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Pork Pricing Systems:
The Importance and Economic Impact of
Formula Pricing

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PORK PRICING SYSTEMS: THE IMPORTANCE AND
ECONOMIC IMPACT OF FORMULA PRICING

Formula pricing is a pricing system used extensively in many important agricultural commodities, yet it has been the focus of concern among producer groups, regulatory agencies, and Congress. Recently, there has been much controversy and concern voiced about formula pricing in the livestock and meat industry, its prevalence and potential for abuse.¹ A recent House Small Business Committee subcommittee report concluded that "the evolution of 'formula pricing' has spread to the extent that today as much as 90 percent of all meat bought and sold is on that basis. This includes processed items, such as hotdogs, and the increased trend toward boxed beef. -- This has left open only a small segment of the industry actually negotiating price on the open market, yet it is this segment that reportedly control the remainder of the market. With a small group dominating the pricing structure through reports to 'The Yellow Sheet', it has raised the question whether the publication is being used as a conduit to manipulate meat prices."²

Subsequently, legislation was introduced which provided for licensing and regulating market price reporting services, mandatory price reporting, and recommendations by the Secretary of Agriculture for "substitute procedures involving the marketing and pricing of meat commodities, including

¹Formula pricing in the meat industry is typically considered to be the practice of using a prenegotiated standard price differential (or premium) on individual transactions, added to a base market price reported by a price reporting service (usually by the National Provisioner (The Yellow Sheet)) on a specified future date.

²Small Business Problems in the Marketing of Meat and Other Commodities (Part 1 - Meat Pricing), report to the Subcommittee on SBA and SBIC Authority and General Small Business Problems, House Small Business Committee, 95th Congress, 2nd Session, October 13, 1978, p. 6. On p. 32 they concluded that 70-90% of all meat sales are formula priced.

but not limited to, the banning of formula base pricing..." which would become effective if not overruled or revised by Congress.¹

The primary issues which arise involve the accuracy and integrity of the price reporting process and the related representativeness and integrity of the underlying pricing system. Recently, some analysis of the price reporting process has been done by both the House Small Business Committee and the U.S.D.A. Packers and Stockyards Administration. The USDA Beef Pricing Report looked at beef carcass prices for one month and found no conclusive differences between the National Provisioner's Yellow Sheet price report and actual prices on invoices from 35 plants. The House Small Business Committee investigative team sharply criticized how the work sheets of the Yellow Sheet reporters compared to their price reports. While that may be evidence of sloppy work or overstatements regarding the diligence of the reporters' note taking, they did not show that the market prices necessarily deviated from reported prices. However, the nature and extent of pricing problems due to formula pricing have only been tentatively appraised; while there has been significant criticism, there has been little consideration of the benefits accruing to those using this system, or the indirect impact on others.

To assist in the appraisal of such sweeping proposals, this study endeavors to appraise formula pricing in the pork industry, a major component of the livestock and meat sector which was not the primary focus of concern in the hearings held by the House Small Business subcommittee.² The extent of formula pricing use in the market for fresh and processed pork products is estimated. In addition, the benefits and problems of formula pricing

¹H.R. 14155, 95th Congress, 2nd Session, introduced by Rep. Smith and Conte, September 22, 1978.

²Small Business Problems in the Marketing of Meat and Other Commodities (Part 1 - Meat Marketing). Hearings before a subcommittee of the House Small Business Committee, 95th Congress, Second Session, October, 1977 and May, 1978. The Small Business Committee hearings concentrated on pricing in the beef industry, which was the focus of an earlier study by the author

observed by buyers and sellers are considered, and the transaction cost impact of a ban on formula pricing is estimated. While only sketchy data are available, this first approximation of the magnitude of the economic impacts attributable to formula pricing systems may be useful in appraising the worth of that system versus alternatives which might be considered, and policies which might be applied where formula pricing systems are in use.

Structure of the Pork Marketing and Distribution System

This study focuses on the pricing systems employed for pork products from the point of hog slaughter to the firm dealing directly with the final consumer. Thus, we focus on the pricing systems employed between pork slaughter-processors (e.g. Oscar Mayer), specialized intermediate pork processors (e.g. Eckrich), and their primary customers -- food retailers (e.g. Jewel) and food service firms (e.g. McDonald's). To set the stage for that analysis, we first describe several structural and behavioral characteristics of these stages of the pork processing and distribution system.

While some pork processing is done by specialized processing firms which rely upon other hog slaughtering firms for their raw material, or have some processing done to their specifications by other processors (e.g. Eckrich and Sons, a subsidiary of Beatrice Foods), the primary stream of pork products flows from firms slaughtering the hog and processing the carcass into: (a) fresh pork loins, butts and spareribs, feet and neckbones; (b) fresh hams, bellies, and jowls for sale to retailers or other processors if slaughter firms don't further process those cuts themselves; and (c) further processed pork products containing pork like smoked hams, sliced bacon, luncheon meats, frankfurters, sausage, Canadian bacon, etc. The approximate proportions of a carcass consisting of these fresh cuts are listed in Table 1

Table 1
TYPICAL PORK CARCASS COMPOSITION

<u>Cut</u>	<u>Percent of Carcass Weight</u>
Fresh*	
Loin	19
Boston butt	9
Spareribs	4
Neckbones	2
Feet	3
Processed*	
Ham	21
Picnic	10
Belly	13
Jowl	3
Fat	12
Lean Trim	4

*These designations are the typical form in which the product leaves the pork slaughter-processing firm. The percentages are on a trimmed weight basis, and would vary with different trimming procedures.

Source: Dr. Robert G. Kauffman, Department of Meat and Animal Science, University of Wisconsin-Madison, and several other published and industry sources.

and the resulting products (except for offal, etc. which comprise 30 percent of the hog) are pictured in the adjacent figure.

The largest slaughter-processing firms in the pork industry are listed in Table 2, with an approximate estimate of each firm's share of federally inspected hog slaughter in January, 1979. According to industry sources, the dominant firm in the fresh pork product market is Wilson Foods Corporation, a subsidiary of LTV, Inc. with nine slaughter plants and approximately 13 percent of hog slaughter. Armour and Company, a subsidiary of the Greyhound Corporation, is second in size, with 8-9 percent of U.S. slaughter, though that will decline when two plants close in 1979. Three meat packers are close competitors for the number three ranking, with 6-7 percent of federally inspected slaughter -- Swift and Co., a subsidiary of Esmark, Inc., John Morrell and Co., a subsidiary of the United Brands Company, and George A. Hormel, Inc. Oscar Mayer and Co., the leading processor and marketer of branded frankfurters and packaged lunch meats, is only the sixth largest hog slaughter firm.

The top four hog slaughter-processing firms control an estimated 34-36 percent of hog slaughter, and the thirteen large (perhaps the largest) firms surveyed control approximately 63 percent of U.S. hog slaughter. The current share of the largest four firms does not appear to have changed much in fifteen years. After a significant drop in the 50's, the proportion of the value of shipments of fresh and frozen pork controlled by the four largest firms in the pork industry appears to have stabilized, based on this survey and earlier Census of Manufactures (37%-1972, 33%-1967, 36%-1963).

The pork slaughter-processing firms surveyed typically sold nearly 60% of the pork carcass components as fresh pork (typically most of their loins, boston butts, and spare ribs to food retailers; a much smaller portion

Table 2

ESTIMATED MARKET SHARE OF THE LARGEST
PORK SLAUGHTER-PROCESSING FIRMS, 1978


<u>Company</u>	<u>Percent of Federally Inspected Hog Slaughter</u>
Wilson Foods	13
Armour	8-9*
Swift	7
Morrell	6-7
Hormel	6-7
Oscar Mayer	5
Frederick and Herrud	4
Farmland	3-4
Dubuque	3
Cudahy	2
Rath	1-2
Farmer John's	1-2
Jones Dairy Farm	<u>1-2</u>
Total	63.5

*Armour's closing of two slaughter plants in early 1979 may reduce their share by 1-2%, and cause others to change as well.


Source: Industry estimates.

RETAIL CUTS OF PORK

WHERE THEY COME FROM AND HOW TO COOK THEM

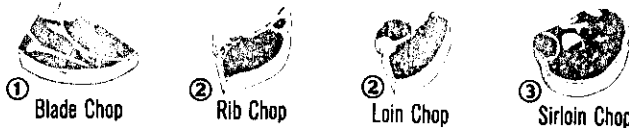


Cubed Steak*
— Braise, Cook in Liquid, —
Broil

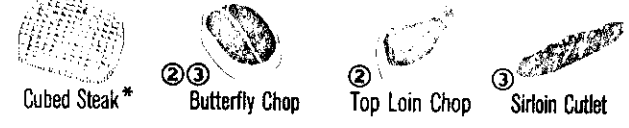


Blade Steak
— Braise, —
Panfry

Smoked Shoulder Roll
— Roast (Bake), Cook in Liquid —

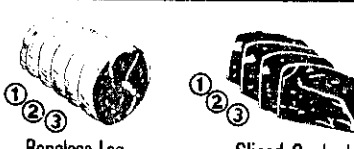


Blade Chop **Rib Chop** **Loin Chop** **Sirloin Chop**




Cubed Steak* **Butterfly Chop** **Top Loin Chop** **Sirloin Cutlet**

— Braise, Broil, Panbroil, Panfry —



Boneless Leg (Fresh Ham) **Sliced Cooked "Boiled" Ham**

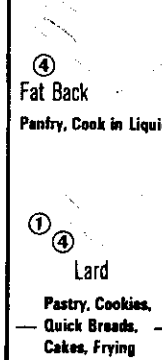
— Roast — — Heat or Serve Cold —



Boneless Blade Boston Roast

Blade Boston Roast
— Braise, Roast —


BOSTON SHOULDER



Fat Back
— Panfry, Cook in Liquid —

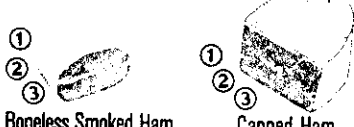
Lard
— Pastry, Cookies, —
Quick Breads, —
Cakes, Frying —

