DESIGN AND EVALUATION OF A SIMULTANEOUS
AUCTION FOR SLAUGHTER CATTLE*

by

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Research intended to provide information that will lead to improved coordination in agricultural subsectors has included efforts to design improved price-making and exchange systems for agricultural commodities. Among the desirable features sought in the design of these systems has been centralized pricing along with direct movement of the commodity from seller to buyer. Centralized pricing permits exposure of each lot of the commodity offered for sale to a large number of potential buyers and facilitates the dissemination of market information, while direct movement eliminates the need for costly central assembly. Price-making and exchange systems that provide centralized pricing along with direct movement include telephone auctions [3, 6], teletype auctions [4, 6] and computerized exchanges [1, 2, 8]. We propose another system. The proposed system utilizes a simultaneous progressive auction with multiple price determination. This proposed system not only permits centralized pricing along with direct movement but offers these additional advantages: reduced interlot price variation, opportunity for comparison of price offers for different trading methods, and provision of market-determined price differentials for quality and other characteristics not disguised by interlot price variation.

Our objective in this paper is to describe and evaluate the proposed system. First, the distinguishing features of the proposed system are identified and discussed. Then, we attempt to indicate how the proposed system may be applied to slaughter-cattle marketing. Finally, we identify some
criteria for evaluating alternative systems and use them to compare the system proposed here with selected other systems.

The scope of this paper is somewhat limited. We focus on the design of the price-making and exchange system rather than on a complete plan for its implementation. Elements of the latter that we ignore include, for example, selection of a host market agency, promotion plans, and drafting of agreements between the market agency and consignors and buyers. Also, our list of criteria for evaluating alternative systems is quite likely not exhaustive. Finally, this paper does not report results of any empirical analysis.

THE PROPOSED SYSTEM

The unique features of the proposed system are the utilization of a simultaneous progressive auction and multiple price determination. We first describe a simple simultaneous auction transaction system and then indicate how the multiple price determination feature may be incorporated. In this section, the focus is on the design of the system, not on its application to slaughter-cattle marketing.

The Simultaneous Progressive Auction

A simultaneous progressive auction may be described by comparing it with an ordinary (successive progressive) auction. In a successive progressive auction, there is a predetermined sale order, and lots are offered successively, bidding is progressive, and each successive lot is sold to the highest bidder at a price equal to the highest bid. In a simultaneous progressive auction, on the other hand, all lots are offered simultaneously, there is progressive bidding on all lots simultaneously, and when the auction ends, all lots pass to the highest bidders at prices equal to the highest bids.
A more detailed description of the preparatory, bidding, and closing stages of a simultaneous progressive auction may provide clarification. In the preparatory stage, each lot offered for sale is physically available or otherwise represented, and starting bids, if any, are displayed for each lot. Bidders are prepared to begin bidding on the offered lots. During the bidding stage, bidders may enter bids on any of the lots by placing opening bids or raising existing bids. The minimum amount that a bid may be raised may be specified in the exchange rules. The latest bid on each lot can be observed by all bidders, and the identification of the bidder holding the latest bid is available to that bidder, to the exchange authority, and, if exchange rules permit, to other bidders. The bidding may continue until no bidder is willing to raise the bid on any lot, or it may be terminated at the end of a specified time period or by some other rule. At the close of the auction, title to each and all lots passes simultaneously to the last and therefore highest bidder on each individual lot. The sale price on each lot is the last bid on the lot.

Multiple Price Determination

In a simple simultaneous progressive auction such as the one just described, only one price is determined for each lot. But in price-making and exchange for agricultural commodities, it is often desirable, and sometimes even necessary, to determine more than one price for each lot. For example, it may be desirable or even necessary to determine both a base price and a set of quality premiums and discounts. This may be necessary if the quality composition of the lots being exchanged is unknown, e.g., trading without prior grading or inspection. It may be desirable to determine both a base price and quality premiums and discounts if the quality composition of individual lots is known but lots contain heterogeneous units. But, multiple
price determination may be desirable even if there are no quality differences. In slaughter cattle marketing, for example, prices may be determined for different selling conditions, i.e., weighing time and place, feed and water restrictions, etc.

