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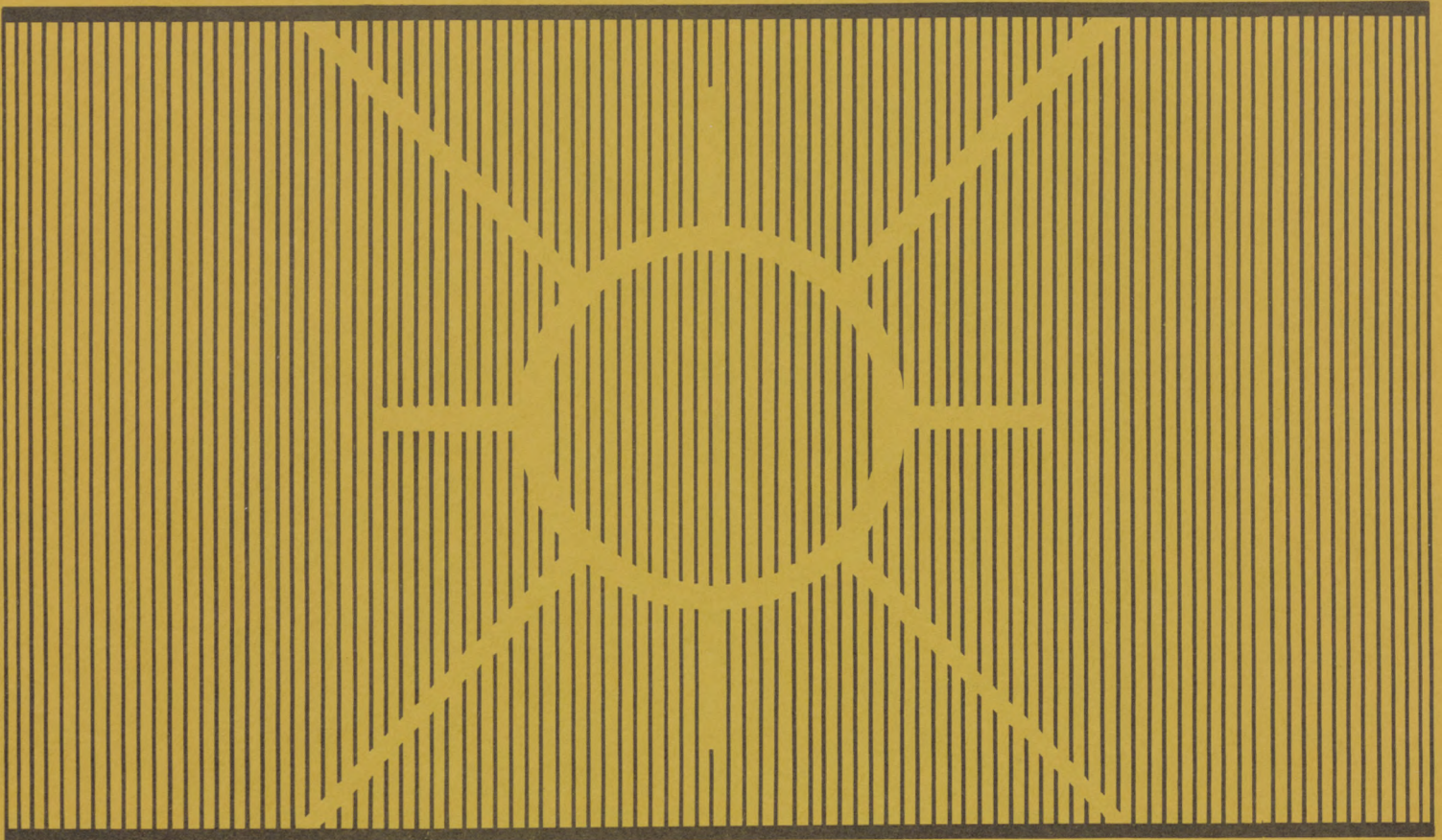
Studies of the
Organization and
Control of the U.S.
Food System

Commodity Pricing Systems:
Issues and Alternatives

Marvin L. Hayenga, editor

WP-39

August 197



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Foreword

At the 1979 Annual Meeting of the American Agricultural Association, the North Central Regional Research Project NC-117 organized a Symposium on Commodity Pricing Systems: Issues and Alternatives. This working paper contains the three papers presented at the symposium. The first paper focuses on current policy issues regarding commodity pricing systems and the recent policy recommendations of the Secretary of Agriculture's Meat Pricing Task Force. The second paper examines the controversial formula pricing systems used in several commodity marketing systems and some policy prescriptions. The last paper tentatively appraises electronic marketing systems as a potential remedy for inadequate market information or poor market performance.

We believe that this examination of commodity pricing systems brings into clearer focus both the underlying causes of recent controversy in some commodity markets and the suitability of some potential remedies that have been proposed.

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Current Policy Issues
Regarding Commodity Pricing Systems*

by

V. James Rhodes

Issues may arise from the grassroots at consumer or producer level or from the interaction of federal agencies with client industries. Recent issues concerning thin markets illustrate that observation. Three recent cases include producer concern about thin markets in eggs and in beef and the concerns of the Commodity Futures Trading Commission (CFTC) and the Department of Justice about committee price-reporting on certain commodity exchanges. As most of my attention will be on beef, let me briefly dispose of the other two cases.

The CFTC staff about two years ago reported on three situations in which committees on supervised exchanges were issuing spot market quotations on rather thin markets. The three included grain at the Kansas City and Minneapolis exchanges and sugar at the New York Coffee and Sugar Exchange. The sugar pricing case had the most severe problems of a thin market. Actual spot transactions were infrequent--about once every ten days. A committee issued daily price quotations based on its judgment of the market. The possibilities of committee manipulation seemed apparent, but no evidence of inaccurate or improper price quotations was found by CFTC. Nevertheless, the Justice Department moved against the sugar committee. A new committee system has been devised with the

*Presented at AAEA Symposium "Commodity Pricing Systems: Issues and Alternatives," Pullman, Washington, 31 July 1979.

objective of eliminating any possibility of manipulation. This new system has been cleared by Justice and is in the process of CFTC clearance.

Meantime, the Minneapolis committee quit making spot price quotations, and the Kansas City exchange seems to have shown that their committee procedure is mainly mechanics that are not subject to possible manipulation. In both grain cases, there were more transactions than in sugar, resulting in less credibility problems for the price reporters. (Material gathered from conversations with John Helmuth, Blake Imel, Vern Pherson, Marvin Hayenga, and others.)

The credibility of reported prices and of the price reporting system is a common theme in these thin market issues. Producers, of course, have frequently been distrustful of prices and pricing institutions in their markets. In recent years two groups have had their day on the Washington scene as they complained of the pricing system for their commodity. Egg producers held the stage for several years in the early 1970s. Meat and especially beef has received attention recently. As the issues in eggs and beef have many similarities, I'll focus on beef in the short time available.

All of us are familiar with those political devices such as Congressional hearings, the introduction of bills, special studies, and governmental task forces by which government gauges the extent of public discontent and either shapes a response or postpones it until the discontent withers away.

You also realize that there are many rings in the Washington circus. Even though beef pricing has received the full gamut of political attention in terms of hearings, bills, studies and task forces, it is still likely that the average Congressman has little knowledge or concern about the Yellow Sheet and the accuracy of its reporting of wholesale beef prices. Thus, we are discussing a genuine political issue but one that is still at the localized level of Congressional committees and the U.S. Department of Agriculture. Whether it actually mushrooms into an issue to be dealt with by the Congress and President is a matter of conjecture.

Background

A technical study of the National Commission on Food Marketing in 1966 expressed concern about formula pricing in the wholesale meat industry. Among its concerns were:

- (1) the accuracy with which a narrowing base of negotiated prices can reflect supply and demand conditions, and
- (2) the possibilities of manipulation of quoted prices.

Recent concerns have largely been expressed through legislative hearings. The leading Congressmen have been from the Cornbelt. Congressmen Thorne of Nebraska and Bedell of Iowa held Agriculture subcommittee hearings in the fall of 1977. They introduced a bill entitled the Meat Market Reporting Reform Act which proposed certain penalties for false reporting. Their efforts also helped to instigate a special study by GAO in 1977 entitled, Marketing Meat: Are There Any Impediments to Free Trade? It was a superficial effort that summarized allegations by the Meat Price Investigations Association (also headquartered in Iowa) and the rather sensational story in the December 6, 1974, issue of the Wall Street Journal as to how the manipulation of the Yellow Sheet's quoted prices was possible.

The most concerted effort has been led by Congressman Neal Smith of Iowa in his role as chairman of the House Small Business Committee. He has held hearings in 1977, 1978, and as recently as this month. Congressman Smith has shown great concern about the alleged deficiencies of the Yellow Sheet as well as the growing market power of the nation's largest beef packer, IBP.

Among the findings and conclusions of the Smith Committee as published in their report of October 13, 1978, (p. 32) were:

- "Of all meat sales, 70 to 90% are based on 'formula pricing'; that is, based on the price as shown on 'The Yellow Sheet' on the day of shipment or some day in the future."

- "Based upon a detailed study of 'The Yellow Sheet' for a 25-day period, 'The Yellow Sheet' is not effectively servicing the industry because:

- (a) Their prices are based on a thin market.
- (b) The detailed study indicated that a majority of their prices are not backed by any trade nor identified as based on no volume.
- (c) They utilize trades in determining price [in ways] contrary to their published rules."

- "Under existing law and reporting practices, 'The Yellow Sheet' is subject to being easily manipulated;"

- "The giants in the industry are successful by using the present system of utilizing only 'The Yellow Sheet' as their basis for trading and are opposed to change;"

- "The USDA has recognized the problems detrimental to the industry but has been ineffective in enforcement or recommending necessary changes."

In response to these Congressional concerns, the USDA in December 1978 published a quickie study, entitled the Beef Pricing Report. Their data indicated that 70% of steer and heifer carlot carcass sales were formula priced, but that only about one-half of the 30% of negotiated sales was reportable. Trades actually reported to the Yellow Sheet were only about 2% of all volume rather than the 15% possible. However, on the basis of admittedly limited data, the analysis found no statistical proof that:

- (1) the Yellow Sheet quotations reflected inaccurately the prices reported to it,

- (2) Yellow Sheet prices were significantly different from average negotiated prices, or that
- (3) formula prices on the average were significantly different from average negotiated prices.