1 CLEAR PLATE
4 FAT BACK



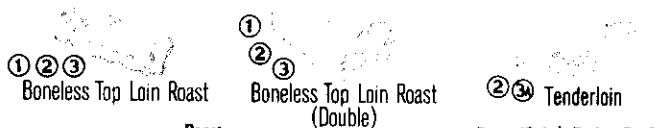
Country-Style Ribs **Back Ribs** **Smoked Loin Chop** **Canadian-Style Bacon**

— Roast (Bake), Braise, Cook in Liquid — — Roast (Bake), Broil, Panbroil, Panfry —



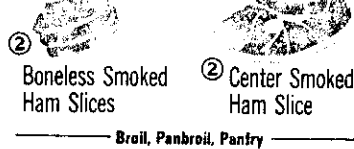
Boneless Smoked Ham **Canned Ham**

— Roast (Bake) —




Boneless Top Loin Roast **Boneless Top Loin Roast (Double)** **Tenderloin**

— Roast — — Roast (Bake), Braise, Panfry —



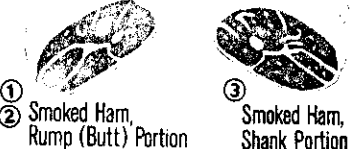
Boneless Smoked Ham Slices **Center Smoked Ham Slice**

— Broil, Panbroil, Panfry —



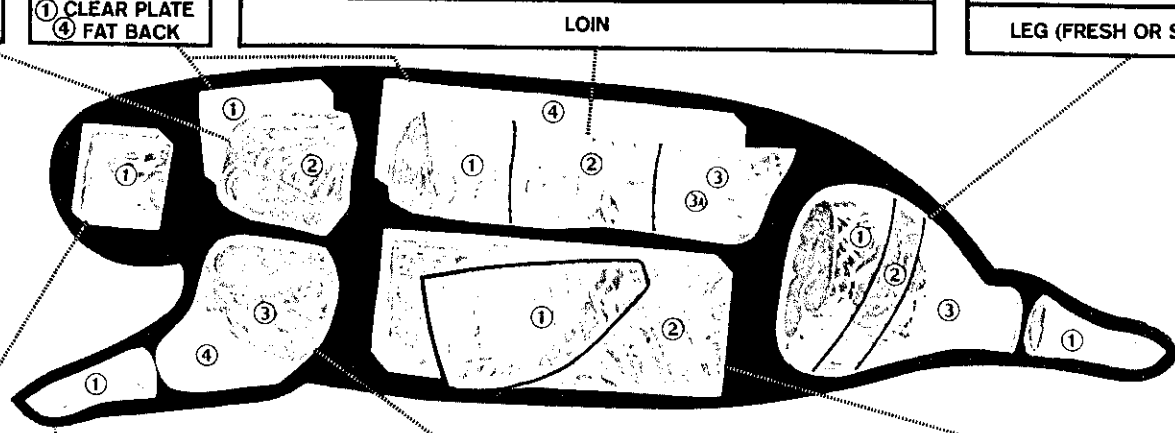
Blade Loin **Center Loin** **Sirloin**

— Roast —




Smoked Ham, Rump (Butt) Portion **Smoked Ham, Shank Portion**

— Roast (Bake), Cook in Liquid —




JOWL



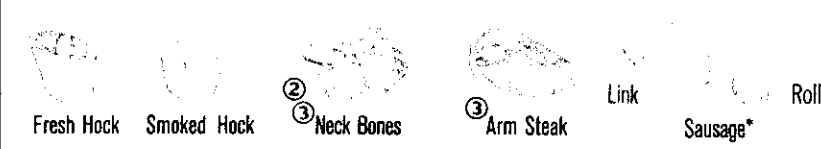
Smoked Jowl
— Cook in Liquid, Broil, —
Panbroil, Panfry —

PICNIC SHOULDER



Fresh Arm Picnic **Smoked Arm Picnic** **Arm Roast** **Ground Pork***

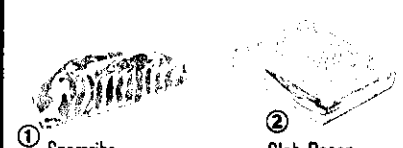
— Roast — — Roast (Bake), Cook in Liquid — — Roast — — Roast (Bake), Panbroil, —
Panfry —




Fresh Hock **Smoked Hock** **Neck Bones** **Arm Steak** **Link** **Sausage*** **Roll**

— Braise, Cook in Liquid — — Cook in Liquid — — Braise, Panfry — — Panfry, Braise, Bake —

1 SPARERIBS **2 BACON (SIDE PORK)**



Spareribs **Stab Bacon**



Salt Pork **Sliced Bacon**

— Bake, Broil, Panbroil, —
Panfry, Cook in Liquid — — Bake, Broil, Panbroil, —
Panfry —

*May be made from Boston Shoulder, Picnic Shoulder, Loin or Leg.

This chart approved by
National Live Stock and Meat Board

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of their fresh or "green" ham, belly and picnic supply to other processors, with some direct to retailers). The remainder is typically processed by the slaughter firm and sold as smoked hams and picnics, packaged bacon, Canadian bacon, sausage, franks, bologna, cold cuts, and other packaged or delicatessen-type products having pork as a component. While some private-label processed pork is sold by most large slaughter-processing firms (the extremes noted were one firm with 1/2 of their processed output sold as private label, some firms with none, and several in the 5-10% range), the bulk of their processed pork was sold as packer-branded product to food retailers, supported by large consumer advertising expenditures.¹ As one might expect with highly advertised products with significant variations in meat ingredients and spices, some strong consumer franchises for processed pork products have been developed regionally or nationally by several pork processors -- including some larger firms like Oscar Mayer and Peter Eckrich and Sons, and some smaller ones like Jones Dairy Farm and Bob Evans Farms. The basic classes of customers for pork dealt with by slaughter-processing firms or their intermediate customers -- specialized pork processing firms (sausage maker, ham canner, etc.)

¹In 1975, the 8 media advertising total (TV, print, radio and outdoor advertising) for hams, bacon, sausage, frankfurters, and canned meats (pork was a major component of all categories) for meat products produced and advertised by the 200 largest food and tobacco processing firms totaled 27.1 million. The biggest expenditures were in the frankfurter, sausage, cold cuts, and bacon product categories (Source: J. Connor and L. Mather, Directory of the 200 Largest U.S. Food and Tobacco Processing Firms, 1975, N.C. Project 117, Special Report No. 2, July 1978). A spot check of the January-June, 1978 advertising expenditures in six media reported by Leading National Advertisers, Inc., showed the leading pork product advertisers to be Oscar Mayer, Hormel, Eckrich, Armour, Hygrade and Swift (in that order), with half-year expenditures ranging from over 5 million to near 1 million dollars. Smaller advertisers included Bob Evans Farms, Wilson Foods, Jones Dairy Farm, Tobin, and Smithfield.

-- are the retail food chains and the hotel, restaurant, and institutional firms (sometimes termed the food service industry). The following table gives some perspective on the continued dominance of food retailers in the meat distribution system (3/4 of the volume), though the restaurant share of volume and expenditures has been increasing noticeably (that may primarily reflect the surge in the sales of hamburger chains). Corresponding estimates on pork and lard distribution patterns recently available from the USDA show 85.5 percent of the farm value of pork and lard moving through food stores in 1977, 14.5 percent through public eating places and institutions (with very little change noted in the food service market share in the last decade).

Recent Changes in the Pork Marketing and Distribution System

Farm Level Changes

Industry participants cite several changes occurring in the pork marketing and distribution system. Slaughter firms have been particularly affected by some of the changes taking place in hog production. Fewer, larger, more specialized hog farms are generally observed. In addition, hog producers have become much better informed, and able to use available market information to better advantage in planning their production and marketing decisions. At the same time, improvement was noted in the type of hog which is produced, as the leaner, meatier, hog provides a better quality input (and less low value fat) into the slaughter and processing operation. A few meat packers also noted the more uniform marketing patterns of hogs associated with confinement housing and feeding systems, with less

Table 3

CONSUMER EXPENDITURES AND FARM VALUE FOR FOOD:
AT HOME AND AWAY-FROM-HOME USE OF MEAT PRODUCTS

Percent of Total

	<u>Consumer Expenditure</u>	<u>Farm Value</u>
<u>Food Stores</u>		
1977	54.9	74.8
1976	56.6	74.7
1967	62.0	77.4
1947	67.9	79.8
<u>Public Eating Places</u>		
1977	39.3	21.1
1976	37.6	21.2
1967	32.1	18.9
1947	28.5	17.3
<u>Institutions</u>		
1977	5.3	4.1
1976	5.8	4.1
1967	5.9	3.8
1947	3.6	3.7

Source: USDA, summarized in Weekly Digest, February 3, 1979, p. 8.

seasonal variation noted between the high and low slaughter volumes (the seasonal and cyclical nature of hog production and prices has long been a fact of life and a factor to contend with in the pork industry).

