using a "build" program. Order of sale, starting time and starting price for each lot is established. The lots for sale are then available for buyer inspection. A buyer can enter the system via a telephone call and receive a detailed written description of the lots to be sold over his terminal. The buyer is then free to get off the system, study his listing of offerings, and decide the price he could pay for each lot he wants. He then logs back onto the system shortly before 11 a.m.

The sale begins promptly at 11 a.m. ELPC lets the computer start the sale and it waits for no one. The first lot is offered at a beginning price set by ELPC in consultation with the producers who have consigned lambs. The price will drop $1.00 per cwt. every 20 seconds until a bid is received. A buyer bids $.25 per cwt. above the last price he has seen or his terminal by pressing the escape key on his terminal. Once a bid is received, the price proceeds upward in a progressive fashion until 20 seconds elapse without any further bids.[25] At this time the computer will either declare the lot sold if the bid is at or above the reservation price or cancel the lot if the high bid was below the reservation price. The terminals keep each buyer continually informed of the high bid and, for each individual buyer, whether the high bid is his or not. Confidentiality is maintained. Only the high bidder and EMA know who has the high bid and only the buyer and EMA know who has purchased the lot. All other potential buyers are informed of the price at which the lot was sold.

At the end of the sale, buyers who have purchased lots receive summaries of the lots they have purchased including telephone numbers of people they are to contact concerning pickup dates, trucking, etc. EMA will then print a detailed record of the sale, including the time each individual bid was received in miliseconds, in case disputes were to arise.

## III.9 IMPLEMENTATION

The importance of early successful sales cannot be over emphasized. To ensure that this occurs, all components should be thoroughly tested before the first sale. This is particularly true with a computerized system where complexity is greatest. The human factor must also be considered. Buyers may be reluctant or slow to begin bidding during the first sale. A wise marketing agency will make efforts to guarantee bids over the system before the sale starts to ensure the lots are sold. Similarly, a wise marketing organization will ensure through pledges, contracts or other means that sufficient offerings are available with reasonable reservation prices. Following these procedures should increase the likelihood of successful implementation which in turn should increase the likelihood that the electronic marketing system will be successful. Clearly, a strong measure of backing and possibly subsidy must be available from the producer organization or other marketing agency to ensure the success of early efforts with a new system.

## III.10 GENERATION OF DATA

An operating electronic marketing system is a dynamic organism. It generates data useful for additional research and system redesign. The design of an electronic marketing system is never complete but continues to evolve in response to new information from a changing environment. Research can become increasingly sophisticated as the informational base grows. The most basic theories may be proven, modified or discredited as electronic marketing systems generate data never before possessed. Insight into the price discovery process will certainly be gained. Hence, the generation of data by an operating electronic marketing system closes the process depicted in Figure 3.1. It makes the process both dynamic and continuous.

## III.11 FOOTNOTES

[17]Electronic Marketing Association, Inc. was originally chartered as Eastern Electronic Marketing Association, Inc. With increasing potential that the system would be utilized by western states, the Board of Directors decided to change the name in August, 1981.

[18]This does not mean that the problems with the first attempted sale is the only factor which has kept the slaughter cattle program from being successfully implemented. Strong order buyer pressure against the electronic system has been an important factor. However, the first attempted sale was important and some seller and auction market support was lost because of the problems.

[19]This section relies heavily on the article by Russell and Purcell.

[20]Mirror-image surveys may be considered a technical study under this definition. Because of their special importance, it was decided to treat them under a separate heading.

[21]A short unpublished technical study heavily influenced EMA to develop a computerized trading system rather than expand teleauctions. The analysis, completed in the fall of 1979, indicated that a computerized sale could be conducted at less than the variable costs incurred in a teleauction. The study formed the basis for a supplemental grant from USDA-AMS to cover some of the fixed costs incurred in developing a computerized electronic marketing system.

[22]Much of the descriptive material in this section concerning Computer Sciences Corporation, is taken from the proposal by Eastern Electronic Marketing Association, Inc.

[23]Depending on the nature of the problem, the transfer to a different computer center may be impeded if the original computer center were to go down during an auction.

[24]ELPC has since expanded into Ohio and Vermont. In addition to ELPC, the Corn Belt Lamb Auction (a number of Equity Cooperative Livestock Sales Association) began using the system October, 1981. Further expansion of EMA's system for slaughter lambs and for other commodities is anticipated.

[25]Again, all of the dollar and time increments are at the control of EMA.

# Chapter IV

# COST CONSIDERATIONS

## IV.1 INTRODUCTION

The cost of an electronic marketing system may be defined as the total value of all resources used by the system priced in their highest alternative uses. Particular electronic marketing systems may be characterized by low fixed and high variable costs (teleauctions), high fixed and low variable costs (some computerized systems), or an almost infinite number of alternative cost scenarios. Procedural choices, within a particular electronic marketing system, will be important in determining costs. Number of head per lot, number of lots per sale, number of buyers and sellers, the type of auction process used, and time of sale will all have an impact on cost. Generally, procedural decisions will determine cost within the bounds that are feasible for a particular electronic marketing system.

If electronic marketing is to increase technical efficiency (discussed in Chapter II), it must operate at lower per unit cost than conventional marketing methods. The feasibility of a proposed electronic marketing system may hinge on the ability of the system to be cost efficient at all levels in the marketing continuum. Theoretically, a potential trader would be expected to participate in a new electronic marketing system if he/she expected new price benefits to exceed any

additional cost. However, it may be difficult to get a potential trader to expect price benefits but relatively easy to show reduced marketing costs. Even after implementation, it is more difficult to demonstrate price benefits accruing to a particular participant than cost savings. Price benefits are linked to value related dimensions of the product, while costs are typically computed on a per unit basis. All participants will not agree on the value of an individual commodity of a specific grade and quality. Specifically, an individual may have biased opinions regarding his/her own product -- especially if the individual buys or sells infrequently and is not well informed on current market conditions. Therefore, since price benefits may be difficult to demonstrate (especially on an individual basis), cost assumes a relatively more important role.

This chapter will examine the short-run variable and fixed costs associated with Eastern Lamb Producer Cooperative's (ELPC) computerized slaughter lamb sales. ELPC utilizes the computerized trading system of Electronic Marketing Association, Inc. (EMA) and is a member of the association. Estimated costs of a computerized slaughter hog sale, using EMA's sytem, will also be analyzed.

## IV.2 ELPC'S COMPUTERIZED SLAUGHTER LAMB SALES

### IV.2.1 Variable Costs

The costs of thirty-two ELPC computerized slaughter lamb sales, held from November, 1980 to August, 1981, were examined.[26] Table 4.1 gives the means, standard deviations, and ranges of factors related to variable cost. The total variable cost per sale averaged $101.60, had a standard deviation of $38.50, and ranged from $33.70 to $194.70. On a per head basis, variable cost averaged $.159, with a standard deviation of $.076, and ranged from $.08 to $.43 per sale. The length of the sales fluctuated between 5.5 and 29 minutes with a mean length of 13.6 minutes and a standard deviation of 7.1 minutes. The number of computer terminals used per sale ranged from 4 to 12 terminals, averaged 8 terminals, and had a standard deviation of 2.3 terminals. The number of lots per sale averaged 2.9 lots, with a standard deviation of 1.2 lots, and ranged from 1 to 5 lots. The number of head offered per sale fluctuated between 238 and 1,383 head, with a mean of 739.8 head, and a standard deviation of 367.2 head. Cost functions estimated from this data base should not be projected very far outside the ranges of the above variables if estimates are to be reliable.

Table 4.2 enumerates the variable cost per head, standard deviation of variable cost per head, number of terminals per sale, and number of sales by size of sale. Although the relationship is not perfect, Table 4.2 exemplifies the importance which sale size has on per unit variable

Table 4.1 Mean, Standard Deviation, and Range of Variables Related to Variable Cost of the Computerized Slaughter Lamb Auction Utilized by Eastern Lamb Producers Coop, Inc. (November, 1980 - August, 1981)

| Variable | Mean | Standard Deviation | Range |
|---|---|---|---|
| 1) Total Variable Cost Per Auction (in dollars) | 101.6 | 38.5 | 33.7-194.7 |
| 2) Total Variable Cost Per Head Per Auction (in cents) | 15.9 | 7.6 | 8.0-43.0 |
| 3) Length of Sale (in minutes) | 13.6 | 7.1 | 5.5-29.0 |
| 4) Number of Computer Terminals Used Per Auction | 8.0 | 2.3 | 4.0-12.0 |
| 5) Number of Lots Per Sale | 2.9 | 1.2 | 1.0-5.0 |
| 6) Number of Head Offered Per Sale | 739.8 | 367.2 | 238.0-1,383.0 |

Table 4.2 Variable Cost Per Head, Standard Deviation, Average Number of Terminals Per Sale, and Number of Sales by Size of Sale

| Size of Sale (head) | Variable Cost Per Head (cents) | Standard Deviation of Cost Per Head (cents) | Number of Terminals Per Sale | Number of Sales |
|---|---|---|---|---|
| 200-399 | 24.33 | 9.90 | 6.8 | 9 |
| 400-599 | 13.20 | 2.39 | 7.0 | 5 |
| 600-799 | 13.50 | .71 | 9.0 | 2 |
| 800-999 | 12.67 | 2.33 | 8.8 | 6 |
| 1,000-1,199 | 13.33 | 1.86 | 9.5 | 6 |
| 1,200-1,399 | 10.25 | 2.63 | 8.3 | 4 |

costs. Auctions which sold 200-399 head had an average variable cost per head of $.2433. In contrast, sales of 1,200-1,399 head had an average variable cost per head of only $.1025 -- a decrease of over 57% in spite of the fact the larger sales averaged 1.5 more terminals per sale.[27]

Models estimating the total variable factor cost function (model 1) and total variable cost function (models 2-5) for FIPC's computerized slaughter lamb sales, from November, 1980 thru August, 1981, are given in Table 4.3. Variable factor costs include those costs which vary with differing levels of input usage. Variable costs include those costs which change with different levels of output. Since neither a total variable cost function nor a total variable factor cost function include fixed costs, the population regression lines should pass through the origins.[28] Incorporating this a priori knowledge, the intercept terms in the models were restricted to zero. This allows fewer parameters to be estimated and reduces the variance on the remaining restricted estimators (Kmenta). However, coefficients of determination ($R^2$) are lowered (Kmenta) and the sum of the residuals are no longer required to be zero (Draper and Smith) because of the restrictions. The models possess the usual desirable properties, assuming the intercept is truly zero (Kmenta).

Model 1 estimates total variable factor cost (TVFC) as a function of the number of computer terminals logged on per sale (TER), the length

Table 4.3 Models Estimating Total Factor Cost (Model 1) and Total Variable Cost (Models 2 thru 5) for Eastern Lamb Producers Coop's Computerized Slaughter Lamb Sales (November, 1980 - August, 1981)[a]

| | Coefficients and T Statistics | | | | | | |
|---|---|---|---|---|---|---|---|
| Model | Number of Computer Terminals Per Sale (Ter) | Length of Sale in Minutes (T) | Number of Lots Offered Per Sale (L) | $L^2$ | Number of Head Offered Per Sale (H) | $H^2$ | $R^2$ |
| 1 | 3.24*** (2.55) | 1.32** (1.93) | 19.51*** (5.62) | | | | .966 |
| 2 | | | 46.07*** (8.64) | -3.39*** (-2.49) | | | .955 |
| 3 | | | | | .197*** (8.50) | -.000068*** (-3.12) | .943 |
| 4 | | | 33.15*** (23.25) | | | | .946 |
| 5 | | | | | .127*** (19.56) | | .925 |

[a]Numbers in parentheses are t statistics. One, two, and three asterisks (*) indicate 10%, 5%, and 1% levels of significance, respectively. All models estimate cost in dollars per cwt.

of the sale in minutes (T), and the number of lots offered per sale (L). Computer Sciences Corp. charges EMA for computer service based on both the amount of computer time and number of computer processing units used. Computer time used during a sale is a function of the length of the sale in minutes (T) and the number of terminals logged on (TER). The number of computer processing units utilized is a function of the number of terminals logged on (TER) and the number of lots offered per sale (L), where L is a proxy for bidding activity. Model 1 is depicted in equation 4.1.

$$(4.1) \quad TVFC = 3.24\ TER + 1.32\ T + 19.51\ L$$

TER and L are significantly different from 0 at the 1% level. T is significantly different from 0 at the 5% level. The equation has an $R^2$ of .966.

Related average variable factor cost functions (AVFC) for TER, T, and L are given in equations 4.2, 4.3, and 4.4, respectively. Similarly, marginal factor cost (MFC) functions for TER, T, and L are given in equations 4.5, 4.6 and 4.7.

$$(4.2) \quad AVFC_{TER} = 3.24 + 1.32\ (T/TER) + 19.51\ (L/TER)$$

$$(4.3) \quad AVFC_{T} = 1.32 + 3.24\ (TER/T) + 19.51\ (L/T)$$

$$(4.4) \quad AVFC_{L} = 19.51 + 3.24\ (TER/L) + 1.32\ (T/L)$$

$$(4.5) \quad MFC_{TER} = 3.24 + 1.32\ T + 19.51\ L$$

$$(4.6) \quad MFC_{T} = 1.32 + 3.24\ TER + 19.51\ L$$

$$(4.7) \quad MFC_{L} = 19.51 + 3.24\ TER + 1.32\ T$$

As equations 4.2 - 4.7 demonstrate, AVFC for a specific factor decreases asymptotically towards its estimated coefficient in equation 4.1 while MFC for a specific factor is constant and equal to its estimated coefficient in equation 4.1 for given levels of the other factors.

Total variable cost functions (TVC) are estimated in Models 2-5. The quadratic models of 2 and 3 are prefered to the linear models of 4 and 5 because of the declining marginal costs associated with the quadratic models. However, the choice between Model 2 and 3 is dependent on whether one considers lots sold or head sold as the output of an electronic marketing system. Model 2 is given in equation 4.8 and Model 3 is given in equation 4.9.

(4.8) $TVC_L = 46.07\ L - 3.39L^2$

(4.9) $TVC_H = .197\ H - .000068\ H^2$

All variables in both equations are significantly different from 0 at the .01 level. $R^2$'s are .955 for equation 4.8 and .943 for equation 4.9. Because of the quadratic forms, the cost equations would not be valid for sales larger than 6.79 lots or 1448.5 head.[29] The average variable cost (AVC) curves and marginal cost (MC) curves corresponding to equations 4.8 and 4.9 are given in equations 4.10 to 4.13.

(4.10) $AVC_L = 46.07 - 3.39\ L$

(4.11) $AVC_H = .197 - .000068H$

(4.12) $MC_L = 46.07 - 6.78\ L$

(4.13) $MC_H = .197 - .000136\ H$

Both average variable cost and marginal cost are linear, regardless of how output is defined.

As discussed earlier, the distribution of cost savings (or increases) among participants in the marketing continuum is important. Table 4.4 displays the distribution of variable costs per head related to ELPC's computerized slaughter lamb auction. Per head charges accruing to individual lamb producers include $.30 for grading, $.75 to auction markets for assembling, weighing and loading and $.45 to ELPC for the sale, for a total of $1.50. This is the same charge as the teleauction sales held previous to the computerized auction, and is $0 to $.50 per head higher than conventional marketing methods depending on the particular auction market used. ELPC pays $.25 per head for the use of EMA's computerized trading system. Per head costs for the previous teleauction sales were not computed but Roy Meek (manager of ELPC) has indicated that the $.25 per head is as low or lower than for the teleauction sales. EMA's variable costs, as mentioned earlier, have averaged $.16 per head for ELPC's sales. Finally, the lamb buyers have no variable cost other than the negligible paper and electricity used by the computer terminals. Hence, the computerized trading system has resulted in the same variable cost for producers, the same or lower for ELPC, and the same for lamb buyers.

Table 4.4 Distribution of Variable Costs Per Head Related to the Computerized Lamb Auction Utilized by Eastern Lamb Producers Coop, Inc. (Dollars)

| Source | Individual Lamb Producers | Eastern Lamb Producers Coop. Inc. | Electronic Marketing Association, Inc. | Lamb Buyers |
|---|---|---|---|---|
| 1) Grading | $ .30 | $ | $ | $ |
| 2) Charge by local auction markets | .75 | | | |
| 3) ELPC charges | .45 | | | |
| 4) EMA charges | | .25 | | |
| 5) Average variable computer charges | | | .16 | |
| Total Variable Cost Attributable to Computerized Auction | $ 1.50 | $ .25 | $ .16 | $ 0 |

### IV.2.2 Fixed Costs

Fixed costs for the computerized system are relatively easy to determine but difficult to allocate to the appropriate activity. EMA's capital investments have been made with the assumption that future growth will occur. A large proportion of the time of EMA's current personnel is spent trying to ensure that growth will occur -- in promotion, training, and modifying current programs to better fit the needs of potential organizational members. As such, EMA's fixed expenses should be allocated on expected potential rather than on current volumes. Should this expected potential later fail to develop, adjustments could then be made by curtailing some of the fixed expenses.

Table 4.5 presents the allocation of appropriate fixed expenses of EMA to ELPC's computerized slaughter lamb sales under three alternative scenarios. Table 4.5 does not include a complete enumeration of all of EMA's fixed expenses. For example, EMA owns approximately $15,000 worth of telephone equipment which enables EMA to make conference telephone calls without going through the telephone company's operator. This equipment was purchased to allow small buyers the opportunity to participate in a computerized feeder livestock sale via a telephone call. No part of the expense of the equipment should be allocated to ELPC's slaughter lamb sales and hence was not included in Table 4.5.

Table 4.5 Allocation of Appropriate Fixed Expenses of Electronic Marketing Association, Inc. to Eastern Lamb Producers Coop's (ELPC) Computerized Slaughter Lamb Sales Under Alternative Scenarios (dollars).

| Type of Expense | Annual Costs | Alternative Allocations to ELPC Sales (40 sales per year) 1% | 3% | 5% |
|---|---|---|---|---|
| Manager's Salary[a] | $21,000.00 | $ 5.25 | $15.75 | $26.25 |
| Secretary's Salary[a] | 10,400.00 | 2.60 | 7.80 | 13.00 |
| Benefits/Taxes on Salaries[a] | 4,396.00 | 1.10 | 3.30 | 5.50 |
| Office Rent[a] | 1,980.00 | .50 | 1.49 | 2.48 |
| Electricity[a] | 381.36 | .10 | .29 | .48 |
| Phone (3 lines)[a] | 1,080.00 | .27 | .81 | 1.35 |
| Paper and Supplies[a] | 120.00 | .03 | .09 | .15 |
| Depreciation:[a] | | | | |
| TI745 ($1,500 ÷ 5) | 300.00 | .08 | .22 | .38 |
| ADM103A ($750 ÷ 5) | 150.00 | .04 | .11 | .19 |
| Office Furniture & Equipment ($2,000 ÷ 10) | 200.00 | .05 | .15 | .25 |
| Service on Terminals[b] | 236.71 | .06 | .18 | .30 |
| Program Storage Cost[a] | 6,000.00 | 1.50 | 4.50 | 7.50 |
| TOTALS | $46,244.07 | $11.56 | $34.68 | $57.81 |

[a]Estimated from interviews with EMA personnel and from EMA records.

[b]Obtained from Chieruzzi's analysis.

Table 4.5 lists $46,244.07 annual fixed expenses of which a portion could be appropriately allocated to EIPC's slaughter lamb program. The cost of the software was not included as this was developed by the Infonet Division of Computer Sciences Corporation for EMA at no cost to EMA. EMA later provided enhancements to the basic program, but the enhancements have been more concerned with other commodities and with record keeping than with the slaughter lamb auction program. Similarly, the funds from the USDA-AMS grants were not included since they involved public funds at no cost to EMA. Naturally, an organization developing a new computerized system would need to consider the development cost excluded from these estimates.

Since all of the fixed resources could be utilized at least 40 hours per week, it is possible to allocate fixed expenses to a specific activity by the proportion of time the resources are utilized in that particular activity. Assuming 40 sales per year, the alternative allocations of 1%, 3%, and 5% would correspond to EMA utilizing its fixed resources for 31.2, 62.4, and 93.6 minutes for each EIPC sale. Considering the fact that EIPC sales have averaged 13.6 minutes in length, a 3% allocation (corresponding to 62.4 minutes per sale) may be reasonably realistic. The additional 48.8 minutes (62.4-13.6) are used for data entry, telephone calls, education, etc. Assuming a 3% allocation to be appropriate, the per sale allocated fixed cost would be $34.68.

All ELPC buyers and ELPC management have a terminal which results in a total annual fixed cost of $454 ($300 for depreciation and $154 for service) or a fixed charge of $11.35 per sale assuming 40 sales per year. This converts to $.12 per head for an average buyer and to $.02 per head for the ELPC manager.[30] Individual producers have no direct fixed costs accruing to them.

Hence, even at the relatively low current annual sales volume, fixed costs on a per unit basis appear to be reasonable for buyers and the ELPC manager. Low (3%) allocations of EMA's fixed expenses to ELPC slaughter lamb sales is dependent on full utilization of EMA's fixed resources. Should lower sustained levels of resource utilization appear likely, services currently provided to member organizations by EMA could be reduced, thus lowering fixed expenses. In the limit, if ELPC were the only member organization, EMA could be dissolved with ELPC handling the computerized sales. All of EMA's fixed expenses could be eliminated except program storage which could be greatly reduced.[31]

### IV.2.3 Total Costs

Assuming 3% of EMA's fixed resources are allocated to ELPC lamb sales, the systems total cost (TC) and average cost (AC) functions would be represented by equations 4.14 and 4.15.

(4.14) $TC = 34.68 + .197\ H - .000068H^2$

(4.15) $AC = .197 + 34.68\ (I/H) - .000068H$

A graphical representation of cost curves generated from equation 4.14 is depicted in Figure 4.1. As with the variable cost curves, the quadratic nature of TC invalidates the function for sale sizes greater than 1448.5 head.[32] As the figures and functions demonstrate, the average cost per head ranges from $34.88 for a sale with one head to $.12 for a sale with 1,448 head. Assuming teleauction costs of $.30 per head, the computerized sales become cost effective at a 300 head sale.[33] ELPC's average sale size was 740 head for an average cost of $.19 per head ($.11 per head lower than the teleauction's assumed cost of $.30 per head) based on the fitted equation.

Table 4.6 summarizes the distribution of per head costs for ELPC slaughter lamb sales. Assuming 40 sales per year, with an average of 740 head per sale, individual lamb producers pay $1.50 per head. ELPC, EMA, and lamb buyers pay $.27, $.20 and $.12 per head in fixed and variable costs respectively. It should be remembered that these costs are based on historical data (November, 1980-August, 1981) and are not perfectly indicative of future costs. Per head terminal costs can be reduced by using the terminals for other sales and in providing other services. Auction charges can be reduced by increasing the number of head offered per lot and per sale. Increased bargaining power may lead to reduced grading and auction market fees. Hence, opportunity to reduce the current marketing cost of ELPC slaughter lamb sales exists.

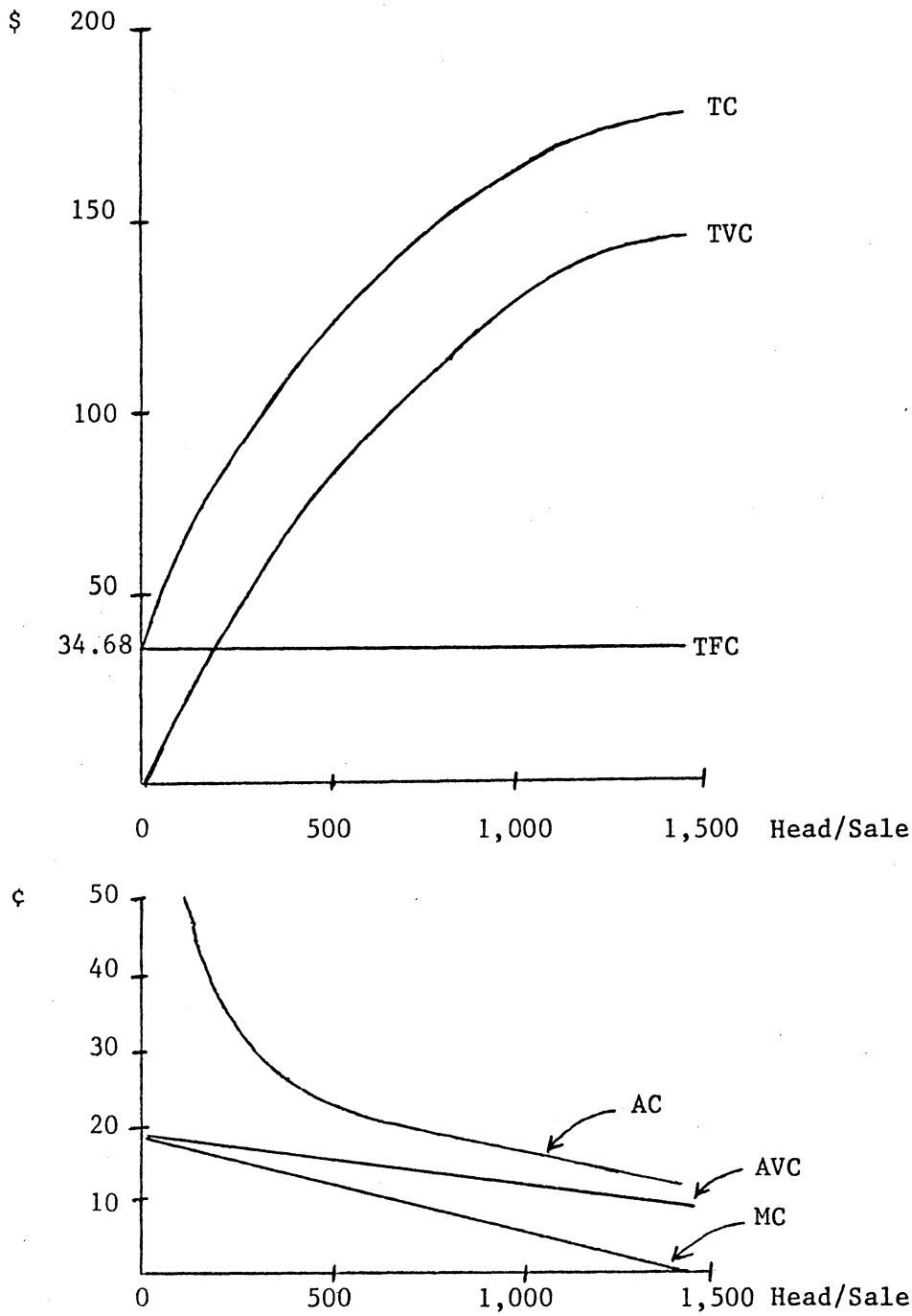


Figure 4.1 Cost Curves for ELPC's Computerized Lamb Sale (November, 1980 - August, 1981)

Table 4.6. Distribution of Per Head Costs Related to ELPC's Computerized Slaughter Lamb Sales (November, 1980 - August, 1981)[a]

| Source | Individual Lamb Producers | ELPC | EMA | Lamb Buyers[b] |
|---|---|---|---|---|
| Variable: | $ | $ | $ | $ |
| Grading | .30 | | | |
| Charge by local auction markets | .75 | | | |
| ELPC fees | .45 | | | |
| EMA fees | | .25 | | |
| Computer charges | | | .16 | |
| Fixed: | | | | |
| 3% Allocation of EMA's Annual Fixed Expenses | | | .04 | |
| Terminal Depreciation and Service[c] | | .02 | | .12 |
| TOTALS | $1.50 | $ .27 | $ .20 | $ .12 |

[a]Based of 40 sales per year, 740 head per sale.