Neither regressive auctions nor computerized exchanges can be readily adapted to permit determination of multiple prices. In an auction with regressive bidding (e.g., the Canadian teletype hog auctions), only one price can be determined per lot in the auction because only one bid is entered per lot. Additional prices such as premiums and discounts for quality can be provided only from outside the auction. The price differences for different qualities of hogs marketed through the Canadian teletype hog auctions, for example, are determined not by the auction but rather by government regulation [6]. Multiple price determination would at best be cumbersome in an exchange. Because both sides would submit multiple price offers, comparison of offers and therefore determination of the winning buyers (and sellers) would be difficult. Perhaps for this reason proposed computerized-exchange designs have permitted determination of only one price per lot.

Multiple price determination can be accommodated, however, if bidding is progressive and if two additional exchange rules are adopted. The first rule would permit designation of several components (or characteristics) of each lot. Further, during the bidding stage, bidders would be permitted to enter separate bids on each of a lot's components. The second rule would permit consignors to decide after the close of the auction how many and which of the units in a lot would be sold. Both these rules require explanation.

Given the adoption of the exchange rule permitting the designation of several lot components and the submission of separate bids on each of a lot's components, the auction proceeds as follows. At any moment in the auction, rather than there being a single bid on a lot, there is an array of bids, one
for each lot component. To become the high bidder on a lot during the
auction, a bidder need only raise the bid on any one of the lot's components.
The lot is sold when there are no offers to raise any of the bids in the array.
There is only one winning bidder on each lot—the high bidder at the time
the auction ends. The prices are given by the lot's final bid array, and
there is one price for each lot component.

The rule permitting consignors to determine how many and which units
in the lot will be sold serves to ensure that the price differences in the
final bid array will reflect differences in values placed on the different
lot components by bidders. Under this rule, consignors may withdraw part or
all of the units in the lot after the prices have been determined. Because
consignors are permitted to do this, bidders have incentive to enter bids
in such a way that the difference between the value of each lot component
and the bid on the component is the same for all lot components. In contrast,
if consignors were not permitted to withdraw units from a lot after the close
of the auction, the array of final bids on a lot may bear no relation to the
values placed on the various lot components by bidders.1/

An example illustrates the application of the exchange rules just dis-
cussed. Suppose a single lot is being offered, that units within the lot are
of two qualities, A and B, that the numbers of units of quality A and quality
B are not known before the auction but will be determined after the lot is
sold, and that there are two bidders. Also suppose that the most Bidder 1
can pay, without making himself worse off after trade than before, is $40
for quality A units and $35 for quality B units. The most Bidder 2 can pay
is $38 for quality A units and $33 for quality B units. The lot might be
auctioned as follows. The array of initial bids is, say, $30 for A and $25
for B. To become the high bidder on the lot a bidder must raise one of the
two bids. If Bidder 1 raises one of the bids, say, A to $31, he is offering
to pay $31 for all A units in the lot and $25 for all B units, i.e., he is offering to pay the amount he bid for the lot component he raised and to pay all other existing highest bids for the other lot components. The bidding continues until no further bids are entered on the lot. The winning bidder is the high bidder on the lot when the auction ends, and he pays prices equal to the final bids on each lot component for those units the consignor elects to sell. Say, to continue the example, that after the penultimate bid, the bid array is $37 for A and $33 for B and Bidder 2 is the high bidder. Suppose then that Bidder 1 bids $38 for A and there are no further bids. Bidder 1 is the winning bidder and he pays $38 for all A units and $33 for all B units the consignor elects to sell.

The proposed system combines multiple price determination with the simultaneous progressive auction. That is, it involves simultaneous progressive bidding on one or more lots, and on each lot there may be a single bid or an array of bids. The lot components represented in the bid array may include different quality categories (e.g., grade and weight categories) or different trading methods (e.g., liveweight and carcass-weight methods), or both. An auction session would proceed as described for a simple simultaneous progressive auction except that bidders could enter bids on any of the components of any of the lots offered. The winning bidder on a lot would always be the high bidder on that lot at the close of the auction. If bids are accepted for only one trading method, the final bid(s) will be the sale price(s). If, however, bids are accepted for more than one trading method, then one of the methods and, therefore, one of the bids (or one subset of bids) must be chosen to determine the sale price(s). Exchange rules may give the option of selecting the trading method to the consignor or to the buyer.
APPLICATION OF THE PROPOSED SYSTEM
TO SLAUGHTER-CATTLE MARKETING

The proposed system just discussed may be used in exchange of slaughter cattle as well as other agricultural commodities. In the discussion of its applicability to slaughter-cattle marketing, slaughter-cattle exchange and exchange of transportation services are considered first largely ignoring the selection of physical equipment to be used in conducting the auction. Then the focus is on the choice of physical equipment.