Slaughter Capacity

A larger number of changes in the system beyond the pork producer were mentioned by a survey respondents. Several noted that there were fewer but larger hog slaughter plants in the industry, and that this was a continuing trend. However, they also noted that the industry still is plagued with overcapacity (which undoubtedly is related to the cyclical as well as the seasonal fluctuations in the hog production, and the continuing shift from older plants to newer, more modern and more specialized slaughter-processing plants). While the greater seasonal variations in hog slaughter in prior years may have given the marginal plants with the greatest excess capacity at least a few months of profitable operation occasionally, the reduction in the seasonal variation of hog production may make the excess capacity in slaughtering less viable, and be a major factor leading to the demise of some marginal plant operations. Some restructuring of the pork industry at the slaughter-processor level is currently underway, with several plants recently closed or closing soon. One industry member estimated that close to 10 percent of total hog slaughter capacity was involved, and that one-half of those plants closed probably wouldn't reopen under current or new ownership.

Product Trends

A large number of survey respondents indicated that there is much more trimming and boning of pork products now done by the packer (perhaps reflecting greater processing efficiency and lower wage rates relative to

retailers?), and a significant growth in the market share occupied by processed pork products, including more packer or processor branded items. And a similar trend has carried over into the retail counter, with more boneless, better trimmed fresh pork products, and more smoked and further processed products like sliced bacon, lunch meats, frankfurters, sausage, etc., filling a high proportion of the retail meat counter. Not all the increased specialized processing is done by the firms that initially slaughter the hog. There has been an increase in the number of specialized processing firms who concentrate on smoking hams, curing and slicing bacon, or processing sausage, lunch meat, and frankfurters, etc.

There is also a greater variety of cutting and trimming systems used by slaughter-processors. The trend toward more processed, higher margin product lines by slaughter-processing firms is perceived as the way to improve earnings and escape or partially compensate for the typical slaughter over-capacity and related low earnings from the slaughtering part of the business. At the same time, building a brand franchise on those processed items is perceived as a way to stabilize customer demand, and have output prices slightly less susceptible to the vagaries of competitive activity which is more pronounced in the fresh pork "commodity-type" product market. Others commented on another motivation -- changing the nature of the product to minimize the effects of price controls that were imposed occasionally in the post WW II period.

At the same time, many packers commented on the general deterioration of the trim on the "commodity-type cuts", perhaps a result of some packers' efforts to sell more poundage (by including more fat and bone or lean from lower-valued adjacent cuts) to customers who may not be fully aware of the value differences that would result from the different trims purchased.

While there are more premium fresh products with special trims being provided to retailers by slaughter-processors, and more retail trimming to improve the looks of products in the clear plastic trays and packages now heavily used in meat retailing, many meat packers feel that there has been a contrary or compensating shift in the trim employed in the cuts (especially green hams and bellies) which typically are the raw materials for other pork processing firms.

Customer and Distribution System Changes

Many packers observe that more pork is being sold to larger buyers in the retail and food service industries, allowing more direct full truck shipments of pork to retail warehouses, or warehouses servicing the food service industry. In contrast to the very small volume, store-door deliveries in vogue ten or twenty years ago, full truck shipments are either made directly to the warehouses or, in some cases, full trucks are shipped to serve three or four high volume stores on a store-door delivery basis. Thus, many packers feel that there have been significant improvements in distribution efficiency which have resulted from this change. In addition, a few packers noted that there has been some modest growth in the food service market for pork. They felt that the significant growth in pizza chains, and the expansion of fast food chain menus to include ham sandwiches and breakfast items such as McDonald's Egg McMuffin (Canadian bacon) and pancakes and sausages are beginning to have a noticeable impact on some firms in the last few years.

Price Behavior and Pricing Systems

Several firms noted that the futures market is now playing a major role in the pork marketing system affecting the movement of bellies in and out of storage and the market price. However, our respondents were split in their opinion regarding the effect of this change on the pork marketing and distribution system. Some noted the greater stability in belly storage patterns that were facilitated by the availability of the futures market contracts. Others were critics, citing the

occasional price volatility which they attributed to speculative influences occasionally causing significant purchasing or selling pressure on the cash belly market, creating problems for them (the critics typically did not use futures markets to hedge their belly inventories).

The significantly higher price levels for pork (and other meat products as well) in the last few years was another change cited, along with the perceived greater variability of prices in the last several years. Some slaughter firms and processors noted that these have resulted in a significantly different risk environment in the last several years, requiring a larger amount of cash to maintain the same level of product inventory. With continuing over-capacity (one industry member estimated only 73-74 percent of current slaughter capacity was being utilized) and high interest rates combined with significant price variability, both seasonally and cyclically, it is easy to see how those firms without established brand franchises may perceive the overall industry environment as becoming more risky over time.

Around 15-20 years ago, several firms mentioned there was little if any formula selling of pork products. Apparently there was a significant shift by some firms toward formula pricing in the mid 60s, with some continuing this emphasis, some phasing it out in recent years.

Conglomerate Influence

More pork slaughter-processing operations and specialized processing operations are now part of conglomerate firms. For example, Wilson Foods, Inc. is a subsidiary of LTV, Inc., Armour and Company is a subsidiary of the Greyhound Corporation, John Morrell and Co., is a subsidiary of the United Brands Company, Swift and Co., is a unit of Esmark, Inc. and Peter Eckrich & Sons, a specialized processor, is a division of Beatrice Foods, Inc. The introduction of different financial or marketing perspectives by the parent companies certainly can have some impact on the financial targets and strength of the pork subsidiaries, as well as their competitive behavior and long term viability.

Pricing Systems for Pork

Slaughter-Processor Pricing Systems

Fresh Pork -- To determine the extent of formula pricing systems prevailing in the pork marketing and distribution system, thirteen of the largest slaughter-processing firms were surveyed, supplemented by interviews with buyers for ten retail chains and a few of the largest food service users of pork, some managers of specialized pork processing firms and a few small pork slaughter-processing firms. Interviews were either personal visits or telephone interviews, nearly always on a confidential, not for attribution basis.

On nearly 60 percent of the fresh pork sold by the thirteen largest slaughter-processors surveyed, one can roughly estimate that approximately 40 percent of that fresh pork is sold on a formula price basis (See Table 4). Most of the fresh pork (around 50 percent and higher) is sold on a negotiated basis, with a small proportion sold on the basis of a daily price list (sometimes a firm price, sometimes adjusted during the day in response to competition).

TABLE 4
Pork Pricing Systems

	Fresh	Processed
Sub-Market Share	60%	40%
Formula Priced	40%	5+%
Negotiated Prices	50%	1-4%
Price List	10%	90+%

There is significant variability in the pricing systems used among cuts and among firms. The largest volume fresh pork cuts -- loins and boston butts -- typically are sold directly to retail chain customers by most slaughter-processing firms. Though a small portion of the loins may be further processed into products like specially trimmed center cut loins, or smoked Canadian bacon, the typical situation has the basic loin (or specially trimmed loins) moving directly to retailers, and priced via buyer-seller negotiation (or offer-acceptance systems like Safeway's), resulting in a firm predetermined market price on each individual trade. The individually negotiated trades are the most prevalent (usually on more than 50 percent of the volume traded, though the percentage varies greatly among firms). Several firms use a formula pricing arrangement with their customers (25-30 percent of their trades), but a few of the large slaughter-processing firms avoid formula trades when possible.

A few firms indicated that a fresh pork product price list was used for part of their sales (up to 50 percent) to retailers or wholesalers, especially to service accounts handled by their own field sales force or brokers handling the firm's fresh product line. Though some firms change this price list very often (sometimes hourly) when the market warrants it, many only change prices daily.

A smaller proportion of the slaughter-processing firm's boston butt output typically is sold as fresh product, since many heavy butts are utilized in their own sausage operations. Some firms with a heavy emphasis on processing use all their own output, and buy more fresh cuts for their own processing operation. The pricing systems used for butts are quite similar to those described for fresh pork loins, with price negotiation most prevalent, followed in order of use by formula pricing and price list arrangements between buyers and sellers.

Other cuts typically sold as fresh pork (especially spare ribs, but also feet, neckbones, etc.) are much more likely to be sold on a negotiated price basis by most slaughter-processing firms, though a few firms sell a small portion of these products on a formula basis (5-15 percent) and a few sell a high proportion of their spare ribs via their daily price list (up to 75 percent in one case).

Some products like hams, bellies, picnics, and jowls will typically reach the retailer or institutional customers as a smoked, further processed product, though a small proportion will reach the retail counter in fresh form (e.g. a fresh ham roast). In most slaughter firms, 50-100 percent of their "processing cuts" output will be sold in fresh form, though slaughter firms emphasizing further processing sell a much smaller proportion of their "processing cuts." In fact, firms emphasizing processing sometimes utilize all the cuts which can be used in the processed products they specialize in, like bacon, canned ham, or frankfurters, and buy more of those fresh pork cuts to supplement their own supply. This is in contrast to firms heavily emphasizing fresh pork sales; some firms utilize only 35-40 percent of "processing" cuts in their own processing operations. Sales of those "processing" cuts in fresh form typically are to other processors, frequently on a standing order basis. Thus, many leading slaughter firms report using a formula pricing system on their fresh ham, belly, picnic, and pork trimming sales, with the proportion most frequently noted around 50 percent, though there were clearly some exceptions (one major firm seldom uses a formula pricing system for these sales, another does on 80-90 percent of its sales). Further, the seasonal fluctuation in hog slaughter also causes variations in the proportion sold on a formula basis, as quantities in excess of the standing order are frequently negotiated.