[b]Assumes buyer purchases 1/8 of lambs offered.

[c]Assumes terminals are used 100% for ELPC sales.

## IV.3 COMPUTERIZED SLAUGHTER HOG AUCTION

In April, 1981 Eastern Electronic Marketing Association, Inc. submitted a proposal for a computerized hog marketing system to Producers Livestock Association (PLA) of Columbus, Ohio. Included in the proposal were estimated monthly costs for alternative sales volume and procedural scenarios. Although the system has not been adopted by PLA, examination of the estimated costs of the proposed system should illustrate the bounds within which EMA's computerized system can operate.

Table 4.7 presents the estimated monthly cost of a computerized slaughter hog auction using EMA's system. The estimated costs assume 40-150 head per lot, 18-36 lots and 3 sales per day. Two control terminals, 12 market terminals, and 10 buyer terminals are assumed to operate 5, 2.5, and 1 hour per day, respectively. In the scenarios utilizing 10 additional monitoring terminals, the terminals are assumed to be used 50 minutes per day. The monthly cost estimates include all on-line activity charges, connect charges, on-line storage and tape storage expenses, and charges by EMA for their overhead.

As Table 4.7 illustrates, estimated per head costs range from $.43 for a system with accounting functions, 10 additional monitoring terminals, and a monthly volume of 35,200 head to $.13 for a system without accounting functions, no additional monitoring terminals, and a monthly

Table 4.7 Estimated Total Monthly Cost of a Proposed Computerized Slaughter Hog Auction for Producers Livestock Association (Eastern Electronic Marketing Association, Inc.) in Dollars[a]

| Monthly Volume (head) | Monthly Cost With Accounting Functions[b] | Monthly Cost Without Accounting Functions[b] | Monthly Cost of 10 Additional Monitoring Terminals[c] |
|---|---|---|---|
| 35,200-52,800 | $12,569.00 ($.35-.24 per hd.) | $ 8,927.00 ($.25-.17 per hd.) | $ 2,674.00 ($.08-.05 per hd.) |
| 52,800-83,600 | $16,319.00 ($.31-.20 per hd.) | $13,039.00 ($.25-.16 per hd.) | $ 3,055.00 ($.06-.04 per hd.) |
| 83,600-118,800 | $19,789.00 ($.24-.17 per hd.) | $15,056.00 ($.18-.13 per hd.) | $ 3,564.00 ($.04-.03 per hd.) |

[a]Includes all on-line activity charges, connect charges, on-line storage and tape storage expenses, and charges by EMA for their overhead. The estimated costs assume 40-150 head per lot, 18-36 lots per day, and 3 sales per day.

[b]Estimates assume 2 control terminals, 12 market terminals, and 10 buyer terminals. The control terminals are assumed to be in use 5 hours per day with a maximum auction time of 60 minutes. Similarly, buyer terminals are assumed to operate 1 hour per day with a maximum auction time of 50 minutes. Market terminals are expected to be used 2.5 hours per day.

[c]Cost estimates assumes the terminals will be used 50 minutes per day with a maximum auction time of 45 minutes.

volume of 118,800 head. For a volume level of 500,000 head per year (PLA's 1980 annual marketing volume - Baldwin) estimated system costs per head would be $.30 with accounting functions, $.21 without accounting functions, and $.06 for the addition of 10 monitoring terminals. At the same sales volume, a system which owns a mini-computer and uses dedicated telephone lines was estimated to cost $.65 per head (Baldwin).[34] Hence, at PLA's current sales levels, EMA's time-sharing, non-dedicated system appears to offer important cost savings. Again, however, one must avoid the temptation to over generalize these cost estimates. Changing any of the basic assumptions regarding number of head per lot or sale, length of sale, number of participants, or procedures used can significantly affect per unit costs.

## IV.4 FOOTNOTES

[26]Earlier sales were excluded because the conversion of software from the ALADDIN language to the FORTRAN language was incomplete.

[27]The Corn Belt Lamb Auction, a member of Equity Cooperative Producers Livestock Sales Association, began using EMA's computerized system during October, 1981. Early sales have averaged approximately 2,000 head, taken 8-10 minutes, and had 7-8 terminals logged on. Although the bills for computer charges have not been received, the variable cost per head for these sales may approach $.05 (and not necessarily from above).

[28]Some may argue that because of sampling problems, positioning of the functions, etc. the models should include intercepts. Models 1 thru 5 were also fitted with intercepts. Only models 4 and 5 possessed intercepts which were significantly different from 0 at the 10% level. Since models 1-3 are the preferred models in Table 4.3, it was felt that sufficient reason existed to argue that the models without intercepts are the correct specification.

[29]The quadratic form of the cost functions may be interpreted as a Taylor series approximation of the true cost curves over the intervals from 0 to 6.79 lots or from 0 to 1448.5 head. Were the sales of sufficient length, the function should eventually reach the point where cost increases at an increasing rate.

[30]This also assumes that both buyers and ELPC management are not using the terminals for anything except ELPC slaughter lamb sales. As EMA adds other sale groups and other services it becomes increasingly likely that buyers will use the terminals for other sales and for additional services -- thus reducing the per unit fixed cost of ELPC slaughter lamb sales. The ELPC manager is already using his terminal for slaughter lamb and feeder cattle record keeping purposes.

[31]As emphasized previously, such a scenario appears highly unlikely. EMA's computerized lamb sales have already expanded into eleven states. Inquiries have been received regarding slaughter cattle, slaughter hogs, feeder cattle, feeder pigs, and fruits and vegetables. Some associations have committed to sell over EMA's system, some appear close to commitment, others are in various stages of investigation. In short, there appears to be a high probability that EMA will continue to expand in the foreseeable future.

[32]Again, the quadratic form of the cost function may be considered a Taylor series approximation of the true cost curve for the interval 0 to 1448.5 head. Were the sales of sufficient length, the function should eventually reach the point where cost increases at an increasing rate.

[33]According to Roy Meek (manager of ELPC), $.30 per head would be a reasonable assumption.

[34]Baldwin's estimates included terminal and modem costs. Since PLA already had terminals these costs were not included in Table 4.7. However, to make the cost estimates comparable per head costs using EMA's system should be increased $.02 ($454 per terminal 24 terminals/500,000 head) for basic service and $.01 ($454 per termnal 10 terminals/500,000 head) for the addition of 10 monitoring terminals.

[35]This assumes that ELPC and buyers only use their computer terminals for ELPC slaughter lamb sales. As other sales and services become available, the validity of this assumption and the allocated cost will decrease.

## Chapter V

## PRICE CONSIDERATIONS

### V.1 INTRODUCTION

This chapter will analyze the price effects of Eastern Lamb Producers Coop's (ELPC) computerized slaughter lamb sales. Since ELPC used a teleauction previous to the computerized slaes, prices will also be compared across electronic mediums. Price magnitudes and variances will be examined and comparisons with theoretical expectations will be made. The relationship between the prices of lambs sold through computerized sales and those sold through regular auction channels will be analyzed.

### V.2 ELPC PRICE MAGNITUDE

The state graded slaughter lambs sold through ELPC's computerized sales generally have 6 or 7 packer buyers participating in the sale. This compares with sometimes as low as 1 or 2 active bidders on the often ungraded slaughter lambs sold at conventional auction market sales.[37] With such an increase in the number of buyers, theory would suggest that the price of slaughter lambs sold in the computerized sales should be at least as high and probably higher than the price of comparable lambs sold at conventional auction markets, assuming no changes in

technical efficiency.[38] Theory also suggests a state grade (obtained by a grader physically examining as well as looking at the lambs) should contain information of value to a buyer that should be reflected in higher bids for comparable but graded lambs, assuming adequate competition.

However, the relationship between price levels and pricing efficiency is not perfect. As demonstrated in Chapter II, changes in technical efficiency may also affect price levels. Pricing efficiency involves many issues besides price levels (for example, pricing accuracy, ability of price to communicate clear and timely signals, etc.). Nevertheless, because of increased competition and the informational value of grades, one would expect higher prices for comparable lambs sold through the computerized sales. If the higher prices are not just due to cost differences, inferences regarding increased pricing efficiency can then be made.

To test the theoretical hypothesis regarding higher lamb prices, the national lamb price (PLN) and the regional lamb price (PLR) were subtracted from the prices received during the computerized lamb sales (PLC) to form two price series. All prices are expressed in dollars per cwt. The national lamb price was represented by the average price of prime and choice spring lambs sold at the San Angelo, TX; Sioux Falls, SD; and South St. Paul, MN markets from May-September, 1961-81 (only the years 1980-81 were used for tests involving only the computerized sa-

les). The regional price was represented by the average price of 95-125 lb. prime and choice lambs sold at the Abingdon, VA and Staunton, VA livestock markets from May-September, 1961-81 (only the years 1980-81 were used for tests involving only the computerized sales). PLC is based on a Virginia state grade called a Blue O. A Blue O is a U.S. high choice and prime lamb, weighing 95-125 lbs. and estimated to dress 50% or better, hot weight.

The national difference (NDF) was computed by subtracting PLN from PLC. NDF had a mean of $1.46 per cwt. which was significantly different from 0 at the 10% level. The regional difference (RDF = PLC - PLR) had a mean of $1.86 per cwt. which was significantly different from 0 at the 1% level. Several alternative explanations exist for the positive means of NDF and RDF. NDF could be positive because the national prices include a mixture of lambs with at least part of them grading low choice which would not be included in the Blue O grade. This could account for some of the difference. Higher prices through increased competition and/or reduced buyer risks through grading could account for the rest of the difference.

It is even more difficult to explain the regional price difference without arguing electronic marketing promotes increased competition, provides information of value through grading, and/or reduces buyer costs. It should be noted that this difference is accentuated when Red O lambs (U.S. choice lambs weighing 85-125 lbs. and estimated to dress

47% or better, hot weight) are considered. ELPC discounts Red O lambs a fixed $3.00 per cwt. below the Blue O grade. For the last two years, the regional livestock markets have docked Red O lambs approximately $6.00 per cwt. below the price of Blue O lambs.[39] A producer selling a large proportion of Red O lambs therefore would have found his effective price difference or RDF considerably higher than the observed $1.86 per cwt. for Blue O's. Hence, both the positive national and regional differences support the hypothesis that the computerized lamb sales have obtained higher prices when compared to conventional marketing techniques.

Within a particular electronic marketing system, varied parameters, procedures, and sale characteristics can affect bidding activity and hence the final negotiated price. Table 5.1 presents econometric models used in explaining the price received for Blue O slaughter lambs (PLC) sold through ELPC computerized sales, May, 1980 thru September, 1981.

Model 1 depicts PLC in dollars per cwt. as a function of the bidding time increment in seconds (BI), the number of lots offered per sale (LO), and the national price in dollars per cwt. (PLN). Model 1 with t statistics in parenthesis is presented in equation 5.1:

$$(5.1) \quad PLC = \underset{(.97)}{-3.84} \; \underset{(3.78)^{***}}{-0.32BI} \; \underset{(-6.11)^{***}}{+1.71LO} \; \underset{(17.52)^{***}}{+0.94\,PLN}$$

$R^2 = .72$ $\quad n = 145$ $\quad DW = .73$

As evidenced by the Durbin-Watson statistic, positive serial correlation is a problem in Model 1. After accounting for the first order serial

Table 5.1. Models Explaining the Price Received for Blue O Slaughter Lambs Sold Through ELPC Computerized Sales (May, 1980 - September, 1981), n = 145[a]

| Model | Intercept (I) | Bidding Time Increment (BI) | Lots Offered (LO) | National Price (PLN) | Lagged Price from Computer Sales (LPLC) | $R^2$ |
|---|---|---|---|---|---|---|
| 1 | 3.84<br>(0.97) | 0.32<br>(3.78)*** | -1.71<br>(-6.11)*** | 0.94<br>(17.52)*** | | .72 |
| 2[b] | 7.48<br>(1.10) | 0.34<br>(2.39)*** | -0.87<br>(-3.38)*** | 0.82<br>( 8.81)*** | | .41 |
| 3 | 2.15<br>(0.75) | 0.09<br>(1.38) | -0.91<br>(-4.25)*** | 0.31<br>( 4.64)*** | 0.68<br>(11.43)*** | .85 |

[a]Numbers in parenthesis are "t" statistics. One, two, and three asterisks indicate 10%, 5%, and 1% levels of significance, respectively.

[b]Estimated to account for first order autocorrelation present in model 1. A method similar to the Cochrane-Orcutt iterative procedure was used.

correlation, Model 2 is the reestimated model and is presented in equation 5.2:

$$(5.2) \quad PLC = \underset{(1.10)}{7.48} + \underset{(2.39)^{**}}{0.34BI} + \underset{(-3.38)^{***}}{-0.87LO} + \underset{(8.81)^{***}}{0.82PLN}$$

$R^2 = .41 \qquad n = 145$

From the fitted models, the positive sign on BI indicates that giving buyers a little more time to decide whether or not to bid has a positive influence on price. For a given amount of buying power and a given average lot size, price should vary inversly with the number of lots offered -- the coefficient on LO should be negative. It could also be assumed that most buyers would use a working knowledge of the national lamb price to formulate the maximum price they would be willing to pay for lambs offered in ELPC sales. As such, national price would be expected to vary directly with PLC. It should be noted that the number of buyers logged on, buying, or bidding, the bidding price increment, or the dropping price and time increments were not significant in any of the models tested.

Because of the serial correlation, the $R^2$ of model 1 is likely to be biased upward (Maddala). The $R^2$ of Model 2 is relatively low when compared to many time series econometric models. However, it must be remembered that important explanatory variables (at least from a theoretical viewpoint) are not included because the data are not available. For example, a particular buyer's bids should be heavily influenced by his/her current inventories, future commitments, etc. Also, it can be difficult to explain behavior at the micro level when only a few (8-9 in this case) individuals are involved.

Model 3 is given in equation 5.3:

$$(5.3) \quad PLC = \underset{(0.75)}{2.15} + \underset{(1.38)}{0.09BI} + \underset{(-4.25)***}{-0.91LO} + \underset{(4.64)***}{0.31PLN}$$

$$+ \underset{(11.43)***}{0.68LPLC}$$

$R^2 = .85$ $n = 145$ DW "D" = 2.12 DW "H" = -1.10

Including lagged price is intuitively appealing. ELPC sales appear to be a residual supply for at least some of the buyers on the system. Such buyers are more likely to rely on ELPC sales for a part of their supply of lambs if they have recently purchased lambs through ELPC. This increases the likelihood that sales with greater than average bidding activity (and subsequent higher prices) will be followed by sales with active bidding (with subsequent higher prices) and conversely. Hence, one would expect a positive correlation between LPLC and PLC. Using a partial adjustment framework, the mdoel implies that 32 percent of the adjustment towards long-run equilibrium price takes place in a one week period.

Models 1, 2, and 3 give insight into the effects varied parameters, procedures and sales characteristics may have on prices received with an electronic marketing system. As noted in Chapters III and IV, ELPC computerized lamb sales use only a small subset of the possible parameter settings, procedures, and sale characteristics available with EMA's electronic marketing system. Certainly, the set of buyers currently using the system is a small proportion of the universe of potential buy-

ers. Generalization of the results of models 1, 2 and 3 across buyers, commodities, electronic marketing systems, or different procedures is not justified at this time. Insight has been gained. As electronic marketing systems develop and the data base grows, more general theories can be formulated with more widespread applicability.

## V.3 ELPC PRICE VARIABILITY

Theoretically, if pricing efficiency has been increased, we would expect short-run price variability (price nervousness) to be greater for ELPC's slaughter lamb sales than for lambs sold through livestock auctions. This would be expected to occur as prices react more quickly to new information and as lambs are priced more in accord with their individual value rather than on group averages.

Unfortunately, ELPC sales are just held once a week and intraday data for regular auction sales are not available. This means comparative tests could not be performed regarding interday and intraday price variability between electronic and conventional markets. Interweek and intermonth tests were performed but theoretical expectations are less clear over these longer time intervals. Interweek variances for the electronic marketing price, regional price, and slaughter lamb prices at the livestock auctions at Abingdon and Staunton, Virginia were 59.13, 53.73, 44.09 and 66.58 $(\$/\text{cwt.})^2$, respectively. Using F statistics,

none of the variances were significantly different from the interweek variance of ELPC price at the 5% level. Intermonth variance was 40.83 ($/cwt.)$^2$ for ELPC prices and 36.24 ($/cwt.)$^2$ for regional lamb prices. Again, however, the variances were not significantly different at the 5% level. Therefore, insufficient evidence exists to say that interweek and intermonth price variances are different for prices negotiated in an electronic arena and those in conventional auction markets. Since these longer term variances are often associated with price "risks", these findings should prove comforting to potential participants of an electronic exchange. Data were not available to test variances of a shorter term nature and hence no implications regarding pricing efficiency can be drawn from ELPC price variability.

## V.4 ELPC PRICE RESPONSIVENESS TO MARKET INFORMATION

For a marketing system to be price efficient, it must receive and correctly interpret market information in a timely manner. New market information should be quickly incorporated into the bids and offers of system participants. As such, one would expect price changes, due to changing market conditions, to be reflected more quickly in a marketing system which is more price efficient. Hence, if electronic marketing is more price efficient than conventional marketing methods, the price changes for electronic markets would be expected to occur before the price changes from conventional markets.

Table 5.2 presents descriptions of variables used in models to evaluate the responsiveness of the price received in ELPC's computerized slaughter lamb sales to market information. Table 5.3 presents the models.

Using weekly data for the months May-September, 1980-81, the first differences of PLR (DPLR) were regressed with models containing 0, 1, and 2 period lags of the first differences of PLC. The resulting models with t statistics in parenthesis are presented in equations 5.4, 5.5 and 5.6.

$$(5.4)\quad DPLR = \underset{(-1.40)}{-0.83} + \underset{(.81)}{0.15}\ DPLC$$

$R^2 = .035 \qquad n = 39$

$$(5.5)\quad DPLR = \underset{(-.86)}{-0.39} + \underset{(3.30)^{***}}{0.45}\ DPLC1$$

$R^2 = .391 \qquad n = 39$

$$(5.6)\quad DPLR = \underset{(-2.06)}{-1.05} + \underset{(.03)}{0.005}\ DPLC2$$

$R^2 = .001 \qquad n = 39$

Then, first differences of PLC (DPLC) were regressed with models containing 0, 1 and 2 period lags of the first differences of PLR. The resulting models with t statistics in parenthesis are presented in equations 5.7, 5.8 and 5.9.

$$(5.7)\quad DPLC = \underset{(-.80)}{-0.64} + \underset{(.81)}{0.24}\ DPLR$$

$R^2 = .035 \qquad n = 39$

$$(5.8)\quad DPLC = \underset{(-1.55)}{-1.21} - \underset{(-.25)}{0.07}\ DPLR1$$

Table 5.2 Descriptions of Variables Used in Models to Evaluate the Responsiveness of the Price Received in ELPC's Computerized Slaughter Lamb Sales to Market Information

| Variable | Description |
|---|---|
| DPLR | The first differences of PLR. PLR equals the average price of prime and choice, 95-125 pound lambs at Abingdon and Staunton Va. Weekly data for the months May-September, 1980-81 are used in these models. $/cwt. |
| DPLR1 | One period lag of DPLR. |
| DPLR2 | Two period lag of DPLR. |
| DPLC | The first differences of PLC. PLC equals the average price of Blue O lambs at the ELPC computerized sales. Weekly data for the months May-September, 1980-81 are used in these models. $/cwt. |
| DPLC1 | One period lag of DPLC |
| DPLC2 | Two period lag of DPLC |

Table 5.3 Models Used to Evaluate the Responsiveness of the Price Received in ELPC's Computerized Slaughter Lamb Sales to Market Information, n = 39[a]

| Model | Dependent Variable | I | DPCL | DPLC1 | DPLC2 | DPLR | DPLR1 | DPLR2 | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | DPLR | 0.83<br>(-1.40) | 0.15<br>(.81) | | | | | | .035 |
| 2 | DPLR | 0.39<br>(- .86) | | 0.45<br>(3.30)*** | | | | | .391 |
| 3 | DPLR | -1.05<br>(-2.06) | | | 0.005<br>(.03) | | | | .001 |
| 4 | DPLC | 0.64<br>(- .80) | | | | 0.24<br>(.81) | | | .035 |
| 5 | DPLC | -1.21<br>(-1.55) | | | | | -0.07<br>(-.25) | | .004 |
| 6 | DPLC | -1.64<br>(-2.06)* | | | | | | -0.43<br>(-1.09) | .121 |

[a]Numbers in parenthesis are "t" statistics. One, two, and three asterisks indicate 10% 5% and 1% levels of significance, respectively.

$R^2 = .004 \qquad n = 39$

$$(5.9) \quad DPLC = \underset{(-2.06)^*}{-1.64} - \underset{(-1.09)}{0.43}\ DPLR2$$

$R^2 = .121 \qquad n = 39$

When comparisons across equations 5.4-5.9 are made, the only coefficient (excluding intercepts) which is significantly different from 0 at the 10% level is the coefficient associated with DPLC1 in equation 5.5 (and it is significantly different from 0 at the 1% level). In other words, the weekly change in the price received for lambs at the computerized sales, is explaining a statistically significant portion of the weekly price change in the regional price for the next or following week.

More sophisticated techniques exist (Granger-Sims tests of causality, for example) to test for causality. However, from the fitted equations there at least appears to be a tendency for the computerized sales to establish the price for the sales at Staunton and Abingdon, VA. At least two reasons can be given to explain the phenomenon. First, the computerized sales may react to market information more rapidly than the conventional markets. If conventional markets react to the same market information one week later than the computerized lamb sales or as buyers in the conventional markets look to the previous ELPC price changes as a source of market information, a positive correlation between DPLR and DPLC1 would be expected. Such explanations would be consistent with the hypothesis that electronic marketing increases pricing efficiency.

However, a second possible explanation also exists. Buyers in conventional markets might view the ELPC sales as a competitor likely to take lamb volume from conventional auctions. As such, these buyers may look to previous ELPC price changes to evaluate what happened in the competitive market. The buyers may then react to the competition by ensuring a positive correlation with the computerized price changes in the conventional markets. Such behavior would also explain a positive correlation between DPLR and DPLC1 but would not be indicative of increased pricing efficiency in the computerized sales. This type of behavior (if it exists) should decrease as the computerized sales become more firmly established.

Hence, price changes in ELPC's computerized slaughter lamb sales appear to lead changes in regional slaughter lamb prices by one week. This may be considered as evidence of the computerized sales ability to react to market information more quickly than conventional markets or as evidence that buyers consider the computerized sales a competitor. The first reason would be indicative of superior pricing efficiency of computerized sales, the latter would not. The data, at present, do not allow the effects of the two possible explanations to be differentiated. Probably, both explanations have at least some validity. Hopefully, future data will allow causal influences to be more fully separated.

## V.5 IMPACT OF ELECTRONIC MARKETING ON OTHER PRICES

Electronic marketing can affect prices traded outside the electronic trading arena. Higher prices in electronic markets will generally mean higher prices for comparable products sold through conventional markets. Unless prevented by institutional or legal barriers, arbitrage will guarantee prices will not diverge much farther than the cost of arbitrage -- assuming adequate competition. Even if the arbitrage process does not work perfectly, it will generally work well enough to establish a strong positive relationship for similar products marketed through alternative channels.

This section will analyze the average monthly price of prime and choice, spring lambs sold through the Abingdon, Virginia and Staunton, Virginia livestock markets from May-September, 1961-1981. As in previous sections, this average price (PLR) is intended to be representative of the regional area which ELPC serves.[40] The time period 1961-1981 includes intervals when no ELPC lambs were sold electronically (1961-1970), when ELPC held teleauction sales (1971-1979), and the last two years when ELPC has held computerized sales. This diversity will not only allow analysis of electronic marketing in general, but will allow comparisons of teleauction and computer sales.

