

IMPLEMENTATION OF ELECTRONIC MARKETING OF SLAUGHTER CATTLE IN VIRGINIA: REQUIREMENTS AND PROCEDURES

James R. Russell and Wayne D. Purcell

Increased attention is being directed to electronic markets in the major agricultural commodities. Electronic markets are characterized by a trading arena that has been centralized via some electronic medium. The medium used may be a conference telephone, teletype, computer system, or some combination of these or other mechanisms. All make possible the sale of a commodity by description without requiring the physical proximity of buyer, seller, and product. In theory, this capability can eliminate or reduce the spatial imperfections and pricing problems now present in many "thin" markets, a topic of increasing concern throughout the food industry (Hayenga).

Thin markets generally are markets with little trading volume and/or markets in which individual offers to buy or sell exert a significant influence on price or other terms of trade. A local livestock auction with a limited number of buyers or buyers with limited orders is an example. Because the quantity offered for the day is essentially fixed when the auction process starts, the seller has little protection against a situation in which an unusually large supply will be taken by the available demand only at prices significantly below prices that would have been realized had a smaller quantity been offered. The only marginal "demand" comes from the auction market, any reservation price set by the seller, and the bids of traders looking for prices low enough to allow arbitrage between markets.

Conceptually, the bid curves of individual buyers in any market are based on their perceptions of the buying strength in the market. The number of buyers is not an accurate barometer of buying strength, but there is typically a positive correlation between buying strength and the number of buyers. Other things equal, the bid curve of each buyer tends to move up (increase) with increases in the number of buyers with access to the available supply.

An electronic marketing system has the potential to change the competitive structure

within which cattle in the southern and eastern states are bought and sold. With decentralized markets, the structure on the demand side often approaches an oligopsony or even a monopsony. Physical proximity of buyer and product is typically required. By allowing buying by description, an electronic marketing system can significantly increase the number of buyers with access to the product. The marginal buyer is able to enter the market when prices dip and exit the market when prices surge. This ease of entry and exit makes the market more responsive to short-run changes in supply and demand.

The growing body of literature which treats this area in a theoretical context suggests electronic marketing has the potential to increase both operational efficiency and pricing efficiency (Ethridge; Henderson et al., 1976; Henderson et al., 1979; Johnson). The limited empirical research that has been done indicates that both pricing efficiency (Henderson et al., 1976; Holder; Lu, 1968; Lu, 1969) and operational efficiency (Engleman et al.; Glazener; Henderson et al., 1979) can be improved by electronic systems. Operational efficiency can be improved by reducing the costs of marketing. Assembly, transaction, and transfer costs can be cut by reducing the multiple handling, cross-hauling, and time consumed in many of the current markets. Pricing efficiency should be improved by providing access to more buyers and by encouraging the use of descriptive terms which identify and categorize important value-related product attributes.

Feeder pigs, slaughter hogs, slaughter lambs, and slaughter or feeder cattle are being sold by conference telephone auctions in at least eight states (Henderson et al., 1976). Slaughter hogs are sold by teletype auctions in Ontario (Peer) and Alberta (Hawkins et al.). Computerized trading systems are being used to sell cotton in Texas (Ethridge, Highley), eggs in New Hampshire (Cox) and Great Britain (Schwartz), and wool in Australia (Computer Sciences of Australia). The Agricultural

James R. Russell is Research Associate and Wayne D. Purcell is Professor, Department of Agricultural Economics, Virginia Polytechnic Institute and State University.

The research reported was financed by a matching funds grant from the Agricultural Marketing Service, U. S. Department of Agriculture, and the Virginia Department of Agriculture and Consumer Services.

Marketing Service of the USDA is supporting four research projects designed to develop, implement, and/or evaluate electronic marketing systems (Henderson et al., 1979).