Processed Pork -- Approximately 40 percent of the pork sold by the large slaughter-processing firms surveyed was in the form of smoked, sliced, canned, boneless, heavily trimmed, or prepared (sausage) products of one form or another. With the increased product differentiation associated with the additional processing functions performed and associated branding and advertising, it was not surprising to find that approximately 90 percent of the processed pork sold by slaughter-processing firms was priced via a weekly published national price list (with many regions or pricing zones, reflecting freight cost differences) on essentially a "take it or leave it" basis. Trade deals and advertising allowances were frequently used as methods to meet short term competition, to encourage high volume specials for some retail customers, or to keep their inventories in line without changing their base prices. Branded product price lists typically are stable for at least a week, sometimes longer if the basic commodity ingredient prices don't change appreciably. On some sausage products, the impact of price changes in individual raw ingredients is buffered by adjustments in the least cost formula, so the price list may remain stable for longer periods of time. Bacon, however, is perhaps the most volatile item typically sold on a price list basis, with changes typically made weekly, or even more frequently if the underlying pork belly price fluctuates sharply, forcing some price list adjustments to maintain margins or meet competitor's price adjustments. Typically the price list is based upon last week's cost of raw materials, plus the target margins considered achievable in the individual product categories. As either of these change, so does the price list. Thus, the weekly price list was clearly the dominant pricing system for packer brand processed pork products.

Very little use was made of formula pricing or price negotiation systems, though a small volume of product is sold via bids for some military contracts, school lunch programs, etc.

The situation was reportedly somewhat different for "private label" sales in which the slaughter-processor processes the product to the customer's specifications and packages it under his customer's brand rather than his own. While most firms surveyed only did a small amount of private label processing (typically 10 percent of their processed pork output or less), many of these arrangements were long term in nature, and formula pricing was frequently used in these frequently recurring transactions, especially on private label bacon.

In some firms, private label sausage would be custom-processed, with the selling price sometimes based on (a) their branded product price list less the cost of advertising, sometimes based upon (b) a formula related to the current least cost computer sausage recipe, the reported prices for the beef and pork trimming ingredients, plus the prenegotiated premium covering all other processing and packaging costs profit, etc. The reported prices typically used in the formulas were the closing Yellow Sheet price quotation of the relevant fresh product (bellies for bacon, lean trim for sausage, etc.) on a specified day of the week. A few formula priced contracts for bacon utilized a prenegotiated premium that was not fixed, but was a sliding scale that varied with the basic price level. Such an arrangement seems reasonable when one considers that the value of trim and shrink loss increases as the basic product cost increases, but packaging and labor costs aren't related to changes in belly prices; thus, a sliding scale premium structure may be more equitable in situations where raw product prices are quite volatile.

The typical formula arrangements are essentially an option for the customer to buy his "normal" requirements, with significant volume increases involving negotiation of a firm price on the additional quantity. However, many bacon contracts are based upon the average belly price quotation for 2, 3, or 5 days during a week, reflecting the volatility of the belly price behavior, and the desire of both buyer and seller to avoid having their price based upon a particular day that proved to be an aberration from the market trend for some reason. When contracts are based on an average of several weekdays (sometimes with one or more weekdays in the formula preceding the order), abnormal orders are usually not tolerated (either via volume restrictions in the contract, or informally). In that way, customers cannot take advantage of a supplier when prices are moving up, or order more from others when their prices are favorable to the contract price formula. Not all bacon contracts are based upon prices to be quoted in the future, though most are because of the inherent temptations otherwise available to customers and suppliers to alter order or shipment quantities to their advantage.

Pricing Systems of Small Slaughter-Processors -- To determine whether pricing systems used by the large slaughter-processors surveyed were also representative of the systems used by the smaller firms slaughtering the other 40 percent of the hogs, a few medium sized and small firms (not listed in Table 2) were contacted for supplemental interviews. These interviews suggest that medium-sized one plant firms have a greater tendency to adopt formula pricing arrangements to facilitate advance sales and minimize the business disruptions caused by disagreements on price with customers. It appears that medium-sized firms rely more heavily upon Yellow Sheet price information and formula pricing than most of the larger firms surveyed. The medium-sized firms' volumes are typically too small, and truckload supplies of some cuts too sporadic to justify the market information search and customer contacts required to do

an adequate job of safeguarding their own interests in negotiating prices with a buyer who is better informed of changing market conditions. Thus, standing orders with local or regional retailers, food service vendors, or specialized processors are often arranged for the bulk of their output, though seasonal surges in slaughter may force some negotiated sales of the surplus product.

In contrast, smaller firms tend to service their own local customers almost exclusively, and tend to rely upon price lists as their primary pricing system. This practice appears to counterbalance the greater tendency of medium-sized firms to utilize formula pricing. Thus, the share of the product volume moving under various pricing systems in the large slaughter-processing firms should be roughly indicative of the pricing system mix in the entire market.

Retail and Food Service Pricing Practices

Food Service Pricing Systems -- For many slaughter-processing or specialized pork processing firms, as much as 25% of their processed pork may be sold directly or indirectly to the food service industry.

Most pork products sold to the food service industry are processed -- ham, bacon, frankfurters, and dry sausage are the largest volume items. The largest food service customers of the slaughter-processing firms are the full line and specialty food service distributors who service the needs of a wide variety of hotel, restaurant, and institutional customers, plus direct large customers like airlines, fast food chains that may emphasize hamburgers but also offer ham sandwiches or breakfast items with pork products, and the rapidly expanding pizza chains. Most of these sales are based upon a price list for the basic list of standardized products catering to food service industry needs. There are some

exceptions -- specialty items like pepperoni may be priced separately from the price list since no other customer may buy it, but involve no price negotiation. Some schools, government and airline contracts for pork products frequently require companies to submit bids, with only the best bid(s) accepted (this might comprise 10% of food service sales). And some of the largest food service firms have evolved some different ways of pricing their pork requirements and assuring that a very large supply of product meeting tight and often unique specifications is available on a long term basis.

Three very large fast food chains were interviewed to supplement the more extensive slaughter-processor and retailer interviews on pricing systems used in the pork industry, and provide some additional insight into this small, yet important segment of the market for pork products. Interviews with three large "hamburger" chains indicated that formula pricing is used by some large firms. For example, McDonald's buys sausage using a formula pricing arrangement with at least one supplier, but uses a "cost plus" arrangement with other suppliers in which the prenegotiated premium is based upon the cost of converting the raw material into the McDonald's product plus a prenegotiated profit margin. On Canadian bacon, however, the price is negotiated weekly because of the difficulty in setting up a formula for determining the actual cost. Since only 25% of the heavy loin is used in making Canadian bacon, there are so many additional products and byproducts whose values would have to be determined that an equitable formula or cost plus arrangement is difficult to set up and administer.

Other firms interviewed primarily were concerned with purchasing smoked, cooked ham. In one firm, a formula based upon the green ham market price quotation plus a prenegotiated upcharge was used. In contrast, another firm always established a firm price on its raw material, sometimes

by buying it and storing it on its own account, and sometimes by an anticipatory hedge (really a cross-hedge) in the hog futures market. Subsequently, the hams would be custom processed by specialized processors under a prenegotiated long-term processing contract.

Retail Pork Purchasing Patterns -- Drawing from our survey of leading pork slaughter/processing firms and some food retailing firms, the extent of formula pricing of fresh pork on the West Coast can be generally characterized as little or none, in contrast with the extensive use of formula pricing on the East Coast and more moderate levels of formula arrangements in between. While not all of the food retailers were interviewed to confirm their suppliers' description of their typical pricing practices, Safeway (with its well known offer and acceptance pricing system), A&P, and Kroger were generally thought to rely upon negotiated prices on fresh pork purchases. However, in a scramble to satisfy their stores' requirements when shortages inadvertently crop up, any pricing system necessary to get the additional supply might sometimes be used. In addition to the largest three food retailers in the country, other retailers based primarily on the West Coast typically rely on negotiated prices. In contrast, some of the larger firms on the East Coast primarily use formula pricing for most of their fresh pork purchases, though they typically negotiate prices on the quantities above their normal requirements when specials on individual products are planned. In the center section of the country, some retailers rely primarily on formula pricing, some on negotiated pricing, and some a mix of the two, sometimes related to the preferences of their preferred suppliers.

Formula Pricing Benefits

Theoretically, one would expect that standing order-formula price agreements could: (a) reduce the buying and selling cost per transaction; (b) reduce the risk of a competitive disadvantage in cost for the buyer, and the risk of "bad" sale for the seller; (c) reduce the risks associated with uncertain quantities and qualities of product available for the buyer, and uncertain sales for the seller; and (d) affect the corresponding operating cost for buyers and for sellers.

For example, the costs involved in a formula price transaction would be expected to be lower than an individually negotiated transaction because less searching for market information would be required. Less time would be required in negotiating the individual transaction because most of the basic elements, once negotiated, would carry over to the next transaction without requiring renegotiation. Further, the negotiating skills (and corresponding salaries) required would be less demanding for part of the smaller buying/selling staff required, and the repetitive nature of transactions based upon well-known price reports and a standard price formula would increase the efficiency of the accounting process as well.