Table 5.4 gives a description of the variables used and Table 5.5 presents the models used in explaining the proxy for regional price (PLR). All of the models are modified versions of Holder's model. Mo-

Table 5.4. Description of Variables Used in Models Explaining the Regional Price of Prime and Choice Slaughter Lambs (PLR) with Emphasis on Electronic Marketing

| Variable | Description |
|---|---|
| PLR | Average price of 95-125 pound prime and choice lambs sold at the Abingdon, VA and Staunton, VA livestock markets in dollars per cwt., monthly data. |
| LCSLR | East coast lamb crop (Reg. 1, 2, 3) / July to September U.S. sheep and lamb slaughter, annual data.[42] |
| MD | May intercept dummy variable. May = 1, other months = 0. |
| SR | East coast slaughter (Reg. 1, 2, 3) / U.S. sheep and lamb slaughter, monthly data.[41] |
| CS | Cold storage of sheep and lamb in thousands of pounds, monthly data. |
| TD | Teleauction intercept dummy variable. ELPC lamb teleauction operating = 1, otherwise = 0. |
| CD | Computerized auction intercept dummy variable. ELPC computerized lamb auction operating = 1, otherwise = 0. |
| ED | ELPC intercept dummy variable. ELPC selling lambs electronically = 1, otherwise = 0. |

Table 5.5. Models Explaining Regional Price of Prime and Choice Slaughter Lambs (PLR) with Special Emphasis on Electronic Marketing, May-September, 1980-81[a]

| Model | I | LCSLR | MD | SR | CS | TD | CD | ED | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -11.52 | 193.29 | 5.32 | 80.25 | -0.0003 | 0.93 | 12.46 | | .93 |
| | (-1.76)** | (14.44)*** | (5.18)*** | (2.20)** | (-3.11)*** | (.96) | (7.27)*** | | |
| 2 | 2.73 | 163.13 | 5.11 | 17.31 | -0.0005 | | | 4.23 | .90 |
| | (.36) | (9.30)*** | (4.14)*** | (.42) | (-3.97)*** | | | (2.61)*** | |
| 3[b] | - 7.80 | 189.22 | 4.94 | 55.52 | -0.0003 | -0.31 | 9.94 | | .84 |
| | (- 1.01) | (11.20)*** | (6.64)*** | (1.33)* | (-2.35)** | (-.21) | (4.18)*** | | |
| 4[b] | 1.33 | 162.96 | 5.02 | 22.49 | -0.0004 | | | 4.26 | .72 |
| | (.16) | (7.04)*** | (7.01)*** | (.51) | (-2.67)*** | | | (1.68)** | |

[a]Descriptions of variables may be found in Table 5.4. Numbers in parenthesis are "t" statistics. One, two, and three asterisks indicate 10%, 5%, and 1% levels of significance, respectively.

[b]Estimated to account for first order autocorrelation present in models 1 and 2. A method similar to the Cochrane-Orcutt iterative procedure was used.

del 1 expresses PLR as a function of an the lamb crop slaughter ratio (LCSLR), a May dummy variable (MD), the slaughter ratio (SR), cold storage (CS), a teleauction dummy variable, and a computer sale dummy variable. Model 1 with "t" statistics in parenthesis is presented in equation 5.10:

$$
\begin{aligned}
(5.10)\quad PLR = & \underset{(-1.76)^{***}}{-11.52} + \underset{(14.44)^{***}}{193.29\ LCSLR} + \underset{(5.18)^{***}}{5.32\ MD} \\
& \underset{(2.20)^{**}}{+80.25\ SR} - \underset{(-3.11)^{***}}{0.0003\ CS} + \underset{(.96)}{0.93TD} + \underset{(7.27)^{***}}{12.46\ CD}
\end{aligned}
$$

$R^2 = .93$ $\quad n = 105$ $\quad DW = .9057$

All of the variables have the expected sign and all are significant at the 5% level or higher except TD. Equation 5.10 did, however, have serial correlation problems. After accounting for the first order autocorrelation, Model 3 is the reestimated model and is presented in equation 5.11.

$$
\begin{aligned}
(5.11)\quad PLR = & \underset{(-1.01)}{-7.80} + \underset{(11.20)^{***}}{189.22\ LCSLR} + \underset{(6.64)^{***}}{4.94\ MD} + \underset{(1.33)^{*}}{55.52\ SR} \\
& \underset{(-2.35)^{**}}{-0.0003\ CS} - \underset{(-.21)}{0.31\ TD} + \underset{(4.18)^{***}}{9.94\ CD}
\end{aligned}
$$

$R^2 = .84$ $\quad n = 105$

Although the coefficients changed somewhat, all variables maintained the proper sign with the exception of TD which was insignificant. LCSLR would be expected to have a positive sign for two reasons. First, when the east coast has the potential to furnish higher proportions of summer slaughter, buyers which have the locational ability to buy either

eastern or western lambs are attracted into the eastern market. Second, the downward trending pattern of LCSLR corresponds closely to the loss of eastern packing plants. MD should be positive as early spring lambs command a premium. SR is positively related to PLR. The higher the proportion of eastern slaughter to U.S. slaughter, the greater the demand for eastern lambs as the eastern region becomes a more viable supplier of lambs. CS should be negatively correlated with price as packers would cut purchases to trim inventories and CS is an indication of supply.

The teleauction and computer auction dummy variables give surprising results.[42] The coefficient for TD is insignificant and the coefficient for CD is surprisingly large. This is particularly puzzling when one considers that both the teleauction and computer sales had the same buyers and the same selling organization. However, differences between the teleauction and computer sales do exist. Examination of these differences should shed light on the price implications of alternative electronic media for an electronic marketing system.

First, the grading standards used for EIPC sales were changed at the same time the computer sales were implemented. The Blue O grade previously specifying U.S. choice and prime graded lambs weighing 95-125 lbs. was changed to include the requirement that the lambs be estimated to dress 50 percent or better, hot weight. The changes in grading standards had the effect of taking U.S. medium and low choice lambs

out of the Blue O grade, which should, theoretically, raise the price of Blue O lambs sold electronically. Because of the positive correlation between lamb prices in electronic and conventional markets, PLR would be expected to rise because of the change in grading standards. The size of the expected increase in PLR is dependent on the proportion of lambs dropped out of the Blue O grade because of the change in standards, the price of Blue O lambs, and the correlation between PLC and PLR. The change in grading standards should account for at least part of the $9.94 per cwt. attributed to the computerized sales by equation 5.5.

Second, the introduction of computerized electronic marketing attracted the attention of packer buyers, order buyers and auction market operators. Packer buyers (and one order buyer), who were purchasing lambs through ELPC's teleauction, greeted the prospect of computerized sales with enthusiasm at an educational and training seminar held in Washington, D.C. This excitement and enthusiasm could be reflected in higher prices at ELPC sales in the short-run, as buyers try to make the system successful. Similarly, the introduction of computerized marketing created excitement among order buyers and auction market operators, but for a different reason. Many feared that computerized electronic marketing could damage or destroy their current business.[43] This fear would be expected to have a positive influence on PLR, at least in the short-run, as order buyers and market operators attempted to prevent the successful implementation of computerized trading by keeping conventional market prices artificially high. Hence, to the degree the introduc-

tion of computerized trading created excitement among packer buyers, order buyers and auction market operators, PLR would be expected to be higher. The portion of the $9.94 per cwt. attributed to computerized marketing which is due to this excitement is unknown. However, the amount attributed to enthusiasm, excitement or fear should decrease as data for additional years become available.

Third, the discounts between lambs grading Blue O and Red O (the next lower grade) are different for ELPC sales and conventional auction sales. ELPC sales use a fixed discount of $3.00 per cwt. whereas the discounts at Abingdon, VA and Staunton, VA are not fixed but vary with market conditions from week to week. For May-September, 1981 the discount at Abingdon and Staunton averaged $6.60 per cwt. Normally, one would expect the flexible discount to be more indicative of market value. However, in conversations with producers and area farm management agents, many indicated that local buyers at auction markets were unduly discounting Red O lambs to artifically raise the price on the more publicized Blue O lambs. Such a practice could have the benefit of keeping the weighted average price of a load of lambs approximately the same while raising Blue O prices at the conventional auctions. If true, part of the $9.94 per cwt. attributed to the computerized sales by equation 5.11 could be explained by the practice. Again, the exact amount contributed by this practice (if any) is unknown.

Finally, two elements directly related to the nature of the electronic medium used may contribute to the price benefits attributed to computerized trading by equations 5.10 and 5.11. The ability of computerized trading systems to provide detailed listings of lots to be sold hours before their actual sale and to maintain strict confidentiality of bids should provide price benefits. In a teleauction, buyers are usually informed of the lots to be sold either immediately preceding the sale via conference telephone call or previous to the sale via individual telephone calls. If a buyer calls (or is called) some t previous to the sale, he may receive a detailed description but the process is time consuming. If a buyer waits until the description is given immediately preceding the sale, it may be difficult to determine the appropriate price to bid for the respective lots (this is especially true when a lot contains a variety of weights, grades, etc.). The process of determining price bids hurriedly would pose risks and for the risk averse buyer would result in price discounts.

In contrast, buyers participating in FIPC's computerized sales can obtain detailed listings of the lots to be sold at least two hours prior to the sale at the rate of thirty characters per second.[44] The buyer can then examine the listings at his/her convenience and determine the maximum amount that could be bid. These early and printed listings should decrease risks of determining the maximum acceptable price bids. For the risk averse buyer, a decrease in risk should result in a higher maximum acceptable bid (in other words, the certainty equivalent would

increase).[45] If the decrease of these risks resulted in higher prices for ELPC sales, regional prices should also benefit. The portion of the $9.94 which results from this is, again, uncertain.

The ability of computerized sales to maintain strict confidentiality of bids may also promote price benefits when compared to teleauction sales. Voices can be and are recognized in teleauction sales. Over time, some buyers will gain the reputation of being willing to pay above market prices if they need lambs. Others will become known as marginal buyers who only enter the market if there is a bargain to be found. If a buyer, who is usually willing to pay above market price to get needed lambs, begins bidding on an early lot, it will often be in other buyers interest to quit bidding on the current lot and wait for later offerings since the price of lots sold in a particular sale are often highly correlated.[46] In other words, buyers may raise the price on all lots by continuing to bid on early lots. Other forms of collusion, both explicit and implicit, are possible when anonymity is not maintained. Teleauctions do not maintain anonymity (unless participating buyers are constantly changing) while computerized trading systems do (or at least have the capacity to do so). In the computer sales, it is not unusual to see two bidders compete long after other bidders have stopped. It would be interesting to see if such bidding would continue in a teleauction, where each bidder recognized there was only one other buyer bidding.

In summary, five factors may account for the $9.94 per cwt. increase in regional price attributed to the computer sales of ELPC lambs. These include:

1. The change in the grading standards used in ELPC sales which occurred at the same time the computerized auctions began;
2. The excitement and enthusiasm of ELPC buyers and the apprehension on the part of some order buyers and auction market operators because of the computerized sales;
3. The unequal discounts between Blue O and Red O lambs for ELPC sales and conventional auction sales;
4. The ability of the computerized trading system to provide detailed listings of lots to be sold in a quick and efficient manner before the sale; and
5. The ability of the computerized trading system to keep individual price bids confidential.

At the present time it is impossible to separate the causal influence each factor has had on price. Too, there is no adequate explanation as to why the teleauction dummy variable was insignificant. As further experience is gained with other systems and other commodities, and as the data base grows for FMA's system, it may be possible to answer these questions.

Models 2 and 4 correspond to models 1 and 3 with one exception. Instead of assuming PIF is a function of the type of electronic medium

used, Models 2 and 4 assume PIC is a function of the organization selling the lambs. Models 2 and 4 with their t statistics in parenthesis are given in equations 5.12 and 5.13, respectively.

$$(5.12)\quad PLR = \underset{(.36)}{2.73} + \underset{(9.30)^{***}}{163.13\ LCSLR} + \underset{(4.14)^{***}}{5.11MD} + \underset{(.42)}{17.31\ SR} - \underset{(-3.97)^{***}}{0.0005\ CS} + \underset{(2.61)^{***}}{4.23\ ED}$$

$R^2 = .90 \qquad n = 105 \qquad DW = 1.27$

$$(5.13)\quad PLR = \underset{(.16)}{1.33} + \underset{(7.04)^{***}}{162.96\ LCSLR} + \underset{(7.01)^{***}}{5.02\ MD} + \underset{(.51)}{22.49\ SR} - \underset{(-2.67)^{***}}{0.0004\ CS} + \underset{(1.68)^{**}}{4.26\ ED}$$

$R^2 = .72 \qquad n = 105$

Equation 5.12 had positive serial correlation problems. Equation 5.12 was reestimated correcting for the serial correlation, resulting in equation 5.13. The signs of all variables are as expected. All variables are significant except SR. The magnitude of the coefficients are similar to those of models 1 and 3 with the exception of the intercepts which are not significant in models 2, 3, and 4 and SR which is not significant in models 2 and 4.

Theory does not help to explain if price is more a function of the electronic medium used or the organization selling the commodity. Equation 5.13 credits $4.26 per cwt. to the regional price (PLR) when ELPC began selling lambs. However, it is also obvious that most of the price benefits have been received after ELPC switched from teleauction sales

to computerized sales when comparisons are made with equations 5.10 and 5.11. Certainly, a sound organization is a prerequisite for successful electronic sales. Again, more experience with electronic marketing may give insight into which is the correct specification.

Footnotes

[36]See Chapter I for a review of Henderson and Baldwin's paper.

[37]Conversations with area farm management agents and Virginia Department of Agriculture personnel document the fact that many lambs sold at conventional auction markets may have only 1 or 2 active bidders.

[38]Nichols demonstrated the validity of this statement when he calculated that the price of hogs would increase 58 percent and equilibrium volume 62 percent as a hypothetical market moved from collusive duopsony to pure competition.

[39]Using the Abingdon, VA and Staunton, VA weekly slaughter lamb prices from May-September, 1980-81, Red O prices averaged $5.97 per cwt. below Blue O prices for 1980 and $6.60 per cwt. below Blue O prices for 1981.

[40]This area includes parts of North Carolina, Kentucky, West Virginia, Tennessee and Ohio.

[41]Region 1 includes the states of ME, NH, VT, MA, CT and RI. Region 2 includes NY and NJ. Region 3 includes PA, WV, VA, DE and MD.

[42]To further test the hypothesis regarding the sign of the coefficient on CD, Model 3 was reestimated without CD. $R^2$ dropped to .70. Ninety-five percent confidence intervals were placed around the predict-

ed values of PLR for the ten observations corresponding to computerized sales. Three of the ten observed values of PLR were outside the confidence intervals. All were greater than the upper limit, averaging $1.81 per cwt. and ranging from $1.12 to $3.16 per cwt. above the upper limit.

[43]This fear appears to be somewhat unfounded. One order buyer uses the computerized sales and the lambs sold through ELPC are assembled at several local auction markets. Progressive order buyers and market operators can profit through the system. Order buyers and market operators who profit from current market inefficiencies will, however, be hurt financially.

[44]EMA has already purchased terminals, for use in the central office, which print 120 characters per second. Future buyers may well decide to use faster terminals.

[45]For a detailed treatment of the relationship between risk, risk preferences, and certainty equivalence the reader should see Anderson et al. and von Neumann and Morgenstern.

[46]A particular buyer which participates in FIPC sales and is known to pay above market prices when he needs lambs, paid an average of $.22 per cwt. above the average sale price, in sales in which he participated, during the last year of teleauction sales. The first year of the computer sales, this average increased 213 percent to $.69 per cwt. Although not proof of this hypothesis, it does lend support.

# Chapter VI

# PARTICIPANT EVALUATION

## VI.1 INTRODUCTION

Alternative methods exist to evaluate the success of an electronic marketing system. Examples would include using efficiency measures (pricing and/or technical), volume sold, participants served, profitability, ease of adoption by the industry, likely future potential, and examination of the attitudes and perceptions of electronic marketing system participants as well as previous market participants excluded from the electronic marketing system. Ideally, one would like to measure gains or losses in social welfare. Unfortunately, quantification of social welfare functions are impossible under most circumstances.

If a situation existed in which an electronic marketing system both increased pricing and technical efficiency along the vertical continuum and did not result in private losses (economic or noneconomic) to present or past market participants, one could argue that electronic marketing has increased social welfare. Regrettably, few "real world" scenarios will yield such unanimity of results. Gains in both pricing and technical efficiency either may not occur or may be difficult to show. Usually one or more present or past market participants will experience net private losses. Since interpersonal comparisons of utility are not possible, in the strictest sense, net gains or losses of social welfare

cannot be determined. However, examination of the private gains (or losses) of past and current market participants can be made. In situations where many gain and few lose (or vice versa) inferences may be drawn about gains (or losses) in social welfare with low probability of error.

This chapter will examine current attitudes and perceptions of buyers and sellers experienced with Electronic Marketing Association's (EMA) computerized trading system. Both participants in the unsuccessful Virginia slaughter cattle program and in the successful ELPC slaughter lamb program were surveyed using the mirror-image survey technique. Inferences will be made as to why the slaughter cattle program was not successful in Virginia and why the slaughter lamb program has been successful.[47] Since it has already been demonstrated the slaughter lamb program has increased technical (Chapter IV) and pricing efficiency (Chapter V), inferences may be drawn regarding net gains or losses in social welfare resulting from the computerized slaughter lamb program.

## VI.2 VIRGINIA SLAUGHTER CATTLE PROGRAM

### VI.2.1 Introduction

During February and March of 1979, a mirror-image survey was administered to 83 producers of Virginia slaughter cattle and to 20 northeastern packers. Copies of the producer and packer surveys may be found in Appendices A and B, respectively. The producers to be inter-

viewed were selected via a stratified random process. A random 1 percent sample was drawn for each producer category (beef cow-calf producer, cattle feeder and dairyman) with a minimum of 20 names per category. An attempt was made to interview the entire population of packers who purchased Virginia slaughter cattle.

Results from the surveys were used to design EMA's computerized trading network. In April, 1980, the packers previously interviewed were invited to an electronic marketing informational and training seminar held in Washington, D.C. The eleven attending packers indicated they would participate in future computerized slaughter cattle auctions -- all taking computer terminals home after the seminar. Educational meetings for Virginia slaughter cattle producers were held throughout Virginia from April to August, 1980. Although some resistance by order buyers and some auction market operators was found, producers were generally receptive to computerized sales.

In July, 1980, the first attempt to sell slaughter cattle was made. Hardware and software problems delayed the 3 p.m. sale until the sale was eventually cancelled. When the already assembled cattle were offered via teleacution the next morning, few bids were received. The cattle were sold at a discounted price damaging producer and auction market support.

Later in the same month, a second attempt to sell slaughter cattle was made. The computerized system worked as planned. The cattle were

grouped into lots ranging in size from 2 to 10 head - smaller than most packers preferred. A terminal was set up in the local auction arena to allow local buyers to bid. The auction began, the cattle were sold, but no bids were received from other than local buyers even though many non-local buyers were logged on. Additional auction market and producer support was lost.

Several later attempts were made to sell slaughter cattle. Truck-load lots were offered on both live weight and carcass grade and yield basis. The hardware and software systems worked without a hitch. Buyers were called previous to the sales, most indicated they were interested in the cattle, and most logged on during the sales. However, no bids were ever received above the reservation price and reservation prices were comparable to local market price levels. Later, producers wanted to hold computerized sales but no auction market would allow their yards or scales to be used. Order buyer pressure was becoming severe, with local auction markets being threatened with boycotts for all of their sales by order buyers if they participated in electronic sales. Presently, slaughter cows and fed cattle are being sold via tel-eauctions but volume is low.

In an effort to determine why the slaughter cattle program was not successful and to examine present attitudes and perceptions of electronic marketing (in view of past experiences), a mirror-image survey was administered to Virginia slaughter cattle producers and northeastern

packers. In the following sections items unique to the producer survey, items unique to the packer survey, and the interface between the producer and packer surveys will be examined. A summary and implications for future systems will be made.

### VI.2.2 The Producer Survey

In July, 1981 a survey was mailed to the 83 Virginia slaughter cattle producers surveyed in the spring of 1979. Twenty-one completed surveys were returned. To increase the data base, an additional 21 completed surveys were obtained via random follow-up phone calls. The resulting 42 completed surveys comprise more than 50 percent of the slaughter cattle producers participating in the 1979 survey. A copy of the producer survey used in system evaluation with a summary of their responses is given in Appendix F.

Table 6.1 presents the distribution of slaughter cattle producers interviewed by the number of slaughter cattle sold per year. Seventeen of the 40 responding producers sell less than 6 slaughter cows per year, while only 6 sell more than 20 slaughter cows per year. The average beef cow-calf producer sold 7.7 cows, whereas the average dairyman sold 15.3 cows for slaughter per year. The average cattle feeder sold 171.1 head per year with 71% of the feeders selling less than 100 head per year and 29% selling more than 300 head per year.

Table 6.1. Distribution of the Slaughter Cattle Producers Interviewed By the Number of Slaughter Cattle Sold Per year

| Slaughter Cows Sold/Yr. | Number of Producers Interviewed | Fed Cattle Sold/Yr. | Number of Feeders Interviewed |
|---|---|---|---|
| 0 - 5 | 17 | 0 - 20 | 2 |
| 6 - 10 | 9 | 21 - 100 | 3 |
| 11 - 20 | 8 | 101 - 300 | 0 |
| 21 - 50 | 6 | 301 - 500 | 2 |

Table 6.2 lists the number of head and percent of slaughter cattle sold through each marketing channel per year by the producers surveyed. Weekly auctions, teleauctions, direct sales to packers, and sales to order buyers accounted for 86.4, 2.6, 8.2 and 2.8 percent respectively of the slaughter cows sold. Surprisingly, more fed cattle were sold through weekly auctions (42.1 percent) than directly to the packer (34 percent). This is probably due to the relatively small sized operations of the cattle feeders surveyed. Nineteen percent of the fed cattle were sold in special graded sales and 4.9 percent were sold directly to order buyers.

Eight of the producers interviewed had sold either lambs, pigs, or slaughter hogs electronically. Of these 8 producers, 5 were highly satisfied, 1 was satisfied, and 1 was dissatisfied with the experience. The number and percent of slaughter cattle producers surveyed which have heard or read about electronic marketing from various sources are presented in Table 6.3. Virginia Tech personnel (100 percent), Virginia publications/magazines (50 percent), other producers (28.6 percent), talks/presentations (26.2 percent) and national publications/magazines have been the most common sources of information about electronic marketing.[48] A majority of producers (54.8 percent) indicated that most of the information about electronic marketing had been positive, 35.7 percent indicated it had been neutral, and 9.5 percent indicated it had been unfavorable. However, few producers (8) felt they were well informed about electronic marketing. Of fifteen producers who made com-

Table 6.2. Number of Head and Percent of Slaughter Cattle Sold Through Each Marketing Channel Per Year By Producers Surveyed

| | Slaughter Cows | | Fed Cattle | |
|---|---|---|---|---|
| Marketing Channel | Head/Yr. | % | Head/Yr. | % |
| Weekly Auctions | 332 | 86.4 | 504 | 42.1 |
| Special Graded Sales | N/A | N/A | 228 | 19.0 |
| Teleauctions | 10 | 2.6 | 0 | 0.0 |
| Direct | 31 | 8.2 | 407 | 34.0 |
| Order Buyer | 11 | 2.8 | 59 | 4.9 |
| TOTAL | 384 | 100.0 | 1,198 | 100.0 |

Table 6.3. Number and Percent of Slaughter Cattle Producers Surveyed Which Have Heard or Read About Electronic Marketing From Various Sources

| Source | Producers Responding | |
|---|---|---|
| | Number | % |
| Talks/presentations | 11 | 26.2 |
| Virginia publications/magazines | 21 | 50.0 |
| National publications/magazines | 9 | 21.4 |
| TV/radio | 0 | 0.0 |
| Conversations with: | | |
| EMA personnel | 2 | 4.8 |
| Va. Tech personnel | 42 | 100.0 |
| Va. Dept. of Agri. personnel | 4 | 9.5 |
| Auction market operators | 5 | 11.9 |
| Order buyers | 1 | 2.4 |
| Other producers | 12 | 28.6 |
| Farm Bureau personnel | 2 | 4.8 |
| Packers | 1 | 2.4 |
| Observing an electronic sale | 1 | 2.4 |

ments at the end of the survey, 5 expressed optimism, 5 listed problems and 5 indicated they didn't know much about electronic marketing.

### VI.2.3 The Packer Survey

All of the slaughter cattle packers which attended the seminar in Washington, D.C. and who took computer terminals home were interviewed via telephone calls in September, 1981. The procedure resulted in 11 completed surveys -- the entire population of packers experienced with the slaughter cattle program. A copy of the survey used with a summary of their responses is given in Appendix G.

Table 6.4 presents the distribution of the slaughter cattle packers interviewed by the number of slaughter cattle purchased per week. Eighty-two percent of the packers purchase less than 1,000 head of slaughter cows per week with the average being 528.6 head per week. Of the 7 packers who kill fed cattle, 6 kill less than 1,000 head per week with 3 of these killing less than 100 head per week. The number of head and percent of slaughter cattle that were purchased through each procurement channel per week by the packers surveyed are given in Table 6.5. As expected, regular auction markets is the dominant procurement channel for slaughter cows (71.5 percent), and direct purchases is the dominant procurement channel for fed cattle (57.1 percent).