Exchange Rules and Procedures

The discussion of exchange rules and procedures for the slaughter-cattle auction is divided into comments about the general exchange procedures, consignor prerogatives, bidder prerogatives, and exchange of transportation services.

General exchange procedures encompass the development of the bid arrays for each lot and rules governing bidding. Development of the bid array requires determination of lot components. A lot component represents a specific trading method and possibly also a specific sex class, grade category, and weight category. For slaughter cattle, trading methods might include liveweight, carcass weight, and carcass grade and weight. Sex classes would include steers, heifers, and possibly others (e.g., cows and bulls). Grade categories would include quality and yield grade categories, and weight categories would be defined in terms of liveweight ranges for liveweight trading methods and in terms of carcass-weight ranges for the other trading methods. Thus, a specific lot component might be: liveweight, steers. Bids entered on this component would be in dollars per hundredweight of live animal. Another lot component might be: carcass grade and weight, steers, choice, yield grades 1-3, 660 lbs and over. Bids entered on this component
would be in dollars per hundredweight of carcass. Lot components for each trading method must be exclusive and exhaustive, i.e., each animal in the lot must fall into one and only one of the lot components.

It would be necessary to establish standard selling conditions and procedures for handling reserve bids. Liveweight bids would be at-feedlot bids, i.e., bids would indicate the amount being offered for cattle weighted at or near the feedlot after observance of standardized handling procedures (sorting, feed and water restriction before loading, loading time, etc.). Carcass-weight bids would also be at-feedlot bids, i.e., transportation would be paid by the buyer, but pay weights would be determined at the slaughter plant after slaughter and observance of standardized trimming and other procedures. Reserve bids by consignors, if permitted, would be at-feedlot bids and could be handled in several ways. Consignors could simply be allowed to participate in the bidding and enter bids on their own lots. Or, an exchange representative could enter bids for consignors as they are instructed. Still another method of handling reserve bids would involve using them as starting bids in the auction.

Exchange rules should specify the maximum number of lots per session and the frequency of sessions. In establishing these rules, the total volume of cattle auctioned per week, the average lot size, and the capacities of physical facilities (e.g., bid-recording equipment) should be considered.

Cconsignors could be allowed a number of prerogatives, including choice of the number of lots to consign, the size of lots, and the sex composition of lots. Costs may constrain decisions about number and size of lots because per head costs and thus fees would likely be higher for small lots. A consignor could also elect whether or not to have his identity revealed to bidders, whether to deliver cattle to a designated assembly point or keep them at the
feedlot before sale, whether to have his cattle graded before the sale, and whether to enter reserve bids. The choice of a delivery interval could also be left to the consignor, and he could elect the trading method or methods for which he would accept bids. For example, he could choose live-weight, carcass-weight, carcass grade and weight, any two of these, or all three. If he elected only one method, then bids would not be accepted on the other trading methods. If he elected two of the three or all three he could be given the prerogative of choosing the trading method after the close of the auction. If a consignor chooses a trading method for which there is more than one lot component, he would be permitted to specify the animals in the lot to be sold. He may be willing to accept some restrictions on this privilege, e.g., he may be willing to supply integer multiples of one load. Information reflecting consignors' choices on all these matters except reserve bids could be reported on the sale bill distributed before the auction session.

Bidders, too, would have prerogatives. They could have a choice of trading method in the sense that they could choose to bid exclusively on lots for which bids were being accepted for only their preferred trading method. By selecting lots on which they bid, bidders could also exercise prerogatives regarding the producers from whom they buy, the location of consigned cattle, the delivery interval, and the sex and quality of cattle purchased.

Bidders would also have the prerogative of arranging for transportation of cattle they purchase from the feedlot because prices determined in the slaughter-cattle exchange are at-feedlot (or at-assembly point) rather than delivered prices. Prices are at-feedlot because the determination of delivered prices would require that all bids be adjusted for transportation costs before
acceptance. An example will clarify this point. Suppose that during an auction the high bidder on a particular lot would have the cattle delivered to a plant 10 miles from their present location. Suppose that another bidder whose plant is 100 miles from the present location of the cattle decides to raise the bid on this lot by the minimal bidding increment. If the bids were delivered prices rather than at-feedlot prices, the new higher bid may actually be a lower bid to the consignor after the additional delivery costs are subtracted. Thus, if delivered prices were to be determined, all bids would have to be adjusted for transportation costs. To avoid this cumbersome procedure, bids must be at-feedlot.