The risk of the buyer or seller looking bad relative to their competitors price or cost would be sharply reduced by relying for their base price on a price quotation that is commonly used by many other competitors or used as a basis for evaluating performance.¹ In an industry with a volatile price structure, and narrow margins for both buyers and seller, there would be a strong motivation to avoid selling and buying prices that are out of line with competition. In addition, a standing order system would provide some advance security for both buyers and sellers regarding their advance sales or an assured portion of their usual requirements from a supplier whose quality is well known. Each might feel less pressure to quickly conclude

¹Of course, this would also be true for many other pricing methods which were also used by their primary competitors.

their marginal sales or purchases to avoid inventory excesses or shortages, and behave accordingly in their negotiations (being less likely to "panic buy" or engage in "distress sales").

Advance knowledge of assured sales could be valuable in planning hog purchases and scheduling plant operations with greater assurance of the full utilization of the scheduled work force. In like manner, buyers could be more sure of satisfying the requirements of their store managers, and avoiding rejections of product that didn't meet their specifications that would create some last minute scrambling for "fill in" product.

Slaughter-Processor Views

Most of the slaughter-processors interviewed felt that the primary benefits of formula pricing accrued to their primary customers -- the food retailers. Several mentioned that the retailer, through formula pricing, avoids the gamble implicit in establishing a firm price on advance purchases, and avoids making mistakes in his cost and retail price compared to his competitors. They also felt that many retail buyers have little experience or skill in negotiation, and want to avoid potential criticism; thus, they have a significant interest in pricing via a formula based upon the "going market price". In addition, most slaughter-processors felt that the retailer can then feel comfortable that he is not being gouged by his supplier. As a consequence, most retail buyers can be order placers after once agreeing on the basic product specifications, base price arrangement, and the premium unless conditions change markedly for the supplier, or unless competitors offer a better deal to the retail customer. Correspondingly, several packers mentioned that some buyers require formula pricing because of these benefits. Though some packers prefer negotiated prices, some noted they sometimes have little alternative to agreeing to the buyer's desired pricing system, particularly when they have significant product surpluses.

However, several slaughter-processors felt that there were some significant benefits to their operations, in addition to allowing them to service more customers who insist on formula pricing. Several mentioned that both buyer and seller prefer an advance commitment for their product to assure that they won't be "caught short" at the last minute because of a disagreement on price. Several cited the greater regularity in the volumes under standing order, formula-pricing arrangements, compared to the off-again on-again nature of volumes with negotiated price customers. Several cited the reduced cost of transportation, and noted that much less communication was required with customers, with lower telephone bills; less time was required per transaction with a smaller number of people and lower skill levels required throughout the sales force. Also, basing many standing order agreements on the same price report simplified the accounting and billing process, cutting down on office staff requirements.

Some survey respondents felt that a shift away from formula pricing to more negotiated sales would be quite traumatic and costly, especially for those firms operating with a skeleton staff with little market analysis or negotiation expertise. Others, especially firms with a significant amount of negotiated trades, already had the market information base and the skill levels required for negotiation, and felt that an underutilized staff could shift to a higher volume of negotiated trades with little additional manpower or expertise required.

However, many packers felt that long term standing order arrangements assured utilization of a significant portion of their plant and work force through these advance sales, so their sales staff could concentrate on the supplemental sales required to develop full load shipments into each marketing area, facilitating more efficient processing plant operations and product distribution. This was particularly true for firms having

standing order arrangements with narrow boundaries on order quantities. Where volumes were not fixed within narrow limits on standing orders, there was a smaller perceived benefit in buying, selling, and plant operating efficiencies. By insuring some contribution to overhead costs from the advance sales, many felt that this strengthened their negotiating position in selling the remainder of their output during the following week.

One or two respondents felt that those processors with a better quality product could better establish a formula price differential for the additional quality or service provided than under a negotiated pricing system; however, another manager felt that negotiating an adequate premium for better quality product was more difficult under a formula pricing system. Finally, most respondents usually felt comfortable with the accuracy of the Yellow Sheet as a pricing base on long term arrangements.

Smaller packers had a slightly different perspective. Some medium sized one-plant firms indicated that they had no good alternative to formula pricing, since they deal in such small quantities of fresh pork that the only feasible way to deal directly with customers is through a formula price arrangement, given their very limited manpower. If they had to shift away from formula pricing, they would have to sell through brokers, and be charged the standard brokerage fee, or add some skilled negotiators to their payroll. Here the cost differences would be very significant. While big packers could afford the investment in time to "test the market" in making their deals, their smaller competitors must rely upon formula deals. The small packer cannot afford to acquire all the information required to negotiate directly on an equitable basis with better informed retailers; small packers also felt that they could never effect the reported market price if they did negotiate prices.

Retailer's Views -- The primary benefits of formula pricing reported by most retailers using formula pricing are: (a) the minimal time requirements for negotiating the individual transactions under a formula price arrangement; (b) the steady flow of consistent quality product, resulting in fewer "out of stocks"; and (c) the assurance that most of their primary competitors are in the same cost situation, and are unlikely to undercut their retail price.

Some other formula pricing advantages were also mentioned. Some retailers felt that the meat packer would require a price premium on forward negotiated price sales to cover the risk of adverse price changes on live animal purchases. Another felt that negotiation would benefit him through lower prices paid prior to "bad weather" markets when market supplies become inadequate (but he acknowledged that he still would not be able to get sufficient supply in that situation). While prices paid under formula contracts might be out of line on any one day with prices that might be negotiated, most buyers felt that the price movements average out over time, resulting in no disadvantage to either buyer or seller. Another commented that there is no way he can look bad on a formula price purchase, noting that he is measured against current market price quotations on the portion of his purchases that are negotiated. One buyer commented that his firm had tried negotiating prices on all their meat purchases several years ago, and switched back to a formula pricing basis on the bulk of their purchases because they felt they ended up with better purchasing results overall.

Formula Pricing Disadvantages

Slaughter-Processor Views

Several disadvantages noted by slaughter-processors were related to the market price reports which typically serve as the base price in formula pricing arrangements. Several slaughter-processing firms felt that formula pricing put them at the mercy of the seller currently in the market with the least desirable product (which they felt often established the reported price). Several felt that the Yellow Sheet does not always reflect what is going on in the market, and partially attributed this to the variations in products which each packer produces (some are not reported by the firms or the price reporting services). Another firm commented that the Yellow Sheet lags in adjusting its price report up or down until the trends are very well established, probably in response to some of the recent controversy and investigation into its activities. Others felt that the Yellow Sheet sometimes reflected other packers' excess inventory and lower prices, even though their own inventory situation was not excessive. A few persons commented that some prices quoted are nominal in nature, and don't necessarily reflect any real trades. Another was suspicious that he might sometimes be the victim of market manipulation, or just the last sale of the day, even thought it might occasionally be a "distress" sale. Some broader concern was expressed about the subjective human judgment involved in determining the price report. To the extent that the reporter's judgment can be erroneous, some felt that there is potentially a problem when only the Yellow Sheet is typically considered the authoritative source for price reports in the industry (despite the USDA and Meat Sheet reports which are also available).

However, one packer strongly felt that there are fewer potential problems in using formula pricing now since there are two private price

reporting services competing (the Meat Sheet began operations in the mid-70's). Another respondent felt that industry was afraid to price its product. While both buyer and seller looked good with a formula price, he felt that formula pricing accentuated the power of the Yellow Sheet, and made its power awesome.

Other formula pricing disadvantages were cited. Formula arrangements can be abused, in that formula pricing arrangements without any quantity restrictions would allow buyers to buy greater volumes on a formula basis when prices were expected to decline, and buy increased volumes on a negotiated basis when prices were expected to increase. Thus, formula pricing arrangements without stable volumes can occasionally cause a packer to experience greater adverse impact from market price changes between the time of product pricing and raw material purchase than otherwise might occur.

Several respondents felt that the skilled negotiator typically gets a better deal for his firm (50-75% of the time). One person felt this might be as much as one cent per pound on some items on negotiated deals (though that firm dealt primarily with small retailers who might be less skilled negotiators). For some firms where other advantages weren't deemed significant, this was a critical consideration in their decision to negotiate most of their fresh pork prices.

One disadvantage of formula pricing cited by some packers was the fact that some retailers (including some of the largest retail chains) will deal only on a negotiated basis for fresh pork products. Another indicated that formula pricing was truly no benefit to the packer unless the market quoted by the Yellow Sheet was higher than the price otherwise available to the packer (although he conceded that the pricing system involved less hassle and arguments with customers).

Yet, several meatpackers felt that there were no significant disadvantages to formula pricing, even though they did not rely heavily on

formula pricing for their fresh pork cuts.

Retailer's Views -- Retailers using formula prices generally were well satisfied with formula pricing, citing few problems or disadvantages associated with formula pricing. One or two indicated that the quoted prices in the market price report may sometimes be temporarily high, and they are stuck with them even when they "know" that it is truly an abnormal situation. Another felt that one or two of the largest packers were in a position to control the product flow in the cash market and, correspondingly, the Yellow Sheet report.

Firms that typically don't use formula prices cited a few more problems. One felt that if there was one packer sale at a higher price at the end of the day, the retailer was stuck with it under a formula pricing system; also, he found it difficult to set a sale price in advance when the price being established under a formula is determined very close to the time that an ad is run promoting week end sales (others apparently needed less lead time for placing ads).