The packers interviewed gave a variety of reasons why they did not participate in the computerized slaughter cow auctions. Table 6.6 lists

Table 6.4. Distribution of the Slaughter Cattle Packers Interviewed By the Number of Slaughter Cattle Purchased Per Week

| Slaughter Cows Purchased/Week | Number of Packers Interviewed | Fed Cattle Purchased/Week | Number of Packers Interviewed |
|---|---|---|---|
| 1 - 100 | 4 | 1 - 100 | 3 |
| 101 - 1,000 | 5 | 101 - 1,000 | 3 |
| 1,001 - 2,000 | 1 | 1,001 - 2,000 | 0 |
| > 2,000 | 1 | > 2,000 | 1 |

Table 6.5. Number of Head and Percent of Slaughter Cattle That Were Purchased Through Each Procurement Channel Per Week By Packers Surveyed

| | Slaughter Cows | | Fed Cattle | |
|---|---|---|---|---|
| Procurement Channel | Head/Week | % | Head/Week | % |
| Telephone auctions | 0 | 0.0 | 154 | 2.9 |
| Regular auction markets | 4,158 | 71.5 | 1,331 | 25.0 |
| Direct from producers | 1,052 | 18.1 | 3,041 | 57.1 |
| Through order buyers | 605 | 10.4 | 799 | 15.0 |
| TOTAL | 5,815 | 100.0 | 5,325 | 100.0 |

Table 6.6. Reasons Given, By Packers Surveyed, For Nonparticipation in the Computerized Slaughter Cow Auctions Held During the Late Spring of 1980.

| Reason | Packers Responding | |
|---|---|---|
| | Number | % |
| I didn't trust the grades. | 4 | 36.4 |
| The lots were too small. | 4 | 36.4 |
| I didn't need cows at that time. | 3 | 27.3 |
| I wanted to buy on a carcass basis. | 3 | 27.3 |
| The price was too high. | 3 | 27.3 |
| I wanted to buy on a live weight basis. | 1 | 9.1 |
| The sale time was too late. | 1 | 9.1 |
| Time consuming for the number offered. | 1 | 9.1 |
| Satisfied with the present system. | 1 | 9.1 |
| Worried about trucking. | 1 | 9.1 |

these reasons. Many of these reasons conflict with attitudes expressed in the 1979 surveys and in the seminar attended by all of the surveyed packers. For example, at the seminar packers expressed a general willingness to give the system a chance by trusting the livestock descriptions until proven otherwise. Yet, in the survey a large proportion said they did not participate because they either did not trust the grades (36.4 percent) or did not want to buy on a live weight basis (27.3 percent).

One wonders if order buyer pressure (so prevalent at auction markets) was also being felt at the packer level.[49] Some of the reasons given are especially confusing when one considers that small and truckload size lots, liveweight and carcass grade and yield sales, and morning and afternoon sale times were all offered at various times in the sales.

The reasons given for nonparticipation in the computerized fed cattle sales are presented in Table 6.7. Again, the fact that sales were held which included a wide range of cattle types, sale times, lot sizes and pick-up dates strains the credibility of the revealed responses. Before every sale, buyers were informed that trucking would be arranged for them if they desired. Reservation prices were comparable to local conditions and some of the packers were obtaining local cattle through these local sales via order buyers. Hence, the reservation prices in the electronic sales were probably lower than the local price plus order buyer commission some packers were paying.

Table 6.7. Reason Given, By Packers Surveyed, For Nonparticipation in the Computerized Fed Cattle Auctions Held During the Late Spring of 1980.

| Reason | Packers Responding | |
|---|---|---|
| | Number | % |
| I didn't need fed cattle at that time. | 2 | 28.6 |
| I wanted to buy on a carcass basis. | 2 | 28.6 |
| The price was too high. | 2 | 28.6 |
| I couldn't use the "type" of fed cattle offered. | 1 | 14.3 |
| I didn't trust the grades. | 1 | 14.3 |
| I was worried about trucking. | 1 | 14.3 |

The surveyed packers felt EMA did a good job explaining the concept of electronic marketing and how to use the computer terminals. They also felt EMA representatives were courteous and helpful when contacted. Table 6.8 lists additional information which slaughter cattle packers would like to see a computerized marketing system offer. Cash livestock prices, meat prices, and outlook information were requested by 5 packers. Four packers requested livestock futures prices, 3 wanted to see cash grain prices and national weather information, and 2 requested news summaries. Eighty percent of the responding packers did not want to see a computerized accounting system developed which packers could use. Of six packers who made comments at the end of the survey, four indicated they would like to see the system work in the future and two indicated they would not.[50]

Table 6.8. Additional Information Which Surveyed Slaughter Cattle Packers Would Like to See a Computerized Marketing System Offer

| Type of Information | Packers Responding | |
|---|---|---|
| | Number | % |
| Cash livestock prices | 5 | 45.5 |
| Cash grain prices | 3 | 27.3 |
| Meat prices | 5 | 45.5 |
| Livestock futures prices | 4 | 36.4 |
| Closing only | 2 | 18.2 |
| Quotes within the day | 2 | 18.2 |
| Grain futures prices | 1 | 9.1 |
| Closing only | 0 | 0.0 |
| Quotes within the day | 1 | 9.1 |
| Outlook information | 5 | 45.5 |
| National weather information | 3 | 27.3 |
| News summaries | 2 | 18.2 |

### VI.2.4 The Interface Between Producer and Packer Surveys

When the interface between the producer and packer surveys was examined, areas of general agreement and disagreement were found. Table 6.9 presents the areas of agreement.[51] Both producers' and packers' previous and current attitudes towards electronic marketing are usually neutral or positive. Most producers and packers either believe slaughter cows will be sold electronically in the future or are neutral on the matter. The majority of producers and packers see advantages accruing to them when electronic marketing gets fully established and believe both buyer and seller support is essential for a beginning electronic marketing system.

Few packers and no producers fail to see potential in using electronic marketing to sell other types of livestock besides cattle.[52] Few producers or packers would not like to see the computerized system utilized for both slaughter cows and fed cattle. When Virginia packers are excluded, a strong majority of producers and packers indicate they would support the system by selling (buying) on it.[53]

Producers and packers disagree in their preference of computer versus teleauction sales and in their outlook regarding the future of electronic marketing. Over 19 percent of producers prefer computer sales, 63.4 percent are neutral, and 17.1 percent prefer teleauctions. In con-

Table 6.9. Areas of Agreement Between Virginia Slaughter Cattle Producers and the Eastern Packers Interviewed Concerning Electronic Marketing[a]

| Attitude, Expectations | Number Responding | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Producers | | | | | Packers | | | | |
| | SA | A | N | D | SD | SA | A | N | D | SD |
| I previously had a positive attitude towards electronic marketing. | 1 | 22 | 18 | 1 | 0 | 0 | 5 | 6 | 0 | 0 |
| My present attitude towards electronic marketing is positive. | 1 | 22 | 17 | 1 | 0 | 2 | 4 | 3 | 2 | 0 |
| I believe within one to two years, slaughter cows will be sold electronically. | 2 | 20 | 15 | 5 | 0 | 1 | 4 | 3 | 2 | 1 |
| I can see advantages accruing to me when electronic marketing gets firmly established. | 6 | 26 | 7 | 1 | 0 | 1 | 4 | 3 | 2 | 0 |
| Both buyer and seller support is essential for a beginning electronic marketing system. | 10 | 28 | 4 | 0 | 0 | 4 | 7 | 0 | 0 | 0 |
| I can see potential for electronic marketing in livestock other than cattle. | 6 | 19 | 16 | 0 | 0 | 2 | 3 | 4 | 2 | 0 |
| I would like to see the computerized system utilized for marketing slaughter cows. | 5 | 20 | 12 | 2 | 1 | 2 | 2 | 4 | 1 | 1 |
| I would like to see the computer system utilized for for marketing fed cattle. | 5 | 12 | 6 | 1 | 0 | 1 | 2 | 2 | 1 | 1 |

[a]SA, A, N, D and SD are defined as strongly agree, agree, neutral, disagree, and strongly disagree, respectively.

Table 6.9 (Con't.)

| Attitude, Expectation | Number Responding | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Producers | | | | | Packers | | | | |
| | SA | A | N | D | SD | SA | A | N | D | SD |
| I would support a computerized marketing system for slaughter cows by selling (buying) through the system. | 7 | 20 | 10 | 1 | 0 | 1 | 5 | 2 | 1 | 1 |
| I would support a computerized marketing system for fed cattle by selling (buying) through the system. | 3 | 9 | 4 | 0 | 0 | 0 | 4 | 1 | 1 | 1 |

trast, 27.2 percent of packers prefer computer sales, 36.4 percent are neutral, and 36.4 percent prefer teleauctions. Over 78 percent of the responding producers feel the outlook for electronic marketing is good or better compared to 50 percent for packers. However, both of the apparent disagreements between producers and packers would disappear if Virginia packers were excluded. With their exclusion (because of possible biases) no packer would have preferred teleauction sales over computer sales and the percentage of packers believing the future of electronic marketing is good or better would jump to 71.4 percent from 50.0 percent.

## VI.3 CONCLUSIONS

The computerized slaughter cattle sales in Virginia have not been successful for at least 5 reasons. They include:

1. Software and hardware problems in the first sale;
2. Grouping livestock in lots which were too small in early sales;
3. Sale times were too late during early sales;
4. Failure of computerized buyers to actively bid; and
5. Order buyer pressure on auction market operators and possibly the packers.

Reasons 1-3 are short-run problems and can be corrected easily.[54] Solutions to reasons 4 and 5 are more difficult and depend upon underlying assumptions regarding causality. In the mirror-image survey, packers (especially non-Virginian) indicated a generally positive attitude to-

wards electronic marketing and a willingness to support future computerized sales. However, when asked why they did not participate in previous sales, a variety of often conflicting reasons were given. One wonders if order buyer pressure was extended at the packer level as well as at the auction market level.

Three important lessons have been learned from the experiences with the slaughter cattle program. These are:

1. Check and recheck hardware, software and sales procedure thoroughly before the first sale;
2. Use a producer organization to promote, coordinate, and oversee sales; and
3. Make sure the producer organization has outside bids in case buyers on a new system are reluctant to bid.

The proper application of these elements could have increased the probability that the slaughter cattle sales would have been successful. Hardware and software problems, small lot sizes, and inappropriate sales times would not have occurred. A strong producer organization could have provided an educational function as well as develop producer support to counterbalance any order buyer pressure that might be present. Outside bids would have encouraged other buyers to bid on the system. However, based on the still positive attitudes of many producers and packers, the future may yet see Virginia slaughter cattle sold via computerized auctions.

## VI.4 ELPC COMPUTERIZED SLAUGHTER LAMB PROGRAM

### VI.4.1 Introduction

In December, 1979 Eastern Lamb Producers Cooperative (ELPC) made the decision to use EMA's computerized trading system for its slaughter lamb sales. ELPC had previously held weekly teleauction sales since May, 1971 from at least May through September of each year.

Lamb buyers, who had previously purchased lambs through ELPC's teleauction, were invited to a one day seminar held in Washington, D.C. during April of 1980. The purpose of the seminar was to inform buyers about the computerized auction, train them in the use of the computer terminals, and to allow them to take a terminal home (rent free for the first six months) if they so desired. All buyers accepted the offer to take a computer terminal.

On May 13, 1980 the first computerized sale was held. Three lots were sold which contained lambs from Virginia and Kentucky. No hardware or software problems occurred, bidding was active, and prices were at levels which satisfied ELPC management. Since that first computerized sale, ELPC has sold lambs via computer from North Carolina, Ohio, Tennessee, Vermont, and West Virginia totaling more than 50,000 head.[55]

Between July and September of 1981, twenty producers and eight packers were interviewed using the mirror-image survey technique. The survey was designed to determine why the computerized lamb sale has been

so successful, as well as to examine participant attitudes toward the computerized system being used and electronic marketing in general. In the following sections, items unique to the producer survey, items unique to the packer survey, and the interface between the producer and packer surveys will be examined. A summary and implications for future systems will be made.

### VI.4.2 The Producer Survey

An attempt was made to interview (through personal telephone calls) the entire population of producers knowledgeable about the transition from the teleauction sales to computerized sales. A list of twenty-seven producers was obtained from Roy Meek, manager of ELPC, and Cecil Goodlett, Kentucky Department of Agriculture. During the interview process, seven producers were found to be unfamiliar with the change to computer sales, resulting in twenty completed surveys.

The distribution of the slaughter lamb producers interviewed by the number of slaughter lambs sold per year is given in Table 6.10. Eighty percent of the producers interviewed sell less than 1,000 lambs per year including 20 percent who sell a hundred head or less per year. Table 6.11 presents the number of head and percent of slaughter lambs sold through each marketing channel per year by the producers surveyed. ELPC was the dominant marketing channel used with 89.0 percent of the slaughter lambs being marketed through this means.[56] This is followed

Table 6.10. Distribution of the Slaughter Lamb Producers Interviewed By the Number of Slaughter Lambs Sold Per Year

| Slaughter Lambs Sold/Year | Number of Producers Interviewed |
|---|---|
| 1 - 100 | 4 |
| 101 - 300 | 8 |
| 301 - 1,000 | 4 |
| 1,001 - 3,000 | 2 |
| 3,001 - 5,000 | 2 |

Table 6.11. Number of Head and Percent of Slaughter Lambs Sold Through Each Marketing Channel Per Year By Producers Surveyed

| Marketing Channel | Slaughter Lambs Head/Year | Slaughter Lambs % |
|---|---|---|
| Eastern Lamb Producers Coop. | 13,608 | 89.0 |
| Regular Auction Markets | 581 | 3.8 |
| Direct to a Packing Plant | 673 | 4.4 |
| Direct to Consumers | 229 | 1.5 |
| Direct to 4-H Members | 199 | 1.3 |
| TOTAL | 15,290 | 100.0 |

by direct markets (3.8 percent), direct marketings to consumers (1.5 percent) and direct marketings to 4-H club members (1.3 percent).

Table 6.12 gives the responses of producers to statements unique to the slaughter lamb producer survey. ELPC management will occasionally "no sale" a group of lambs when it feels bids are not representative of market value. The lambs, which are still on the farm, will typically be offered again the following week. Table 6.12 demonstrates 70 percent of the responding producers do not have serious objections to the practice, 15 percent are neutral, and 15 percent do have serious objections. ELPC allows buyers to choose the pickup date within seven days of purchase. Eighty five percent of the producers surveyed believe the practice has a positive influence on price. Seventy-five percent of the surveyed producers believe the higher price is usually worth the inconvenience of letting the buyer choose the pickup date.

Only one producer felt that "feeder" livestock could not be sold electronically and all producers believed that lambs sold through ELPC brought higher prices than if they had been sold through other channels. When asked about deducting a pencil shrink from the weight of the lambs, 60 percent of the producers indicated that it wouldn't have a positive influence on price and that they didn't want to see ELPC adopt the practice. All of the surveyed producers felt that ELPC's commission charge was about right.

Table 6.12. Responses of Slaughter Lamb Producers to Statements Unique to the Producer Survey[a]

| Statement | Number Responding | | | | |
|---|---|---|---|---|---|
| | SA | A | N | D | SD |
| I have not had serious objections when ELPC has decided to "no sale" a group of lambs and hold them over for next week's sale. | 4 | 10 | 3 | 2 | 1 |
| ELPC's practice of allowing the buyer to choose the pickup date has a positive influence on the price I receive. | 8 | 9 | 1 | 2 | 0 |
| I believe that "feeder" livestock could be sold electronically. | 9 | 8 | 2 | 0 | 1 |
| I believe the price I receive for lambs sold through ELPC is higher than if I sold these same lambs through other types of markets. | 13 | 7 | 0 | 0 | 0 |

[a]SA, A, N, D, and SD are defined as strongly agree, agree, neutral, disagree, and strongly disagree, respectively.

When asked to choose factors which helped ELPC receive a higher price, 100 percent of the producers surveyed cited a reputation for high quality lambs and offering lot sized lots. Other frequently cited factors included accurate grading, selling by description reduces buyer's costs, electronic marketing, letting the buyer choose the pickup date and superior management of ELPC. Sixty-five percent of the producers were aware EMA provided the computer services, with no producer having a negative reaction to EMA.

The majority of producers who gave comments at the end of the survey were extremely positive about electronic marketing. One producer did suggest that better quality lambs were bringing more on a grade and yield basis. Two producers indicated they were still unsure regarding the benefits and costs of the computer sales.

### VI.4.3 The Packer Survey

The entire population of slaughter lamb buyers who have used the computerized system were interviewed via personal telephone calls in September, 1981. The process resulted in eight completed interviews. The distribution of the slaughter lamb buyers interviewed by the number of slaughter lambs purchased per week is given in Table 6.13. More than 62 percent of the lamb buyers purchase less than 1,000 head per week but the three packers killing more than 1,000 head per week push the average up to 1,706 head per week. The average weekly purchases range from 300 to 6,000 head among the buyers interviewed.

Table 6.13. Distribution of the Slaughter Lamb Buyers Interviewed By the Number of Slaughter Lambs Purchased Per Week

| Slaughter Lambs Purchased/Week | Number of Lamb Buyers Interviewed |
|---|---|
| 0 - 500 | 1 |
| 500 - 1,000 | 4 |
| 1,000 - 3,000 | 2 |
| 3,001 - 6,000 | 1 |

Table 6.14 presents the number of head and percent of slaughter lambs purchased through each procurement channel per week by the buyers surveyed. Regular auction markets are the principal procurement channel with 73.9 percent of the lambs purchased through auction markets. Telephone auctions are a distant second with 8.9 percent of the lamb volume to be followed by order buyers (7.4 percent), computerized sales (6.3 percent) and direct purchases from producers (3.5 percent).

Responses of slaughter lamb buyers to statements unique to the lamb buyer survey are given in Table 6.15. Responding buyers are almost evenly split between preferences for large lots with some lambs at different locations and smaller lots at a single location. The table clearly demonstrates that trucking has not usually posed a major problem for buyers and the computer terminals have been relatively easy to use. According to the surveyed buyers, EMA has been courteous and helpful, has kept the buyers well informed regarding program changes, and is doing a good job in handling the technical (computer) component of the sales. Fifty percent of the buyers would prefer to buy more lambs electronically and the rest are neutral on the matter. Similarly, 50 percent of the buyers prefer to buy lambs over the computer rather than through a teleauction and the rest are indifferent between the two methods.

Four buyers indicated they pay an average of $1.13 per cwt. (range $1.00 -1.50 per cwt.) more for comparable lambs purchased electronically and four buyers indicated the price as no different. However, when the

Table 6.14. Number of Head and Percent of Slaughter Lambs Purchased Through Each Procurement Channel Per Week By Buyers Surveyed

| Procurement Channel | Slaughter Lambs Head/Week | Slaughter Lambs % |
|---|---|---|
| Computerized Sales | 798 | 6.3 |
| Telephone Auctions | 1,135 | 8.9 |
| Regular Auction Markets | 9,400 | 73.9 |
| Direct from Producers | 448 | 3.5 |
| Through Order Buyers | 935 | 7.4 |
| TOTAL | 12,716 | 100.0 |

Table 6.15. Responses of Slaughter Lamb Buyers to Statements Unique to the Lamb Buyer Survey[a]

| Statement | Number Responding | | | | |
|---|---|---|---|---|---|
| | SA | A | N | D | SD |
| I would prefer larger lots with some at different locations rather than small lots offered at a single location. | 2 | 1 | 2 | 3 | 0 |
| Trucking has not been a problem for lambs purchased through ELPC. | 2 | 4 | 2 | 0 | 0 |
| I have found the computer terminals relatively easy to use. | 0 | 8 | 0 | 0 | 0 |
| EMA has been courteous and helpful when I have needed their assistance. | 3 | 5 | 0 | 0 | 0 |
| EMA has kept me informed when changes have occured in the slaughter lamb computer program. | 2 | 6 | 0 | 0 | 0 |
| I feel EMA is doing a good job in handling the technical (computer) component of the sales. | 2 | 6 | 0 | 0 | 0 |
| I would prefer to buy more lambs electronically rather than through other means. | 0 | 4 | 4 | 0 | 0 |
| I prefer to buy lambs over the computer rather than through a telephone conference call. | 1 | 3 | 4 | 0 | 0 |

[a]SA, A, N, D, and SD are defined as strongly agree, agree, neutral, disagree and strongly disagree, respectively.

total delivered cost for similar lambs was compared across electronic and conventional markets, seven buyers indicated there was no difference and one buyer indicated the price in electronic markets averaged $3.00 per cwt. higher.

When asked to identify additional services they would like to see EMA provide through the computer, six buyers chose cash lamb and lamb carcass prices. Five buyers identified outlook information, national weather informationm and news summaries. Three buyers chose other cash livestock and meat prices, and two buyers chose cash grain and grain futures prices. Seventy-five percent of the buyers did not want to see a computerized accounting system developed which packers could use.

### VI.4.4 The Interface Between Producer and Buyers Surveys

Product description factors and participant attitudes and perceptions of electronic marketing are examined along the interface between the slaughter lamb producer and buyer surveys. Table 6.16 presents the responses of slaughter lamb producers and buyers to statements related to product description. Eighty-five percent of the producers and 75 percent of the buyers believe the grading standards used by ELPC do a good job of reflecting value differences in the lambs. Fifteen percent of the producers do not feel the grading standards do a good job, while 25 percent of the buyers are neutral.

Table 6.16 Responses of Slaughter Lamb Producers and Buyers to Statements Related to Product Description[a]

| Statement | Number Responding | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Producers | | | | | Buyers | | | | |
| | SA | A | N | D | SD | SA | A | N | D | SD |
| The grading standards used by ELPC do a good job of reflecting value differences in the lambs. | 3 | 14 | 0 | 3 | 0 | 0 | 6 | 2 | 0 | 0 |
| The state graders do an acceptable job in grading the lambs. | 6 | 12 | 1 | 0 | 1 | 1 | 2 | 1 | 3 | 1 |
| The discounts used by ELPC (heavy lambs, bucks, Red O's, etc.) accurately reflect differences in value. | 3 | 12 | 3 | 2 | 0 | 0 | 1 | 1 | 6 | 0 |
| When I have not felt the lambs I delivered (received) were graded accurately, ELPC has settled the issue to my satisfaction. | 0 | 4 | 5 | 1 | 0 | 0 | 5 | 2 | 0 | 0 |

[a]SA, A, N, D and SD are defined as strongly agree, agree, neutral, disagree, and strongly disagree, respectively.

Ninety percent of the surveyed producers believe the state graders do an acceptable job in grading the lambs. However, only 37.5 percent of the lamb buyers believe the state graders do an acceptable job. Buyer comments ranged from "graders aren't consistent" to "the grading service doesn't appear to care". Such a lack of confidence in the quality of grading is alarming in an electronic system where trading by description is essential. It is especially surprising that such a lack of confidence is found in a successful electronic marketing system.[57]

Only 10 percent of the producers surveyed believe the discounts used by ELPC (heavy lambs, bucks, Red O's, etc.) do not accurately reflect differences in value. Seventy-five percent of the buyers surveyed questioned the effectiveness of the grades. Most of the lamb buyers were concerned that the discount on heavy lambs (or premium on light lambs) and bucks is too low. When lambs delivered (received) were not believed to have been graded accurately, only one producer (and no packers) felt ELPC has not settled the issue to their satisfaction.

Table 6.17 presents the responses of slaughter lamb producers and buyers to statements directly related to their attitudes and perceptions of electronic marketing. When asked if they were pleased with the service provided by ELPC, 57.9 percent of the responding producers strongly agreed and 42.1 percent agreed. To the same statement, 37.5 percent of the buyers strongly agreed and 62.5 percent agreed. All of the producers interviewed and 87.5 percent of the buyers interviewed said they

Table 6.17 Responses of Slaughter Lamb Producers and Buyers to Statements Directly Related to Their Attitudes and Perceptions of Electronic Marketing[a]

| Statement | Number Responding | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Producers | | | | | Buyers | | | | |
| | SA | A | N | D | SD | SA | A | N | D | SD |
| I have been pleased with the service provided by ELPC. | 11 | 8 | 0 | 0 | 0 | 3 | 5 | 0 | 0 | 0 |
| I would recommend that others sell their lambs through ELPC (for buyers, recommend using the computerized method of purchasing lambs) | 14 | 6 | 0 | 0 | 0 | 2 | 5 | 1 | 0 | 0 |
| I believe other types of slaughter livestock could be sold electronically. | 11 | 7 | 2 | 0 | 0 | 1 | 6 | 1 | 0 | 0 |
| I believe the future of electronic marketing is promising. | 14 | 6 | 0 | 0 | 0 | 2 | 5 | 1 | 0 | 0 |

[a]SA, A, N, D, and SA are defined as strongly agree, agree, neutral, disagree, and strongly disagree, respectively.

would recommend the method of selling (buying) lambs to others -- the one dissenting buyer was neutral.

Ninety percent of the producers and 87.5 percent of the slaughter lamb buyers think other types of slaughter livestock can be sold electronically. One hundred percent of the producers and 87.5 percent of the buyers believe the future of electronic marketing is promising -- again, the one dissenting buyer was neutral. Hence, Table 6.17 demonstrates high levels of satisfaction with ELPC's computerized lamb sales and optimism for electronic marketing in general by both the slaughter lamb producers and buyers.

### VI.4.5 Conclusions

This section has demonstrated that ELPC computerized slaughter lamb sales have gained widespread acceptance and support from participating producers and buyers. The success of the computerized sales can be attributed to the well managed and organized ELPC, the well designed computerized trading system of EMA, the support of ELPC by its member producers, and the willingness of progressive buyers to try a new method of purchasing lambs. The previous experience with the teleauction provided a smooth transition to computerized sales.

The analysis did, however, identify four areas in which ELPC might improve the sales. These are:

1. Grading. The relatively high levels of buyer dissatisfaction with the quality and consistency of grading suggests that improvements must be made. Failure to do so will damage the system and may lead to its eventual collapse. Perhaps producers could be trained to grade and/or experienced graders could be identified by the grading service to grade ELPC lambs. Whatever the case, a solution must be found.
2. Discounts. The large number of buyers who believe the current discounts are inappropriate should provide incentive for additional research in the area. The surveys did not provide the solution, but they did indicate the presence of a problem.
3. Flexibility. ELPC should offer large producers (who can put together a load of lambs) the flexibility to sell on a grade and yield basis if they desire. Such a practice could be instituted at low cost to ELPC and could promote retention of present large scale producers and might attract new large scale producers.
4. Education. The interviews with several producers suggest that the ELPC educational effort could be improved. A quarterly newsletter or other publication is a possible solution.

Hence, even though the surveys revealed the widespread support by participants in ELPC's sales, improvements can be made.

The widespread support for the computerized slaughter lamb sales allow inferences to be made about gains (or losses) in social welfare. Since the same participants were involved in both the teleauctions and

computerized sales, and since all respondents either considered the switch from the teleauction to computerized sales method an improvement or were indifferent towards it, it can be inferred that there has been a gain in social welfare because of the change.