The existence of successful electronic exchanges, the development of sound theoretical arguments, and positive results from empirical studies do not, however, ensure that a new proposed electronic marketing system will be adopted and prove to be successful. For the system to be successful, either both buyers and sellers must expect economic benefits from the new system or one of the two groups must see economic benefits and have sufficient bargaining power, either natural or legislated, to impose their views. It is therefore the expectation of economic benefits that will be the stimulus for change. When the buyers and/or sellers see economic benefits to change, they exert pressure on the service institutions (organized markets, order buyers, etc.) to adjust. Change will be slow to come but the pressure of significant economic benefits is difficult to deny or oppose.

Recognition of benefits will vary with the expectations and perceptions of buyers and sellers. The expectations of buyers and sellers will in turn be influenced by their attitudes toward 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 will operate the electronic marketing system. In the case of slaughter cattle, this set of expectations will be different in the southeastern and eastern states than in other areas of the country. Production units are small and geographically dispersed. In some states, a high percentage of the slaughter cattle is cull cows from dairy herds.

Local auction markets perform the assembly function and provide a mechanism through which buyers can combine the small, fragmented lots into loads of reasonably uniform cattle. Change in this system will be accepted and promoted by producers only if it is clear that change will bring improvement (higher prices and/or lower costs). Buyers will insist on lower procurement costs, the ability to buy cattle in more uniform lots, or other related benefits if they are to accept and promote a new system. Therefore any new electronic marketing system must be carefully designed and based on a sound understanding of the buyer, the seller, and the attitudes of both parties toward the present market system.

OBJECTIVES

The objectives of this article are:

1. To describe the method employed and report the results of surveys used to provide a base of information to guide the development of an electronic marketing system for slaughter cattle in Virginia.
2. To determine the organizational structure and the operational procedures necessary for an electronic marketing system to be acceptable to buyers and/or sellers of slaughter cattle in Virginia.

PROCEDURES

Mirror-image¹ survey forms were prepared and administered to Virginia producers and to eastern and northeastern packers during the spring months of 1979.

Personal interviews were conducted with 83 Virginia producers selected via stratified random sampling procedures to ensure that cow-calf producers, dairymen, and cattle feeders would be represented. All packers who buy slaughter cattle in Virginia were identified and contacted for permission to conduct personal interviews. Twenty-six packers were visited and a total of 20 interviews and survey forms were successfully completed.

Four broad areas were explored in the surveys.

1. The current situation. Emphasis was on the knowledge level of producers and packers, their perception of the current system, their understanding of the procedures employed in current markets, their attitude toward the need for change, and their reactions to the emerging trend toward electronic marketing systems.
2. Product description. Of primary interest was the consistency, or lack of consistency, between packers and producers as to what product attributes significantly influence value. The implicit objective was to isolate descriptors which would be acceptable to both parties in selling by description.
3. Performance guarantees. Timing of title transfer and the related liability for loss were the key issues. The questions probed for areas of agreement and disagreement to determine what role, if any, the organization operating an electronic marketing

¹A mirror-image approach to surveying involves "paired" questions on separate surveys designed for two related stages of economic activity in a marketing system. The purpose is to identify key dimensions of the activity along the interface between the two stages. A more detailed discussion of the method and its application is given in the article by Purcell. More detail on the survey procedures and copies of the survey forms are available from the authors.

system would have in the area of performance guarantees.

4. Organization and operation of the electronic marketing association. Emphasis was on the attitudes of packers and producers as to who should control an electronic marketing association, who should be involved, and how it should be operated.

The survey results were tabulated and examined for attitudes, issues, or dimensions which would influence the acceptance and possible effectiveness of an electronic marketing system. Areas of consistency or compatibility provide a base on which to build the organization and help to identify acceptable operational procedures. Areas of differences or inconsistency indicate a need for some other approach or approaches. An educational effort to resolve the differences can be attempted. In laying out the organizational structure and operational procedures, compromise to reach acceptable positions is a possibility. If education and/or compromise do not elicit short-run participation, a longer term perspective which also relies on the pressure of expectation of economic benefits to one or more of the market system participants might be required.