While this report did not confirm the worst suspicions of the Smith committee, it did not quiet all concern. Clearly the reported volume of trades to the Yellow Sheet is a tiny fraction of all trades.

Congressman Smith introduced a bill, H.R. 91, in this current session of the Congress that is consistent with those findings. It is vague in spots but seems aimed at:

- (1) mandatory reporting of negotiated carlot trades,
- (2) stiff penalties for furnishing or reporting false price quotations,
- (3) licensing of meat price reporting services, and
- (4) the establishment of a Meat Industry Marketing Standards Board with responsibilities for recommending specific policies concerning a national computerized market for wholesale beef, the prohibition of formula trading, and the reporting of meat prices.

The passing of such legislation and its vigorous enforcement would represent far-reaching mandatory changes in an industry that has stoutly resisted governmental regulation.

In response to these legislative concerns and the pro and con industry pressures thereby generated, the Secretary of Agriculture set up last April a ten-member Task Force on Meat Pricing. The Task Force contained three members from the meat industry, four members from producers, one representative of consumer groups, and two agricultural economists from state universities. The Task Force was instructed to recommend:

- (1) improvements in meat marketing, pricing and price reporting,
- (2) the USDA response to H.R. 91, and
- (3) any additional legislation in this area that USDA should seek.

The Task Force held six days of public hearings, accepted all written testimony offered it, and then developed by June 12 a report to the Secretary.

Task Force members could question each of the many witnesses and could call upon legal and economic expertise provided by the USDA. The public hearings predictably contained much old material and the singing of familiar litanies, but some new evidence was developed and the overall impact was educational.

It quickly became clear to the public members that the industry-producer majority had already made up their minds on the second and third of the three charges to the Task Force. They were generally opposed to Neal Smith's general approach and to H.R. 91 and--indeed--were opposed to any new legislation.

The strong antipathy of those industry members to governmental intervention of any sort set narrow constraints upon the Task Force. The problem was how to recommend changes and improvements that did not involve governmental "thou shalt" or "thou shalt not."

Most but not all of the testimony was in the same vein. Fairly representative was the testimony of the executive secretary of the feedlot division of the Kansas Livestock Association. Referring to Neal Smith's H.R. 91, he said, "In short, his program is designed to allow the government more power to decide what is reported and who reports it. Smith has overlooked one very basic factor in his attempt to replace Lester Norton, owner of The National Provisioner, with the government. That is the fact that cattlemen distrust government even more than they distrust Lester Norton." While none of us other three members on the Task Force were avid supporters of governmental regulation, the recommendations would likely have been a bit stronger if we had been the majority.

The major recommendations of our Task Force focused on voluntary efforts by industry and encouragements by government rather than regulation. We easily agreed to oppose any ban on formula trading. We found formula trading to be operationally very efficient and widely acceptable to industry participants. A 50-employee meat distributor in Montana put it this way in his letter to us.

"...companies in our situation don't 'buy meat,' we select a supplier whom we must count on then to keep us competitive." "In the absence of formula pricing, which automatically picks up the market movements we would be priced off the supplier's price list."

We easily agreed that the carcass market was thin and getting thinner. However the gap between the 2% reported and the 30% negotiated suggested that the proportion reported could be increased through industry efforts. We suggested a little armtwisting by government of a few big firms that have a policy against reporting. As a few of these do not report on advice of their attorneys who are worried about antitrust suits, we urged investigation of the legal realities and steps to protect price reporting from antitrust concerns if there is in fact a problem. We also urged the Yellow Sheet to cover more aggressively the national market and to reduce its dependence on prices phoned in. There were a few of us who suspected that some sort of mandatory response system and a new price reporting service will be necessary to achieve a price reporting system that is both accurate and largely free from public suspicion.

The Task Force did an about-face on an electronic market. That concept was strongly opposed by the majority of testimony. Packer and producer groups and firms, such as IBP, went into detail as to why the problems in the trading of meat cannot be handled by a computer. The industry representatives on the Task Force seemed generally to agree. Agricultural economists

in testimony and on the Task Force, consumer representatives, and Mr. William Albanos (the director of the Meat Sheet which is a competitor of the Yellow Sheet) were virtually the only supporters of electronic trading.

However, the final report of the Task Force carries a rather vigorous endorsement of electronic markets. Perhaps, we in the profession can claim some credit for that educational job. The most credit, however, must go to Mr. Albanos. In concert with General Electric, he has developed a computer software system for wholesale meat trading. Several large firms, including one and perhaps two represented on the Task Force, have agreed to participate in pilot runs of this electronic market this fall, provided enough buyers and sellers can be signed up. Thus the Task Force eventually perceived that an electronic market could be feasible and that private enterprise was trying to make one work. The endorsement of the enterprise became possible. It is worth noting that in today's political climate, an electronic market has the powerful advantage of being a potential free enterprise tool for change.

A strong supporter of electronic markets might well question why we as a Task Force spent so much effort on the Yellow Sheet, etc. Won't an electronic market solve all the problems? Perhaps it will. However, some of us 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. Formula trading and direct negotiation may continue to be more attractive. Thus, we felt it wise to hedge our bets and to make recommendations improving the present system in case the electronic market leaves many problems unsolved.

As I reflect on the Task Force experience, I would suggest two lessons for us agricultural economists:

- (1) a greater appreciation for the relevance of the quality of a price reporting system to the whole question of thin markets;
- (2) a greater appreciation of the extent to which a political mandate is essential to much public action.

Let me elaborate briefly on the last point. Despite the attention given by the Smith committee, there was not and is not, a strong mandate for reform of the meat pricing system. Some market participants complain a bit and a very few are quite exercised about the problems. But there is a silent majority who are busy in the day-to-day business and who see no problem big enough to call in the feds. Those conditions dominate the feasible solutions.

FORMULA PRICING: A COMPARATIVE ANALYSIS
OF FIVE COMMODITY MARKETING SYSTEMS

by

Marvin L. Hayenga and Lee F. Schrader*

INTRODUCTION

Formula pricing, its use and potential for abuse, has been a controversial subject in the food industry during the last twenty years, and perhaps longer. Formula pricing contracts, as we shall use the term, usually are long term purchase-sales arrangements in which the price of each transaction is not individually negotiated; rather, an infrequently negotiated premium (or discount) is typically added to a specific market price report on some specified future date to facilitate a long-term series of individual transactions. If buyers and sellers once agree on the formula, subsequent transactions are routine and their transaction cost is practically zero.

Formula pricing is a delegation of price discovery to those who negotiate prices. Consequently, the market mechanism and the price reporting services which generate the prices used in formula-priced contracts have an increasingly important and potentially more difficult burden placed upon them [1, p. 24]. Formula pricing arrangements reduce the fraction of total supply entering into market price determination, and the more thinly traded markets may be more sensitive to erratic or manipulative influences on market prices or market price reports [8, p. 56; 3, pp. 1, 7-13; and 13, pp. 2-5].

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Recently, there has been much controversy in the meat industry involving formula pricing systems and price reporting systems. This is evidenced by several court cases in the beef industry, extensive hearings before a House Small Business subcommittee, a special Meat Pricing Task Force assembled by the Secretary of Agriculture, and a Congressional bill providing for licensing and regulating market price reporting services, mandatory price reporting, and consideration of alternative pricing systems, including a ban on formula pricing.¹ Also, there have been situations where the increased incidence of vertical integration and formula pricing essentially led to the demise of some viable negotiated markets (e.g. live broilers, eggs), and a court case on egg price reporting is currently pending.

To assist in appraising the sources of the controversy and some of the policy prescriptions (which may be forerunners of proposals in other industries), this study focuses on formula pricing in five commodity marketing systems where formula pricing was known or expected to be heavily used. We propose to analyze the extent of formula pricing use in those markets, the incentives for or benefits of formula pricing, and the disadvantages and problems associated with formula pricing. Through a comparative analysis of formula pricing in the beef, pork, cheese, turkey, and egg markets, we hope to provide some insights into the similarities and differences found in these markets, the sources of the controversy surrounding formula pricing systems, and to propose a few policy alternatives which might be beneficial.

The results summarized below were primarily obtained from surveys of the largest firms involved in the markets where formula pricing was used. In beef and pork, the large slaughter-processing firms surveyed controlled

¹H.R.91, 96th Congress, 1st Session, introduced by Rep. Smith and Conte, 1979.

40 and 60 percent of the total market volume, respectively; the major cheese marketing firms surveyed controlled 85-90% of the cheese consumed in the U.S.; the firms surveyed in the turkey subsector controlled about 45 percent of the industry's volume. In addition, supplemental surveys of a smaller number of buyers and suppliers provided confirming evidence of the extent of formula pricing use and supplemental views of the perceived advantages and problems. The egg market analysis draws upon a recently completed comprehensive study of coordination systems in the egg subsector [10] and one author's in-depth experience from years of work with the egg subsector.

Formula Pricing Utilization in Five Markets

Our studies of the markets where formula pricing was used in five commodity subsectors revealed significant differences in the use of formula pricing. These differences were not only between commodities, but at different levels of the marketing system and between closely related products at the same level of the commodity marketing system (see Table 1).

Beef¹

The primary use of formula pricing in the beef subsector occurs in the beef carcass and wholesale cut markets. In a typical formula price contract, the quantity, product specifications, delivery date, and premium or discounts (reflecting trim, grade, etc.) are established one to five days (sometimes longer) before shipment; the premium usually is added to the carcass price reported in the National Provisioner (the Yellow Sheet) on the day prior to shipment, which serves as the base price for the transaction.

¹For more detail, see [6].

TABLE 1
PRICING SYSTEMS IN FIVE COMMODITY SUBSECTORS, 1978

PRODUCT SUB-MARKET OR MARKET LEVEL	BEEF		PORK		CHEESE		TURKEYS		EGGS	
	BEEF CARCASS	BOXED BEEF	FRESH	PROCESSED	FIRST HANDLER TRANSACTIONS	PACKAGED AND PROCESSED	LIVE	PROCESSED	NEST RUN	GRADED AND PACKED
SUB-MARKET SHARE (%)	50+	40+	60	40	100	100	100	100	100	100
INTRAFIRM ¹ TRANSFER					20		60		35	≤ 5
FORMULA PRICED	70	10-20	40	5+	65-70	25-35	33	20	60	90
NEGOTIATED PRICES	30	80-90	50	1-4	10-15	1-2	7	35	10 ²	5
PRICE LIST			10	90+		60-70		45		

¹Involves vertically integrated cheese production facilities, and a combination of vertically integrated production, producer-owned cooperatives, and cost-plus or service contracts in the turkey and egg subsectors.