## VI.5 FOOTNOTES

[47]Other organizations (outside Virginia) have expressed considerable interest in the slaughter cattle program. Although firm commitments have not been made, it appears likely that the slaughter cattle program will be operational as early as spring, 1982.

[48]Since the surveys were administered by Virginia Tech personnel, it should come as no surprise that 100 percent of the respondents listed Virginia Tech personnel as a source of information about electronic marketing.

[49]If this were the case, one could understand the reluctance of packers to discuss it, in view of the many Federal anti-trust regulations.

[50]It is interesting that both negative comments were from Virginia packers. Virginia packers could have a vested interest against increasing the number of packers bidding on Virginia slaughter cattle.

[51]It should be noted that all packer "disagree" and "strongly disagree" responses were from Virginia packers.

[52]The bias in some of the Virginia packers' responses is particularly obvious in two of them disagreeing with this statement. The Virginia based EMA operates the only successful computerized lamb auction in the country. In addition, successful feeder pig teleauctions have been held for years in Virginia.

[53]Again, one has to wonder why no bids were received above the reservation price in previous attempts if this is "truly" their attitude.

[54]However, critical beginning support may be damaged irreparably by unsuccessful early attempted sales.

[55]As mentioned earlier, the Corn Belt Lamb Auction has already begun using EMA's system, also. Other organizations are also in various stages of commitment although no firm commitments have been made.

[56]This illustrates the unrepresentativeness of the sample if viewed from a total lamb producer perspective. In Virginia, less than 20 percent of the slaughter lambs are sold through ELPC sales.

[57]ELPC has, in a few instances, given buyers partial payment for losses received due to inaccurate grading. Had ELPC failed to make these payments, inaccurate grading might have damaged or destroyed ELPC's electronic sales.

## Chapter VII

## SUMMARY AND CONCLUSIONS

### VII.1 INTRODUCTION

An electronic market may be defined as a market whose trading arena is some electronic medium. The medium used may be a computerized system, teletype, conference telephone or some combination of these or other communciation networks (Russell and Purcell). Electronic markets are of relatively recent origin and have been gaining increased attention. Teletype systems have been used to sell slaughter hogs (Peer) and conference telephone auctions have been used to sell feeder pigs, slaughter hogs, feeder and slaughter lambs, and feeder and slaughter cattle (Henderson et al., 1976). Computerized systems have been used to sell cotton, eggs, wool, feeder cattle, hogs, and lambs (Ethridge; Cox; Computer Sciences of Australia; Sporleder; Baldwin; Va. Dept. of Agriculture and Consumer Services, 1980).

Analysts have suggested that electronic marketing has the theoretical potential to increase both technical and pricing efficiency (Henderson et al., 1976; Henderson et al., 1979; Johnson). The limited empirical work that has been done has tended to confirm the theoretical expectations (Engleman et al.; Helmreich; Henderson et al., 1979; Henderson and Baldwin; Holder; Lu, 1968; Lu, 1969).

However, as Russell and Purcell point out, the existence of successful electronic exchanges, the development of sound theoretical arguments, and positive results from empirical studies do not ensure that a proposed electronic marketing system will be successful. The validity of this statement is exemplified by Virginia's unsuccessful lamb teleauction in the early 1960's (Holder), little participation on the electronic marketing system for eggs (Schlei), shutting down a computerized slaughter hog auction system due to insufficient consignments (Henderson and Baldwin), and the unsuccessful attempts to sell slaughter cows by computer in Virginia. Electronic marketing is not without its opponents and even some supporters deserve the right to be skeptical (Rhodes, 1979; Rhodes, 1980).

In short, most analysts feel that electronic marketing has potential if properly designed electronic systems could be implemented. But beliefs about electronic marketing appear to be based on a combination of facts, supposition, and ignorance. Future decisions regarding electronic marketing will be important to the nation. The impact of these decisions will be felt at all levels of the marketing continuum.

The problem is that very little is known about electronic marketing -- especially computerized electronic marketing. Questions concerning benefits, costs, distribution of benefits, effect on industry structure and needed regulation all remain unanswered (Schlei). Research is needed to provide the information base to help answer these questions. Work

needs to be done in the area of system design, in developing conceptual frameworks to determine the feasbility of electronic marketing, and in the implementation of electronic systems. Conceptual, theoretical and empirical work is needed if intelligent decisions are to be made regarding electronic marketing.

This study was based around the working hypothesis that an increase in the theoretical and empirical base of knowledge about electronic marketing will aid in determining its feasibility and in system design, implementation, and evaluation. The specific objectives of this study were:

1. to build a theoretical base from which the broad issues of electronic marketing may be examined;
2. to conceptualize, articulate and illustrate the issues involved in determining the feasibility and design of an electronic marketing system;
3. to examine the costs of electronic marketing both theoretically and empirically;
4. to explore the relationships between price level and price variability and electronic marketing; and
5. to demonstrate, theoretically and empirically, a means of evaluating an electronic marketing system.

Experiences gained from participation in the design and implementation of the computerized trading system of Electronic Marketing Association, Inc. (EMA) as well as analysis of the data generated by EMA's electronic marketing system were used in fulfilling the objectives.

## VII.2 THEORY

The study gradually built the theoretical base from which the broad issues of electronic marketing can be examined. It used the definition of agricultural marketing advocated by Purcell (1979) that "agricultural marketing is the set of economic and behavioral activities that are involved in coordinating the various stages of economic activity from production to consumption". The study also used a systems orientation recommended by Godwin and Jones, Kohls, Purcell (1979), and Shaffer.

In developing a theoretical base, the study first examined an ideal marketing system followed by some common system shortcomings (including a brief literature review on thin markets). Possible solutions to these marketing problems were then examined. Finally, the theoretical implications of electronic marketing regarding both pricing and technical efficiency were discussed.

An ideal marketing system is both technically and price efficient. It supplies the consumer the product in the form, time and place he or she desires at the lowest possible cost. Unfortunately, system shortcomings will often keep the ideal system out of reach. Thin markets, conflicting goals, lack of effective grades, lack of informed participants, unequal bargaining power, unequal access to information, and inadequate informaton can all foster inefficiencies.

Vertical integration, contractural arrangements, improvements in price reporting, legislation, research, teaching, extension and electronic marketing were examined as possible solutions. Vertical integration and contractual arrangements appear to reduce private costs but questions remain about social costs and benefits. Improvements in price reporting should have social benefits but one wonders if the private cost would be prohibitive. Legislation can be helpful or harmful depending upon its wording and timing. Research, teaching and extension possess the potential to increase marketing efficiency. Although the evidence is not all in, electronic marketing appears to have the ability to improve technical and pricing efficiency.

Technical efficiency could be improved via moves to electronic marketing systems by reducing transportation, transaction, and assembly costs. Additional services provided by a computerized trading system might further increase technical efficiency. Examples of such services include accounting, market news and market analysis. Electronic marketing does involve additional costs which must be more than covered by cost savings for the system to make a positive contribution to technical efficiency. The distribution of benefits should be important in determining system feasibility and in establishing fee structures.

It was determined that if a system is technically efficient, equilibrium quantity will be expected to increase and price at the retail

level will be expected to fall assuming adequate levels of competition at all levels in the system. The direction of price changes for other levels is not theoretically determinate as the solution is dependent upon distributional factors. The impacts of electronic marketing will be felt at all levels in the marketing continuum.

Factors such as increasing the number of buyers and sellers, providing timely and accurate market information, increasing emphasis on value related characteristics of the product, and possible structural changes should allow electronic marketing to increase pricing efficiency. It is difficult to conceive of situations where pricing efficiency would decrease but such might occur in a beginning system. Price variability will be expected to increase as products are sold at prices that more nearly reflect their economic value and reactions to changes in market information are completed more quickly. If the present market environment is characterized by insufficient competition, electronic marketing should increase price levels.

In short, the findings of this study do not contradict the conclusions of other writers. Electronic marketing does appear to have the theoretical potential to increase technical and pricing efficiency.

## VII.3 SYSTEM FEASIBILITY, DESIGN AND IMPLEMENTATION

The study developed a conceptual framework for determining the feasibility, designing and implementing an electronic marketing system. Theory from the fields of economics, finance, organizational behavior, and other disciplines guide the development and methods used in mirror-image surveys and technical studies. Output from these studies can then be used to determine the feasibility of a particular system or aid in determining the best system out of a set of alternatives. Should it be determined that electronic marketing is not feasible, the process stops. If, however, electronic marketing is determined feasible, additional research should be completed to aid in system design. When the electronic system has been designed it must then be successfully implemented. The operating trading system would then generate data useful in additional research, system redesign, and in modifying, validating, or rejecting current theories. The sequential relationships established with the conceptual framework were used as patterns by which the research was organized.

### VII.3.1 Theory

Determining the feasibility of a proposed electronic marketing system is an investment decision under conditions of risk or uncertainty. Implementing a new electronic system involves motivational factors. Neither the investment decision nor the implementation process can be

separated from system design. This study examined theoretical foundations of the investment decision and potential trader motivation. To do so required drawing on the theories of economics, finance and organizational behavior.

Theoretically, the net present value method is the preferred method of evaluating the investment decision (Van Horne). But when risk is introduced, two difficulties arise. One involves the need to determine the expected cash flows and the other deals with how the investors preferences towards risk affect the investment decision. Bayesian analysis (Eidman et al.) and simulation (Hertz) are often used to determine expected cash flows. The expected utility theorem considers the investors attitude toward risk, equates the utility of a risky prospect with it's expected utility, and assumes the investor is a utility maximizer (Anderson et al.; Van Horne; Von Neumann and Morgenstern).

To date, most electronic systems have been developed by groups of individuals (coops, for example) or by government entities. Elicitation of risk preferences in such situations would be difficult if not impossible because of the large number of participants. The limited experience with electronic marketing makes the determination of probabilities associated with alternative cash returns more complicated. As time and experience increase, more reliable probabilities can be generated across systems, commodities and participants. With this, the quality of the investment decision regarding electronic marketing should improve.

Trader motivation is important in any electronic marketing system, but is particularly important in designing and implementing a new electronic marketing system. Using a modified version of the Porter and Lawler model of motivation, the study illustrated many important theoretical considerations when designing and/or implementing an electronic marketing system. The path from the participant's effort to desirable rewards must be well defined and understood by all. The individual requirements by the system should not unduly restrict the potential trader's perceptions of his or her ability to participate. This has implications regarding the type of performance guarantees, procedures, hardware and software utilized by the system. Similarly, the system characteristics should be such that they instill a high degree of confidence in the individual that the system can and will be successful. Potential participants should be involved in the earliest stages of system design. Such a policy will not only increase the quality of decisions in system design, but has an educational dimension as well.

Potential traders must also see positive reinforcement accruing to them when the system is successful. An educational effort needs to underscore the potential benefits accruing to traders should the system prove successful. If feelings of inequity exist with the present marketing system, the educational effort should draw upon these feelings to promote electronic marketing. Continued participation by a trader will, to a large part, hinge on individual satisfaction received from previous participation. This exemplifies the importance of successful sales --

especially the first few sales when uncertainty concerning the system is highest.

### VII.3.2 Mirror-Image Surveys

A mirror-image survey involves the use of paired questions to examine key areas of concern along two related stages of economic activity in a marketing system. Information from such surveys can provide the invaluable insight which is so necessary to perform an accurate and objective feasibility study for a proposed electronic marketing system. Such surveys provide a useful vehicle to examine the attitudes of buyers and sellers towards the present marketing system, their awareness of the value-related dimensions of the product, their ability to identify important dimensions of the pricing process, their attitudes toward product liability and when it should change, and their perception of the organization that should operate an electronic marketing system. It should then be possible to estimate the level of participation for a proposed electronic marketing system. The study illustrated the use of the mirror-image survey technique and demonstrated the information that can be gained from such a technique, by discussing the surveys used to design EMA's computerized trading system.

### VII.3.3 Technical Studies

Technical studies refer to all scientific analyses, both theoretical and empirical, having applicability to electronic marketing. Studies concentrating on cost, pricing implications, feasibility and/or distirbutional impacts of either electronic marketing in general or specific electronic systems provide examples. Likewise, studies estimating the efficiency, capacity and/or flexibility of different hardware and software configurations constitute examples of technical studies. Just as mirror-image surveys are needed to discern the attitudes, goals and perceptions of potential system participants, technical studies are needed to determine the particular electronic system which will provide the greatest benefits at the lowest possible cost. With information from both mirror-image surveys and technical studies, one has the necessary data to complete a thorough and accurate feasibility study.

### VII.3.4 Feasibility Study

This study presented a generalized outline of a feasibility study for beginning a new computerized electronic marketing system. The outline is divided into environmental conditions and factors exerting a more direct influence. The current marketing situation, goals and objectives and resources available are classified as environmental conditions. To assess the current marketing situation, the present competitive environment must be examined to see if problems are evident. The

adequacy of product grades and standards and the effectiveness of current assembly procedures must be examined. The attitudes of market participants towards the current marketing system must be obtained as this may be indicative of initial support for a beginning electronic marketing system. The willingness of producers to organize for a common purpose is important and efforts should be made to determine the degree of their willingness to organize. Finally, likely opponents to electronic marketing should be identified, their bargaining strength estimated, and their probable objectives considered in developing an educational program.

The goals and objectives of the proposed computerized electronic marketing system and of the feasibility study should be explicitly stated. Both human and capital resources available for the development of the computerized system should be inventoried. Expertise and industry contracts should not be overlooked. Potential for outside support from grants, personnel, publicity, etc. should be evaluated and sought. In some cases, the feasibility study might only show the system feasible contingent upon the support of one or more of these agencies or groups.

Product supply, buying strength, structure of the selling organization, equipment needs, procedures and financial considerations are all classified as directly influencing factors. Seller identification, estimates of the initial and potential sales volume, and the likely time

frames are necessary to estimate product supply. Similarly, buyer identification and estimates of the initial and potential purchase volume with their likely time horizons are necessary to assess buying strength.

The structure of the selling organization could be correctly classified as a directly influencing factor or as an environmental condition depending on whether a new organization must be established to sell electronically or whether a previously organized association will handle the function. Regardless, at some time or another, decisions must be made regarding whether it is to be operated for profit or at cost, the type of ownership arrangement, whether it is to be a cooperative or not, and who will manage and control the association.

Decisions must be made regarding the type of computer, terminal and communications network to utilize. Ownership, leasing and time-sharing alternatives should be evaluated. The benefits and costs of dedicated and nondedicated communciation networks need to be compared. Brand decisions must be made considering costs, service arrangements, and reliability. Such evaluations should not be taken lightly as decisions made will affect cost, flexibility and reliability of the computerized system. Procedural alternatives must also be examined. Chocies must be made regarding product description, performance guarantees, auction characteristics, size of lots, time of sale, means of access, control features and contractural arrangements. Throughout the study, invest-

ment capital needs should be considered, operating budgets prepared and cash flow analysis performed for each likely alternative.

Each feasible alternative should be evaluated financially. The net present value technique should be utilized. Based upon the financial evaluation, as well as factors such as ease of industry acceptance and adaptability of the system to future growth and/or unanticipated changes in market factors, a recommendation should be made.

If the feasibility study indicates that electronic marekting is not feasible at the present time, that conclusion should be accepted until circumstances indicate otherwise. If the feasibility study indicates that electronic marketing is feasbile, it will usually point to additional research that needs to be done. Generally, this research is needed to provide answers which will fine tune the system.

### VII.3.5 Design

The design of an electronic marketing system may be subdivided into organizational, hardware, software and procedural design. There is no single optimal design across commodities and different marketing situations. The optimal design will be contingent on a variety of factors, including: the commodity involved; expected volume levels; the progressiveness of market participants; current marketing procedures and customs; perceptions of the current marketing system; the degree of market power held by current market participants; past current and expected go-

vernment actions; and the amount of investment capital available. However, the absence of an optimal universal design does not preclude a particular system design (or parts of it) from having widespread applicability. Even electronic marketing systems which prove to be unsuccessful can provide valuable insight to future designs. The study described the organizational, hardware, software and procedural design of the computerized electronic marketing system used by Electronic Marketing Association, Inc. (EMA).

The organizational design factors which have proved beneficial to EMA include:

1. the nonprofit nature of the corporation;
2. the involvement of industry leaders early in design and development;
3. the concentration on computer aspects of the sale, while allowing each member organization of EMA to focus on procedural aspects;
4. tying membership, voting rights and representation on the board of directors to participation; and
5. maintaining confidentiality of member organization's buying lists.

It is hoped these experiences will prove useful to future designers of electronic marketing organizations.

EMA's computerized trading system is a remote access, time-sharing system utilizing the services of the INFONET Division of Computer Sci-

ences Corporation. EMA also owns telephone equipment which can link as many as 18 buyers (via a conference telephone call) to the computerized sale or can be operated independently as a teleauction.

Utilizing a time sharing system has allowed EMA to implement a computerized tradng network without incurring the high fixed costs of obtaining and maintaining a computer. The minimal fixed costs (manager salary, office equipment, terminals in the central office) are then shared by many users which allow computerized electronic marketing systems to be feasible at much lower levels of sales volume. By using a commercial vendor, access to multiple computer centers is acquired, resulting in important redundancy features.

Flexibility is maintained by the acceptance of a wide variety of computer terminals, the world wide communications network, the use of commercial phone lines in accessing the computerized system, and EMA's telephone conferencing equipment. New participants in the computer sales can be added quickly and efficiently without the expenses and the sometimes long delays of providing dedicated phone lines. Small buyers who purchase infrequently can gain access to the system through the teleconferencing equipment. In short, the hardware used by EMA has proved to be reliable, flexible, and cost efficient in its first year and half of operation. Such characteristics would be beneficial to any electronic marketing system.

The success of EMA's software development suggests five factors which should aid in the successful development of software for future electronic marketing systems. These are:

1. Mirror-image surveys and technical studies should precede the development of the software. This will ensure that the resulting program will more closely fit the needs and biases of system participants.
2. To encourage quick and efficient program design, effort should be made to keep initial computer programs as simple as possible.
3. Since many questions remain until the system becomes operational, initial computer programs should be as flexible as possible.
4. To increase the security and integrity of the system, a terminal hierarchy should be established. Buyer, seller and control terminal identification numbers should be established which will limit the activity of a specific terminal to the types of activity allowed by the identification number.
5. The control terminal should possess the ability to direct the system in the event quick and decisive action is needed.

Considering these five factors will allow future designers to avoid potential problems. The cost of software design should be lowered. The likelihood that the software will form the basis of a successful computerized electronic marketing system should be increased.

Procedures used by a particular electronic marketing system may vary across commodities or trade groups. As such, a specific procedural design is less likely to have general applicability than either organizational, hardware or software design. This is especially true when transferred across systems. Nevertheless, to demonstrate a successful procedure, EMA's computerized slaughter lamb program utilized by Eastern Lamb Producers Coop., Inc. (ELPC), was discussed.

### VII.3.6 Implementation

A well designed electronic marketing system, which has been determined feasible and is the result of input from industry participants, will be implemented with less effort and a higher probability of success than a system not so designed. The importance of early successful sales cannot be over emphasized. To ensure that this occurs, all components should be thoroughly tested before the first sale. This is particularly true with a computerized system where complexity is greatest. The human factor must also be considered. Buyers may be reluctant or slow to begin bidding during the first sale. A wise marketing agency will make efforts to guarantee bids over the system before the sale starts to ensure the lots are sold. Similarly, a wise marketing organization will ensure through pledges, contracts or other means that sufficient offerings are available with reasonable reservation prices. Following these procedures should increase the likelihood of successful implementation which in turn should increase the likelihood that the electronic market-

ing system will be successful. Clearly, a strong measure of backing and acceptable performance guarantees subsidy must be available from the producer organization or other marketing agency to ensure the success of early efforts with a new system.

### VII.3.7 Implications

The importance of this part of the study must be emphasized. All electronic marketing systems will not be feasible in all situations. Feasibility must be determined. The design and implementation of an electronic marketing system will to a large extent determine the success of the system. The steps and procedures identified above will not guarantee a successful electronic marketing system. If followed, however, these guidelines should increase the probability that a feasible electronic marketing system will in fact be successful. The future of electronic marketng of agricultural products may hinge, to a large extent, on the ability to determine the feasibility, design and implement specific electronic marketing systems.

## VII.4 COST CONSIDERATIONS

If electronic marketing is to increase technical efficiency of the marketing system, it must reduce marketing costs. The distribution of cost savings (increases) along the marketing continuum is important and may affect the feasibility of the electronic marketing system. An elec-

tronic marketing system may be characterized by high fixed and low variable costs, low fixed and high variable costs, or an almost infinite number of alternative cost scenarios. Within a given electronic marketing system, costs will vary by procedure, sales volume, and number of system participants. However, system design will determine the bounds within which cost may fluctuate.

The costs asociated with EMA's computerized trading system were examined. Fixed and variable costs of ELPC's computerized slaughter lamb sales (which uses EMA's system) were estimated. During the period November, 1980 thru August, 1981, per head variable costs (excluding transportation) have averaged $1.50 for lamb producers which included $.25 for ELPC, $.16 for EMA, and $0 for lamb buyers. Per head fixed costs averaged $0 for lamb producers, $.02 for ELPC, $.04 for EMA, and $.12 for lamb buyers. The resulting per head total costs are the same for lamb producers, lower for ELPC and higher for lamb buyers compared to previous teleauction sales. In previous teleauctions, ELPC initiated all phone calls which means buyers had no out-of-pocket expenses. However, additional buyer time was involved and the computerized sales save the buyer approximately 15 minutes per sale in addition to the significant advantage of having printed descriptions of the lots to be sold. It should be noted that all buyers purchased computer terminals, indicating the value of time saved was greater than terminal costs. It was concluded the computerized sales increased technical efficiency when compared to previous teleauctions.

Estimated hardware and software costs of a proposed computerized slaughter hog trading system were also examined. Estimated per head costs ranged from $.43 for a system with accounting functions, 10 additional monitoring terminals, and a monthly volume of 35,200 head to $.13 per head for a system without accounting functions, no additional monitoring terminals, and a monthly volume of 118,800 head. When compraed to a system which owns its own mini-computer and uses dedicated phone lines at a volume level of 500,000 head per year, estimated per head costs ranged from $.29 to $.44 per head lower using EMA's system, depending on the option chosen. Hence, EMA's computerized system could operate at lower cost than a system using a mini-computer and dedicated lines (at least for a volume of 500,000 head per year). Comparisons with conventional marketing methods would involve assembly, grading, and transportation costs. However, since Baldwin indicated a system utilizing a mini-computer and dedicated lines would be cost competitive with an annual volume of 900,000 head and a hardware and software cost of $.30 per head, one could infer that EMA's system would be cost effective at a much lower volume. The particular level would be dependent on the particular option chosen. Therefore, it appears EMA's system at least has the potential to improve technical efficiency for Ohio's slaughter hog marketing system.

As reiterated throughout, the costs of an electronic marketing system are dependent on such factors as system design, head per lot, lots per sale, procedural considerations, etc. As such, only a small subset

of possible cost scenarios for EMA's system was examined. Cost functions for specific sales using specific procedures were estimated and shown to result in cost savings. Cost functions for a wider range of sales utilizing a broader set of procedures need to be estimated and/or simulated. At present, data does not exist to estimate such functions and experience is just accumulating to the point where realistic simulations are possible.

In addition to EMA's system, research needs to examine alternative hardware, software and communication configurations. Little to no work has been completed concentrating on electronic markets using multiple electronic mediums. The long run average cost function needs to be estimated. Research should be on the leading edge of technological advances -- considering and estimating the cost and applicability of advances in data processing, data storage, and communication. Today, the potential exists for many electronic marketing systems to be cost efficient. Tomorrow, the set of possible cost efficient electronic marketing systems will grow. Research must sift and measure the cost effectiveness of alternative electronic marketing systems.

## VII.5 PRICE CONSIDERATIONS

The study analyzed the price effects of Eastern Lamb Producer Coop's (ELPC) computerized slaughter lamb sales. Price magnitude, price variability, and responsiveness to market information were examined for ELPC sales. Relationships between the price of lambs sold through computerized sales and those sold through conventional channels were analyzed. Comparisons were made across electronic mediums and inferences were drawn.

ELPC slaughter lamb prices from computerized sales average $1.86 per cwt. above regional price and $1.46 per cwt. above the national price. The differences were significantly diffeent from 0 at the 1% and 10% levels respectively. In models attempting to explain the ELPC price, the bidding time increment, the number of lots offered, the national lamb price and the one period lagged ELPC price were all found to be significant in one or more models. Data were not available to test interday and intraday price variability. When interweek and intermonth price variability comparisons were made across electronic, regional and local markets, no significant differences were found -- suggesting computerized marketing did not increase price risk. ELPC price changes were found to lead regional price changes by one week. Because of higher prices received for ELPC lambs, the tendency for ELPC price changes to lead regional price changes, and the informational gains to system participants through grading, it can be concluded that the computerized

system has increased pricing efficiency when compared to conventional auction markets. Any of the factors taken alone would not be sufficient to conclude that pricing efficiency has increased. However, when taken together a convincing argument is presented.

Models were estimated which attempted to explain the regional slaugther lamb price. Using intercept dummy variables, the computerized sales were found to have added $9.94 to $12.46 per cwt., depending upon the particular model. A teleauction dummy variable was insignificant in all models. Five factors were identified to explain the effect the computerized sales had on regional price. These include:

1. the change in the grading standards used in ELPC sales which occured at the same time the computerized auctions began;
2. the excitement and enthusiasm of ELPC buyers and the apprehension on the part of some order buyers and auction market operators because of the computerized sales;
3. the unequal discounts between Blue O and Red O lambs for ELPC sales and conventional auction sales;
4. the computerized trading system's ability to provide detailed listings of lots to be sold in a quick and efficient manner before the sale; and
5. the computerized trading system's ability to keep individual price bids confidential.