Several options for transportation of cattle could be provided. Buyers could be given the option of providing their own service or hiring services from the feeder or a commercial carrier. A separate auction could be held after the slaughter-cattle auction so that buyers could purchase transportation services. This auction could be a simultaneous auction with the winning bidders and prices determined by the lowest bid on each lot. Consignors who insist on delivering their cattle could be allowed to specify in the sale bill information a schedule of delivery charges. Bidders could take this information into account when entering bids. To eliminate shrink differentials, it would be necessary for cattle purchased on a liveweight basis to be weighed after loading at or near the feedlot. There is some recent evidence that suggests that distance shipped does not affect carcass-weight [7], thus pay weights for cattle sold on a carcass-weight basis could be determined at the slaughter plant without correcting for shrink.

Selection of Physical Facilities and Equipment

A number of different types of facilities and equipment could be used to conduct the simultaneous slaughter-cattle auction. The choice among these
likely would depend on volume. If volume is low, relatively inexpensive
equipment, such as a chalk bidding board, could be used. An example bidding
board that could be used in an auction involving four lots is presented in
Figure 1. Each of the numbered columns represents a consigned lot of cattle.
The lot identification number would correspond to a lot identification number
listed on the sale bill distributed before the auction. Each of the re-
main ing rows, except for the last row, represents separate lot components.
The first two of these are for a liveweight trading method, the next two for
a carcass-weight method, and the remainder for a carcass grade and weight
method. The last row on the board in the figure could be used to record iden-
tification numbers of high bidders on each lot during the auction. This type
of equipment would be disadvantageous in that it would require physical assembly
of bidders and a relatively large amount of bidder time per unit purchased.

If volume is higher, more sophisticated equipment likely would be selected.
The focus in the remainder of this section will be on the selection and im-
plementation of electronic equipment in a high-volume auction.

Electronic equipment could be used to assist in the performance of five
functions: (a) auction control, (b) consignment, (c) remote data transmission,
and (e) bidding. The types of electronic equipment that may be used to per-
form these functions are illustrated in Figure 2.

The auction control function could be performed by a high-speed digital
computer (i.e., the central processing unit (CPU) and main storage unit
(memory)), centrally located at the electronic simultaneous-progressive
slaughter-cattle auction (ESPSCA) headquarters. When needed to supplement
the main storage unit, auxiliary on-line storage units, such as magnetic drums,

Consignment information from moderate-sized cattle feeders may be trans-
<table>
<thead>
<tr>
<th>COLUMN NO.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>LOT IDENTIFICATION NO.</td>
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<td></td>
<td></td>
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<tr>
<td>LIVE-WEIGHT</td>
<td>Steers</td>
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<td></td>
<td>Heifers</td>
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<tr>
<td>IN THE MEAT:</td>
<td>Steers</td>
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<td>Heifers</td>
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<td>CGW:</td>
<td>Choice 1-3, ≤ 660</td>
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<td>Choice 1-3, &gt; 660</td>
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<td>Choice 4-5, ≤ 660</td>
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<td>Choice 4-5, &gt; 660</td>
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<td>Good 1-3, ≤ 660</td>
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<td>Good 4-5, &gt; 660</td>
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<td>Good 1-3, ≤ 500</td>
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<td>Good 4-5, ≤ 500</td>
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<td>Good 4-5, &gt; 500</td>
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<tr>
<td>HIGH BIDDER IDENTIFICATION NO:</td>
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</tbody>
</table>

Figure 1. Bidding Board for a Simultaneous Progressive Slaughter-Cattle Auction.
mitted by using personal touch-tone telephone consignment terminals. Large-sized feedlot operators may instead use card-dialing telephone consignment terminals. Rural banks and farm supply stores may obtain a small, punched-card consignment terminal and make it accessible for a small per-lot fee or as a complimentary customer service. Consignment card files for the punched-card terminals could be prepared off-line by the use of specially perforated computer cards and a port-a-punch. Brokerage firms that offer consignment services to producers unwilling to purchase their own consignment terminal could buy or rent a teletypewriter consignment terminal. To facilitate rapid transmission of consignment data, these teletypewriter consignment terminals would be equipped to transmit from off-line prepared paper tapes.