RESULTS

Analysis of the producer and packer survey results reveals, as hypothesized, areas of compatibility and agreement. The producers and packers interviewed deal in slaughter cattle of roughly the same weights. Both groups believe they receive (pay) a fair price for their slaughter cattle and are generally satisfied with the convenience and performance of the current marketing (procurement) system. For a 10-hour period, the packers and producers expect about the same amount of liveweight shrink for slaughter cattle. Both groups believe slaughter cattle can be sold (bought) effectively by description. Both producers and packers identify the same general set of carcass characteristics that should be used when cattle are sold on a carcass basis. Perhaps significantly, both think that the trend toward electronic marketing is desirable.

Both producers and packers believe the present auction markets should be involved in an electronic system where cattle are sold by description. An objective third party, such as a state grader, should do the grading when grading is required. Each set of cattle should be auctioned separately rather than by letting the high bidder take his pick of lots and then repeating the auction process. Producers and

packers agree that, depending on the nature of the problem, either the manager of the marketing organization or its board of directors should settle any disputes that might arise.

On other issues the packers and producers do not agree, however. It is especially important that the electronic marketing system be designed and operated to either resolve these differences, neutralize their impact, or work toward an acceptable compromise. Because the successful resolution of the areas of disagreement or conflict will be a major determinant of the acceptance of a new system, each of the areas is discussed in some detail.

The Current Situation and Present Attitudes

Table 1 presents responses to questions concerning the current situation and present attitudes. A large majority of the responding

TABLE 1. PRODUCER AND PACKER RESPONSES TO QUESTIONS CONCERNING THE CURRENT SITUATION AND PRESENT ATTITUDES

Attitude, Experience, Expectation	Number Responding			
	Producers		Packers	
	Yes	No	Yes	No
Would like to see changes in the present marketing (procurement) system:				
for slaughter cows	32	34	16	3
for fed cattle	9	8	12	3
Have sold (bought) slaughter cattle "on the rail"	29	54	18	2
Producer: would your attitude towards selling "on the rail" improve if the packer would allow you to visit his plant whenever you choose? Packer: if buying "on the rail" would you allow producers to visit your plant whenever they choose?	29	48	20	0
Producer: would you commingle your slaughter cattle with others if you thought you could get a higher price? Packer: would you pay more for truckloads of similar cattle at one location than for the same cattle at 3-4 separate locations?	72	8	20	0
Would you pay at least as much to sell (buy) cattle over an electronic system as your present marketing (procurement) costs?	73	2	11	7

packers would like changes in the present procurement system. Producers are almost evenly split on the issue. These responses came after both packers and producers had stated earlier in the interview process that they were "generally satisfied" with the current system.

Most packers have purchased cattle on a carcass basis or "on the rail." All would allow producers to observe their plant operations to watch cattle being processed. In contrast, most producers have not sold any cattle "on the rail." They voice a generally negative atti-

tude toward selling on a carcass basis and indicate that observing procedures in the packing plant would not change that negative attitude.

Both producers and packers agree that truckloads of commingled cattle would be worth more to the packer, but disagree on the magnitude of the increased value. Most producers and packers would be willing to pay at least as much to sell (buy) cattle over an electronic marketing system as their present marketing (procurement) costs. This point could prove to be important because the auction markets, acting as assembly points, would continue to perform many of their present functions and would thus require a per head commission. The costs of the electronic marketing system must also be covered.

Product Description

In the interviews with producers and packers, it became apparent that packers are much more familiar with USDA grades than are producers. Most producers, for example, do not know the difference between yield grade and dressing percent.