At the present time it is impossible to separate the casual influences each factor has had on price. Too, there is no adequate explanation as

to why the teleauction dummy variable was insignificant. As further experience is gained with other systems and other commodities, and as the data base grows for FMA's system, it may be possible to answer these questions.

When the influence of ELPC was included as an explanatory variable, it was found to have raised regional price $4.23 to$4.26 per cwt., depending upon the particular model. The limited experience with electronic marketing does not allow one to determine if the particular electronic medium used or the selling organization is most important in determining price. Certainly, however, a sound organization is a necessary prequisite for a successful electronic marketing system.

This part of the study showed that a computerized trading system's prices can be higher and its price changes can lead prices from more conventional markets. In addition, it was shown that the presence of a computerized trading system can significantly affect prices outside the electronic marketing system. Insight has been gained, but questions remain. The robustness of parameters and inferences from this study across time, other electronic trading systems, other commodities, and other buyer's needs to be tested.

## VII.6 EVALUATION

The mirror-image survey technique was used to examine the unsuccessful introduction of a computerized slaughter cattle trading system and EIPC's successful computerized slaughter lamb program. Surveyed Virginia slaughter cattle producers and northeastern cattle packers revealed attitudes which were still generally positive towards electronic mareketing. It was determined the computerized slaughter cattle sales were not successful because of at least five reasons:

1. software and hardware problems in the first sale;
2. grouping livestock in lots which were too small in early sales;
3. sale times were too late during early sales;
4. failure of computerized buyers to actively bid; and
5. order buyer pressure on auction markets operators.

Three important lessons were learned from the experiences with the slaughter cattle program which have implications for implementation of future electronic marketing programs. These are:

1. check and recheck hardware, software and sales procedures thoroughly before the first sale;
2. use a producer organization to promote, coordinate, and oversee sales; and
3. make sure the producer organization has outside bids in case buyers on a new system are reluctant to bid.

The proper application of these principles should increase the probability that implementation of future electronic marketing programs will be successful.

Surveyed slaughter lamb producer and buyers indicated widespread acceptance and support of ELPC's computerized slaughter lamb sales by participants in the system. Reasons for the success of the computerized lamb sales included:

1. the well managed and well organized ELPC;
2. the well designed computerized trading system of EMA;
3. the support of ELPC by its member producers;
4. the willingness of progressive buyers to try a new method of purchasing lambs; and
5. the previous experience of buyers and sellers with the slaughter lamb teleauction.

The mirror-image surveys did, however, suggest four areas in which improvements may be made. These include:

1. the quality of grading;
2. the size of the various price discounts from the Blue O grade;
3. the degree of flexibility offered large scale producers; and
4. the educational effort to ELPC members.

The surveys did suggest that switching from the teleauction sales method to computerized sales has increased social welfare.

## VII.7 CONCLUDING REMARKS

This study has built a theoretical base from which the broad issues of electronic marketing may be examined. It has conceptualized, articulated and illustrated the issues involved in determining the feasibility, designing , and implementing an electronic marketing system. The study has examined the cost and price considerations associated with the ELPC computerized slaughter lamb sales and has demonstrated the use of the mirror-image survey technique in evaluating electronic marketing systems.

However, most of the inferences have been based on either personal experiences with EMA or data which has been generated from EMA sales. Such inferences should be restrained until their robustness has either been proven or disproven with further research. Additional research is needed in electronic marketing across systems, commodities and different sets of participants. The future of electronic marketing looks promising. However, a much broader research base (theoretical and empirical) is needed if intelligent decisions are to be made regarding electronic marketing.

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## Appendix A

## VIRGINIA SLAUGHTER CATTLE PRODUCER QUESTIONNAIRE USED IN SYSTEM DESIGN WITH A SUMMARY OF THEIR RESPONSES

### A.1 COVER PAGE

1. Name _____

2. Address _____

3. Phone number _____

4. How many head of slaughter cattle do you sell through each marketing channel per year?

| | Slaughter Cows | Fed Cattle |
|---|---|---|
| Weekly auctions | 811 (97.1%) head/yr. | 214 (11.2%) head/yr. |
| Special graded sales | N/A head/yr. | 510 (26.6%) head/yr. |
| Tel-o-auction | 0 head/yr. | 0 head/yr. |
| Direct | 17 ( 2.0%) head/yr. | 1192(62.2%) head/yr. |
| Order buyer | 7 ( .9%) head/yr. | 0 head/yr. |

5. How many head of slaughter cows do you normally market in each of the following months?

| | | |
|---|---|---|
| 58 (7.8%) Jan. | 82(11.1%) May | 64 (8.6%) Sept. |
| 53 (7.2%) Feb. | 69 (9.3%) June | 104(14.1%) Oct. |
| 41 (5.5%) Mar. | 46 (6.2%) July | 67 (9.1%) Nov. |
| 37 (5.0%) Apr. | 56 (7.6%) Aug. | 63 (8.5%) Dec. |

6. How many head of fed cattle do you normally market in each of the following months?

| | | |
|---|---|---|
| 77 (3.7%) Jan. | 224(10.9%) May | 87 (4.2%) Sept. |
| 77 (3.7%) Feb. | 224(10.9%) June | 373(18.1%) Oct. |
| 167 (8.1%) Mar. | 79 (3.8%) June | 322(15.6%) Nov. |
| 247(12.0%) Apr. | 100 (4.8%) Aug. | 87 (4.2%) Dec. |

7. How would you classify the slaughter cows you sell (check only one)?

   26 fat  38 medium flesh  2 thin

8. What is the average weight of the slaughter cattle you sell?

| | | |
|---|---|---|
| slaughter cows | 1,086 pounds | (Range 700-1,450) |
| fed steers | 1,096 pounds | (Range 1,000-1,200) |
| fed heifers | 911 pounds | (Range 800-1,000) |

## A.2 PART I. THE CURRENT SITUATION AND PRESENT ATTITUDES

1. Do you feel you receive a fair price for the slaughter cows you market?

   45 yes  20 No

   If no, why not? Not enough buyers; buyers collude.

2. Do you feel you receive a fair price for the fed cattle you market?

   13 Yes  4 No

   If no, why not? Market adjusts slowly for price increases and rapidly for price declines; price here is below midwestern quotes.

3. Are you satisfied with the convenience (time required, frequency of sales, etc.) offered by the marketing method you are presently using?

   For slaughter cows: 59 Yes 7 No; Why? No -takes too much time.

   For fed cattle: 16 Yes 1 No; Why? No -takes too much time.

4. Would you like to see changes in the marketing system you are now using?

   For slaughter cows: 32 Yes 34 No; What type of changes? 20 more buyers; 5 better physical facilities; 2 electronic marketing; 2 others.

5. Have you sold cattle on the rail or on a carcass weight and grade basis?

   29 Yes 54 No

   If yes, is you reaction positive or negative and why? 11 positive, 14 negative; negative - just didn't like, low price, low weights, didn't get as much money; positive - good if you have good cattle.

6. If the packer were willing to allow you or your representative to observe his plant operations whenever you choose, would it make selling on the rail

   12 much more acceptable

   17 slightly more acceptable

48 wouldn't change my attitude towards selling on the rail

7. Assume it takes 10 hours from the time the cattle are weighed until they reach the packing plant. On a liveweight basis, what percent shrink of weight loss would you expect?

5.80 (Range 1.5-15) % for slaughter cows

4.13 (Range .5-10) % for fed cattle

If these same cattle were sold by carcass weight would you expect tissue (carcass) shrink to be a problem?

13 Yes 37 No If yes, what percent shrink would you expect?

2.12 (Range 1-4.5) % for slaughter cows No Answers % for fed cattle

8. Assume each slaughter animal is sold by carcass weight and grade. Would you be willing to comingle your cattle with other similar cattle and sell them as a group if you thought you could get a better price?

8 No, if no why not? Just don't want to; wouldn't get a better price anyway.

72 Yes, if yes, how much price increase do you feel would be appropriate? $1.63 per cwt., (Range $.60-$8.00)

9. Assume an electronic marketing system exists which sells slaughter cattle by description and which has 10 or more buyers tied

into the system. Compared to your present marketing costs would you be willing to pay

42 More 3 The Same 2 Less

per head to sell cattle over such a system. Would your answer change if you could leave the cattle on the farm until they are sold?

42 Yes 34 No I would be willing to pay $10.67, (Range $1.00-$50.00) per head more to sell the cattle while they are still on the farm.

10. Do you have any objections to an auction system that uses regressive bidding rather than progressive bidding?

45 No 26 Yes 12 Uncertain

Why? Yes - unfamiliar with regressive bidding, buyers may collude, will bring lower price.

11. Do you think slaughter cattle can be sold effectively from the viewpoint of the seller, when the buyer cannot see the cattle and trade is on a description basis?

41 Yes 27 No

Why? No - would still want to see the cattle.

12. Which procedure would you prefer?

22 1) the cattle are sold by description on the farm and are delivered to a pickup point on a day the buyer specifies (within a week of purchase)

33 2) the cattle are sold by description at an assembly point such as a local auction, etc.

Would you say your choice above is

13 much better 23 a little better 32 about the same as the second choice?

13. Do you think the trend we are seeing toward tel-o-auctions or other electronic methods of selling cattle is a desirable trend?

60 Yes 10 No

Why? Yes - should increase number of buyers, should increase efficiency; No - satisfied with present system.

14. Would you be interested in marketing any of your slaughter cattle by tel-o-auction or other electronic medium?

53 Yes 19 No 11 Uncertain

Why? Yes - willing to try; no - satisfied with present system, too much trouble; uncertain - need to know more about it.

15. In an electronic marketing system how would you prefer to sell your cattle?

41 each set of cattle is auctioned separately

25 conduct the auction and let the high bidder pick one or more lots and then repeat the procedure on the remaining lots

## A.3 PART II. PRODUCT DESCRIPTION

1. For slaughter cattle of the same class, how much difference can there be in value between animals?

| | | |
|---|---|---|
| slaughter cows | $ 7.46 per cwt. | (Range $0-20) |
| fed steers | $ 6.16 per cwt. | (Range $1.50-17.00) |
| fed heifers | $ 6.10 per cwt. | (Range $1.50-16.00) |

2. Besides liveweight, what is the single most important determinant of value in slaughter cattle?

   26 quality grade, 19 dressing percent, 6 yield grade, 4 breed, 4 age, 3 others slaughter cattle

   8 quality grade, 4 dressing percent, 2 yield grade fed cattle

3. Rank in order of importance (1=most important) all the following you feel should be used in describing a slaughter animal if trade is on the basis of description of live animals and the buyer cannot see the cattle?

| | Slaughter Cows | | Fed Cattle | |
|---|---|---|---|---|
| | Times Chosen | Average Rank | Times Chosen | Average Rank |
| Sex | N/A | N/A | 16 | 1.00 |
| Breed | 38 | 3.08 | 4 | 4.12 |
| Age in years | 24 | 2.67 | 3 | 3.67 |
| Liveweight (estimated) | 12 | 2.58 | 0 | N/A |
| Liveweight (weighed) | 51 | 3.18 | 14 | 3.29 |
| Qualtiy grade | 46 | 2.26 | 13 | 2.31 |
| Yield grade | 29 | 2.52 | 8 | 3.00 |
| Dressing percent (yield) | 24 | 2.33 | 6 | 4.00 |
| Amount of flesh or finish | 37 | 2.46 | 5 | 5.20 |
| Fill | 8 | 3.50 | 4 | 4.25 |
| State of health | 35 | 2.34 | 4 | 4.50 |
| Other _____ | 0 | N/A | 0 | N/A |
| _____ | ___ | ___ | ___ | ___ |

4. If you were the packer, would you be willing to buy cattle on a live basis using the terminology or descriptive terms you identified in #3?

   72 Yes  10 No

   If yes, what questions concerning the cattle would still be unanswered?

   None; reputation of producer; origin of cattle; history of antibiotic used; bruise damange.

   What would you do to offset these unanswered questions?

   Discount price; wouldn't buy.

   If no, what other conditions would you require?

   Would still want to see the cattle.

5. How would you like to sell your slaughter cattle if they were sold live on a description basis?

   56 1) Competitive bids on each animal or groups of like kind in terms of sex, breed, class and weight.

   19 2) Competitive bids on an average animal with price premiums and discounts tied to the differencea by grade, weight, finish, etc. in some market report such as the yellow sheet.

6. If the cattle are being bought on the rail or on a carcass grade and weight basis, what variablies do you feel need to be identi-

fied to sort the cattle into loads so the buyer will know what he is getting?

| | Times Chosen | |
|---|---|---|
| | Slaughter Cows | Fed Cattle |
| Sex | N/A | 14 |
| Breed | 32 | 9 |
| Age in years | 19 | 4 |
| Liveweight (estimated) | 58 | 11 |
| Liveweight (weighed) | 4 | 2 |
| Quality grade | 40 | 11 |
| Yield Grade | 25 | 7 |
| Dressing percent (yield) | 27 | 10 |
| Amount of flesh or finish | 33 | 5 |
| Fill | 9 | 6 |
| State of health | 29 | 3 |
| Other _____ | 0 | 0 |
| _____ | _____ | _____ |

7. If the cattle are sold on the rail, what carcass characteristics should be used to describe carcasses of different value which ought to go at different prices?

| | Slaughter cows | Fed cattle |
|---|---|---|
| Carcass weight | 64 | 15 |
| what weight increments? | 91.10 lbs. | 82.14 lbs. |
| Quality grade (USDA grade) | 63 | 15 |
| Yield grade (USDA grade) | 62 | 15 |
| Sex of animal (if fed cattle) | N/A | 13 |
| Other _____ | _____ | _____ |
| _____ | _____ | _____ |

## A.4 PART III. PERFORMANCE GUARANTEES

1. Assume you are selling cattle through a new system which describes the cattle and sells them before they leave the farm. You later haul the cattle to a collection point to be picked up by the buyer. When do you think title to the cattle (and liability for death loss, etc.) should change?

   50-when delivered to assembly point; 10-when loaded on buyers truck; 10-when sold; 7-when loaded at the farm; 5-when weighed.

2. Another approach would be to have you move your cattle to a local holding facility and have them described there and sold to buyers who buy on a description basis. When should the title of ownership (and liability) change?

   43-when delivered to assembly point; 30-when sold; 3-when loaded on buyers truck; 3-when loaded at the farm; 1-when weighed.

3. Would you be willing to sell cattle under an agreement where you guarantee live delivery to the packing plant, if you thought you could receive a higher price? 59 Yes 23 No

   If yes, how much higher would the price have to be? $2.24 per cwt. (Range $0-8)

   If no, why not? Don't know how truckers will treat the cattle; don't have any control over the cattle.

4. If there was a marketing organization providing the connection between you and the buyer and handling the sale by telephone or other electronic medium, do you think it would make sense for the

marketing organization to guarantee live delivery to the packing plant? 48 Yes 32 No

Why? Yes-just makes sense; No-packer and trucker should share the responsibility after the cattle are picked up.

If yes, how should the cost of this guarantee be met? 24-by producers and packers; 11-by producers; 6-by packers.

5. If the buyer were asked to accept the liability of death loss after the cattle left your farm, do you think this would influence their price bids?

   51 Yes 24 No

   If yes, how much? $2.32 per cwt. (Range $.25-9.00)

6. In a marketing system where trading occurs by telephone or other electronic medium, what arrangement would you like to see to insure the performance of both buyer and seller?

   Buyer

   12 oral agreement

   38 written contract

   31 written contract with performance bond

   __ other _____

   Why? _____

   Seller

   21 oral agreement

   48 written contract

   11 written contract with performance bond

   __ other _____

Why? _____

## A.5 PART IV. ORGANIZATION AND OPERATION

1. Assume an electronic marketing organization is established. Who or what groups should own and control the organization?

   29-producers and packers; 26-producers; 15-third party; 4 producer, packer and third party; 3 other combinations.

   How should the organization be financed?

   38-producers and packers; 32-producers; 1-packers; 1-indifferent.

2. The current system is based on direct movement, order buyer activity, and local auction markets. Shold local auction markets be involved in a new system where cattle are sold by description?

   63 Yes 16 No

   If yes, what role should they play? assembly; weighing; arranging turcking; accepting and dispursing payments; agent.

3. Producers are sellers and packers are buyers. There is a natural conflict of interest. If cattle are sold by description on a liveweight basis, should there be some objective third party outside the market organization to grade or describe the cattle or do you feel the marketing organization should handle this task?

   67-third party; 14-marketing organization

   Why? Third party - more objective, more likely to be able to grade cattle correctly; market organization - why pay third party, don't like state graders.

4. Assume you are selling cattle through an electronic marketing system which has at least ten buyers tied into the system. Do you feel "no sale" provisions would be necessary to insure you always get a fair price? 45 Yes 38 No; If yes, which "no sale" provisions would be acceptable to you?

   61 1) You set a minimum price when you consign the cattle

   77 2) You give the marketing organization the authority to stop sales when it feels the bids are not reflecting a fair market price.

   0 3) other _____

5. In the event of a disagreement between a particular buyer and seller when cattle are sold by description, who should settle the dispute?

   31 the manager of the marketing organization

   20 Board of Directors of the marketing organization

   19 independent third party

   0 other _____

6. In the event of a disagreement between a particularr buyer or seller and the marketing organization which is the middle man in sales by description, who should settle the disputes?

   9 a special producer committee

   33 Board of Directors of the marketing organization

   21 independent third party

   0 other _____

Appendix B

EASTERN PACKER QUESTIONNAIRE USED IN SYSTEM DESIGN WITH A SUMMARY OF THEIR RESPONSES

A.6 COVER PAGE

1. Name _____

2. Address _____

3. Phone number _____

4. How many head of slaughter cows do you buy through each marketing channel per year? How many fed cattle?

| | Slaughter Cows | Fed Cattle |
|---|---|---|
| Weekly auctions | 304,877 (68.9%) | 15,415 (17.8%) |
| Special graded sales | N/A | 2,453 ( 2.8%) |
| Tel-o-auction | 100 ( .1%) | 100 ( .1%) |
| Direct | 28,940 ( 6.5%) | 55,775 (64.3%) |
| Order buyer | 108,267 (24.5%) | 13,060 (15.0%) |
| From Virginia | 114,852 (26.0%) | 17,111 (19.7%) |

5. How many head of slaughter cows do you normally buy each week?

   598 hd./wk average, Range 50-2,613 hd./wk.

6. How many head of fed cattle do you normally buy each week?

   374 hd./wk. average, Range 40-2,000 hd./wk.

7. What percent of your slaughter cattle are bought FOB plant?

   Slaughter cows 29.6%, Range 0-80%; Fed cattle 30.9%, Range 0-90%

8. Do you have a Federal grader in your plant

   8 Daily? 6 plants average 1.9 days per week? 5 no grader

   Do you have a state or Federal inspector in your plant 18 Daily?

   2 plants average 3 days per week?

9. What type of slaughter cows do you buy?

   | | |
   |---|---|
   | 8 all types | 8 utility boner |
   | 1 commercial | 10 cutter |
   | 5 utility breaker | 6 canner |

10. What is the average weight of the slaughter cattle you buy?

    slaughter cows 1090 pounds, (Range 900-1,360 lbs.)

    fed steers 1070 pounds, (Range 900-1,250 lbs.)

    fed heifers 923 pounds, (Range 800-1,100 lbs.)

PART I. THE CURRENT SITUATION AND PRESENT ATTITUDES

1. Do you feel you get your slaughter cows bought at a reasonable cost into the plant?

   15 Yes 4 No

   If no, why not? _____

2. Do you feel you get your fed cattle bought at a reasonable cost into the plant?

   10 Yes 4 No

   If no, why not? _____

3. Are you satisfied with the convenience (time required, frequency of sales, etc.) offered by the procurement method you are presently using?

For slaughter cows: 14 Yes 6 No; Why?

_____

For fed cattle: 10 Yes 4 No; Why?

_____

4. Would you like to see changes in the procurement system you are now using?

   3 No 16 Yes: What type of changes? Cheaper procurement costs; Spend less time buying; use outweights; schedule kill.

5. Have you bought cattle on the rail or on a carcass weight and grade basis?

   18 Yes 2 No

   If yes, is your reaction positive or negative and why? 15-positive, 2 negative. Positive - get what you pay for; Negative - too much trouble.

   If no, would you be willing to buy on the rail? 1 Yes 0 No 1 Uncertain

6. If you are now buying or are willing to buy on the rail would you allow producers or their representative to observe your plant operations whenever they choose? 20 Yes 0 No

   Why? Would encourage it.

7. Assume it takes 10 hours from the time the cattle are weighted until they reach the packing plant. On a liveweight basis, what percent shrink or weight loss would you expect?

   4.5% (Range 3-11%) for slaughter cows

   3.6% (Range 1-8.5%) for fed cattle

If these same cattle were sold by carcass weight, would you expect tissue (carcass) shrink to be a problem? 2 Yes 7 No

If yes, what percent shrink would you expect?

2.5% for slaughter cows 1.3% for fed cattle

8. If producers comingled their cattle so you could buy truck loads of fairly uniform cattle at one location, would you pay more for these cattle than for the same cattle at 3-4 separate locations?

20 Yes 0 No

If no, why not? _____ If yes, how much more? 7 responding averaged $.35 per cwt., 13 no answers Most no answers said they would pay at least the savings in transportation expense.

9. Assume an electronic marketing system exists which provides information on the number of slaughter cattle being offered for sale (by location and grade) and sells the cattle by description. Would you be willing to pay a fee to tie into this system (assume all questions about description are worked out to your satisfaction)? 12 Yes 6 No

If no, why not? Producers responsibility

If yes, compared to your present procurement cost would you be willing to pay 3 more, 8 the same, or 1 less per head? Would your answer change if you could decide what day the cattle could be picked up?

7 No 10 Yes - I would be willing to pay $.24 per cwt. more to schedule the pick-up date on the cattle.

10. Do you have any objections to an auction system that uses regressive bidding rather than progressive bidding? 9 No 9 Yes; Why?

    Yes - unfamiliar with system, prefer old system; No - regressive system is best, big guy can't push little guy around.

11. Do you think slaughter cattle can be bought from your viewpoint, when you cannot see the cattle and trade is on a description basis?

    15 Yes 5 No; Why? No - want to see the cattle; Yes - must have accurate description, will know with experience.

12. Which procedure would you prefer?

    18 1) the cattle are held on the farm and then are delivered to a pick-up point on the day you specify (within a week of purchase)

    2 2) the cattle go to an assembly point where they should be picked-up in 24 hours

    Would you say your choice above is 10 much better, 6 a little better, or 1 about the same as the second choice?

13. Do you think the trend we are seeing toward tele-auctions or other electronic methods of selling cattle is a desirable trend?

    12 Yes 2 No; Why? Yes - more efficient, less cost, opens new procurement channels; No - no small lots

14. In an electronic marketing system, how important is it to you to have a description of all the lots of cattle available before the sale is begun?

12 essential 6 important 1 slightly important 1 not important

Why? Can plan buying

15. If you have seen description of all the cattle by number, grade, and location, which of the following procedures would you prefer?

15 each setof cattle is auctioned separately

5 conduct the auction and let the high bidder pick one or more lots and then repeat procedure on the remaining lots.

## A.7 PART II. PRODUCT DESCRIPTION

1. For slaughter cattle of the same class, how much difference can there be in value between animals?

| | | |
|---|---|---|
| slaughter cows | $9.33 per cwt., | (Range $0-15.00) |
| fed steers | $4.50 per cwt., | (Range $0-10.00) |
| fed heifers | $4.83 per cwt., | (Range $0-10.00) |

2. You buy cows or fed cattle by the load. Put a price on the best and worst individual animal in the average or typical load if you have:

A. A load of fed steers at $60.00 per cwt. (all grade choice)
The best steer is worth $63.17 per cwt.
The worst steer is worth $54.94 per cwt.

B. A load of canner and cutter slaughter cows at $50.00 per cwt.
The best cow is worth $54.96 per cwt.
The worst cow is worth $44.77 per cwt.

3. Besides liveweight, what is the single most important determinant of value in slaughter cattle?

   10 dressing percent, 7 quality grade, 2 finish, 1 fill slaughter cows

   9 yield grade, 7 quality grade, 2 dressing percent fed cattle

4. Rank in order of importance (1 = most important) all the followng you feel should be used in describing a slaughter animal if trade is on the basis of description of the live animals and you cannot see the cattle.

| | Slaughter Cows | | Fed Cattle | |
|---|---|---|---|---|
| | Times Chosen | Average Rank | Times Chosen | Average Rank |
| Sex | N/A | N/A | 13 | 1.31 |
| Breed | 16 | 2.00 | 14 | 2.43 |
| Age in years | 3 | 5.33 | 5 | 1.00 |
| Liveweight (estimated) | 12 | 1.75 | 10 | 1.50 |
| Liveweight (weighed) | 13 | 1.62 | 10 | 1.20 |
| Qualtiy grade | 17 | 2.12 | 14 | 1.71 |
| Yield grade | 6 | 2.17 | 14 | 1.64 |
| Dressing percent (yield) | 19 | 1.47 | 6 | 2.17 |
| Amount of flesh or finish | 8 | 1.75 | 2 | 2.50 |
| Fill | 6 | 3.50 | 2 | 1.00 |
| State of health | 11 | 2.73 | 3 | 3.00 |
| Other location | 1 | 1.00 | 1 | 1.00 |
| grub treatment | 1 | 1.00 | 1 | 1.00 |
| mud | 0 | N/A | 1 | 5.00 |

5. Would you be willing to buy cattle on a live basis using the terminology or descriptive terms you identified in #4?

   18 Yes 2 No

   If yes, what questions concerning the cattle would still be unanswered? Feeding conditions, grub treatment, weighing conditions; most said no questions would be left.

What would you do to offset these unanswered questions?

Discount price.

If no, what other conditions would you require?

Would want to see the cattle.