A West Coast retailer indicated that the prices quoted in the midwest (the "River Market") are not always representative of prices on the West Coast, especially when there are transportation difficulties on products moving from the midwest to the West Coast. This may be one of the primary reasons why most West Coast retailers prefer negotiated prices on their fresh pork products. Another questioned whether the quote was based on a large enough sample to really make it representative of the other retailers' cost.

In addition, some firms felt that they are in a stronger legal position if they use formula pricing, so they can't be accused of using their market power to force the market price down. Some others felt that avoiding formula pricing may be safer legally, citing

some of the law suits which have been brought against food retailers regarding their beef purchasing practices and the role of the Yellow Sheet in influencing those prices.

Food Service Firms - Advantages and Disadvantages -- The large firms using a formula pricing arrangement for part or all of their pork requirements typically considered it an excellent way to assure the acquisition of an adequate supply of high quality products that are virtually sure to meet their tight specifications. In those firms, quality was considered their first priority, and price was a secondary consideration.

In cases where formula pricing was not used, a "cost plus" arrangement was sometimes used, which has the advantage of not relying upon a market price quotation which may not be in line with a firm's actual cost. However, this system usually requires the supplier to open its books to its customer, and may involve questions of judgment regarding the appropriate procedure of allocating cost to the individual customer's product.

In some cases it was very difficult or impossible to set up an equitable formula because only a small portion of the basic product for which a price was quoted was purchased (e.g. loins - Canadian bacon).

One food service firm insured the ultimate quality of the product delivered by establishing long term processing arrangement with specialized processors, but elected to negotiate firm prices on its raw material. They felt that they typically could achieve a lower cost through negotiation than the Yellow Sheet quotation at that time.

Thus, some formula pricing is definitely used in the food service industry to insure product supply and quality, but the largest firms have a greater tendency to utilize more negotiated prices or other arrangements that don't rely on the Yellow Sheet for a base price, insuring quality

through their approval of a large enough group of suppliers willing to negotiate prices, or setting up custom processing arrangements with known high quality processors.

Estimated Impact of a Formula Pricing Ban

To partially estimate the economic impact of formula pricing, buyers and sellers of pork products using formula pricing were asked what the impact of a formula pricing ban would be on their operations. Where possible, they were asked to roughly estimate the changes in their cost structure which would result from their shifting from formula pricing to the next best pricing system on the product volume sold or acquired on a formula basis. Most firms interviewed felt that an outright ban on formula pricing would create a significant amount of turmoil in the industry, as many buyers and sellers would have to significantly restructure their sales and purchasing arrangements and organization. Because this was a very difficult question, several firms were unable to address it -- being unable to conceptualize how the change would affect them, or unable to estimate the impact in their complex organizations without spending a significant amount of time and effort. However, several slaughter-processing and retailing firms provided estimates, basing them on their experience on the portion of their operations relying upon negotiated pricing systems.

A few small slaughter-processor cost estimates ranged from .21 to 1.25 cents per pound of pork produced; that was considered to be the additional cost of staffing up their sales operation to negotiate sales directly with their customers without being "taken" by better informed customers. Two large pork slaughter-processing firms felt that there would be very little added cost to their operations resulting from a formula pricing ban -- some increase in telephone bills and time involved in

negotiating, with some increase in manpower (perhaps a man or two in each firm) required to handle the increased work load. One large pork processor felt that the additional time and effort required would probably involve increasing their sales force by one or two persons, which would result in less than 1 cent per hundred-weight additional cost. However, another major firm which relied more heavily on formula pricing felt that a significant improvement in both the quality and quantity of manpower involved in price negotiations would be required to hold their own in the negotiated pricing system. In addition to increased communication cost, he felt that the labor costs would probably increase approximately 2.5 cents per hundredweight, and involve a significant change in the parts of their organization responsible for procuring fresh pork from outside suppliers, and product marketing. In addition, he felt that there would be significantly more risk involved for both buyer and seller without formula-priced advance commitments, and that another way of getting advance sales on the books would have to be developed.

While the available data from the survey are sketchy at best, they tentatively indicate that a ban on formula pricing would be least costly and problematic for the very large slaughter-processing firms now well negotiating part of their sales (and purchases), and for smaller firms relying upon a fresh pork price list for small retail and service accounts. For larger firms, like those in the top 10, perhaps 1-2.5 cents per hundredweight might be the additional costs. For others, especially in the medium-sized one plant size category where the required additions to the labor force would be proportionately greater, though on much smaller volumes, 1/4-1 cent or more per pound might be the additional cost.

Since 40 percent of fresh pork is formula priced for the top 10 firms, that might increase their transaction costs by \$300 - 800 million dollars, based on 1978 pork slaughter volumes. Assuming that the "medium-sized" firms comprise 20 percent of slaughter, and that the amount of processed pork sales is 30 percent of their volume, the cost of a formula price ban for those firms would be an additional three million dollars if the additional cost per pound were only 1/4 cent per pound.

What would be the cost of banning formula pricing for retailers? Elimination of formula pricing might give some advantage to the seller, since many formula arrangements are now set up to expedite quantity commitments 4-5 days in advance; the buyers would still need that assured supply 4-5 days in advance (sometimes further in advance for some specials) to establish ad prices and insure sufficient supply for their merchandising programs. But slaughter firms could scale down their slaughter rate if the sales volume wasn't sufficiently large at prices that would justify current or expected paying prices for hogs. Thus, the seller may feel less pressure to make a marginal deal, and benefit in the negotiation process. Five retailers using formula pricing provided rough estimates of the increased cost of purchasing pork and/or beef on that portion of their purchases which are currently formula priced. Four large regional chains estimated that the increased costs associated with formula pricing would range from 2.5 cents per hundredweight to 7 cents per hundredweight, with the higher cost levels estimated by smaller firms. Each of these chains had a centralized purchasing operation. Another chain had decentralized buying offices in a large number of regions, and was a very heavy user of formula pricing in fresh pork; they estimated that they might need to add the equivalent of 1/2 man year in each of their regional offices to handle the increased information search, negotiating time, and clerical work, or 28 cents per hundredweight of pork purchased.

Assuming that only 70 percent of all pork goes through retailers, and 25 percent of that is formula priced, applying a conservative added cost estimate of 5 cents per hundredweight results in a total annual cost increase slightly over 1 million dollars for food retailers, heavily concentrated on those middle-sized national and regional chains most heavily using formula pricing.

Further Observations and Analysis

The general issue raised most often by industry participants and economists relates to the representativeness of the price generated from thinly traded markets often found in conjunction with extensive formula pricing. Let's consider several questions raised about formula pricing, and the price reports that are a critical element of formula pricing systems.

Some market participants become vexed when someone's transaction near the end of the day establishes the market price report, even though it's lower or higher than the prevailing price pattern during the rest of the trading period. If 99 trades are made at \$1.00 per pound, and the last one (100th) is made at 99¢ per pound, is 99¢ an appropriate price to report? Is it a representative price? Presuming that product quality was within the product specifications usually reported, that price certainly would be a legitimate price to report as representative of the market at that particular point in time, just as the other prices were representative at other points in time. Keep in mind that trades earlier in the day are based upon information and expectations regarding demand and supply (current and future) which may not be accurate, and cause firms holding out for that "better" price to change their expectations later, and salvage or benefit from the situation as best they can. The resulting

price is what it takes to clear the market at that time, and that's a legitimate price from an economist's standpoint.¹

However, one still should question whether one price quoted for a specific small period of time is the best indicator of product values over a longer time period. If a formula is based only on a closing price, that price shouldn't be expected to be perfectly representative of prices throughout the whole day, since new information continually becomes available, changing supply, demand, and price expectations and firm behavior in the marketplace. However, they should be reasonably representative of market prices over a long period of time if the report timing doesn't cause firms to adjust their market behavior, or the adjustments by sellers are not effectively countered by buyers, etc.

Is a firm better off by having a high proportion of its sales or purchases locked up in a formula price contract? Many firms felt they would be in a position where they wouldn't have to "scramble" as much for their remaining sales or purchases, and be less likely to get into a "panic" buying or selling situation. That may be true, but that doesn't necessarily mean that the ultimate market price wouldn't be adversely affected anyhow. While one buyer/seller pair would be largely removed from the market price determination process, the remaining firms would still have to search for a price that would balance quantities desired with quantities offered. While the formula-priced firms may avoid a "panic" situation, the other firms may be more likely to get into a panic buying or selling situation which may sometimes be necessary to clear the market. The resulting base market price used by the firm in its price formula might be the same as the price it would have negotiated.

¹ Obviously, that assumes no manipulation; of course, manipulating a closing price would undoubtedly be easier than manipulating an average daily price or some broader market price index.

Does the use of extensive formula pricing in a market lead to a change in the equilibrium market price?

If there is no reason to expect consumer demand to change and the basic supply of the raw material to change in the short run, the formula price contracts withdraw from the price negotiation process an equivalent amount of customer purchases and processor sales, leaving unchanged the market price.

However, the introduction of a standing order--formula pricing transaction system into the market may cause a change in the relevant firm supply and demand curves. Because this pricing system reduces the price and quantity risk of the supplier, less risk premium would be required in the price on each advance sale. In a similar vein, the greater assurance of acceptable quality and quantity, and less hazard of competitors getting a lower price might shift the customer's demand curve facing the firm. The resulting market price could be the same or slightly different, depending upon the relative shifts in supplier and customer behavior due to the new market institution.