Producers' and packers' rankings of descriptive variables (1 = most important) which they think should be used when slaughter cattle are sold on a *liveweight* basis, by description, are given in Table 2. Their rankings of descriptors which should be used when the cattle are sold

TABLE 2. PRODUCERS' AND PACKERS' RANK^a OF DESCRIPTIVE VARIABLES (1 = MOST IMPORTANT) WHICH SHOULD BE USED WHEN SLAUGHTER ANIMALS ARE SOLD ON A LIVEWEIGHT BASIS BY DESCRIPTION

Variable	For Slaughter Cows				For Fed Cattle			
	Producers		Packers		Producers		Packers	
	Times Chosen	Rank	Times Chosen	Rank	Times Chosen	Rank	Times Chosen	Rank
Sex	N/A	N/A	N/A	N/A	16	1	13	4
Breed	38	3	16	3	8	4	14	1
Age in years	24	7	3	10	3	10	5	8
Liveweight (estimated)	12	9	12	5	0	11	10	5
Liveweight (weighed)	51	1	13	4	14	2	10	5
Quality grade	46	2	17	2	13	3	14	1
Yield grade	29	6	6	8	8	4	14	1
Dressing percent	24	7	19	1	6	6	6	7
Amount of flesh	37	4	8	7	5	7	2	11
Fill	8	10	6	8	4	8	2	11
State of health	35	5	11	6	4	8	3	9
Other variables	0	11	2	11	0	11	3	9

^aRank is based on the number of producers or packers selecting each particular variable.

TABLE 3. PRODUCERS' AND PACKERS' RANK^a OF DESCRIPTIVE VARIABLES (1 = MOST IMPORTANT) WHICH SHOULD BE USED WHEN SLAUGHTER ANIMALS ARE SOLD ON A CARCASS BASIS BY DESCRIPTION

Variable	For Slaughter Cows				For Fed Cattle			
	Producers		Packers		Producers		Packers	
	Times Chosen	Rank	Times Chosen	Rank	Times Chosen	Rank	Times Chosen	Rank
Sex	N/A	N/A	N/A	N/A	14	1	15	3
Breed	32	4	17	3	9	5	13	4
Age in years	19	8	2	10	4	9	5	7
Liveweight (estimated)	58	1	18	1	11	2	13	4
Liveweight (weighed)	4	10	9	4	2	11	6	6
Quality grade	40	2	18	1	11	2	15	2
Yield grade	25	7	5	7	7	6	16	1
Dressing percent	27	6	9	4	10	4	1	10
Amount of flesh	33	3	5	7	5	8	1	10
Fill	9	9	3	9	6	7	2	8
State of health	29	5	8	6	3	10	2	8
Other variables	0	11	0	11	0	12	1	10

^aRank is based on the number of producers or packers selecting each particular variable.

on a *carcass* basis are given in Table 3. The agreement between producers' and packers' rankings of the individual variables is not very encouraging. Of particular concern is the disparity in rank given to dressing percent for slaughter cows. This variable clearly is important to the packers and provision must be made for accurate and objective estimation of this variable when cows are sold by description on a *liveweight* basis. The top five or six variables chosen by producers and packers are more consistent, however. Neither producer nor packer should have major objections to use of these variables if the education process has stressed the needs on both sides of the issue.

Performance Guarantees

The responses of producers and packers concerning the type of contracts they would like in an electronic marketing system are shown in Table 4. Wide differences of opinion are ap-

TABLE 4. PRODUCER AND PACKER RESPONSES AS TO THE TYPE OF CONTRACTS THEY WOULD PREFER IN AN ELECTRONIC MARKETING SYSTEM

Type of Contract	Number Responding			
	Type for Producers		Type for Packers	
	Producers Responding	Packers Responding	Producers Responding	Packers Responding
Oral	21	12	12	18
Written	48	2	38	2
Bonded Written	11		31	

parent. Most producers would like either a written or bonded written contract, whereas most packers would prefer an oral agreement. A compromise will be required.