Data would be transmitted to the CPU by using WATS lines, and telephone and teletype channels. All of the consignment terminals capable of receiving only audible transmissions from the CPU (i.e., the touch-tone telephone, the card-dialing telephone, and the small, punched-card consignment terminals) would be connected with the audio-response unit at ESPSCA headquarters via WATS lines. The consignment brokers' teletype-consignment terminals would be able to receive printed transmissions from the CPU, thus they would avert the audio-response unit and be connected directly with the CPU via leased voice-grade telephone channels. Teletypewriters installed at bidding terminals would receive transmissions from the CPU over leased teletype channels. All other hardware at each bidding terminal (i.e., the line printer and the cathode-ray tube display stations) would be connected with the CPU via leased standard voice-grade telephone channels.

To receive sale bill transmissions from the CPU, some participating buyers, such as the moderate-volume packer in Figure 2, may choose to buy or rent a teletypewriter terminal. Other buyers, such as the large-volume packer
in Figure 2, may instead equip their buying stations with a line printer terminal to receive the sale bill transmissions.

Finally, bidders at each bidding station could have use of one or more cathode-ray tube display stations. Comprising each cathode-ray tube display station would be a cathode-ray tube, an alphanemic keyboard, a programmed-function keyboard, and a fiber-optic light pen. Moderate-volume buyers likely would install only one cathode-ray tube display station, while larger volume buyers and brokerage firms would be more likely to install multiple cathode-ray tube display stations and display control units.

**Conduct of an Electronic Slaughter-Cattle Auction**

The ESPSCA would be conducted as follows. In the preparatory stage of the auction, any cattle feeder interested in consigning a lot of cattle for sale on the ESPSCA would use his touch-tone telephone to contact the ESPSCA headquarters. The cattle feeder would be greeted by the CPU's audio-response unit. By using a pre-established code, the cattle feeder could enter his identification number and request market information. Upon receipt of these transmissions, the CPU would verify that the requesting producer is a bona fide member of the exchange and verbally report the average, high, and low sale prices for cattle for specified trading methods during the current and previous auction sessions.

If the cattle feeder decides to consign one or more lots, he would transmit to the CPU the following consignment information: (a) the number of lots to be consigned; (b) the desired trading methods for each lot; (c) the number of head of each sex in each lot; (d) the location of the cattle at the time of sale; (e) the auction session for which consignment is being made; (f) the desired delivery interval; (g) the desired grading option; (h) whether his identity is to be revealed to bidders; and (i) his reserve bids. The CPU
would verbally repeat the consignment details for consignor verification, assign each lot a Lot Identification Number, and record the data in the lot's consignment file. If the consignor so requested, a grader would be dispatched and the grader's report would be included in the particular lot's consignment file.

As the auction session approaches, the ESPSCA computer would prepare to compile an auction sale bill by compiling a list of lots consigned for sale during this auction session. Subsequently, the computer would categorize these lots by trading method, sex composition, and delivery interval. The computer would then compile each lot description from the data in the consignment file for each lot. The sale bill would be transmitted to each packer-buyer station.

Each participating packer-buyer is warned of the approach of the auction starting time. Upon receiving the starting signal, each packer-buyer who is operating a CRT display station could use his programmed-function and alphanemic keyboards to enter command messages. These commands would permit the buyer to view one or more lot bid arrays on his CRT display screen. If the buyer desires to enter a bid on a particular lot displayed on his screen, he would select the desired bid increment and depress the appropriate key on his programmed-function keyboard. The packer-buyer would then enter the bid by pointing his display station's fiber-optic light pen at the last illuminated character in the previous bid for the desired lot and lot component. Immediately after receipt and registry of the individual bid increment, the display would reflect the new incremental bid and an "X" at the bottom of the appropriate bid array, indicating that the particular buyer is now the high bidder on the lot. In addition, the new incremental bid is registered on the CRT display screen of any other buyer who also is viewing the bid array for that particular lot.
As the auction progresses, the number of bids entered per minute will decrease. As bid entrance drops to a pre-determined rate per minute, the CPU would alert buyers that the end of the session is approaching. The cessation of bidding would be followed by the computerized identification of winning bidders. The final bid array on each lot would immediately be transmitted to the consignor, and the consignor would be asked to indicate, when appropriate, his choice of trading method and the number of animals to be supplied. Each buyer would then receive a list of lots purchased, the trading method for each lot, and number to be supplied from each lot. Finally, consignors would be given the name and phone number of the buyer of each lot they had consigned.