²Includes direct sales of eggs to breakers, and resales among egg handlers; thus, there's some double counting in the nest run egg estimates.

Formula pricing is used in approximately 70 percent of the beef carcass sales which comprise 50-60 percent of the output of beef slaughter-processing firms. In contrast, only 10-20% of boxed beef primal and subprimal sales are formula-priced. Boxed beef formula price contracts primarily involve boxed primal cuts which are sold as a carcass unit, with the formula price related to the reported Yellow Sheet carcass price, and formula priced ground beef or hamburger patty sales which are based on the lean trim price reports. Since boxed beef is the most rapidly growing segment of the beef market (now 40% or more), and may continue to displace some centralized retail fabrication facilities in the future, it seems very likely that the negotiated portion of beef transactions could increase. However, the growth of boxed beef continues to remove volume from the carcass beef market, making the negotiated part of the carcass market more thinly traded and susceptible to problems, an area of concern if it is to remain the primary base for formula-priced transactions.

Pork¹

There has been a gradual shift toward more processing of pork by slaughter firms, with a corresponding shift in the mix of pricing systems employed. Slaughter-processors sell approximately 60% of their pork as fresh pork cuts (loins, Boston butts, fresh hams, bellies, etc.). Slightly less than 40% of slaughter-processor pork sales were processed pork (smoked or canned hams and picnics, bacon, lunch meats, frankfurters, sausage, etc.).

On fresh pork cuts, formula pricing arrangements are used in approximately 40% of the transactions, firm prices are established in 50% of the transactions through negotiated or offer-acceptance pricing systems,

¹For more detailed analysis, see [3].

and a daily fresh product price list is the primary pricing vehicle for the remaining 10% of sales. The prevalence of formula pricing in fresh pork transactions apparently has not changed much in the last fifteen years; formula pricing was used for approximately 40% of fresh and frozen pork sales in 1965, according to a study by the National Commission on Food Marketing.

In contrast, over 90% of the processed pork sales are based upon a weekly price list for packer-branded products. Less than 10% of processed pork sales were "private label." Over half of the private label transactions are on a formula pricing basis, and the remainder are priced using the branded price list minus advertising costs, or are individually negotiated transactions.

Overall, approximately 25% of all pork sales are formula-priced, 35% of the prices are established at the time of the transaction through negotiation or offer-acceptance, and 40% of sales are priced via a daily or weekly packer price list.

Cheese¹

Formula pricing in the cheese industry is found at two levels of the marketing system: in cheese purchases by large marketing firms (like Kraft and Borden) from many cheese manufacturing plants; and in sales arrangements between these large cheese marketing firms and their retail, food service, and industrial customers. At each level of the marketing system, the standard formula pricing arrangement utilizes the prevailing price at National Cheese Exchange on the date of manufacture as the pricing base, to which a prenegotiated premium (reflecting services provided, costs incurred, and profit) is added. Despite the fact that the National Cheese Exchange trading volume is less than one percent of the cheese marketed in

¹For more detail, see [5].

the country, it serves as the balancing mechanism for inventory surpluses or deficits in the cheese industry, and as the base price for 90-95 percent or more of the cheese sold by U.S. cheese manufacturing plants to large cheese processing and marketing firms. These marketing firms also manufacture about 20 percent of their requirements, and import the remainder (6-7 percent of sales) directly or through brokers at negotiated, firm prices. Thus, 85-90 percent of cheese purchases by the large cheese marketing firms are through long term formula priced contracts, either written or oral, in which the prenegotiated premium frequently remains stable for as long as a year.

Formula pricing plays a less important role in large marketing firm sales to retail, food service, and industrial customers. Of the 50-55 percent of cheese going through retail channels, approximately 60 percent is sold under a manufacturer brand, with a weekly manufacturer's price list as the standard pricing mechanism. On the 40 percent private label sales to retailers, some marketing firms use a price list that is essentially the branded price list less advertising and promotion costs. Others utilize a formula-priced selling arrangement similar to the one used for cheese purchases, but with a higher premium reflecting their services rendered, packaging costs, and profit.

The food service industry is the most rapidly growing market for cheese, with 30-40 percent of the cheese volume. A weekly or monthly price list is used for most sales through specialized food service distributors. Approximately 20-30 percent of food service sales are directly negotiated long term formula price arrangements with large volume fast food chains which have special product specifications. The unusual aspect of some of these formula arrangements is the base price calculation -- the price this month is based upon the average Exchange price last month, so "menu margins" are based on known costs.

Industrial cheese sales (approximately 10 percent of sales) by large cheese marketing firms are typically specially formulated ingredients for frozen pizzas, frozen entrees, cheese flavored products, etc. A high proportion of these sales are formula priced arrangements with large industrial customers, with the price established at the date of manufacture.

Thus, 25-35 percent of the large marketing firms' sales are formula priced, based directly on the National Cheese Exchange prices. Another 5-10 percent of sales are based on a price list so closely tied to the National Cheese Exchange prices that they implicitly are formula priced sales. Approximately 65-70 percent of sales are based on a price list which is loosely related to the National Cheese Exchange (the raw material cost is an important influence in the pricing decision). Only 1-2 percent of the sales of the large marketing firms are spot sales on a firm priced basis; these often are sales of surplus inventories to another marketing firm through the National Cheese Exchange.

Turkeys¹

Approximately 60 percent of the live turkeys produced in the United States are produced and slaughtered by the producing firm, slaughtered by cooperatives, or produced under contracts (e.g. cost-plus or service fee contracts) where the ultimate producer payment is not directly tied to the spot market price. About 80 percent of the remainder are transferred from the grower to the processor under contract terms that relate the transaction price directly to the Urner-Barry or USDA market price quotation for frozen, ready to cook turkeys (though some contracts may have price floors, ceilings, or "sharing" formulas), and 20 percent are negotiated firm prices.

¹For more detail, see [9].

At the processed turkey level of the marketing system, approximately 45 percent of sales are further processed and processor-branded products which are sold via a price list. The processor price lists are generally changed weekly, monthly, or even less frequently, and are not sensitive to daily changes in market prices.

Approximately 35 percent of processed turkey or turkey product sales are negotiated price transactions. The market share of the unadorned Grade A whole frozen turkey (which serves as the base price quotation in most formula arrangements) has been declining; whole frozen turkeys now comprise only 15 percent of all turkeys sold, and approximately 30 percent of the negotiated market volume. The remainder of processed turkey sales (approximately 20 percent) are formula priced; the base market price quotation used is the Urner-Barry or USDA whole frozen turkey price quote.

One input into the Urner-Barry turkey price quotation system is the Urner-Barry computerized price reporting system, in which subscribing processors report their prices, and are provided summary information on trading by all subscribers; this information is also used in developing the Urner-Barry price quotes. Present participants in the computerized information exchange account for about 30 percent of federally inspected turkey slaughter.

Eggs¹

Eggs are formula-priced at two levels in the marketing system -- the producer-first handler market for nest-run eggs, where the first handlers typically assemble, grade, and pack eggs (though some trading among the first handlers does occur), and the subsequent level of the market where graded eggs are sold to the retail and food service sectors.

¹For more detail, see [10].

In the nest run or first handler level of the market, 35 percent of the eggs are produced by vertically integrated firms. Sixty percent of the nest run eggs are transferred to first handlers via a long run formula-priced arrangement where most contracts do not have a clear cut base price or premium established, just the handler's commitment to use his "best efforts" to achieve a "competitive" price for the producer. Yet, most handlers determine their payment by establishing a fairly stable discount from the pricing formula which they, in turn, have established with their primary customers. Thus, while the formula is not explicit in many cases, it is used implicitly in a large proportion of these transactions.

Very few of producers' nest run egg sales involve negotiated prices. However, negotiated sales of nest run eggs to egg breakers or among assemblers and first handlers are one point in the egg marketing system where spot market price negotiation can be observed. These negotiated transactions (which include 1/2 percent of the nest run egg volume, traded through the Egg Clearinghouse, Inc., an electronic exchange for nest run eggs) involve approximately 10 percent or more of the nest run egg volume.

Approximately 90 percent of graded eggs purchased by retailers and food service firms are acquired under a long term formula pricing arrangement. In most cases, graded eggs that don't satisfy other customers' requirements are sold to egg breakers, also on a formula price basis. Approximately 5 percent of graded egg purchases are negotiated price transactions, primarily when suppliers build up inventories in excess of their contract commitments, or retailers require extra volume for sales promotions. Thus, negotiated sales of graded eggs are sporadic and small in volume.

The egg price quotations typically used in formula-pricing arrangements at both the nest run and graded egg market levels are the graded egg price quotations by Urner-Barry for sales in the Eastern two-thirds of the United States, and by the USDA on the West Coast. Yet, the Urner-Barry reports do not represent any specific graded egg market transactions; rather, the Urner-Barry report reflects changes in egg prices at other levels of the marketing system, changes in inventory levels, etc. The USDA price quotation does reflect prices for graded eggs paid by retailers.

Primary Benefits and Problems of Formula Pricing

Beef and Pork

Because many of the same retail, food service and slaughter-processing firms operate in both the beef and pork markets, and the basic product and market characteristics are similar, it is not surprising that the primary benefits and disadvantages of formula pricing expressed by the firms surveyed are quite similar in these markets. As would be expected when most firms use formula pricing on at least a small proportion of their beef or pork purchases or sales, the advantages of formula pricing typically were considered to outweigh the disadvantages. This was the case for a majority of the buyers and sellers interviewed, though there were some strong contrary views.

The primary disadvantages cited by industry participants were:

- (a) The inability of the formula pricing firm to influence its own fate, relying on a price determined by somebody else.
- (b) The lack of an authoritative market price report representative of prices on the West Coast; thus, formula pricing was impractical for West Coast firms.

- (c) Firms were unable to capitalize fully on their forecasting or negotiating skills.
- (d) Reported market prices were alleged to occasionally be out of line with actual market prices for a day or two, though they were generally considered representative of actual market prices in the long run.
- (e) Some large buyers refused to use formula pricing arrangements.
- (f) On boxed beef cuts only, wide reported price ranges and wide fluctuations in daily prices created risks considered too large by many potential formula price users.