However, the dynamic and imperfect structure of the market in real life could lead to the appearance of or actually result in different short term price results. Since firms with formula price contracts might tend to be more poorly informed negotiators, who might be prone to short term errors, eliminating them from the market price determination might cause occasional changes in the short run market price. The expected average dispersion from a full information price level might be less with formula pricing (fewer mistakes might be made).

Other market imperfections might also cause the market price to change if formula pricing was prevalent in a market. A firm with market power in its product market could find its effect on the market price was

increased as its share of the residual negotiated market increased (due to formula priced firms' exit). If the firm also had some formula priced sales, the revenue impact of the price change from an incremental market transaction would be even greater. This could lead to changes in firm behavior and equilibrium market prices. But, the presence of countervailing power on the other side of the market could partially or completely counter that effect on market prices.

In addition, there are other aspects of formula pricing that may influence the shape and position of the firm's supply and/or demand curves. There may be lags in firm adjustments to market prices if formula pricing is used. Firms involved in formula pricing arrangements would be expected to be less responsive to price changes today, since those quantities were predetermined. However, a buyer's subsequent orders may be affected by today's market price and related consumer response. Thus, short run prices might change, but longer term average price levels may not be affected.

Other factors may also influence the equilibrium price. The lower cost per transaction for buyers and sellers could affect their effective demand and supply curves. Firms using formula pricing to assure a sufficient volume of uniform quality product appear less likely to shift their patronage to other firms; this may change the demand curve facing their suppliers.

As a consequence, formula pricing could result in different supply and demand functions for some buyers and sellers in the market, compared to a market without formula pricing as a market mechanism. But, there are too many potentially compensating factors influencing the likely equilibrium market price to determine clearly whether it would be equal to or different from the price expected in a wholly negotiated market ~~on~~ any particular day, or

over a longer period of time.

Is the Yellow Sheet a dominant influence in determining price levels in the pork industry?

Certainly, the Yellow Sheet, as the authoritative market price reporting service in the meat industry, has a pervasive influence in affecting prices in the pork industry. This influence is most direct through the use of the quoted prices as the base price for formula price contracts with customers, and through the use of quoted prices as transfer prices, and, thus, cost bases for the processing and sales arms of slaughter-processing firms. The influence is more diffused in the firms where the Yellow Sheet serves as the primary information base supplementing a firm's own purchase and sales prices. There the Yellow Sheet and the information base gained by buyers and sellers in their contacts among themselves affect the firms' perspective of the most recent market price from which there might be incremental changes if supply-demand conditions change. The influence is also felt in the price of processed products, since the commodity cost that must be recovered is influenced directly or indirectly by the Yellow Sheet price reports. However, as more factors influence the firm's information base or the product costs, the impact of the Yellow Sheet is more diffused.

Does formula pricing in the market for pork lead to very thin, and potentially manipulable markets in some pork products? Formula pricing certainly removes some loins and butts from the price negotiation process, and an even higher proportion of the fresh hams and bellies which are typically sold to other processors.

In addition, many slaughter-processors use different trimming and boning practices on their fresh pork in an effort to favorably

differentiate their product or to increase the amount of poundage sold as higher priced product (a slight difference in knife placement can make an appreciable yield and profit difference). As a result, there may be a large proportion of the fresh pork products sold that do not fit into the basic product classes reported by the primary price reporting services. This may be true on products like loins, where special trims may take a lot of product out of the commodity mainstream. In addition, a high proportion of the hams, bellies, picnics, and jowls are retained for packers' own processing operations, sharply reducing the number of negotiated price transactions that are possible. Small volumes of fresh pork (especially processing cuts) at negotiated prices are undoubtedly common, making it difficult to find and report representative prices, and making reports more susceptible to errors of omission or commission by slaughter/processing firms, their customers, and the price reporting services.

Yet, most market participants surveyed felt fairly comfortable regarding the representativeness of the prices quoted by the Yellow Sheet. A few were antagonistic toward the Yellow Sheet and formula pricing in general, sometimes on the basis of distrust, sometimes for philosophical reasons (they didn't want to rely on anyone else's price). Several market participants were troubled by the lack of disclosure of the factors determining the price reported when it occasionally differed from sales or purchase prices their firms made and reported. But, several felt that the accuracy of the Yellow Sheet report has been improving in recent years, with some persons attributing it to the entry of a competitive price reporting service (the Meat Sheet) several years ago. The fact that the government and other private competitors both offer price reports which can be readily compared to the Yellow Sheet probably provides some ready ammunition for

critics when reporting errors are made, and provides a self-policing mechanism in the Yellow Sheet reporting process. Yet, significant controversy still exists in the public arena regarding the integrity of the Yellow Sheet and the formula pricing process.¹

Policy Options²

Private Firm Options

A continued increase in the use of quite efficient formula pricing arrangements in a market could gradually erode the volume involved in the price determination process. In the logical (or illogical) extreme, formula pricing could expand to the point where the negotiated market would become extinct, and, in doing so, make extinct the base market price necessary for the formula. Of course, one would begin to see signs of problems developing with regard to that market price as that process evolved, which would probably cause private firms to act differently, and forestall the continued evolution.

The critical public policy question is whether the economic costs or problems associated with formula pricing are greater than the benefits, and enough so to warrant government intervention? Or, alternatively, could some of the problems be eliminated or minimized, while retaining the economic efficiencies associated with formula pricing?

There are some options available to private firms which might remedy some of the alleged problems. When firms feel that the price report on any particular day is error prone because the reporting firm is not immediately

¹The reporting by the Yellow Sheet has been critiqued by the House Small Business Committee (op. cit.), and most recently by the Secretary of Agriculture's Meat Pricing Task Force, among others.

²For a discussion of policy options for both beef and pork, see the author's paper entitled Formula Pricing and Price Reporting Problems in the Markets for Beef and Pork, NC-117 Working Paper WP-32, May, 1979, and the Meat Pricing Task Force Report to the Secretary of Agriculture, June, 1979.

and accurately sensing a real change in the market price level, or some of the firms fail to report accurately or fully, they could base their formulas on 3 or 5 day price averages, presuming that aberrations in either the market price or the market price report would average out over that time period. Alternatively, they could regularly negotiate prices on part of their volume and report them to help insure representative prices being reported. Where that may not be feasible, the average or 2 or 3 price reporting service reports might be considered as the base price quote, actual "cost plus" contracts might be used, or the firm could consider vertical integration to avoid the pricing problem.

Price reporting services could intensify their efforts to more comprehensively report the trades in the most thinly traded (on a negotiated or offer-acceptance basis) product categories. But even that effort would have its limitations, since the point can be reached where additional searching by the reporter may be too costly for the results obtained. This could be partly attributable to the practice of some large firms to not report or confirm any negotiated trades, and the standard practice of some reporting agencies to report only confirmed trades. When those practices in combination with a high incidence of formula pricing take a high proportion of some products of the population of transactions that could be reported, it undoubtedly becomes very difficult to find a large enough number of transactions to confidently base a price report on, while making it easier for a report to be in error.

Price reporting services could compensate for the small negotiated volumes or small number of reported transactions in some commodity categories by expanding the breadth of the product categories that they report. If a basic commodity is often further processed by the packer

before it enters the market, the price reporting agency could report prices for the highest volume processed product categories. By broadening the price report coverage, these prices could directly relate to some processed products traded by their clientele, or indicate when prices in the most thinly traded but closely related basic commodity categories are out of line. If aberrations are frequently observed, those prices and reports ought to be carefully monitored, and perhaps eliminated from formula agreements, or considered suspect as a base for starting the next day's negotiations. Having such information available can help diagnose possible discrepancies and inequities, and may stimulate improved market arbitrage among product categories.

Public Policy Options

There are also several public policy options that might be considered, some closely related to the private firm options. The extreme option would be banning formula pricing, with its corresponding effect on industry transaction costs and risk, and the readjustment trauma involved. There is a serious question whether a ban would be enforceable, given the strong motivations among many buyers and sellers for some form of low risk, efficient standing order advance purchase/sales arrangement, and the oral nature of many such agreements.

All firms, or perhaps just the largest firms, could be required to negotiate all or a specified percentage of their sales or purchases, to maintain sufficient volume in the negotiated product markets. If all firms were forced to negotiate, this would probably put the smaller, less well-informed buyers and sellers at a greater cost disadvantage, and a greater bargaining disadvantage than they are now. The result could be some undesirable structural changes in the meat pricing and retailing

industries. Forcing only the largest firms to negotiate prices on all or part of their volume would be less traumatic, since many now rely on negotiation for a large part or even all of their purchases/sales.

However, this could also have a significant impact on their relationships (and relative bargaining strength) with the smaller customers or suppliers they may now deal with on a formula pricing basis.

Large buyers or sellers not reporting their large volumes of negotiated transactions could be required to report to approved price reporting agencies. While some might question whether purchase price reports by Safeway or A&P might facilitate collusion in pricing among big retailers (and that may be one very sound reason why some large firms currently elect not to report prices), the basic information on prices paid by leading retailers is already well known to the best informed firms in the industry without their reporting or even confirming their purchase prices. Requiring reports from large retailers and slaughter-processors could eliminate that legal question, make that information more broadly available, and make the total spectrum of reported prices more credible. While there might be some costs involved in reporting, they probably wouldn't be too large if the breadth of the report and underlying documentation required would be reasonable.