Table 5 presents producers' and packers' responses regarding the timing of title transfer

TABLE 5. PRODUCER AND PACKER RESPONSES AS TO WHEN TITLE OF OWNERSHIP SHOULD CHANGE FOR TWO MARKETING ALTERNATIVES^a

Point at which title should transfer	Number Responding			
	Alternative 1		Alternative 2	
	Producers	Packers	Producers	Packers
When sold	10		30	4
When loaded at farm	7		3	
When delivered to assembly point	50		43	
When weighed	5	2	1	1
When loaded on buyer's truck	10	16	3	11
When unloaded at packing plant		2		2

^aAlternative 1: Cattle are sold by description on the farm and are later hauled to a collection point by the producer to be picked up by the buyer. Alternative 2: Cattle are sold by description at an assembly point.

(and liability for death loss, etc.). Two different marketing alternatives are examined. Alternative 1 involves a system in which the cattle are sold by description on the farm and are later hauled to a collection point by the producer to be picked up by the buyer. Alternative 2 involves a system in which cattle are sold by description at an assembly point. For both alternatives, most producers want title to change when the cattle are delivered to the assembly point and weighed. Most packers want title to change when the cattle are loaded on the packer's truck. During the period the cattle are being held at the assembly point, neither party feels they should accept responsibility. Producers and packers will either have to compromise or another party (such as the central organization) will have to assume the liability while the cattle are at the assembly point.

Producers believe the right to enter a reservation price would be important. Most producers would allow the central marketing association to set the proper reservation price. Packers question the need for a reservation price but would not object if producers wanted to enter reservation prices.

Organization and Operation

Producer and packer responses to questions concerning the operation of an electronic

TABLE 6. PRODUCER AND PACKER RESPONSES TO QUESTIONS CONCERNING THE OPERATION OF AN ELECTRONIC MARKETING SYSTEM

Topic	Number Responding			
	Producers		Packers	
	Yes	No	Yes	No
Have objections to a system using regressive bidding	26	45	9	9
Would prefer cattle be sold on the farm and delivered to an assembly point on a day the buyer specifies (within a week of purchase), rather than a system which sells the cattle at an assembly point	22	33	18	2
Would prefer 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	56	19	9	9
Feel that in an electronic system containing ten or more buyers, sufficient competition would exist to insure bid prices would always be a reasonable approximation of true slaughter value	38	45	19	1

marketing system are given in Table 6. The majority of producers have no strong objection to regressive bidding but few have actual experience with the procedure. Packers are evenly split on the issue. Most of the producers and packers who have objections to regressive bidding are fairly adamant in their objections. Whether this attitude is due solely to lack of familiarity with the procedure is not apparent from the survey results. The opposition does suggest the need for a complete education program if regressive auction processes are to be used.

Producers prefer that the slaughter cattle be sold at an assembly point. Packers prefer the cattle to be sold on the farm and delivered to an assembly point on a day the buyer specifies within a week of purchase. If grading of live cattle is required, selling small lots on the farm on a liveweight basis is not feasible. On the farm, sales would have to be on a carcass basis.

Producers would like 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 are evenly divided on the issue.

In an electronic marketing system with 10 or more buyers, producers do not believe competition would be sufficient to ensure that bid prices would be indicative of true slaughter value. This is a surprising result which will require clarification during the education process. At most local markets, the number of actual buyers, primarily order buyers, is typically five or less—and is often as few as two. There might well be another reason for the producers' concern about the level of competition even with 10 buyers represented. One hypothesis is that they do not really believe

the packer would be an effective buying influence unless he is represented in a market with physical proximity to the product. This area will require probing beyond the results of the survey. Almost all packers (95%) think competition would be sufficient with 10 buyers represented—but they would be unlikely to suggest anything else.