While not specifically mentioned by the firms surveyed, formula pricing also reduces trading volume in the negotiated market. In carcass beef and fresh pork product markets where more processing by slaughter firms also has removed some basic commodities from the price determination process, the end result is some thinly traded markets. And the number of reported transaction prices are even smaller -- some firms elect not to report prices paid or received to reporting firms, or their products do not fit in standard reporting categories [2, pp. 4-5; 11, pp. 31-32]. Firms with a high proportion of formula-priced transactions may also have a greater incentive to change their behavior to influence the basic market price or the price report.

The primary advantages of formula pricing cited by meat industry participants were:

- (a) The reduced risk of prices on forward sales or purchase agreements looking bad relative to the current market price or competitor's prices.
- (b) Assured forward sales for sellers; assured volume with satisfactory product quality for buyers with tight specifications and high volume requirements.

- (c) The greater efficiency of each individual transaction for both buyer and seller -- less purchasing or sales staff and negotiating skill required, less market information search, less communication time and expenses, etc.
- (d) Greater bargaining equity, with less chance of being "taken" by a better-informed trader.

Never being at a disadvantage compared to current market prices (e.g. presumed competitors price) seemed to be a strong incentive to use formula pricing, along with the transaction efficiency and reduced quality risk of a long term buyer/seller arrangement.

Packers and retailers were asked to estimate how their costs would change if they could not use formula pricing. Based on estimates from ten firms, the additional transaction cost resulting from a ban on formula pricing could be as much as five million dollars annually for pork, and much higher for beef -- perhaps 15 million dollars annually. This does not include (a) the risk premium that slaughter firms would require for negotiated sales a week or ten days in advance of shipment -- the kind of lead time often required to assemble sufficient product volume for supermarket features of particular beef or pork products, or (b) the operating inefficiencies associated with more sporadic and uncertain product volumes for both buyers and sellers.

Cheese

Formula pricing of cheese sold by cheese manufacturing plants has been the standard way of doing business for so many years that most cheese plant managers could not conceive of any other way of pricing their cheese.

The primary advantages of long term formula pricing contracts cited by industry participants were:

- (a) An assured outlet for a perishable product in a market where seasonal surpluses and shortages periodically develop, at little or no price risk for the cheese plant.
- (b) Assurance that the price of cheese received by the cheese factory will allow their paying price for milk to be on a par with competing plants also selling cheese on a formula basis.
- (c) A continuous supply of high quality cheese, or cheese meeting unusual specifications, with little risk of the product not meeting the buyer's specifications and endangering consumer franchises.
- (d) A more manageable margin for large cheese marketing firms, and prices comparable to competitors for retail, food service, and industrial buyers.
- (e) Avoidance of a price leadership system developing at the first handler level of the cheese marketing system.

While the disadvantages of formula pricing were generally not considered significant, some industry members expressed concern about potential manipulation of the Cheese Exchange price by four or five Exchange members who trade a high proportion of the Exchange volume. However, upon closer examination, significant artificial price enhancement by any one firm acting alone for more than a very short period of time seems impractical because of the instantaneous communication of prices and the potential for countervailing reactions to price distortions by Exchange participants controlling 85-90 percent of the cheese in the country.

In general, there was a high level of satisfaction with the performance of the formula pricing system and the very thinly traded National Cheese Exchange that serves as the focal point in the price determination process at all levels of the cheese marketing system in the United States.

Turkeys

The primary benefits of turkey formula pricing lie in reducing uncertainty for producers, and facilitating coordination of the production, processing, and distribution functions. Producers face less risk with an assured outlet for a perishable product, while buyers face less price risk in a formula price transfer than in negotiating a firm price at the time of production planning. Arrangements for packaging materials and turkey supplies must often be made before the buyer or seller is willing to take the risk associated with a firm price for turkeys, and negotiating a price for an earlier agreed-upon transfer is not practical. Thus, the coordination of the growing, processing, and distribution functions is achieved while the ultimate price remains open, to be established by a third party.

Formula pricing of turkey products was least used by the largest and smallest processing firms. The largest firms felt that their own perspective on the appropriate market price is equal or superior to the market price quotations, and some felt that their product is sufficiently differentiated to be unique. The smallest also produced a differentiated product with loyal local consumers, so a price list was used instead of a price formula. Other reasons for not using formula prices included: (a) the desire to maintain greater control of the ultimate price paid or received; (b) some firms are located in areas where price quotations are not representative of local price; and (c) some firms feel that they can negotiate better prices than those achieved through formula pricing.

Eggs

Formula pricing of eggs is seldom questioned by participants in the egg subsector. A National Egg Pricing System Study Committee (an industry group) in 1971 listed as one of their recommendations "Establishment of a

national base price quotation system". Most industry members do not wish to abandon formula pricing, but they do desire a better system of arriving at a base quote. A widespread concern is with the accuracy of the price report, derived from very small or, sometimes, nonexistent negotiated trading volume.

The basic benefits of formula pricing in the egg subsector are physical marketing efficiency and assured product quality. Assembly of a perishable product requires a close, reliable producer-handler relationship. A stable routing system is essential for efficient store-door delivery, and the retail labeling service and the quality assurance desired by the retailer also may be provided better by a stable buyer-seller relationship. While the extent and cost of pricing inaccuracy is unknown, the benefits of long-standing buyer-seller relationships are widely acknowledged in the egg subsector.

Summary and Conclusions

The extent of formula pricing in the five industries studied varied significantly, ranging from 90-95 percent or more of the cheese sold by cheese manufacturing plants to large cheese processing and marketing firms, to less than 20 percent for boxed beef and less than 10 percent for processed pork products.

Formula pricing lowers internal transaction costs and frees people from the task of negotiating prices. It facilitates close coordination of physical transfer of perishable commodities. Often risks are shifted in a way that is desirable for both parties involved in a transaction. When desired quality and quantity can satisfactorily be assured only through long term sales/purchase arrangements, formula pricing is an attractive pricing system. Both buyer and seller are assured a price in

line with competitors' prices at the time of delivery. Firms using formula pricing for both raw material purchasing and product sales find that system useful in managing their margins. Many small firms feel that formula pricing reduces bargaining disparities between themselves and their larger, better informed suppliers or customers, enhancing their long term viability. Formula pricing may be an alternative to a higher degree of vertical integration in some subsectors. In some commodity marketing systems, shifting to alternative pricing methods would be traumatic, with a high initial cost and perhaps higher cost per unit in the long run.

In the commodity subsectors analyzed, formula pricing has been a contributing factor, if not the primary factor, causing some negotiated markets to be thinly traded, and putting added stress on the negotiated market and the price reporting system in those primary markets. The primary disadvantages noted for formula pricing in the five subsectors studied were the perceived inaccuracies in reported prices, and the suspicions regarding manipulation of either the thin negotiated markets or the market price reports. However, in our subjective assessment, the degree of dissatisfaction expressed ranged from very little in the cheese industry to substantial in the carcass beef and egg markets, with more moderate levels of concern in the pork and turkey markets.

Why is the incidence of formula pricing so different in these markets? While the answer is not entirely clear, we speculate that there are several contributing causes. The least amount of formula pricing is found in the packaged and processed cheese and processed pork markets where processor brand franchises are well established, and administered price lists are feasible and preferred by the seller (and perhaps by the buyer, too). Only a small amount of boxed beef is formula priced, partly because

buyers dislike the price risk associated with wide ranges on boxed beef price reports (which may be due to poor product standardization, or imperfect market arbitrage on boxed beef cuts). But, the longer shelf life of boxed beef products (compared to beef carcasses) also may reduce meat packers' incentive to insure continuing buyer-seller relationships through formula-priced arrangements on boxed beef relative to beef carcasses. More fresh pork may be formula-priced than the comparable beef primal cuts because of pork's greater perishability, the greater perceived risk of using boxed beef pricing quotations, and the relatively recent entry of many boxed beef processors which may have prevented the development of long term relationships. Where close coordination of perishable products is required, as in eggs, cheese, and turkeys, and price risk must be avoided by one party to the transaction, formula pricing or vertical integration is quite prevalent.

Why would there be such a difference in the apparent level of satisfaction with the pricing systems used in these markets? The egg and cheese markets appear to have very similar institutional characteristics, with very thinly traded negotiated markets and an extremely high incidence of formula pricing. We would conjecture that there may be several contributing factors. While the National Cheese Exchange trades less than 1 percent of the total cheese produced in the U.S., nearly all major market participants are present, distortions are instantly communicated, and countering reactions are quick. Further, the cheese production is concentrated in one region of the United States. Contrast this with the egg market where production is widely dispersed throughout the country, and regions that are nearly self-sufficient sometimes shift temporarily from surplus to deficit regions. While the Egg Clearinghouse, Inc. (ECI) provides a regional arbitrage mechanism, the trading volume may still be too

low (less than 1/2 percent of production) to achieve perfect arbitrage among regions. Further, the relatively recent development of ECI trading rules combined with the low level of participation may make the ECI more amenable to manipulation than the National Cheese Exchange which has had its trading rules evolve over 60 years, and where the level of industry participation, either actual or potential, is quite high. The occasional discrepancies between reported market prices and actual market prices in some regions may be a contributing factor to the greater level of dissatisfaction with pricing systems in the egg market.

In contrast, the carcass beef market still has a high volume (though declining) of negotiated trades, so the dissatisfaction noted in that market probably cannot be attributed to a thinly traded market. Rather, the dissatisfaction seems to be related to the accuracy of the reported prices, and suspicion regarding potential manipulation of reported prices via various methods. This might be related to the failure of many buyers and sellers to fully and accurately report their prices to the price reporting services, and the failure of price reporting services to increase their reported product classes to include some high volume product streams that differ slightly in trim or grade from the current report categories. At the same time, there may be imperfect regional arbitrage in the carcass and boxed beef markets due to inadequate communication of market prices that are out of line, causing occasional regional price discrepancies relative to reported prices, and prompting dissatisfaction among market participants. Further, the entire pricing process and the price reporting process is clearly more difficult for the outside observer to scrutinize and understand than the "open to the public" National Cheese Exchange where fears of the unknown might be better allayed.

Policy Options

Our study of these markets has not revealed a need for major legislative remedy. Since the benefits of formula pricing generally seem to outweigh the perceived problems, an extreme policy option like a ban on formula pricing certainly does not seem warranted. However, there are some perceived problems associated with some of the negotiated markets and price reporting systems which some more modest private or public policy changes may help to remedy.¹

The perceived problems in the beef and pork pricing system seem to be related to inadequacies in the price reporting system. One change that would quickly improve the quality of the price reports would be complete price reports from buyers and sellers who now report selectively or not at all. If voluntary reporting was not sufficient, mandatory responses to requests from approved price reporting agencies could be considered. However, many products purchased by the large retailers currently not reporting prices are specially trimmed or borderline grade products which don't fit current price reporting categories. Price reporting services would have to be encouraged or required to increase the number of product categories reported to encompass these currently unreported high volume product streams. More complete reporting from buyers and sellers would allow more complete exploitation of the prices determined in the still viable negotiated product market. Broadened product coverage would help persons relying upon the prices reported for the most thinly traded product classes to spot distortions in relative prices, and forestall effective manipulation of market prices or price reports in the product markets most susceptible to problems.