EVALUATION OF THE PROPOSED SYSTEM

The price-making and exchange system just proposed should be recommended for adoption in a given situation only if its adoption would result in a "better" exchange environment or "better" exchange results, or both, than if some other price-making and exchange system were adopted. If recommendations were made on this basis, it is not likely that the proposed system, or any other one system, would be recommended for all situations. The reason is that there are many dimensions or attributes of the exchange environment and results. Further, it is unlikely that one system will be superior in all dimensions. And, because the relative importance of various dimensions likely will vary between situations, it is not likely that one price-making and exchange system will be generally preferred.

To identify those situations in which the system just proposed might be recommended, the following procedure is suggested. First, important attributes of the exchange environment and results and indicators or measures of these attributes should be identified. Second, norms against which the measures may be compared should be established. In some instances, it may be suffi-
cient only to indicate desirable directions of change in the measures. Furthermore, either norms or desirable directions of change may depend on the situation or may be different for different participants (e.g., buyers vs. sellers). Third, sets of values for attribute indicators or measures should be obtained for alternative price-making and exchange systems. And finally, by using this information, systems or subsets of systems to be recommended for specific situations (i.e., for given relative weights on the various attributes of the exchange environment and results) should be identified.

In the remainder of this section, a rather modest attempt is made to use this procedure to evaluate and compare the proposed simultaneous auction and three other price-making and exchange systems— the telephone auction, the teletype auction, and the computerized exchange. The evaluation and comparison focuses on five categories of attributes of the exchange environment and results: characteristics of exchange outcomes, transaction costs, trader prerogatives, demands on facilitating institutions, and feasibility. An attempt is made to identify specific attributes within each category, to suggest measures for some of these attributes, to identify norms or desirable directions of change for the measures, and to qualitatively compare the four price-making and exchange systems with respect to each category of attributes.

Finally, some situations in which the proposed simultaneous auction might be recommended over the other three systems are identified. The results of this evaluation and comparison should be regarded only as hypotheses, which should be subjected to empirical test.

Specific attributes that should be considered in evaluating exchange outcomes include exchange efficiency, the division of gains between buyers and sellers, and the amount of interlot price variation. Measures of these characteristics have been defined in an earlier study [5]. Exchange efficiency may
be measured by the ratio of the actual to the potential gain from trade, and
the division of gains may be measured by the proportions of the potential gain
realized by buyers and by sellers. The variance of price may be used to
measure interlot price variation. Cet. par., both buyers and sellers would
prefer more efficient outcomes to less efficient ones, but the preferred divi-
sion of gains obviously would differ between buyers and sellers. Less inter-
lot price variation would be preferred to more because it is more equitable,
it makes formulation of bidding strategies easier, and it makes price differ-
ences associated with quality, location, and time easier to perceive. There
is some evidence to suggest that exchange outcomes are more efficient and
there is less interlot price variation with a simultaneous auction than with
a successive progressive (e.g., telephone) auction or a successive regressive
(e.g., teletype) auction [5]. It is likely that the simultaneous auction would
also result in more efficient outcomes and less interlot price variation than
a computerized exchange.

Costs of effecting transactions are reflected in the efficiency of ex-
change outcomes but perhaps deserve separate attention as well. Component
costs include costs of physical handling, costs incurred in anticipation of
exchange (e.g., advertising and strategy development), and costs incurred
during negotiations (e.g., bidder time). Cet. par., lower transaction costs
are preferred to higher costs. Johnson [4] concluded that transaction costs
are lower with teletype auctions than with telephone auctions in fed cattle
marketing, but there is little evidence on comparative transaction costs with
a computerized exchange or a simultaneous auction. It is likely that the
amount of bidder time required would be relatively high with a simultaneous
auction, at least compared with a teletype auction.