TABLE 7. PRODUCER AND PACKER RESPONSES REGARDING WHO SHOULD OWN AND CONTROL THE ELECTRONIC MARKETING ORGANIZATION

Parties which own and control	Number Responding	
	Producers	Packers
Producers	26	5
Packers	2	
Third party	15	5
Producers and Packers	29	
Packers and third party	1	
Producers, packers, and third party	4	
Doesn't matter		5

TABLE 8. PRODUCER AND PACKER RESPONSES REGARDING WHO SHOULD FINANCE THE ELECTRONIC MARKETING ORGANIZATION

Parties which should finance	Producers	Packers
Producers	32	7
Packers	1	
Producers and Packers	38	4
Doesn't matter	1	1

Tables 7 and 8 give producer and packer responses regarding who should own, control, and finance the electronic marketing organization. Producers believe the organization should be owned and controlled by both producers and packers. Packers are evenly divided among producer owned, third party owned, and indifference. Producers think that both producers and packers should share in financing the organization, whereas packers think the organization should be producer financed.

CONCLUSIONS

The mirror-image survey approach gives a broad understanding of the needs, desires, and

biases of the producers and packers interviewed. It suggests characteristics which an electronic marketing system should and should not have if it is to be adopted by producers and packers.

The survey results suggest that a new electronic marketing system in the southeastern area should use progressive instead of regressive bidding. Producers are not familiar with regressive bidding and insisting on that approach will influence the willingness of some to participate. Because of the concern about selling on a carcass basis, producers should at least be given the choice of selling their cattle on a liveweight basis. An objective third party should do the grading. Each set of cattle should be auctioned separately. Bids should be received on the particular grade of cattle offered for sale rather than on an average animal with premiums and discounts for other qualities. The marketing organization should have the authority to stop a sale when it believes bids are not reflecting a fair market value and/or the producer should be able to set a reservation price for his cattle.

The survey results also identify a broad set of descriptive terms which would be acceptable to producers and packers. Producers and packers differ, however, in their rankings of the relative importance of the descriptors. Differences in the importance attached to the variables should be given special attention in the education process which accompanies initiation of the system.

The marketing organization's manager or its board of directors should settle any disputes that arise. The present auction markets should participate in the new system. This point is important. Much of the producer's attitude toward a new system will be picked up from the auction operator. Bringing the present market auction managers into the new system in a progressive fashion and encouraging the use of their facilities, encouraging their participation as local coordinators, etc., will increase the probability of acceptance by producers and packers.

Producers and packers disagree in some areas which have significance for an electronic marketing system. The surveys give no conclusive answer as to what type of contractual arrangement (oral, written, bonded written) should be used. Answers to such questions as when title to the cattle should change, who should own and control an electronic marketing organization, whether to sell the cattle on the farm or at an assembly point, and what size lots should be offered for sale are not apparent. These issues on which producers and packers do not agree will need to be emphasized during the interaction and education process prior to the opening of the new system.

The survey results and the insight developed during the survey process suggest that a strategy to introduce an electronic marketing system for cattle in the southern and eastern states should include the following steps.

1. Mirror-image surveys should be completed to identify the areas of compatibility and agreement on which a system can be built and the areas of inconsistency which should be stressed in an educational process during introduction of a new system.
2. Because of the need for assembly of small, geographically dispersed offerings of slaughter cattle, the present auction markets will be essential to the success of an electronic system. They provide assembly facilities, bring an element of credibility where producers are concerned, and are a known entity to producers and packers. The pressure of competition between markets and the alternative of producer-owned assembly and weighing facilities will keep commission charges at reasonable levels and provide an incentive for present markets to become involved.
3. A new electronic marketing system should be operated by a private non-profit organization 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 because few if any functions will be eliminated prior to any structural reorganization. Costs at the auction markets will be reduced because the cattle will be sold in multiple head lots rather than individually through a sales ring. But the auction markets will be reluctant to decrease their commission charges significantly early in the life of the new system. As the costs of the electronic system must be covered, it is crucial that these costs be kept low. (Development in Virginia subsequent to the surveys indicates a simple computer system which uses portable terminals and buys time on a time-sharing arrangements from a computer company will meet the dual requirements of low cost and effectiveness as a communication system.)
5. During the introductory phase of system development, the educational effort should stress the problems associated with thin markets and the ability of the electronic system to provide access to more buyers. The survey results indicate producers have limited awareness of the importance of the number of buyers to price levels and the ability of the market system to respond to a surge in the quantity offered on any particular sale day.
6. Overall, efforts should be made to establish a coalition of interests and to involve, during system development and introduction, all the groups or institutions that will be using the system. Institutions always feel threatened by change, even progressive change which has the potential of economic benefits to most of the institutions in the system. Involving them during the planning phases and seeking input to guide the development of organizational structures and operating procedures will be important to the probability of success for any new electronic marketing system.