¹ Solid evidence of manipulated or inaccurate prices or price reports has not been produced, but even the feeling that there is or might be a problem can cause firms to behave differently, and result in changed market performance.

While these changes might provide significant improvements for a few years, the introduction of a centralized electronic exchange might be a long term remedy worth considering, to facilitate better market arbitrage among dispersed buyers and sellers, and add significantly to the market information available to market participants and price reporting services.

The first handler markets interfaces for cheese, turkeys and eggs are characterized by significant use of long term formula pricing arrangements. Yet, there exists no readily accessible report on the current premiums or discounts in those long term contract markets. Expanding market reports to encompass the premiums on recently concluded long term agreements could alleviate some dissatisfaction regarding those markets, and help insure more equitable bargaining for the smaller producers who usually are at a disadvantage in contract negotiation. This change would be particularly useful to turkey production firms which are not directly involved in the turkey pricing process.

In the turkey subsector, the proportion of product trades which are not formula priced remains large, although trends toward more heterogeneous products pose some reporting problems. Fuller reporting of transactions to reporting services and, perhaps, expansion of the Urner-Barry report to include separate regional price reports could improve a system which appears to function relatively well at the processed product level. At this time, the problems cited by market participants do not appear to justify the imposition of mandatory price reporting. The introduction of centralized trading using an electronic exchange mechanism may not be appropriate in the processed turkey market, since the presence of some strong packer brands, retailers' desires to deal with particular packers for quality or service reasons, and the use of retailer labels would limit the potential use of an electronic exchange.

The egg subsector defies gravity daily with the most used price quotes representing a market level (graded eggs) at which few trades are negotiated. It appeared 15 years ago that such a situation could not endure. Urner-Barry is preparing to produce regional quotes on graded eggs -- a positive step. However, that does not solve the basic problem of prices rarely being negotiated at that level. In the short run, the industry may have to rely more on prices generated from gradeable nest run egg trading on the Egg Clearinghouse exchange. However, volume of trading on that exchange must be increased to provide clearly representative, credible prices for broader use in the industry. This might be achieved by fine-tuning the Egg Clearinghouse trading rules to enhance trading volume, and expanding the access of traders to the Egg Clearinghouse (a current USDA-ECI joint effort). Still, a market at the cartoned egg level is needed. Trading of graded eggs packed in standard cartons for delivery to wholesaler or chain warehouses via an institution like ECI may provide a solution to a serious problem in the current egg marketing system. If necessary to insure a minimum negotiated trading volume, the mandatory purchase of some percentage of large retailer requirements on such an open exchange might be legislatively mandated, but only as a last resort.

Thus, there are some fine-tuning adjustments of some market and price reporting mechanisms which can alleviate some of the dissatisfactions of market participants. Yet, our overall evaluation of the formula pricing systems used heavily in these commodity marketing systems leads us to conclude that the positive contributions clearly outweigh the disadvantages, and that requiring firms to shift to different pricing mechanisms could often be harmful to firm and market performance.

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The Economic Feasibility and Impacts of Electronic Markets:
A Tentative Appraisal^{1/}

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One obvious solution to pricing problems stemming from thinly traded markets is market "thickening." That is, many pricing problems can be mitigated by increasing the amount of trading in an organized market to the point where the volume of trading is adequate to generate prices which reflect marketwide supply and demand conditions with an acceptable degree of accuracy.

Market Thickening by Electronic Exchange

One innovative institution which has been put forth as a means of market thickening is the computerized trading floor, or the so-called electronic market. This is a marketing system in which the negotiation of prices, and perhaps other terms of exchange among a large number of buyers and sellers is centralized in a single, computerized trading operation.^{3/} The physical flow of product from sellers to buyers occurs in a direct or nearly direct manner subsequent to successful sales negotiations.

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^{3/} It is important to distinguish between electronic markets and computerized information systems. The latter use computer technology and often remote

Buyers and sellers do not physically stand on the centralized trading floor; rather, trading is conducted by a central computer and traders participate through various means of long distance communications such as telephones, teletype terminals, computer terminals or other remote access, high speed electronic media. The computer acts as communication manager and performs numerous marketing functions such as matching bids and offers, auctioneering, recording and confirming transactions, invoicing, managing traffic, enforcing trading rules, and compiling and disseminating price reports and other market information. Products are sold by description rather than by personal inspection and third-persons are normally used to certify the accuracy of such descriptions.

Electronic markets are organized exchange mechanisms, rather than computerized compilations of assorted and diverse private transactions. The essence of an organized market is centralized price discovery. Centralized assembly of products in one physical location is not necessary, nor necessarily desirable if the products can be accurately described in terms meaningful to the market participants. The characteristics necessary for organized trading are: 1) trading is conducted according to some predetermined set of rules; 2) all potential traders have equal and ready access to the market and the information generated from it, including prices and volumes traded, and 3) all potential buyers and sellers have freedom to act on the information available (Sporleder et al., p. 13). A successful organized exchange requires a sufficient number of potential traders to make for a competitive market.

electronic communications to compile and disseminate information on sales offerings, purchase requirements and/or prices and other terms of trade subsequent to actual transactions. They do not include a mechanism for actual sales negotiations. Electronic markets, on the other hand, include sales negotiation as an integral part of the computerized system. That is, the computer actually monitors, facilitates, and records sales negotiations among buyers and sellers. As such, price establishment occurs within the electronic marketing process rather than in private negotiations as an adjunct to a computerized market information system.

One might envisualize an electronic market as similar to a trading pit on a major commodity exchange. Numerous buyers and sellers meet as a large group and sort out deals from among the offers and bids of other participants in a process that is competitive, visible, and governed by impersonal rules. The major difference is, in the electronic market buyers and sellers are not physically present at a single location; rather, they enter the market and engage negotiations through long distance communications while a computer manages the interface. For a comprehensive description of electronic markets, see Henderson, Schrader and Turner.

Theoretical Performance of Electronic Markets

Conceptually, the economics benefits of electronic marketing follow mainly from its characterization as a remotely-accessed, organized exchange. Because of its remote-access feature, traders do not have to physically travel to one central location to meet with other participants in the market. Because product shipment is arranged after transactions have been successfully negotiated, direct or nearly direct product movement from seller to buyer is possible. As a result, the operational efficiencies which are normally realized with directly negotiated private sales, in comparison to central assembly markets, can be achieved.

At the same time, the ability is created to generate the magnitude of pricing efficiency previously associated only with large-volume central assembly markets. Sellers offer their products to many buyers rather than one or a select few, as is characteristic of private transactions, and buyers have access to the supply of many sellers. Thus, participation in both sides of the market is much expanded compared to private trading. Furthermore, because price negotiations occur in an organized, centralized and competitive arena, the ability of a dominant trader to unduely influence price is

appreciably reduced compared to the typical one-on-one nature of private treaty. As a result, it is reasonable to expect that prices which are established within an electronic trading mechanism are more accurate reflections of market-wide supply and demand conditions and thus more efficient in their role of allocating resources and products among alternative uses.

Because a large number of transactions are negotiated at one point (the central computer) and because the computer tracks and records the results of all negotiations, comprehensive and continuously updated market and price information become an integral feature of electronic markets. Conceptually, this potential to expand the quantity, quality, accuracy and timeliness of market information and to equalize its availability among a large number of potential market participants creates a "public good" aspect to computerized marketing roughly comparable to publicly supported market reporting services.

Electronic communications makes possible an additional source of potential operational efficiencies. When computer terminals are used for communications among traders (rather than telephones or other forms of voice communication) electronic data rather than audible data are transmitted. Each bit of electronic data can be transmitted on a single electronic cycle, whereas 3,000 cycles or more are required for voice communications. As a result, a substantially larger volume of electronic data can be transmitted in the same communications space that is required for a lesser amount of voice communication. Therefore, data can be transmitted much more rapidly electronically than audibly, significantly reducing the communication time required for sales negotiation.

Industry structure may be impacted by electronic marketing as well as operational and pricing efficiency. Because the electronic market is

accessible through remote communication media, and because numerous trade possibilities can be found at one place (the centralized computer trading floor), the ability of smaller and more remotely located traders to participate in the market is enhanced. This 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.

To summarize, based upon theoretical reasoning the establishment and widespread use of electronic markets for agricultural products would be expected to result in: 1) improved pricing efficiency; 2) greater operational efficiency; and 3) a reduced rate of economic concentration and integration. The first is most directly relevant to the topic of concern in this symposium, that is pricing systems; however, the others are also important economic impacts which deserve consideration in any appraisal of this marketing innovation.

Experience With Electronic Marketing

Empirical validation of the performance expectations for electronic markets in agriculture requires observations of the results from actual computerized trading. To date, however, only a few such markets have been commercialized. Currently, there are a number of efforts underway to develop additional electronic markets for agricultural products. Most of these are experimental, designed to further test the feasibility of this institutional innovation.

The computerized markets that exist and that are being developed vary considerably in design and operation. There is, at this point, no standard design which has proved itself most effective. However, all systems combine the technical capacities of remote communication with some form of electronic computing for purposes of common price negotiation among large numbers of remotely located sellers and buyers.

The earliest commercialized electronic-type market is a teletype auction, developed by the Ontario Pork Producers Marketing Board for selling slaughter hogs produced in that province. It has been used continuously since its introduction in 1961 (Peer). The Board has a provincial monopoly for marketing hogs and has elected to sell essentially all 2.5 million to 3 million hogs produced in Ontario annually through its electronic auction. A similar hog marketing system has been in operation in Alberta since 1969 (Hawkins et al.), and another operated in Manitoba from 1965 to 1977 (Lowe, 1968B) but ceased operation when declining hog marketings became insufficient to support a competitive marketing system.