Trader prerogatives are determined by the exchange rules. Cet. par.,
fewer restrictions on traders should be preferred to more. Undesirable re-
restrictions that might be imposed include, for example, required assembly of the commodity before sale, no opportunity to choose among trading methods, and no opportunity to place reserve bids. An advantage of the simultaneous auction, as far as trader prerogatives are concerned, is that it can easily accommodate price offers for several trading methods. On the other hand, bidders may consider it a disadvantage of the simultaneous auction that, for instances in which there are multiple lot components for a single trading method, consignors would be permitted to choose quantity sold after the winning bidder and prices have been determined.

Dependence upon facilitating services, or institutions, or both, is an important issue in many agricultural-commodity exchange situations. Cet. par., less dependence upon facilitating institutions and services would be preferred to more. For example, it would likely be better if price differentials between quality categories did not have to be determined outside the price-making and exchange system. The simultaneous auction system does permit market determination of price differentials. This cannot be accomplished with the regressive (teletype) auction and has not been incorporated in telephone auction or computerized exchange systems.

Finally, feasibility of implementation should be considered in evaluating and comparing alternative systems. Among the factors detracting from the feasibility of implementation would be required enabling legislation, required establishment of a uniform grading system for the commodity, and required retraining of exchange participants. Cet. par., a system requiring less rather than greater cost and effort to implement would be preferred. One disadvantage of the simultaneous auction as far as feasibility of implementation is concerned is that it likely would require more retraining of participants, especially buyers. Implementation and continued operation of all four systems
may require that a "free rider" problem be overcome. That is, to ensure sufficient volume and income to operate the exchange it may be necessary to require all those who use the exchange, even indirectly (e.g., those who trade on prices determined in the exchange), to pay for the operation of the exchange.

Although all four of the price-making and exchange systems just discussed should be among those considered for adoption if centralized pricing in combination with direct movement is an important objective, the simultaneous progressive auction would probably rank high among these four if certain additional conditions exist. These additional conditions include considerable emphasis by exchange participants on overall exchange efficiency, a desire to avoid interlot price fluctuations, a desire on the part of sellers or buyers to have access to more than one trading method, a need for market determination of price differentials between quality and weight categories, and a willingness on the part of buyers to adjust to a new bidding situation. At least some of these additional conditions characterize exchange of slaughter cattle and, to some extent, may characterize exchange of other agricultural commodities.
SUMMARY

Centralized pricing and direct movement of the commodity from sellers to buyers are desirable features of a price-making and exchange system. Telephone auctions, teletype auctions, and computerized exchanges are systems that have these desirable features. The goal here has been to propose yet another system with these features. The distinguishing characteristics of the proposed system are use of a simultaneous progressive auction and multiple price determination. Specific objectives of this discussion were to describe the proposed system, to examine its applicability to slaughter-cattle marketing, to identify alternative types of physical facilities and equipment that may be used to implement it, and to compare it with selected alternative systems.

Neither the proposed system nor this discussion of it are without limitations. Perhaps the major limitation of the proposed system, as compared with the three alternative systems considered, is that buyers would be required to adapt to a new bidding situation and, in some instances, they could not be sure until sometime after the close of the auction just how many units of the commodity and which units they had purchased. This discussion of the proposed system is limited because an empirical analysis aimed at quantitatively comparing the proposed system and selected other price-making and exchange systems has not been undertaken.

This discussion does, however, suggest some tentative conclusions that may serve as a starting point for further work. A simultaneous progressive auction transaction system has advantages over other price making and exchange systems that permit centralized pricing and decentralized movement in that it reduces interlot price variation, it offers sellers and buyers a choice of trading methods, and it permits market determination of price differentials
for quality and other characteristics. As such, this system may be one that should receive serious consideration by groups interested in improving marketing systems for agricultural commodities.
REFERENCES


FOOTNOTE

1/ If consignors are not permitted to withdraw units of a lot after the bidding closes, then bidders may enter bids so as to minimize the cost of becoming the high bidder. But if they do this, there is no reason to expect that bids on the various lot components will reflect differences in values placed on the components by bidders. This is because a bidder may raise a bid on a lot component that is relatively overpriced rather than raise a bid on a lot component that is relatively underpriced if by doing so he can become the high bidder on the lot at a lower cost, i.e., if he can become the high bidder by offering less additional money for the entire lot than the previous high bidder offered. This likely would occur if one or more lot components represented a very small proportion of the total quantity in the lot.