6. If the cattle are being bought on the rail or on a carcass grade and weight basis, what variables do you feel need to be identified to sort the cattle into loads so you will know what you are getting?

| | Time Chosen | |
|---|---|---|
| | Slaughter Cows | Fed Cattle |
| Sex | N/A | 15 |
| Breed | 17 | 13 |
| Age in years | 2 | 5 |
| Liveweight (estimated) | 18 | 13 |
| Liveweight (weighed) | 9 | 6 |
| Quality grade | 18 | 15 |
| Yield grade | 5 | 16 |
| Dressing percent (yield) | 9 | 1 |
| Fill | 3 | 2 |
| State of health | 8 | 2 |
| Other amt. of finish | 5 | 1 |
| how fed | 0 | 1 |

7. If the cattle are sold on the rail, what carcass characteristics should be used to describe carcasses of different value which ought to go at different prices?

| | Slaughter Cows | Fed Cattle |
|---|---|---|
| Carcass weight | 19 | 14 |
| what weight increments? | 77 lbs. | 120 lbs. |
| Quality grade (USDA grade) | 18 | 14 |
| Yield grade (USDA grade) | 8 | 14 |
| Sex of animal (if fed cattle) | N/A | 14 |
| Other color of fat | 1 | 1 |

*In cows: 2 wanted break at 350, 3 at 400, 2 at 450, and 1 <300 and >500. For fed cattle: 1 wanted break at 650, 1 at 550, 1 at 500 and 900.

## A.8 PART III. PERFORMANCE GUARANTEES

1. Assume you are buying cattle through a new system which describes the cattle and sells them before they leave the farm. The producer later hauls the cattle to a collection point to be picked up by you. When do you think title to the cattle (and liability for death loss, etc.) should change?

   16-when loaded on buyers truck; 2-when weighed; 2-when the cattle reach the packing plant.

2. Another approach would be to have the producer move his cattle to a local holding facility where they are then described and sold on a description basis. When should the title of ownership (and liability) change?

   11-when loaded on the buyers truck; 4-when sold; 2-when the cattle reach the packing plant; 1-when weighed.

3. Would you prefer the producer guarantee live delivery to the packing plant if it required either a fee or a higher price for the cattle?

   8 Yes 11 No

   If yes, what would be a reasonable amount? $.23 per cwt., (Range $.035-.50)

   If no, why not? Not feasible; would expect it anyway, not fair to producers.

4. If there was a marketing organization providing the connection between you and the seller and handling the sale by telephone or

other electronic medium, do you think it would make sense for the marketing organization to guarantee live delivery to the packing plant? 7 Yes 9 No

Why? Not feasible; producer should do it.

If yes, how should the cost of this guarantee be met?

1-by producers; 1-by packers; 1-by producers and packers.

5. If you were asked to accept the liability fo death loss after the cattle left the farm, would this influence your price bids?

15 Yes 3 No; If yes, how much $.50 per cwt.

6. In a marketing system where trading occurs by telephone or other electronic medium, what arrangements would you like to see to insure the performance of both buyer and seller? Buyer

18 oral agreement

2 written contract

0 written contract with performance bond

0 other _____

Why? _____

Seller

12 oral agreement

2 written contract

0 written contract with performance bond

0 other _____

Why? _____

PART IV. ORGANIZATION AND OPERATION

1. Assume an electronic marketing organization is established. Who or what groups should own and control the organization?

   5-producers; 5-third party; 5 doesn't matter.

   How should the organization be financed?

   7-by producers; 4-by both producers and packers; 1-doesn't matter.

2. The current system is based on direct movement, order buyer activity, and local auction markets. Shold local auction markets be involved in a new system where cattle are sold by description?

   11 Yes 6 No

   If yes, what role should they play? assembly; weighing

3. Producers are sellers and packers are buyers. There is a natural conflict of interest. If cattle are sold by description on a liveweight basis, should there be some objective third party outside the market organization to grade or describe the cattle or do you feel the marketing organization should handle this task?

   10-third party; 6-marketing organization

   Why? Third party - more unbiased.

4. Assume you are buying cattle through an electronic marketing system which has at least nine other buyers tied into the system. Do you feel that sufficient competition would exist to insure that bid prices would always be a reasonable approximation of

true slaughter value? 19 Yes 1 No If the marketing system contained "no sale" provisions, which would be acceptable to you?

8 1) the producer sets a minimum price when he consigns the cattle to the marketing organization
9 2) the producer gives the marketing organization the authority to stop sales when it feels the bids are not reflecting a fair market price
0 3) other _____
3 4) no sale provisions would not be acceptable to me

5. In the event of a disagreement between a particular buyer and seller when cattle are sold by description, who should settle the dispute?

12 the manager of the marketing organization

4 Board of Directors of the marketing organization

2 independent third party

1 other doesn't matter

6. In the event of a disagreement between a particularr buyer or seller and the marketing organization which is the middle man in sales by description, who should settle the disputes?

1 a special producer committee

7 Board of Directors of the marketing organization

4 independent third party

0 other _____

## Appendix C

### ARTICLES OF INCORPORATION OF ELECTRONIC MARKETING ASSOCIATION, INC.

This is to certify that the undersigned desire to associate themselves to establish a corporation not organized for profit and in which no capital stock is required or issued, under and by virtue of Chapter 2 of Title 13.1 of the Code of Virginia, and the Acts of the General Assembly amendatory thereof and supplemental thereto, and to that end set forth the following:

A - The name of the corporation hereinafter referred to as the corporation, shall be ELECTRONIC MARKETING ASSOCIATION, INC.

B - The purpose for which the corporation is formed and the powers which, in addition to those conferred by law, it shall have are as follows:

1. To encourage and promote more effective marketing of agricultural products through the use of electronic marketing.
2. To provide electronic marketing services to agricultural producers, processors, auctions, packers, buyers, wholesalers, retailers and others involved in marketing agricultural products.
3. To organize and operate the agricultural marketing services in such a way that no part of the net income of the corporation shall inure to any member or other individual.

4. To have and possess and exercise any and all of the powers conferred by law on like corporations.

C - The directors constituting the initial Board of Directors shall hold office until the first annual meeting of the members. Thereafter the directors not more than twenty (20) and not less than three (3), shall be elected by the members as follows: One-third (1/3), or as nearly as may be, of the directors shall be elected for one year, and one-third (1/3), or as nearly as may be, of the directors shall be elected for two years, and one-third (1/3), or as nearly as may be, of the directors shall be elected for three years, and thereafter each director shall be elected for three years.

The members of the corporation shall elect the directors in accordance with, and subject to, such rules as set forth in the by-laws of the corporation, to the extent such rules are not inconsistent with this charter or law.

D - There shall be only one class of members of the corporation and any producer or marketer of an agricultural product interested in the advancement of electronic marketing of agricultural products may become a member of the corporation by agreeing to comply with the bylaws of the corporation and said members shall have full voting rights.

E - The address of the initial registered office of the corporation shall be , Daleville, Virginia, 24083, which is in the County of Botetourt and the initial registered agent at such address shall be , who is resident of Virginia and a director of the corporation.

F - The number of directors constituting the initial Board of Directors is ten (10) and the names and addresses of the persons who are to serve as the initial Directors are:

Deloplane, VA 22025

, VA 24523

, Culpeper, VA 22701

, Verona, VA 24482

, Pulaski, VA 24482

Draper, VA 24324

, Harrisonburg, VA

22801

, Pearisburg, VA

24134

, Richmond, A 23261

, Daleville, VA 24083

The duration of the association shall be perpetual. Given under my hand this _____ day of _____, 1980.

_____

_____

_____

_____

_____

Incorporators

Appendix D

BY-LAWS OF ELECTRONIC MARKETING ASSOCIATION, INC.

A Non-Stock Associatin Incorporated Under Chapter 2 of Title 13.1 of the Code of Virginia

ARTICLE I

PURPOSE

The members of this corporation have voluntarily associated themselves together into an organization to carry out the following purposes as set forth in the certificate of incorporation:

1. To encourage and promote more effective marketing of agricultural products through the use of electronic marketing.
2. To provide electronic marketing services to agricultural producers, processors, auctions, packers, buyers, wholesalers, retailers,and others involved in marketing agricultural products.
3. To organize and operate the agricultural marketing services in such a way that no part of the net income of the corporation shall inure to any member or other individual.
4. To have and possess and exercise any and all other powers conferred by law on like corporations.

ARTICLE II

MEMBERS

Section 1. Membership. Any corporation, firm, association, partnership or person who contracts for and patronizes the electronic marketing or other services of the corporation, pays such membership fees, makes such initial capital investment, or meets other conditions as may be prescribed by the board of directors, may become a member of the corporation.

Section 2. Duties of Members. Each member shall in good faith comply with these by-laws and any amendments thereto duly adopted and with rules and regulations adopted by the association and with terms and conditions of any and all agreements with the association. The conduct of the member in all matters shall not be detrimental to the rights and interests of the association.

Section 3. Resignation, Suspension or Termination. Any member may resign their membership upon giving notice in writing to the secretary. Upon failure of the member to patronize a sponsored activity of the association during a period of two preceding years prior to the date of any annual meeting, or to pay the prescribed dues, the member will automatically be dropped from membership. Membership shall terminate when the member withdraws, or the board of directors cancel the membership.

The board shall have the right at all times to dismiss any member who has been judged by a two-thirds vote of the board to be acting con-

trary to the purposes and interest of the association provided that any such member shall have the opportunity to appear in his own defense before the next regular or special meeting of the membership. In such case the dismissed member may be reinstated by a two-thirds vote of the members present.

Section 4. Liability. Except for debts lawfully contracted between him and the association, no member shall be liable for the debts of the association to an amount exceeding the sum remaining unpaid on his subscription to capital in the association, including any unpaid balance or any promissory notes given in payment thereof.

Section 5. Annual Meeting. The annual meeting of the association shall be held each year during the month of February, the exact time and place to be determined by the board of directors.

Section 6. Special Meetings. The board of directors shall have the right to call a special meeting of the membership at any time. Ten percent (10 percent) of the members may file a petition stating the specific business to be brought before the association and demand a special meeting of the membership. Such meeting shall thereupon be called by the President and Secretary.

Section 7. Notice. Notice of all membership meetings, together with a statement of the purposes thereof, shall be mailed to each member at least 10 days, but no more than 50 days, prior to the meeting. No

business shall be transacted at special meetings other than that referred to in the call. Notices and services thereof may be waived in writing or by the attendance in person, of all the members.

Section 8. Quorum. Two percent (2%) of the members, present in person or represented by proxy, shall constitute a quorum for the transaction of business of any meeting. A meeting may be adjourned from time to time by those present until the quorum is obtained.

Section 9. Payment of Dues and Voting Rights. Only qualified members, who have patronized the activities of the corporation at least once during the two years preceding any annual meeting and paid the prescribed dues, shall vote and each such member shall have one vote and only one vote at all meetings of the membership or each question presented. Firms, partnerships, corporations, or associations may be represented by a duly authorized individual, associate, officer, or member thereof, who shall register with the Secretary prior to any regular or special meeting and who shall vote for the firm, partnership, corporation, or association which he represents.

Section 10. Proxy Voting. Proxy voting shall be permitted under such conditions as may be prescribed by the board of directors.

## ARTICLE III

## DIRECTORS AND OFFICERS

Section 1. Number and Composition. The business of this corporation shall be managed and conducted by a Board of Directors composed of at least six (6) but not more than twenty (20) directors. The board shall be composed of persons who represent any corporation, firm, association, partnership, or persons who are members of the association.

Section 2. Director Representation. Insofar as possible, directors shall represent members in proportion to the dollar volume of business each member conducted with the corporation during the preceeding two (2) years. Directors shall be selected as (a) allocated directors or as (b) at large directors.

(a) Allocated Directors - Allocated directors shall represent large dollar volume users and shall be selected by the member as their director to the association. A member may qualify for one or more allocated directors based on the member's share of the total dollar volume. The number of directors allocated to a member shall be proportional to the member's share of the dollar volume of business conducted during the two previous years reduced to the nearest whole number. For example, if the total number of directors is assumed to be 10, then 10 to 19.9% of the volume would qualify for one director, 20 to 29.9% would qualify for two directors and members with volumes of less than 10% would be represented by more than one-half of the total number of directors of the association.

(b) At-large Directors - Members with insufficient voluem to qualify for an allocated director shall be represented by at-large directors. Members qualifying for at-large directors shall be entitled to one vote for each at-large director vacancy.

Section 3. Director Nomination and Reallocation. At least six (6) months prior to each annual meeting the Director Nomination and Reallocation Committee shall submit to the board a plan for the next fiscal year for the total number of directors, the number of allocatd and at-large directors, and the dollar volume represented by each. The board must approve this or a modified plan at least four (4) months prior to the annual meeting.

Members qualifying for allocated directors shall be notified of the allocation at least three (3) months prior to the annual meeting. Such members shall select their own director prior to the annual meeting. The Nominations and Reallocation Committee shall solicit nominations for the at-large directorships from members not qualifying for allocated directors. At least (2) nominees shall be nominated for each at-large vacancy.

Section 4. Advisors to the Board. The president, subject to confirmation of the board, shall appoint one or more advisors to the board to represent land grant universities and state departments of agriculture.

Section 5. Election of Directors. Each director shall be elected for a term of three (3) years and any director may succeed himself for a second term of three years and then may not be returned to the board until one (1) year has elapsed. The immediate past president shall remain on the board for one year if not serving an elected term. No director,

during the term of his office, shall be party to a contract with the corporation differing in any way from those accorded other members of the corporation.

Section 6. Transition. All directors elected prior to the 1982 Annual Meeting shall complete their elected terms. Directors succeeding these directors shall be elected as allocated or at-large directors based on dollar volume of business. At-large directors may be elected at the first annual meeting following the adoption of these by-laws.

Section 7. Officers. The Board of Directors may meet immediately but not later than 30 days following the annual meeting and shall elect a president and a vice-president from among themselves, and a treasurer and a secretary or a secretary-treasurer, who may or may not be a member of the corporation. Such offices shall hold office for one year, or until their successors are duly elected and qualified, unless earlier removed by death, resignation, or for cause. The board shall also have the power to elect or appoint a general manager and any other officers or assistant officers that shall be found necessary in the operation of the corporation, who may or may not be a member of the corporation.

Section 8. Meetings and Attendance. The Board of Directors shall meet at least quarterly at a place and time set by the President. Special meetings of the board of directors shall be held upon call of the President or upon written request of a majority of the directors.

Whenever a board member fails to attend three (3) consecutive meetings and in the judgement of the other board members there are no extenuating circumstances, then the board shall declare the directorship vacant.

Section 9. Notice of Meetings. Notice of both regular and special meetings shall be mailed by the secretary to each member of the board at his last known post office address not less than ten (10) days before any such meeting; however, such notice may be waived in writing, or by the attendance in person of all of the directors.

Section 10. Quorum. A majority of the board of directors shall constitute a quorum at any meeting of the board.

Section 11. Vacancies. When a vacancy on the board of directors occurs, other than by expiration of term, the remaining board members, by a majority vote, may fill the vacancy until the annual meeting, when the membership of the association shall elect a director for the balance of the term.

Section 12. Compensation. The compensation, if any, of the members of the board of directors and of the executive committee shall be determined by the board subject to approval of the members at any annual or special meeting of the association, provided; however, that no member of the board other than one who is acting as an officer of the association and receiving a regular salary theefore, shall receive compensation

or allowance for services rendered the association for more than thirty (30) days in any one year, exclusive of the periods for which compensation is paid for attendance at director's meetings or at meetings of the executive committee.

## ARTICLE IV

## DUTIES OF DIRECTORS

Section 1. Responsibilites. The board of directors shall have general responsibility for the control of the association and its affairs, and shall make all rules and regulations not inconsistent with law, or with these by-laws, for the management of the association and the guidance of the members, officers, employees and agents.

Section 2. Bonds and Insurance. The board of directors shall require all officers, agents and employees charged by the corporation with responsibility for the custody of its funds, on negotiable instruments, to give adequate bond. Such bonds, unless cash security is given, shall be furnished by a responsible bonding company and approved by the board of directors. The board shall provide for the adequate insurance of the property of the corporation, or property which may be in the possession of the corporation, or stored by it, or not otherwise adequately insured, and in addition for adequate insurance covering liability for accidents to all employees.

Sction 3. Audits. At least once in each year the board of directors shall secure the services of a competent and disinterested public auditor or accountant, or appoint a disinterested committee of three persons, who shall make a careful audit of the books and accounts of the association and render a report in writing thereon, which report shall be submittted to the members at their annual meeting. Th report shall include at least (1) a balance sheet, (2) an operating statement and (3) a statement showing the amount of capital, if any, furnished by the members during the period under review. Special audits shall be made upon order of the board of directors or upon a majority vote of the members at any regular or called meeting.

## ARTICLE V

## DUTIES OF OFFICERS

Section 1. Duties of President. The president shall (1) preside over all meetings of the association and of the board of directors, (2) call special meetings of the board of directors, (3) perform all acts and duties usually performed by an executive or presiding officer, and (4) sign all such papers of the corporation as authorized or directed by the board of directors; provided, however, that the board of directors may authorize any person to sign any or all checks, contracts and other instruments in writing on behalf of the association. The president shall perform such other duties as may be prescribed by the board of directors.

Section 2. Duties of the Vice-President. In the absence or disability of the president, the vice-president shall perform the duties of the president; provided, however, that in case of death, resignation, or disability of the president, the board of directors may declare the office vacant and elect a successor.

Section 3. Duties of Secretary. The secretary shall keep a complete record of all meetings of the membership and of the board of directors and shall have general charge and supervision of the books and records. The secretary shall serve all notices required by law and by these by-laws and shall make a full report of all matters and business pertaining to this office to the members at the annual meeting. The secretary shall act as secretary to the executive committee, and shall perform such other duties as may be required by the board of directors. Upon the election of a successor, the secretary shall turn over all books and other property belonging to the corporation.

Section 4. Duties of Treasurer. The treasurer shall perform such duties with respect to the finances of the association as may be prescribed by the board of directors. The treasurer shall make all reports pertaining to finance required by law.

Section 5. Duties of General Manager. Under the direction of the board of directors, the general manager shall have general charge of the ordinary and usual business operations of the association. The general manager shall, so far as practicable, endeavor to conduct the business

of the association in such a manner that the members will receive just and fair treatment. Upon the appointment of a successor, the general manager shall deliver all property belonging to the association to the successor.

Section 6. Delegation of Duties. Any of the above duties may be delegated by the board of directors to any assistant officers they may appoint or elect.

## ARTICLE VI

## COMMITTEES

Section 1. Executive Committee. The executive committee shall be composed of the president, the vice president and at least one (1) other member who shall be selected from the board by the board membership. The executive committee shall have the power to act for the board on all matters which the board prescribes to the executive committee.

Section 2. Director Nominations Committee. The president shall appoint a Director Nominations Committee of not less than three (3) members prior to each annual meeting. This committee shall make nominations for board vacancies to be submitted to the membership at the annual meeting.

Section 3. Other Committees. The president shall appoint other committees as may be needed and determine their tenure and duties.

## ARTICLE VII

## METHOD OF OPERATION

Section 1. General. This association shall be so operated that the current and active members will be treated on a fair and equitable basis in the performance of services for them and in the pro-ration of the operating costs of the association to them.

Section 2. Business Policies. The board of directors shall enter into such agreements and contracts as may be deemed desirable in correction with the business of the association. The board shall adopt operating policies which shall guide the business activities sponsored by the association.

## ARTICLE VIII

## MISCELLANEOUS PROVISIONS

Section 1. Fiscal Year. The fiscal year of this association shall begin on January 1 and shall end on December 31 of each year.

## ARTICLE IX

## AMENDMENTS

Section 1. By the Members. These by-laws may be amended, repealed, or altered, in whole or in part, by a majority vote of the members present in person at any regular or special meeting at which there is a quorum and the notice of which contained a statement covering the proposed amendment.

Section 2. By the Board of Directors. These by-laws also may be amended repealed, or altered, in whole or in part, by a two-thirds majority of the board of directors of the association at any regular meeting of the board or at a special meeting of the board called for the purpose of amending the by-laws. All amendments made by the board of directors shall become effective ten (10) days after the members are notified of the amendment in writing, unless the secretary of the association receives, by that date, a petition for a special meeting of the members to consider the amendment signed by ten (10) percent of the members.

## ARTICLE X

## DISSOLUTION

Upon dissolution of this association and after payment of all debts of the association, the remaining assets of the association, if any,

shall be transferred to a charitable or non-profit organization as may be designated by the board of directors charged with dissolution.

As Amended August 25, 1981.

## Appendix E

## A WORKING AGREEMENT BETWEEN ELECTRONIC MARKETING ASSOCIATION, INC. AND MEMBER ORGANIZATIONS

Electronic Marketing Association (hereafter EMA) and any member organization shall jointly agree to abide by the following statement of definition of parties, objectives, and operating procedures:

1. EMA is an association of agricultural commodity marketing organizations (where organizations includes individuals, cooperatives, corporations, partnerships or other legal forms of ownership). EMA is organized to furnish electronic marketing services through which member organizations may market their products. All other marketing and related functions such as quality control, product promotion, assembly and packaging, financial responsibility, approval of buyers and buyer and membership relations will be the responsibilty of the individual mamber organization.
2. Any applicant organization who desires to be a member and use the services of EMA will be considered by the Board of Directors of EMA and will be accepted as a member when it pays such membership dues, makes such capital investments, and/or meets such other conditions as may be prescribed by the Board of Directors of EMA. Each member organization which meets dollar volume requirements establshed by the Board will be entitled to place a person on the

Board. Additional board representation will be permitted when the dollar volume of commodities marketed through EMA meets requirments, established by the Board of Directors of EMA, for additional representation.

3. Prior to the acceptance into membership of any organization that markets the same products as an existing member, the Board of Directors of EMA will confer with representatives of the existing member organization. If it is determined there may be a conflict of interest, a meeting of representatives of the boards of directors of the existing member organization(s), the organization seeking membership, and the Board of Directors of EMA will be held. If after this meeting the Board of Directors of EMA determines that an agreement would strengthen the total marketing program for the particular commodity, EMA will proceed with a separate marketing agreement with the new applicant.

4. Buyers list furnished by a member organization to market its products will be kept in strict confidence and will not be divulged or used by EMA to market like products for other member organizations.

5. This agreement can not be changed without proposed changes being reviewed by all active members of EMA and subsequently voted on by the board of directors of EMA.

Appendix F

VIRGINIA SLAUGHTER CATTLE PRODUCER QUESTIONNAIRE USED IN SYSTEM EVALUATION WITH A SUMMARY OF THEIR RESPONSES

NAME _____

ADDRESS: _____

PHONE: _____

1. During an average year how many head of each type of livestock will you normally sell?

| | |
|---|---|
| Slaughter dairy cows | 15.3 (n=10) |
| Slaughter hogs | 485.0 (n=5) |
| Slaughter beef cows | 7.7 (n=30) |
| Feeder pigs | 228.8 (n=4) |
| Fed cattle | 171.1 (n=7) |
| Slaughter lambs | 176.7 (n=3) |
| Feeder cattle | 83.0 (n=36) |
| Feeder lambs | 0 |

2. About what percentage of your yearly slaughter cow sales are sold through each of the following channels?

| | |
|---|---|
| Regular weekly auction markets | 86.4 |
| Tel-O-Auctions | 2.6 |
| Direct to a packer | 8.2 |
| Other (please list) | |
| _____ | _____ |
| TOTAL | 100% |

3. About what percentage of youryearly fed cattle sales are sold through each of the following channels?

| | |
|---|---|
| Regular weekly auction markets | 42.1 |
| Special graded fed cattle sales | 19.0 |
| Tel-O-Auctions | 0.0 |
| Direct to a packer | 34.0 |
| Direct to an order buyer | 4.9 |
| Other (please list) | |
| TOTAL | 100% |

4. Other than cattle, have you sold any livestock electronically (either telephone auction or computerized auction)?

   Yes 8 No 34

   If yes, what types of livestock? 3 lambs, 2 pigs, 1 slaughter hogs

   If yes, were you (circle your response)

   5-highly satisfied, 1-satisfied, 0-neutral, 1-dissatisfied, 0-highly dissatisfied

5. Please check every source from which you have heard or read about electronic marketing, (teletype or computerized markets).

| | |
|---|---|
| a) Talks/presentations | 11 |
| b) Virginia publication/magazines | 21 |
| c) National publication/magazines | 9 |
| d) TV/Radio | |
| e) Conversations with others | |

Please check with whom:

| | |
|---|---|
| Eastern Electronic Marketing Personnel | 2 |
| Virginia Tech personnel | 42 |
| Virginia Dept. of Agriculture personnel | 4 |
| Auction market operators | 5 |
| Order Buyers | 1 |
| Other producers | 12 |
| Others (please list) | |
| Went to sale | 1 |
| Farm Bureau | 2 |
| Packers | 1 |

f) I have never heard or read about electronic marketing

6. I am very familiar with electronic marketing and how it operates.

   0-Strongly agree, 8-Agree, 20-Neutral, 12-Disagree, 1-Strongly disagree

7. Have most of the things you have heard or read about electronic marketing been

   0-Highly favorable, 23-Favorable, 15-Neutral, 4-Unfavorable, 0-Highly Unfavorable

8. I previously had a positive attitude towards electronic marketing in general.

   1-Strongly agree, 22-Agree, 18-Neutral, 1-Disagree, 0-Strongly disagree

9. I presently have a positive attitude towards electronic marketing in general.

   1-Strongly agree, 22-Agree, 17-Neutral, 1-Disagree, 0-Strongly Disagree

   During the past two years, my attitude toward electronic marketing has

   2-Improved significantly, 1-Improved slightly, 36-Stayed same, 2 Become Slightly Negative, 0-Turned sour

10. I believe when any operational problems are overcome, resistance to change will disappear and within 1 to 2 years slaughter cows will be bought and sold electronically.