The most technically advanced system currently in operation is TELCOT, a computer terminal marketing network for upland cotton operated by Plains Cotton Cooperative Association at Lubbock, Texas. In operation since 1975, this system directly connects cotton producers, through more than 165 local gins, to about 45 cotton merchants and other buyers over a network of TV-like cathode ray tube computer terminals (Highley). All transactional activities, including invoicing, payments, inventory control and market information in addition to price negotiations, are facilitated by the central TELCOT computer. In 1977-78 this system marketed about 844,000 bales of cotton, roughly 20 percent of total Texas production (not forward contracted). It serves buyers throughout Texas and the Southeast cotton marketing areas and has recently been expanded to a capacity of more than 4 million bales per year.

Other operating systems include the computerization of a relatively small volume trading floor for nest run eggs operated by the Egg Clearinghouse, Inc. of Durham, New Hampshire (Cox), a similar system operated as the Central Egg Agency in the United Kingdom (Schwartz), and a computerized exchange system, called Woolnet, that has recently been developed in Australia for the

international marketing of wool (Computer Sciences of Australia).^{4/}

In addition to these computerized markets are numerous teleauctions for various agricultural products. A large number of feeder pigs and market lambs are sold by teleauction in the U.S. along with relatively small quantities of feeder cattle, slaughter cattle and butcher hogs (Henderson). The teleauction is a manual selling procedure, utilizing conference telephone arrangements to interconnect several buyers at remote locations for bidding on consigned sales which are sold by description. Teleauctions offer some competition enhancing capability; however, trading is relatively slow and selling capacity is considerably smaller than for computer-managed systems. Thus, their potential economic impacts are not directly comparable. Some teleauctions, nonetheless, have clear potential to evolve into computerized systems as trading volume expands, and this evolutionary process provides additional insight into the feasibility of electronic marketing (See Holder, 1977, for example).

To encourage further evaluation of the economic feasibility and performance of electronic markets in agricultural industries, the U.S. Department of Agriculture's Agricultural Marketing Service (AMS) initiated a program to support, with partial funding, the development and pilot operation of a limited number of experimental projects (Schlei). Four electronic marketing projects have been initiated in response. These include: 1) an expansion of the nationwide electronic market operated by Egg Clearinghouse, Inc. (ECI) for nest run eggs by developing a computer terminal communication network whereby egg traders have direct communications with other market participants through the central market computer (Egg Clearinghouse, Inc.); 2) the development and operation of a computerized trading network for the daily marketing of slaughter hogs in Ohio and surrounding areas (Baldwin); 3) the design and development

^{4/} In addition to the described systems for agricultural products, several somewhat similar systems have been developed for marketing financial securities. Most notable are computerized trading networks for corporate stocks operated by the Cincinnati and Toronto stock exchanges.

of an electronic marketing system for feeder cattle in Texas (Sporleder and Davis); and 4) expansion of the teleauction method of selling cull cows in Virginia with a feasibility analysis for conversion to a large-volume computer-assisted system (Virginia Department of Agriculture and Commerce).

Empirical Evidence

The operating and developing systems provide the basis for our research into the performance implications of electronic marketing in agriculture. At this point, the appraisal is tentative as it is based largely upon analysis of the results reported by others who have examined various aspects of existing systems, plus observations, considerations and experiences to date in the process of developing and deploying the experimental AMS-related projects.

There currently exists no body of generalizable evidence as to the performance implications of electronic marketing for agriculture, as no comprehensive evaluation has been completed nor have the various marketing systems been evaluated vis a vis one another. The Electronic Markets Task Force of the North Central Regional Research Committee NC-117 has as one of its objectives, to complete such a comprehensive evaluation and, to the extent possible, draw generalizable conclusions. While satisfactory progress toward that objective is being made, complete evaluation awaits full implementation of actual trading in the four experimental projects. These will not be completed for another 12 to 18 months. Thus, at this time the report is limited to tentative conclusions based upon developmental considerations, partial evidence, and preliminary analyses.

Pricing Efficiency

As would be expected, the Canadian teletype hog markets have been the subject of much of the research reported to date which evaluates empirical results of electronic trading. The major impetus for developing these markets

stemmed from concern over lack of effective buyer competition and the related impacts in terms of incomplete arbitrage and pricing inefficiencies. Thus, much of the reported research has concentrated on pricing impacts.

In a time series analysis, Wen-Fong Lu found statistically significant increases in average price levels for hogs in both Ontario and Manitoba which correlated with the introduction of electronic marketing. He interpreted these results as indicative of increased buyer competition. Generally, consistent findings were reported by Lowe (1968A). Lu also found a statistically significant decrease in the difference between average transportation costs and average provincial prices associated with the introduction of electronic teletype selling. These findings support the hypothesis that, electronic marketing enhances geographic arbitrage and thus improves pricing efficiency.

While the relationship between arbitrage and pricing efficiency is direct and straightforward, there is a less clear interpretation of the relationship between pricing efficiency and short term price variability. Chang-Mei Lu, in a study of price variability in the Manitoba hog industry, found both intraday and interday price variability to be greater in electronic markets than in private treaties. Lu interpreted this finding as indicative of increased pricing efficiency in the electronic system.

While little definitive theoretical work has been reported on the specification of the relationship between short term price variability and pricing efficiency, it is intuitively appealing to except Lu's conclusion. The logic can best be illustrated with a comparison of the price-contracting process in a private treaty with that in an open, organized market. In most private negotiations between farmers and others in the marketing channel, there is a considerable disparity in the amount and quality of market information possessed by each party. Typically, an individual buyer purchases larger volume and is in the market more frequently than is an individual farmer-seller. Buyers

are often supported by a staff of market experts, whereas farmers seldom have access to similar expertise. Buyers are generally in contact with sellers in other areas and with other buyers, thus affording themselves with a market-wide perspective which is difficult for many farmers to duplicate.

As a result of obvious imbalances in their extent of comprehensive market knowledge, it is likely that farmer-sellers in private treaties accept the price offered by the buyers (and the nonprice market information implicit in the price offer) as being reasonably accurate. Or, at least accurate enough to justify the lack of search for more extensive market information. As the actual number of buyers with which a given farmer-seller deals is reduced, or as the ability of buyers to coordinate their offer prices increases because of less head-to-head competition in private negotiations, the variability in prices among individual transactions would be expected to decline. That is, buyers typically set a purchase price at which they believe they can acquire needed supplies. This price may be adjusted if inventory is accumulated too rapidly or too slowly, but it is modified infrequently for individual transactions (due to quality, location, timeliness or other value-related factors) unless sellers object. Such objection is constrained by lack of adequate and comprehensive market information.

An organized market in general, and the electronic exchange in particular, increases the availability and relevancy of market information for all potential market participants. It reduces the likelihood of selective or biased reporting. Furthermore, because all of the relevant terms of trade are visible and, in the electronic market because a wide range in terms can be observed and disseminated to every potential participant, a larger number of price differentials for value differences due to quality, location, timeliness, size of sale lot and the like tend to result. Both the quality and availability of information is improved.

Sellers realize a substantial gain in market information relative to buyers in such a situation. This should reduce the seller's willingness to accept the buyer's offer price (and its implicit market information). Sellers would be expected to use their additional information to influence their individual terms of exchange. This implies that transaction prices should be more variable in an organized market. This further suggests that the price in each individual transaction should more nearly reflect the true market value for that particular exchange. As a result, the efficiency with which prices throughout the market are established is improved, thus enhancing pricing efficiency.

In the case of a daily hog market, for example, this logic suggests that a market demonstrating greater price variability would be more pricing efficient than one in which individual transaction prices are equal or nearly so.

To distinguish between price variability around a general point of market equilibrium and instability in market equilibrium prices over time, we will hereafter refer to the former as "price nervousness." As such, greater price nervousness refers to greater price variability and bears no direct relationship to long run price instability.

Analysis of egg prices in the U.S. prior to and following the introduction of electronic egg trading on ECI provides further support for the expectation of improved pricing efficiency as a result of electronic marketing. ECI price behavior has been observed over the past four years and compared with egg prices as reported by a proprietary reporting service, Urner Barry Publications, Inc. Urner Barry price reports are generally accepted as the benchmark for market value determinations for private trades in much of the U.S. egg industry. Thus, comparison of ECI price behavior with Urner Barry price reports gives a valid comparison of electronically-negotiated prices with private treaty

price performance.

In addition to a direct comparison of ECI prices and Urner Barry price reports during the 1974-78 electronic trading period, it is also valid to compare Urner Barry price reports prior to ECI trading (1969-72) with those price reports during ECI trading. Prior to electronic trading, the major source of Urner Barry price information was a daily survey of private egg transactions. Subsequent to the development of ECI, Urner Barry has utilized ECI prices in compiling price reports along with the survey of private trades.

That is, Urner Barry price reports are influenced to some extent by ECI but continue to retain primary emphasis on private trades. Thus, the impact of electronic trading on egg price performance revealed by a cross-sectional comparison of Urner Barry price reports with ECI prices in the 1974-78 period would tend to be confirmed if the same direction of change, but of smaller magnitude, is revealed by a time series comparison of Urner Barry price reports between the pre-ECI (1969-72) and during-ECI (1974-78) periods.

A comparison of egg price behavior as reported by ECI and Urner Barry is presented in Table 1. It is clear from these data that both the frequency of price change and the magnitude of price nervousness, as measured by the short run standard deviation in reported prices, is appreciably higher in the electronic market than in private transactions. Furthermore, the magnitude of the average price change is less in the electronic market. Therefore, ECI prices change more often but by smaller amounts. This would appear to further support the positive impact of electronic trading on pricing efficiency. Not only are prices more nervous, but the resulting market price aggregate (periodically reported average market price) appears to adjust more rapidly and with less amplitude in response to changing market conditions, thus more accurately tracking temporal changes in market supply and demand relationships.

TABLE 1: U.S. Egg Price Behavior (Grade A Large White)

	<u>Urner Barry Price Reports</u>		<u>ECI Prices</u>
	<u>1969-72</u>	<u>1974-78</u>	<u>1974-78</u>
Average Price Change (cents per dozen)	1.16	2.32	2.18
Frequency of Price Change ^{1/}	0.347	0.481	0.687
Short Run Standard Deviation in Prices ^{2/}	2.09	2.19	2.47
Long Run Standard Deviation in Prices ^{3/}	8.03	8.46	8.43

^{1/} Calculated by dividing the number of changes in the reported prices by the total number of prices quoted.

^{2/} Calculated on a four week moving average, in cents per dozen.

^{3/} Calculated across all observations, in cents per dozen.