Licensing approved private reporting services or having all reporting done by a government agency are two additional public policy options. If there are significant problems in current private price reports caused solely by the actions or inactions of the price reporting service, an oversight or regulatory function might help to eliminate those errors. But the regulation would result in added cost to the individual reporting services, ultimately their customers, and the taxpayer if a government agency was established to administer such regulations. Sidestepping the

"freedom of the press" legal question (which may be quite important), guidelines might be established to minimize some alleged problems. But, the nature and extent of the real problems are still insufficiently documented to clearly point out whether such a prescription would really be necessary (or whether the problems lie elsewhere). Of course, requiring buyers and sellers to report prices to approved reporting services might be a great incentive for the private reporting agencies to elect to seek a license as an approved reporting serving--the increased credibility might dramatically affect customer confidence in their reports.

Requiring reports from buyers and sellers to a government price reporting agency is another option. But the current government price reporting agency is little used by most market participants, partly due to the lack of an overnight written report, partly due to their report format (price ranges, etc.), partly due to less credibility than the Yellow Sheet. Unless other changes were also made to make the government report more readily available and usable, it's not clear that the expansion of the price reporting population (at some cost) would by itself be sufficient to be a significant improvement in the view of many market report users.

Summary and Overview

To determine which pricing systems are most prevalent in the market for pork and pork products, confidential interviews were conducted with thirteen of the largest pork slaughter-processing firms, a few small pork slaughter-processors, ten retail chains, and a few large fast food chains. Because formula pricing in the meat industry has been the focus of some controversy, market participants were questioned regarding the advantages and disadvantages of formula pricing, and the economic impact that a ban on formula pricing would have on their business.

The thirteen large (perhaps the largest) slaughter-processing firms interviewed sold nearly 60% of their pork (not including offal, etc.) as fresh pork, and approximately 40% as processed pork in one form or another. Most of the processed pork was sold under the packer's brand or label, though several slaughter-processors sold 5-10% of their processed pork outside as private label product (especially bacon). However, some fresh pork was sold to other processors, where it was converted via boning, smoking, grinding, trimming, and other processing into processed products sold under the processor's brand or their retail customer's private label. Possibly 20% of the pork carcass is processed by specialized processing firms, but the bulk of the slaughter-processors' pork output is sold to retail chains (perhaps 65-70%) and the food service industry (10-15%).

The results of our industry survey on pork pricing systems are clearly inconsistent with the House Small Business Subcommittee conclusion that 70-90% of all meat sales are formula priced. The pricing system most frequently employed in fresh pork sales by the slaughter-processing firms surveyed was a negotiated pricing system (approximately 50%),

followed closely by formula price arrangements (approximately 40%), especially with specialized processing firms. The remainder (about 10%) of fresh sales were based on a daily fresh product price list.

Processed pork sales were typically sold via a weekly price list for the packer branded products (over 90%), though a small proportion of the processed pork products (less than 10%) were sold as private label products, with over half of those sales (especially bacon) sold on a formula pricing basis. Other private label prices were based upon the branded product price list minus the cost of advertising, or were individually negotiated.

An overview of the sales of pork by the large slaughter-processors surveyed shows that approximately 40% of all the fresh and processed pork sold (excluding offal, etc.) was priced via their daily or weekly price list, approximately 35% of the sales were negotiated (or bid-acceptance) prices, and the remainder (approximately 25%) of the pork sold was via a formula pricing system relying upon reported market prices in the Yellow Sheet as the base price in the formula. Thus, the prevalence of the use of formula pricing has not changed appreciably from the 41% reported for fresh and frozen pork by the National Commission on Food Marketing in 1965, but the 29% formula sales reported for cured hams, picnics, and bacon (and 20% for other prepared meats) in 1965 has sharply declined to approximately 5% of all processed pork sales if our survey is representative of all firms in the industry.¹

Most slaughter-processor firms relied upon formula pricing for some proportion of their fresh pork sales, though the proportion was declining or very small in a few of the larger firms. The greatest reliance on

¹Organization and Competition in the Livestock and Meat Industry, Technical Study No. 1, National Commission on Food Marketing, June, 1966, p. 57. The NCFM study focused solely on the pricing systems used with packer's five largest customers, so it may not be representative of the industry mix of pricing systems at that time.

formula pricing arrangements was by two or three of the larger firms, and several medium sized and small one plant firms where the fresh pork sales volume was not consistently large enough to justify the sales force and skill levels necessary to negotiate on an equitable basis with larger, better informed retail customers or specialized processors.

The largest national retail chains tended to avoid formula pricing, as did the retail chains on the West Coast. The greatest use of formula pricing among retail chains seems to be concentrated on the East Coast, though medium-sized regional chains or smaller retail chains utilizing some formula price arrangements or heavily dependent upon them are scattered throughout the Eastern two-thirds of the United States.

The pork prices for most food service firms are typically based upon a standard price list, though the largest food service customers dealing directly with pork slaughter-processors have evolved some other ways of pricing their pork purchases and insuring that very large volume requirements and very tight, often unique product specifications are consistently satisfied. These include formula pricing arrangements, "cost plus" arrangements, negotiated prices on individual transactions, and custom processing arrangements in concert with separately negotiated raw ingredient purchases.

Formula Pricing Advantages and Disadvantages

Slaughter-processors typically felt that the greatest beneficiaries of formula pricing arrangements were their retail and specialized processing firm customers. While a few firms found little or no advantages from formula pricing accruing to them, and were trying to shift away from its use, many other slaughter-processors felt that the advantages tended to outweigh the disadvantages. While a variety of formula-pricing advantages

were cited, the most frequently mentioned were: (a) the greater volume stability, facilitating better sales staff and plant utilization, and (b) the reduced transaction cost and hassle.

Retailers utilizing formula pricing felt the primary advantages were (a) reduced time involved per transaction, (b) the greater assurance of adequate volumes of consistent quality product, and (c) the reduced risk that competitors would gain a cost advantage. The primary disadvantages of formula pricing were most frequently characterized as (a) occasional discomfort or suspicion regarding the representativeness of reported market prices, and (b) some buyers refuse to trade on a formula basis.

The Cost Impact of Formula Pricing

To get another perspective of the economic impact of formula pricing in the industry, both slaughter-processing firms and their retail customers were asked what additional costs would be incurred if formula pricing was banned. While a few large firms currently involved in negotiating a significant portion of their sales or purchases felt there would be little added cost in their operations, a very high proportion of the respondents felt that a ban on formula pricing would be traumatic for many firms in the industry. Several firms were able to come up with a well-reasoned estimate of the additional time and manpower required in their buying or selling operations, and the additional phone bills, clerical time, etc. involved in shifting to a wholly negotiated pricing system.

Among slaughter-processors, the largest firms' estimates ranged from 1.2-5 cents per hundred pounds, while the medium to small-sized firms estimates ranged from .21-1.25 cents per pound. Using estimates in the low end of these ranges, these suggest a formula pricing ban would result in an additional annual transaction cost in the three to four million dollar range.

Retail chain estimates of the additional cost per hundred weight purchased ranged from 2.5 to 28 cents per hundredweight. Using the most prevalent estimates, which were in the 5-7¢ per hundredweight range, the cost avoided through formula pricing would be over 1 million dollars on an annual basis for the food retailing sector.

Realizing that these estimates do not include any additional costs due to increased risk premiums that might be involved, or reduced efficiency or effectiveness of marketing or processing operations due to more sporadic product volume or quality, one can conclude on the basis of this small data base that formula pricing systems in the pork sector have reduced marketing costs by approximately five million dollars per year.

Policy Options

Some changes in policy are briefly considered which might deal with some of the alleged problems with formula pricing, the thinly traded negotiated market for some pork products, and the market price reports used in formula-priced transactions. While the pros and cons of these policy alternatives are not comprehensively considered, one can conclude on the basis of this survey that a ban on formula pricing would be traumatic to many market participants, especially small to medium-sized slaughter-processors, and some East Coast and other regional retailers predominantly buying fresh pork on a formula-priced basis. A ban might add approximately five million dollars annually to the cost of buying and selling pork products. Many market participants felt a strong incentive for some low-risk form of advance purchase/sales arrangement and felt that a ban might be unenforcable.

Other policy options considered include (a) adding more resources to reporting the most thinly traded product markets, (b) expanding the breadth of product coverage to include other closely related product classes

varying in degree of processing, (c) required reporting of negotiated or firm-price transactions by large buyers and sellers (some do not report prices currently, (d) requiring negotiated trades on all or part of the transactions of large buyers and sellers, (e) licensing and regulating price reporting services, or governmental price reporting.

Because of the extensive trimming of some cuts and internal utilization of some "processing cuts" by some firms, combined with the greater reliance on formula pricing for some "processing cuts", the negotiated markets for some standardized fresh pork cuts are thinly traded. If these trends continue, there is a reasonable probability that more noticeable problems may crop up in the future. While there are significant criticisms or suspicions regarding the accuracy of the Yellow Sheet's market price reports, most firms were generally comfortable with using those price reports as an accurate index of product values in the long run. Some modifications of current practices by reporting firms (like broadening their product coverage) and retailers (reporting prices if they currently do not) could provide some incremental improvements in the reporting base and the usefulness of the price reports.

At this stage of evolution in the wholesale pork market, the concerns and problems associated with formula pricing and the price reporting process appear less in magnitude than in the beef sector. On the basis of this survey, there is no indication that the current pricing system in the pork industry is permeated with significant problems that would warrant significant intervention by the government.