    2-Strongly agree, 20-Agree, 15-Neutral, 5-Disagree, 0-Strongly disagree

11. I can see advantages for the producer when electronic marketing gets firmly established.

    6-Strongly agree, 26-Agree, 7-Neutral, 1-Disagree, 0-Strongly disagree

    The advantages I see are:

    Higher price 23 Access to more buyers 25 Reduced marketing costs 8 Eliminating middlemen 13 More flexibility in marketing 7

    Others (Please list) _____

    Which of the above advantages do you feel is most important (list 1 or more with the most important first)?

6-Eliminating middlemen, 13-Access to more buyers, 8-Higher price, 2-Reduce marketing cost

12. Do you see any disadvantages to electronic marketing?

    7-Yes, 28-No

    If yes, please list any disadvantages starting with the one you think is most important.

    1-Lower price, 2-Difficult to assemble large lots, 1-Problems for small farmers, 1-Animals would have to be pooled, 2-Must have accurate grading, 1-Market might take advantage of you.

13. I would prefer a computerized system rather than a conference telephone auction.

    0-Strongly agree, 8-Agree, 26-Neutral, 7-Disagree, 0-Strongly disagree

14. Both buyer and seller support is essential for a beginning electronic system.

    10-Strongly agree, 28-Agree, 4-Neutral, 0-Disagree, 0-Strongly disagree

15. I can see potential for electronic marketing in farm products other than cattle.

    6-Strongly agree, 19-Agree, 16-Neutral, 0-Disagree, 0-Strongly disagree

    Which farm products?

    1-All livestock, 3-Truck crops, 1-Feeder pigs, 1-Feeder cattle, 7-Slaughter hogs, 4-Lambs, 7-Grain, 1-Tobacco, 3-All products.

16. I would like to see the computerized system utilized for marketing slaughter cows.

    5-Strongly agree, 20-Agree, 12-Neutral, 2-Disagree, 1-Strongly disagree

    If you agree with the above statement, would you be willing to support the system by selling some of your slaughter cows over the computerized system?

    7-Definitely Yes, 20-Probably Yes, 10-Don't Know, 1-Probably Not, 0-Definitely Not

17. I would like to see the computerized system utilized for marketing fed cattle.

    5-Strongly agree, 12-Agree, 6-Neutral, 1-Disagree, 0-Strongly disagree

    If you agree with the above statement, would you be willing to support the system by selling some of your fed cattle over the computerized system? 3-Definitely Yes, 9-Probably Yes, 4-Don't Know, 0-Probably Not, 0-Definitely Not

18. I think the future for electronic marketing looks

    2-Excellent, 15-Promising, 16-Good, 8-Fair, 1-Poor

19. Please use the space below for any comments you would like to make.

    1-Satisfied with present system

    5-Don't know much about it

    1-Would like to know more about electronic marketing

    1-Not that interested in electronic marketing

5-Electronic marketing is the coming thing

1-Must be truck load lots before buyers can afford to buy

1-Hard to get market operators to cooperate

Appendix C

Eastern Packer Questionnaire Used in System Evaluation

With a Summary of Their Responses

Firm Name: _____

Address: _____

Name and title of person completing survey

_____

1. During an average week approximately how many of each of the following types of livestock will your firm buy?

| | | | |
|---|---|---|---|
| Slaughter cows | 528.6 | (n=11) | head per week |
| Fed cattle | 887.5 | (n=6) | head per week |
| Slaughter hogs | 1100.0 | (n=5) | head per week |
| Slaughter lambs | 375.0 | (n=2) | head per week |
| Slaughter ewes | 60.0 | (n=1) | head per week |

2. About what percentage of your cows are bought through each of the following channels?

| | |
|---|---|
| Telephone auctions (by you or your buyer) | 0.0% |
| Regular auction markets (by you or your buyer) | 71.5% |
| Direct from producers (by you or your buyer) | 18.1% |
| Through order buyers | 10.4% |
| Other (Please explain) _____ | |
| TOTAL | 100 % |

3. About what percentage of your fed cattle are bought through each of the following channels?

| | |
|---|---|
| Telephone auctions (by you or your buyer) | 2.9% |
| Regular auction markets (by you or your buyer) | 25.0% |
| Direct from producers (by you or your buyer) | 57.1% |
| Through order buyers | 15.0% |
| Other (Please explain) | |
| _____ | |
| TOTAL | 100 % |

4. Please check reasons why you didn't participate in the cow auctions held over the computerized system in late spring of 1980.

3 a. I didn't need cows at that time

0 b. I couldn't use the type of cows offered

4 c. I didn't trust the grades

0 d. Lots were too big

4 e. Lots were too small

1 f. I wanted to buy on a live weight basis

3 g. I wanted to buy on a carcass basis.

1 h. The 3:00 pm time of the sale was inconvenient.

0-Too early? 1-Too late?

0 i. I didn't want to try to use the terminal

0 j. I had trouble using the terminal

0 k. I was asked not to by others within my firm

0 l. I was asked not to by others outside my firm

3 m. Price was too high

n. Other reasons (Please explain)

1 Time consuming for number had

1 Satisfied with present system

1 Worried about trucking

5. Of the reasons above (a through n), which were the most important? (List 1 or more with most important first.)

4-Didn't trust the grades, 2-Price was too high, 1-Didn't need cows at that time, 1-Satisfied with presnt system, 2-Wanted to buy on a carcass basis, 1-Lots were too small.

6. Please check reasons why you didn't participate in the computerized fed cattle auctions held.

4 a. I don't kill fed cattle

2 b. I didn't need fed cattle at that time

1 c. I couldn't use the type of fed cattle offered

1 d. I didn't trust the grades

0 e. Lots were too big

0 f. Lots were too small

0 g. I wanted to buy on a live weight basis

2 h. I wanted to buy on a carcass basis

0 i. The 3:00 pm time of the sale was inconvenient

0 j. I didn't want to try to use the terminal

0 k. I had trouble using the terminal

0 l. I was asked not to by others within my firm

0 m. I was asked not to by others outside my firm

2 n. The price was too high

o. Other reasons (Please explain)

1 Worried about trucking

7. Of the reasons above (a through o), which were the most important? (List 1 or more with the most important first.)

2-Price was too high, 1-High trucking cost, 1-Wanted to buy on a carcass basis, 4-Don't kill fed cattle

8. Before the computer sales, I had a positive attitude towards electronic marketing in general.

0-Strongly agree, 5-Agree, 6-Neutral, 0-Disagree, 0-Strongly disagree

9. My present attitude twoards electronic marketing is positive.

2-Strongly agree, 4-Agree, 3-Neutral, 2-Disagree, 0-Strongly disagree

10. I believe when any operational problems are overcome, resistance to change will disappear and within one to two years slaughter cows will be bought and sold electronically.

1-Strongly agree, 4-Agree, 3-Neutral, 2-Disagree, 1-Strongly disagree

11. I believe when any operational problems are overcome, resistance to change will disappear and within one to two years fed cattle will be bought and sold electronically.

2-Strongly agree, 3-Agree, 4-Neutral, 1-Disagree, 0-Strongly disagree

12. I can see advantages for the packer when electronic marketing gets firmly established.

    1-Strongly agree, 4-Agree, 3-Neutral, 1-Disagree, 0-Strongly disagree

    The advantages I see are:

    6 Reduced procurement cost

    5 Access to more cattle

    2 Better conditions of cattle (fresher cattle)

    0 Other (Please explain) _____

13. I would prefer a computerized system rather than a conference telephone auction.

    2-Strongly agree, 1-Agree, 4-Neutral, 3-Disagree, 1-Strongly disagree

14. Both buyer and seller support is critical for an electronic system to succeed.

    4-Strongly agree, 7-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

15. I can see potential for electronic marketing for livestock other than cattle.

    2-Strongly agree, 3-Agree, 4-Neutral, 2-Disagree, 0-Strongly disagree

    What types of livestock?

    2-Feeder cattle, 3-Lambs, 3-hogs

16. Representatives of the Eastern Electronic Marketing Assoc. (EEMA) did a good job in explaining the concept of electronic marketing to me.

    5-Strongly agree, 5-Agree, 0-Neutral, 1-Disagree, 0-Strongly disagree

17. EEMA representatives did a good job in explaining how to use the terminal.

    4-Strongly agree, 7-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

18. EEMA representatives have been courteous and helpful when I have called with questions.

    6-Strongly agree, 5-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

19. Please check any additional information you would like to see a computerized marketing system offer.

    Market News Reports

    cash livestock prices 5

    grain futures prices 1

    cash grain prices 3

    closing only 0

    meat prices (such as yellow sheet 5

    quotes within the day 1

    lvstk. futures prices 4

    National weather info 3

    Closing only 2

News summaries 2

Quotes within the day 2

Other (please explain)

_____

Which of the above services do you think is most important?

(List 1 or more with most important first, please.)

3-Cash livestock prices, 1-Meat prices

20. Would you like to see a computerized accounting system developed which packers could use?

    2-Yes, 8-No

    Would you be interested in using such a system?

    0-Definitely Yes, 2-Probably Yes, 1-Don't Know, 0-Probably Not, 0-Definitely Not

    How important would this service be to you?

    0-Very important, 2-Some importance, 1-Neutral, 0-Prefer not to see done, 0-Very negative on any such attempts

21. I would like to see the computerized system utilized for marketing slaughter cows.

    2-Strongly agree, 2-Agree, 4-Neutral, 1-Disagree, 1-Strongly disagree

22. If the computerized system were avialable for slaughter cows, I would support the system by bidding if prices were at competitive levels.

1-Strongly agree, 5-Agree, 2-Neutral, 1-Disagree, 1-Strongly disagree

23. I would like to see the computerized system utilized for marketing fed cattle.

    1-Strongly agree, 2-Agree, 2-Neutral, 1-Disagree, 1-Strongly disagree

24. If the computerized system were avialable for marketing fed cattle, I would support the system by bidding if prices were at competitive levels.

    0-Strongly agree, 4-Agree, 1-Neutral, 1-Disagree, 1-Strongly disagree

25. I think the future for electronic marketing looks

    1-Excellent, 2-Promising, 2-Good, 5-Fair, 0-Poor

26. Please use the space below for any comments you would like to make.

    1. Well pleased with system - prices were just too high. Hope it works in the future.

    2. Would like to have seen the government money spent on changing yard scales to outweights instead of on electronic marketing.

    3. Think this whole idea was just a waste of taxpayers money for slaughter cows. May work for fed cattle and other species of livestock.

    4. Good system. Hope it works in the future.

5. Would like to see the system work in the future.

6. Would probably try again.

## Appendix H

### Slaughter Lambs Producer Questionnaire Used in System Evaluation With a Summary of Their Responses

Name: ----------

Address: ----------

Phone: ----------

1. During an average year how many head of each type of livestock will you normally sell?

| | |
|---|---|
| slaughter lambs | 764.5 (Range 5-5,000) |
| feeder lambs | .3 (Range 0-6) |
| slaughter cattle | 27.5 (Range 0-300) |
| feeder cattle | 97.4 (Range 0-900) |
| slaughter cows | 5.2 (Range 0-20) |
| slaughter hogs | 3.7 (Range 0-75) |
| feeder pigs | 0 |
| slaughter horses | 0 |

2. About what percentage of your slaughter lamb sales are sold through each of the following channels?

| | |
|---|---|
| Eastern Lamb Producers Coop | 89.0 (Range 33-100%) |
| Regular auction markets | 3.8 (Range 0-40%) |
| Direct to an order buyer | 0 |
| Direct to a packing plant | 4.4 (Range 0-67%) |
| Other (Please explain) | |
| Direct to consumers | 1.5 (Range 0-10%) |

Direct to 4-H kids 1.3 (Range 0-25%)

TOTAL 100 %

For the following statements, please circle your response.

3. The grading standards being used by Eastern Lamb Producers Coop (ELPC) do a good job of reflecting value differences in the lambs.

   3-Strongly agree, 14-Agree, 0-Neutral, 3-Disagree, 0-Strongly disagree

4. The state graders do an acceptable job in grading the lambs

   6-Strongly agree, 12-Agree, 1-Neutral, 0-Disagree, 1-Strongly disagree

5. When I have not felt the lambs I delivered were graded accurately, ELPC has settled the issue to my satisfaction.

   0-Strongly agree, 4-Agree, 5-Neutral, 1-Disagree, 0-Strongly disagree 10-Not applicable

6. The discounts used by ELPC (heavy lambs, bucks, Red O's, etc.) accurately reflect differences in value.

   3-Strongly agree, 12-Agree, 3-Neutral, 2-Disagree, 0-Strongly disagree

7. ELPC's practice of offering large sized lots for sale has a positive influence on the price I receive.

   10-Strongly agree, 10-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

8. ELPC's practice of allowing the buyer to choose the pickup date has a positive influence on the price I receive.

   8-Strongly agree, 9-Agree, 1-Neutral, 2-Disagree, 0-Strongly disagree

   If you agreed with the above statment, is the higher price worth the inconvenience of letting the buyer choose the pickup date.

   15-usually, 2-sometimes, 1-seldom

9. Many lamb teleauctions across the country deduct a pencil shrink from the weight of the lambs. Do you feel this practice has a positive influence on price.

   1-Definitely Yes, 3-Probably Yes, 4-Don't Know, 9-Probably Not, 3-Definitely Not

   Do you feel a pencil shrink would help ELPC attract new buyers and/or retain the present buyers on the system?

   0-Definitely Yes, 2-Probably Yes, 6-Don't Know, 8-Probably Not, 4-Definitely Not

   Would you like to see ELPC adopt a pencil shrink?

   0-Definitely Yes, 1-Probably Yes, 7-Don't Know, 8-Probably Not, 4-Definitely Not

   If you agree with the previous statement, what pencil shrink do you feel would be appropriate?

   0-6%, 0-5%, 0-4%, 0-3%, 1-2%, 0-1%, 2-Unsure

10. I have not had serious objections when ELPC has decided to no sale a group of lambs and hold them over for next week's sale.

4-Strongly agree, 10-Agree, 3-Neutral, 2-Disagree, 1-Strongly disagree

11. I believe the price I receive for lambs sold through ELPC is higher than if I sold these same lambs through other types of markets.

    13-Strongly agree, 7-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

12. I believe the ELPC's commission charge is

    0-much too low, 0-too low, 20-right, 0-too high, 0-much too high

13. I have been satisfied with the service provided by the ELPC.

    11-Strongly agree, 8-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

14. I would recommend that others sell their lambs through ELPC.

    14-Strongly agree, 6-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

15. If you believe that ELPC has received a higher price for the lambs they have sold, put a check beside the reasons you think are on the cause.

    19 selling by description reduces buyer's costs

    18 electronic marketing (teleauction & computerized sales)

    20 reputation for high quality lambs

    20 offering large size lots

    17 letting the buyer choose the pick-up date

    19 accurate grading

17 superior management of ELPC

other (Please describe) _____

Which reason do you feel is the most important (one or more with the most important first).

2-Buyer choosing pickup date, 9-Good reputation, 3-Electronic marketing, 2-Large lots, 2-Accurate grading.

16. Are you aware that FIPC is now selling it's lambs through a computerized sale rather than through a telephone auction?

20-Yes, 0-No

17. Are you aware that the ELPC has used Eastern Electronic Marketing Association (EEMA) to provide the computer services?

13-Yes, 7-No

If yes, has your reaction to EEMA been

10-Positive, 0-Negative, 3-Uncertain

18. I believe that other types of "slaughter" livestock could be sold electronically (computer or conference telephone).

11-Strongly agree, 7-Agree, 2-Neutral, 0-Disagree, 0-Strongly disagree

19.

What types? 12-Cattle, 9-Hogs, 4-All types.

20. I believe that "feeder" livestock could be sold electronically (computer or conference telephone).

9-Strongly agree, 8-Agree, 2-Neutral, 0-Disagree, 1-Strongly disagree

21. I believe that the future of electronic marketing is promising.

    14-Strongly agree, 6-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

22. Please use the space below for any comments you would like to make.

    1. Electronic marketing has done more for lamb marketing in this area than anything in the last 20 years.

    2. Need to get more producers to sell electronically.

    3. Better lambs have been bringing more on a grade and yield basis.

    4. Electronic marketing is the thing of the future.

    5. Still have doubts about computer sales-prefer teleauctions.

    6. Have not made up mind regarding computer sales yet.

    7. Very impressed with everything.

    8. Computerized marketing takes pressure off FIPC's manager. Electronic marketing raises all prices.

## Appendix I

### Slaughter Lamb Buyer Questionnaire Used in System Evaluation With a Summary of Their Responses

Firm Name: _____

Address: _____

Name and title of person completing survey

_____

1. During an average week approximately how many of each of the following types of livestock will your firm buy?

| | | | |
|---|---|---|---|
| Slaughter lambs | 1,706 | (Range 300-6,000) | head per week |
| Slaughter cows | 64 | (Range 0-500) | head per week |
| Slaughter hogs | 2,156 | (Range 0-17,000) | head per week |
| Slaughter ewes | 133 | (Range 0-500) | head per week |
| Fed cattle | 204 | (Range 0-900) | head per week |
| Slaughter horses | 0 | | head per week |

2. About what percentage of your lamb purchases are bought through each of the following channels?

| | | |
|---|---|---|
| computerized sales | 18 | (Range 0-75%) |
| telephone auction | 9 | (Range 0-40%) |
| regular auction markets | 58 | (Range 25-90%) |
| direct from producers | 7 | (Range 0-20%) |
| through order buyers | 8 | (Range 0-30%) |

Other (Please explain)

_____

TOTAL 100 %

For the following statements, please circle your response.

3. The grading standards being used by Eastern Lamb Producers Coop (ELPC) do a good job of reflecting value differences in the lambs.

   0-Strongly agree, 6-Agree, 2-Neutral, 0-Disagree, 0-Strongly disagree

   List anything which you feel would improve the grading standards: 1-Need some indication of breakdown between prime & choice, 1-Need more experienced graders, 1-Graders aren't consistent, 1-Grading service doesn't appear to care if they do a good job, 1-Weights need to be accurately called.

4. The state graders do an acceptable job in grading the lambs

   1-Strongly agree, 2-Agree, 1-Neutral, 3-Disagree, 1-Strongly disagree

5. When I have not felt the lambs I delivered were graded accurately, ELPC has settled the issue to my satisfaction.

   0-Strongly agree, 5-Agree, 2-Neutral, 0-Disagree, 0-Strongly disagree 1-Not applicable

6. The discounts used by ELPC (heavy lambs, bucks, Red O's, etc.) accurately reflect differences in value.

   0-Strongly agree, 1-Agree, 1-Neutral, 6-Disagree, 0-Strongly disagree

Suggestions: 1-Should be a premium for light lambs, 2-Heavy lambs aren't discounted enough, 3-Bucks discount isn't high enough, 1-Need a heavier lamb, 1-Red O's need to be discounted more after July 1.

7. How many lambs would you prefer ELPC offer in each lot they put together for the auction?

   1--0-100, 3--101-200, 2--201-300, 3--301-400, 3--Over 400

8. I would prefer larger lots with some at different locations rather than small lots offered at a single location.

   2-Strongly agree, 1-Agree, 2-Neutral, 3-Disagree, 0-Strongly disagree

9. Allowing me to choose the pickup date is an important advantage of buying through ELPC.

   4-Strongly agree, 4-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

10. Trucking has not been a problem for lambs purchased through ELPC.

    2-Strongly agree, 4-Agree, 2-Neutral, 0-Disagree, 0-Strongly disagree

11. I have been satisfied with the service provided by ELPC.

    3-Strongly agree, 5-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

12. I prefer to buy lambs over the computer rather than through a telephone conference call.

1-Strongly agree, 3-Agree, 4-Neutral, 0-Disagree, 0-Strongly disagree

13. I would prefer to buy more lambs electronically (computer or teleauction), rather than through other means.

    0-Strongly agree, 4-Agree, 4-Neutral, 0-Disagree, 0-Strongly disagree

14. The prices I pay for lambs purchased electronically are generally (4-higher, 0-Lower, 4-No different) than the price of comparable lambs purchased through other channels. Please estimate the amount of this difference.

    $.56 (Range 0-1.50)$/cwt.

15. The total delivered cost (price, transportation, commissions, etc.) of lambs purchased electronically are (1-Higher, 0-Lower, 7-No different) than the total delivered cost of comparable lambs purchased through other means. Please estimate the amount of this difference.

    $.38 (Range 0-3) $/cwt.

16. I have found the computer terminals relatively easy to use.

    0-Strongly agree, 8-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

17. How many times do you normally dial the computer before you are able to get through?

    7-1, 1-2 0-3, 0-4, 0-More than 4

18. Is the 20 second time interval that is presently being used during the ales, 1-Too slow, 0-Too fast, 7-about Right?

    Suggestions: 1-12 Seconds

19. I believe that the future of electronic marketing is promising.

    2-Strongly agree, 5-Agree, 1-Neutral, 0-Disagree, 0-Strongly disagree

20. I would recommend the computerized method of purchasing lambs if asked by another buyer.

    2-Strongly agree, 5-Agree, 1-Neutral, 0-Disagree, 0-Strongly disagree

21. I believe other types of slaughter lievstock could be sold electronically.

    1-Strongly agree, 6-Agree, 1-Neutral, 0-Disagree, 0-Strongly disagree

22. Eastern Electronic Marketing Assn., Inc. (EEMA) has been courteous and helpful when I have needed their assistance.

    3-Strongly agree, 5-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

23. EEMA has kept me informed when changes have occured in the slaughter lamb computer program.

    2-Strongly agree, 6-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

24. I feel EEMA is doing a good job in handling the technical (computer) component of the sales.

2-Strongly agree, 6-Agree, 0-Neutral, 0-Disagree, 0-Strongly disagree

25. Please check all additional services you would eventually like to see EFMA provide through the computer.

Market News

cash lamb prices 6

other cash livestock prices 3

lamb carcas prices 6

other meat prices 3

cash grain prices 2

livestock futures prices 2

grain futures prices 2

outlook information 5

National weather information 5

News Summaries 5

Other (Please list) 1-Volumes

Which of the above services do you think is most important (List 1 or more with the most important first, please).

1-All market news, 1-Outlook, 1-Lamb carcass prices, 2-Cash lamb prices, 1-Cash livestock

How often would you like to see prices updated?

3-Daily, 2-Twice a day, 0-Three times a day, 1-More than 3 times a day

26. Would you like to see a computerized accounting system developed which packers could use?

    2-Yes, 5-No, 1-Not Applicable

    Would you be interested in using such a system?

    1-Definitely Yes, 1-Probably Yes, 0-Don't Know, 1-Probably Not, 0-Definitely Not

    How important would this service be to you?

    0-Very important, 2-Some importance, 0-Neutral, 1-Prefer not to see done, 0-Very negative on any such attempts

27. Please use the space below for any comments you would like to make.

    1. Very good staff. Pleasure to work with. Personal touch makes a difference. Price is about the same as auction market lambs, but you know what you are getting.

    2. Electronic marketing is the technology of tomorrow applied today. Takes some of the personal touch out which I miss.

    3. Have been disappointed about the high number of no sales on the computer. Have just been wasting my time getting on.

    4. Quit buying from Eastern lamb because we need heavier lambs than were being offered - not because of the computer. I personally like the computer sales, but some of the old timers in the firm don't care for it.

5. Grading service should be held responsible when they misgrade a load of lambs, not the coop. Grading is good in some areas, bad in others. I like the system overall.

6. Weigh up condition is bad. Lambs should be shrunk 3% at time of arrival. Some producers abuse the situation. Unfair to both packers and producers who don't overfill the lambs before weighing. Another alternative would be to deliver the lambs the night before, and weigh them the next morning.

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ELECTRONIC MARKETING: CONCEPTUAL, THEORETICAL AND EMPIRICAL CONSIDERATIONS

by

James R. Russell, II

(ABSTRACT)

This study was based around the working hypothesis that an increase in the theoretical and empirical base of knowledge about electronic marketing will aid in determining its feasibility and in system design, implementation and evaluation. The specific objectives of this study were:

1) to build a theoretical base from which the broad issues of electronic marketing could be examined;
2) to concentualize, articulate and illustrate the issues involved in determining the feasibility and design of an electronic marketing system;
3) to examine the costs of electronic marketing both theoretically and empirically;
4) to explore the relationships between price level and variability and electronic marketing; and
5) to demonstrate, theoretically and empirically, a means of evaluating an electronic marketing system.

Experiences gained from participation in the design and implementation of the computerized trading system of Electronic Marketing

Association, Inc. (EMA) as well as analysis of sales data generated by EMA's operating electronic marketing system were used in fulfilling the objectives.

In developing a theoretical base from which to examine electronic marketing, the study first examined a theoretically ideal marketing system, followed by common shortcomings. Possible solutions to these marketing problems were then examined. Lastly, the theoretical implications of electronic marketing regarding both pricing and and technical efficiency were discussed. The study concluded that electronic marketing has the theoretical potential to increase both technical and pricing efficiency.

The study developed a conceptual framework for determining the feasibility, designing and implementing an electronic marketing system. Based on experiences with EMA's trading system, the study developed a generalized outline of a feasibility study for beginning a new computerized electronic marketing system and identified important factors in designing and implementing an electronic marketing system. The study repeatedly emphasized the importance of feasibility studies, and the design and implementation process to the future of electronic marketing.

The costs of Eastern Lamb Producer Coop's (ELPC) computerized sales, which use EMA's system, were examined. From the estimated cost functions and the distribution of cost among participants, it was concluded that the computerized sales resulted in greater technical efficiency than teleauction sales.

The study also analyzed the price recieved at ELPC computerized slaughter lamb sales. The price received was found to be significantly higher than either the regional or national slaughter lamb price. ELPC's computerized prices had a significant effect on the regional slaughter lamb price, whereas previous teleauction sales did not. ELPC price changes tended to lead regional price changes by a week. The study concluded that the computerized sales offered superior pricing efficiency when compared to conventional auction methods.

The mirror-image survey technique was demonstrated as a tool for evaluating electronic marketing systems. Both an unsuccessful attempt to sell slaughter cattle over EMA's system and the successful ELPC lamb sales were examined.

Finally, broad generalizations from the limited experience were cautioned against. However, insight was gained concerning electronic marketing.