Not only do ECI prices demonstrate greater price nervousness than do the Urner Barry reports, the amount of nervousness in the latter has appreciably increased since the outcome of electronic trading has been incorporated into its population of observed prices. The analysis was extended to determine whether the increased price nervousness as reported by Urner Barry was a result of the price nervousness evidenced in ECI prices, or whether price nervousness in the private transactions captured by the Urner Barry report had increased between the two time periods.

The results of a correlational analysis between daily ECI prices advanced in front of Urner Barry price reports, and of Urner Barry price reports advanced ahead of ECI prices, are presented in Table 2. High correlation exists between these two price series on a same-day basis. Relative to the

lead-lag relationship, the correlation between the two price series is notably higher when ECI prices are advanced in front of Urner Barry prices than when Urner Barry is advanced over ECI, for as far as six days lead. This indicates that ECI prices tend to lead Urner Barry prices rather than vice versa. This finding, therefore, suggests that the impacts on pricing efficiency extend beyond the electronic exchange to the product market in general.

TABLE 2: Lead-Lag Relationship Between Urner-Barry Egg Price Reports and Egg Clearinghouse Prices (Grade A Large White, 1974-78)

Number of Days ECI Advanced Over Urner-Barry	Coefficient of Determination	Number of Days Urner-Barry Advanced Over ECI	Coefficient of Determination
0	0.916	0	0.916
1	0.900	1	0.848
2	0.822	2	0.735
3	0.712	3	0.621
4	0.599	4	0.525
5	0.506	5	0.462
6	0.442	6	0.423

At this point, we have no clear evidence regarding what constitutes sufficient trading volume on an electronic exchange to generate efficient pricing throughout an entire product market. The Ontario hog marketing system, which (by mandate) prices virtually 100% of the slaughter hogs sold in that province over an electronic exchange, stands at one extreme. It has become a pricing base for hogs throughout much of Canada. The Egg Clearinghouse stands at the other extreme, with perhaps two to three percent of the negotiated egg sales represented. ECI prices have clearly become a factor in egg price determination. However, this market does not yet reflect sufficient trading volume to be generally accepted by traders as the major determinant of true market value for eggs, given the continued reliance by much of the industry upon Urner Barry price reports.

There has not yet been sufficient experience with the deployment of computer terminals directly to egg traders to determine the impact on ECI trading volume. It was hypothesized at the outset of the ECI experimental project that, deployment of computer terminals would positively impact upon the volume of trading. If that is observed over the length of the project, trading volume may grow to the point where ECI prices become acceptable to many in the industry as a primary market value indicator.

In a study of the impact of teleauction selling on prices in the Virginia and West Virginia lamb market, Holder reported evidence of improved pricing efficiency associated with enhanced buyer competition (1979). While tele-auctions do not include all of the characteristics of electronic market, they do centralize price negotiations among numerous traders. Therefore, price behavior impacts should be similar to our expectations for computerized markets.

Increased buyer competition, improved arbitrage and expansion of market information have been important considerations in the design of the experimental computerized markets for feeder cattle and slaughter hogs. The feeder cattle industry, for example, is composed of a large number of relatively small independent producers on the selling side and, on the buying side, a much smaller number of considerably larger feedlot operators. Trading occurs primarily in small country auction markets and through direct sales by private treaty. As a result, marketing can be characterized as many small producers selling to one or a few buyers in spatial monopsonies or shared oligopsonies. Nonprice terms of trade tend to be quite variable spatially due to the large number of locations at which transactions occur. Collection of market information is not comprehensive nor are the results necessarily representative. Therefore, price information cannot be easily aggregated into information of industry-wide value.

In designing the electronic feeder cattle exchange, emphasis has been placed upon equalization of market power by increasing information equality, expanding the number of buyers involved in price negotiations, and decreasing the potential for price manipulation, and upon minimization of spatial restrictions on price discovery by increasing the relevant geographical market area (Davis and Sporleder).

Specifically, the computerized spot market for feeder cattle is designed to increase competitive interaction among buyers by consolidating price negotiations for a large number of local markets onto one centralized computer trading floor. That is, rather than price negotiations occurring at numerous country locations (as is currently the practice), the electronic market will provide, for each participating country market, remote terminal access to a centrally located computer. The market computer will conduct simultaneous price negotiations for numerous buyers across all selling locations. Furthermore, uniform descriptive terminology for quality factors such as frame size, muscling, flesh condition and confirmation have been specified. Thus, the electronic exchange will both expand buyer competition in the price negotiation process and extend it to a much larger market area. It will also capture, internally, comprehensive price information over a large and known geographic and quality distribution.

The combination of more comprehensive spatial and quality-related price information with a vastly expanded trading area is expected to facilitate the process of price arbitrage, thus, aligning price differentials more accurately with differences in marketwide assessments of supply and demand conditions for different categories or classifications of product type and location. Based upon these considerations, it appears that existing barriers to spatial and quality price arbitrage in the feeder cattle market can be

significantly reduced through the advantages of design flexibility possible in computerized trading systems.

The slaughter hog industry, in contrast with feeder cattle, has undergone major production and marketing changes during the past two decades. Considerable concentration and specialization has occurred, resulting in a substantial increase in the volume of hogs marketed per farm. Associated with this has been alterations in acquisition practices by packers. Between 1950 and 1976, for example, the share of hog purchases by packers at terminal markets declined from 40 percent to 17 percent. During the same period, direct purchases increased to 71 percent (Packers and Stockyards). The number of packers also declined during this period. Slaughter hog marketing today can be characterized as, many farmers selling hogs direct by private treaty to a few buyers in spatial monopsonies or shared oligopsonies. Thus specialization and concentration have been associated with direct marketing which, in turn, may have an adverse effect on market information and pricing efficiency.

The movement toward direct sales created a situation in which price discovery depends on the relative bargaining strength of buyers and sellers. Bargaining strength is related to the adequacy and accuracy of market information possessed by the participants. Because buyers normally are engaged in daily acquisition of large number of hogs, they typically have more complete information than farmer-sellers. Prices and other terms of trade in direct sales are not fully sampled nor reported by market news services and are not generally meaningful to farmers until enough trades are reported so that market trends can be detected. At least in the eastern part of the corn belt, individual daily sales negotiations are nearly complete by the time the overall market trend becomes apparent (Baldwin).

The dominance of direct sales has also created a situation in which farmers are often paid average rather than quality-related prices. Mixing hogs from different farms is a common practice by packers. To simplify the process, packers frequently pay an average price upon delivery, with only a minimal initial sort. This practice in conjunction with the lack of a uniform industry-wide grading system is not conducive to rewarding farmers for producing superior products, thus creating pricing inefficiencies (Armstrong, et al.).

Improving pricing efficiency is a major consideration in the design and development of the electronic slaughter hog market. Specific design considerations include the use of uniform grading and descriptive standard for all sales, the sale of one-owner lots where feasible, formulation of settlement prices for different quality hogs in commingled lots based upon market-determined value differences, creation of the central computerized trading arena in which numerous buyers compete, and improving the collection and dissemination of market information.

The Federal hog grading system is being modified in order to consistently describe all market hogs by respecifying and standardizing variables such as backfat thickness, degree of muscling, and percentage of lean cuts. Additional descriptive information such as eye appeal, tastiness, and by-product value may ultimately be included for price determination purposes.

Because of the difficulty often encountered in accurately and consistently grading live slaughter hogs, a carcass weight and grade system is also an integral part of the electronic market. By utilizing the extensive capability of computers to handle data, it is feasible to provide simultaneous trading information on both live weight and grade and carcass weight and grade. This will encourage live-carcass price comparisons which should also result

in improved alignment between quality and price. Ultimately, buyers will be able to bid live and carcass prices for each lot of hogs simultaneously, with sellers selecting the one for actual settlement which they consider to be "best." With this capability, price-quality and live-carcass price differentials will both be determined through competitive bidding.

By selling one-owner lots, where feasible, price will be directly related to the quality and type of hog sold by individual producers. Most of these lots will be sold while the hogs are still on the farm, thus allowing prices to reflect the market value of "fresh" hogs delivered direct to the packer with minimum risk of disease or stress from commingling and excess handling. Commingling will occur for farmers who sell in small numbers. Payment for commingled hogs will be based on a settlement price which is tied to price-quality differentials generated by competitive bidding for other lots of uniform quality hogs. This procedure should extend rewards for producing quality products and penalties for producing inferior products to smaller producers.

Competition will be enhanced by consolidating price negotiations for a large number of direct sales, each somewhat unique as to lot size, quality, location, or time of offering, onto a centralized exchange. The electronic market will provide to buyers, farmers and country marketing points computerized terminal access to the centrally located computer. The computer is being programmed to conduct price negotiations through three different procedures; a descending auction, sealed bids, and firm offers. Traders will, for the most part, be able to choose the pricing system that best serves their needs.

Pricing efficiency will also be enhanced by collecting and disseminating

comprehensive price information for each sale. All bids, offers and acceptances will be reported in the system; carcass equivalent prices based on live weight and grade prices will be determined and reported; periodic sales summary and market analysis will be made available; and price in other cash and futures markets will also be reported via the computer marketing network.

It is hypothesized that the combination of more comprehensive price information, an improved descriptive system, and the centralization of price negotiations on direct sales will result in enhanced competition and substantially improved spatial and quality price arbitrage. If the electronic system eventually captures an adequate volume of trade, prices established in this system should accurately reflect regional, and possibly national supply and demand conditions for a wide variety of slaughter hogs.

Operational Efficiency and Industry Structure

To round out this tentative appraisal is a preliminary assessment of the impacts of electronic trading on other aspects of market performance, specifically operational efficiency and industry structure.

There have been two studies that estimated costs for marketing livestock in the U.S. through hypothetical electronic markets which have received general attention. Holder examined the costs for marketing slaughter hogs through a simulated computerized system in the U.S. and compared these costs with conventional marketing methods (1972). Results show electronic transaction costs ranging from about 18% above 85% below the costs for conventional marketing methods, depending upon volumes marketed electronically and the type of existing method used for comparison. Transactional costs were higher for the electronic market, however, only when its volume was low and when compared to direct purchases by packers. Combined with non-quantified factors, Holder concluded that electronic marketing should generally result in a net reduction in transaction (selling and buying) costs.

In another analysis, Johnson estimated costs for marketing all fed cattle in the United States through an electronic teletype system similar in design to the Ontario hog marketing system, and compared these with estimated costs for conventional marketing methods such as terminal markets, auctions and private treaties. He also included cost estimations associated with pricing inefficiencies and inequities in bargaining strength between producers and packers under assumed conditions. The results showed a potential net efficiency gain for teletype marketing ranging from \$38 to \$60 per head, depending upon which conventional system was used for comparison.