REFERENCES

- Computer Sciences of Australia. *A User's Guide for Woolnet*, St. Leonards, New South Wales, September 1978.
- Cox, Meg. "Egg Clearinghouse, Inc., Despite Its Size, Plays a Big Role in Determining Prices." *Wall Street J.*, March 6, 1978.
- Engleman, Gerald, David L. Holder, and Allen B. Paul. *The Feasibility of Electronic Marketing for the Wholesale Meat Trade*, Agricultural Marketing Service and Economics, Statistics and Cooperative Service, USDA, AMS-583, May 1979.
- Ethridge, Don E. "A Computerized Remote-Access Commodity Market: Telcot." *S. J. Agr. Econ.* 10(1978):177-82.
- Glazener, Gretchen. "The Economic Feasibility of Computerized Spot Markets for Feeder Cattle in Texas," unpublished M.S. thesis, Texas A&M University, August 1979.

- Hawkins, M. H., A. A. Warack, J. L. Dawson, and L. Quantz. *Development and Operation of the Alberta Hog Producers Marketing Board*, University of Alberta, Agr. Econ. and Rur. Soc. Bull. 12, December 1972.
- Hayenga, Marvin, ed. *Pricing Problems in the Food Industry*, North Central Regional Research Project NC-117, Mono. No. 7, Madison, Wisconsin, February 1979.
- Henderson, Dennis R., Lee F. Schrader, Thomas L. Sporleder, and E. Dean Baldwin. "The Economic Feasibility and Impacts of Electronic Markets: A Tentative Appraisal," paper presented at joint annual meeting of American Agricultural Economics Association and Western Agricultural Economics Association, July 1979.
- Henderson, Dennis R., Lee F. Schrader, and Michael S. Turner. "Electronic Commodity Markets," in *Marketing Alternatives for Agriculture. Is There a Better Way?* Olan D. Forker, V. James Rhodes, and Ellen M. Bonn, eds. National Public Policy Education Committee Pub. No. 7, Cornell University, November 1976.
- Highley, Vern F. "Telcot Service Expands." *Cotton Coop. Communicator* 10(October 1977).
- Holder, David L. "Benefits of a Sheep and Lamb Teleauction in Virginia and West Virginia," paper presented at Southern Agricultural Economics Meeting, February 1979.
- Johnson, Ralph D. *An Economic Evaluation of Alternative Marketing Methods for Fed Cattle*, Neb. Agr. Exp. Sta. Bull. SB-250, June 1972.
- Lu, Chang Mei. "Effect of Teletype Auction on Hog Price Variation in the Short Run," unpublished M.S. thesis, University of Manitoba, 1969.
- Lu, Wen-Fong. "Effect on Regional Price Levels of Selling Hogs by Teletype," unpublished M.S. thesis, University of Manitoba, 1968.
- Peer, D. "Pricing System for Hogs in Ontario," lecture, University of Guelph, Agricultural Economics and Extension Education, October 22, 1976.
- Purcell, Wayne D. "An Approach to Research on Vertical Coordination: The Beef System in Oklahoma." *Amer. J. Agr. Econ.* 55(1973):65-8.
- Schwartz, Alfred N. "British Egg Marketers Planning Exchange Patterned After ECI." *Poultry Times*, December 19, 1977.