These potential operational efficiencies associated with electronic marketing appear to be supported by a fairly complete analysis of computer and communication costs for the experimental electronic hog market, as it is currently designed. Potential costs have been examined for the exchange function, facilitating functions (weighing, description, sorting and commingling, transportation, and the like) and the loss-arbitration function (disease, death losses, injuries orcrippings and weight losses).

Costs associated with the computerized function are reported in Table 3. The monthly computer cost is fixed by contract. All other costs are estimated at relatively high levels. For example, average rental fees for computer terminals being considered for use equal \$93/month. For this analysis, a higher rental cost (\$110/month) is assumed, to allow for unexpected cost increases.

On a per head basis, these estimated costs for operationalizing the computerized market total to between 42 and 64 cents depending upon volume marketed (see Table 4). The minimum market volume (40,000 head per month) approximates current hog marketing by the EOB Company. EOB is the subsidiary of Producers Livestock Association (PLA) which handles daily

TABLE 3: Estimated Costs for Computer and Communications Capability,
Experimental Electronic Hog Market (HAMS)^{1/}

	Monthly Cost (\$)
Central Computer System (including management software and maintenance)	2,600.00
Remote Computer Terminals (50 ea. @ high cost estimate of \$110 ea.)	5,500.00
Auxiliary Printers for Remote Terminals, market points only (17 @ high cost estimate of \$100 ea.)	1,700.00
Modems (100 @ \$20 ea.)	2,000.00
Leased Line Communications	9,565.00
17 Marketing points (955 mi. @ \$2.50/mi.)	2,387.00
3 Columbus points (\$50 ea.)	150.00
7 Ohio-located Packing Plants (582 mi. @ \$2.50/mi.)	1,455.00
10 On-farm locations in Ohio (561 mi. @ \$2.50/mi.)	1,402.50
11 Packers located outside of Ohio	4,170.00
Operations Personnel	4,375.00
Total	<u>25,470.00</u>

^{1/}A Hewlett Packard (HP 3000) has been acquired and is being programed. Since terminal selection process is underway, high rental estimates are reported for this equipment. All terminal and line cost estimates are based on location of a computer in Columbus, with trading terminals located in Columbus, at 17 marketing points around Ohio and eastern Indiana, on 10 Ohio hog farms, at 7 Ohio packing plants, and at 11 packer sites in the northeastern and midsouth regions of the United States. Operations personnel include a sales manager, a half-time equivalent administrative assistant and a half-time equivalent computer technician.

livestock sales. PLA is a cosponsor of the experimental project, and all EOB marketings will be converted to the electronic exchange. The upper range limit (60,000 head) permits a 50 percent increase in marketing volume during the programmed six month experimental period. To achieve this increase in volume, approximately 25 percent of the Ohio hogs currently direct marketed outside the PLA/EOB system must be converted to the centralized electronic market. Approximately 4200 head of hogs per month, which are currently marketed directly to packers, will be immediately available to the system during the experiment via on-farm selling terminals located at ten large volume hog farms.

TABLE 4: Estimated Per Head Costs for Marketing Slaughter Hogs Electronically, HAMS Experimental Project

	Cost Per Head	
	40,000 Head Per Month ^{1/}	60,000 Head Per Month ^{2/}
Computer and Communications Functions	\$0.64	\$0.42
Facilitating Functions (grading, weighing, sorting, etc.) ^{3/}	0.98	0.87
Total	\$1.62	\$1.29

^{1/} Current average monthly hog marketing volume through the EOB Company which will be diverted in total to the electronic market during the experimental period.

^{2/} Requires conversion to the electronic market of 25 percent of the slaughter hogs in Ohio that are currently being marketed directly by farmers to packers. About one-fifth of this requirement can be obtained directly from the farms on which computer terminals will be located during the experiment.

^{3/} Cost estimates are based upon current costs realized by Producers Livestock Association and its EOB Company subsidiary for handling hogs, exclusive of sales negotiation and market clearing activities. Costs are about 52 percent labor and 48 percent for travel, buildings, maintenance and related overheads.

Assembly, handling, weighing, grading and other farm-to-packer costs (facilitating functions) were also estimated for the proposed electronic exchange (Table 4), based upon current PLA costs associated with their weekly auctions, adjusted for potential savings in labor due to more direct and faster hog movement and replacement of some telephone and other services with the computer network. Approximately 52 percent is allocated to labor services and 48 percent allocated to buildings and equipment, travel, supplies, and other overheads. It is estimated that total marketing costs will range between \$1.29/head and \$1.62/head, depending on the volume marketed.

Combining the costs of the computerized price negotiation system with the estimated costs for performing the necessary facilitating functions generates a basis for comparison of anticipated marketing costs for the experimental electronic market with existing marketing fees (Table 5). These data indicate that the costs for performing the pricing and facilitating functions are appreciably less than fees incurred at the major assembly (terminal) market in the relevant marketing area. The findings further suggest these hypothetical cost relationships: 1) operating costs for electronic markets are somewhat higher than direct sales to packers when electronically marketed volumes are low; and 2) substantial gains in economies are possible as trading volume increases.

Costs for performing the loss-arbitration function have not yet been specified, but there appears to be no reason why these should be any greater in the electronic market than in the current daily sales operation of EOB. Such costs could be somewhat lower to the extent that the more extensive information communicated on the electronic system regarding quality and other value-related factors reduces the gap between buyer expectation and

reality. Also, if the computer communications system is used to arbitrate disputes in lieu of more expensive telephone communications, arbitration costs may be further reduced.

TABLE 5: Comparison of Existing Hog Marketing Fees and Costs with Estimated Electronic Marketing (HAMS) Costs.

	Indianapolis Terminal Market	PLA/EOB Marketings	Electronic Market	
			40,000 Head Per Month	60,000 Head Per Month
- Dollars Per Head -				
Marketing Fee	1.80 - 1.90	0.30 ^{1/}	---	---
Marketing Costs	---	1.17 ^{2/}	1.62	1.29
Total	1.80 - 1.90	1.47	1.62	1.29

^{1/} Fee currently charged buyers by EOB for marketing services.

^{2/} Based upon typical fee structure for local auction markets operated by PLA, less marketing fee charged packers in daily EOB sales operation. Excluded from PLA/EOB fee structure as current PLA/EOB income from daily hog marketings derives mainly from purchase-resale margins rather than direct marketing fees.

The experimental feeder cattle project has also been designed to effectuate operational efficiencies. Both geographical dispersion and seller-buyer size differences contribute to operational inefficiencies. Cattle must be pooled from numerous sellers, and often across a fairly large geographical area, in order to meet the needs of many individual buyers. Order buyers and marketing agents currently perform this function in most instances. However, in collecting feeder cattle from several areas and assembling large lots, considerable cross-hauling and handling results. This causes stress on the cattle which results in shrink, sickness and death, and adds appreciably to marketing costs. Because the electronic feeder cattle exchange is designed to consolidate offerings of a large

number of sellers on one trading floor, it should be less costly for buyers to accumulate desired quantities compared to purchasing at numerous country points.

To the extent practical, trading rules are being specified which will require a minimum amount of pooling and handling between the farm of origin and the buyer's feedlot. For producers who sell truckload lots, direct shipment can be facilitated as the sales arrangements will be completed and destination (buyer location) known before the cattle leave the seller's farm or ranch. Local pooling will be used for smaller (less than truckload) lots prior to sale. Because buyers will be able to acquire cattle assembled at several locations simultaneously without traveling to each separate assembly point, procurement needs should be fulfilled more rapidly, thus allowing for expeditious movement of cattle to and from those local concentration yards. The extent to which these potential gains in operational efficiencies are actually realized, of course, will not be known until this experimental system is operationalized and actual trading experiences documented.

To date, only one study has shed light on the impact of electronic trading on industry structure. In an evaluation of trading on the Manitoba electronic hog market while it was operated on a voluntary basis, Chen found that the producers who marketed through the electronic system operated significantly smaller hog enterprises, on average, than did producers who sold through private treaties. Although Chen did not draw such a conclusion, one implication of this finding is that the electronic system provides viable market access for smaller producers, thus mitigating structural concentration pressures at the farm level. Impacts, if any, of the

experimental electronic markets on industry structure are being closely monitored as these systems are operationalized.

Concluding Comment

Based upon theoretical reasoning, electronic markets offer high potential to enhance pricing efficiency by thickening markets. This is accomplished by bringing about greater competition among traders, expanding spatial market boundaries, expediting the process of price adjustment toward an equilibrium point, improving price arbitrage, balancing market power among participants in the price negotiation process, and quite possibly, attracting more traders into a price negotiation process. Equally important, market information is appreciably improved because pricing occurs in a central arena where all resulting prices are observable, and a broader array of transactions are brought into the information base. This substantially reduces problems of sampling for price in a large number of widely diverse and geographically dispersed private sales, and increases the number of price observations which can be reliably related to product type and quality, location, time of sale and other value-related factors.

These theoretical expectations with regard to the pricing impacts of electronic trading are supported by observations from the limited number of electronic markets which have been developed and operationalized to date for agricultural products. Furthermore, the design flexibility possible in computerized trading systems appears to offer high potential for realizing these benefits in experimental markets which are currently under development.

Theoretical reasoning supported by limited experimental evidence suggests that the additional economic impacts of improved operational efficiency and reduced structural concentration may be associated with electronic marketing in agriculture. Further insights into these

potential impacts is being gained as the development and commercialization of these marketing systems progresses.

However, no single institution can be viewed as a panacea. Much of the potential impact of electronic trading stems from the improved information flow. But, there is no assurance that such improved information will necessarily flow to those who could most gain from it. If the operation and control of an electronic exchange is such that access to either the trading mechanism or to the information generated therein is unduly restricted, the economic benefits will be jeopardized, and perhaps reduced below costs. The rules of operation and ownership structure can also influence the distribution of both benefits and costs among market participants and between participants and nonparticipants, which could be a source of considerable inequity. Additionally, there is no assurance that an open market system is optimum for agricultural products in an industrialized economy.

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Abstract

Commodity pricing systems are the focus of three papers. The first considers current policy issues, especially in the meat industry, and the recent recommendations of the USDA Meat Pricing Task Force. Formula pricing systems in the beef, pork, cheese, egg, and turkey marketing systems are then described and evaluated followed by a tentative appraisal of electronic marketing systems.

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