VERTICAL ORGANIZATION AND COORDINATION IN SELECTED COMMODITY SUBSECTORS

edited by

Gerald R. Campbell and Marvin L. Hayenga

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Papers presented at a Symposium of the American Agricultural Economics Association, Blacksburg, Virginia.

Preface

This group of papers was presented at an American Agricultural Economics Association Symposium organized by the North Central Regional Research Project NC-117 in Blacksburg, Virginia on August 7, 1978. In the last two years, one element of the NC-117 research effort has been an analysis of the organization and vertical coordination mechanisms in a large number of commodity subsectors, the reasons underlying their existence, and their performance implications. The focus of analysis on the vertically linked stages of production-processing-distribution within the subsectors was an attempt to expand the frame of reference of traditional organization studies to examine the dynamics of changes in structure, coordination mechanisms, and performance among these vertically linked stages and to assess the impact on the control of productive resources in the food system. The first four papers highlight the dominant organization and coordination features in selected commodity subsectors, the reasons for their dominance, and some noteworthy performance implications. These are drawn from the results of in-depth subsector studies which are being or will be published as NC-117 research monographs or working papers. The final paper is an initial attempt to compare and contrast the dominant structural, coordination, and performance features of the subsectors considered in the symposium (plus dairy), to extract the commonalities and differences, and suggest some hypotheses regarding those interrelationships which might be tested as further case studies of commodity subsectors now underway provide additional evidence in the future. We consider it an interim report, and would welcome your comments and suggestions.

Marvin L. Hayenga
Gerald R. Campbell

August, 1978

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Vertical Organization and Coordination in the Broiler and Egg Subsectors*

Lee F. Schrader** and George B. Rogers***

Our subject is too broad to do more than compare and contrast the broiler and egg subsectors with respect to a few issues. We refer the reader interested in a more complete picture to others (Marion and Arthur, Benson and Witzig, and Schrader, et al.). Our object is to contribute to the understanding of vertical market structures, their causes and impact on performance across commodities.

Concentration

Both the broiler and egg subsectors have tended to concentrate horizontally and geographically. Broilers are more concentrated in both dimensions. The largest 20 broiler firms did 55 percent of the business in 1975 with 61 percent grown in 5 states in 1977. The largest 34 egg producers accounted for only 25 percent of production in 1977 with 37% produced in five states. Both have shifted toward the South Central and Southeast.

Economies of scale in processing led to fewer plants. Other economies to scale, particularly in broiler marketing, input supplying, and financing, have encouraged horizontal concentration at the processing stage. Economies attributable to production density have contributed toward geographic concentration.

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* AAEA Symposium, Vertical Organization and Coordination in Selected Commodity Subsectors, August 7, 1978, Blacksburg, Virginia.

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That is, cost of supplying production inputs vary inversely with production density.

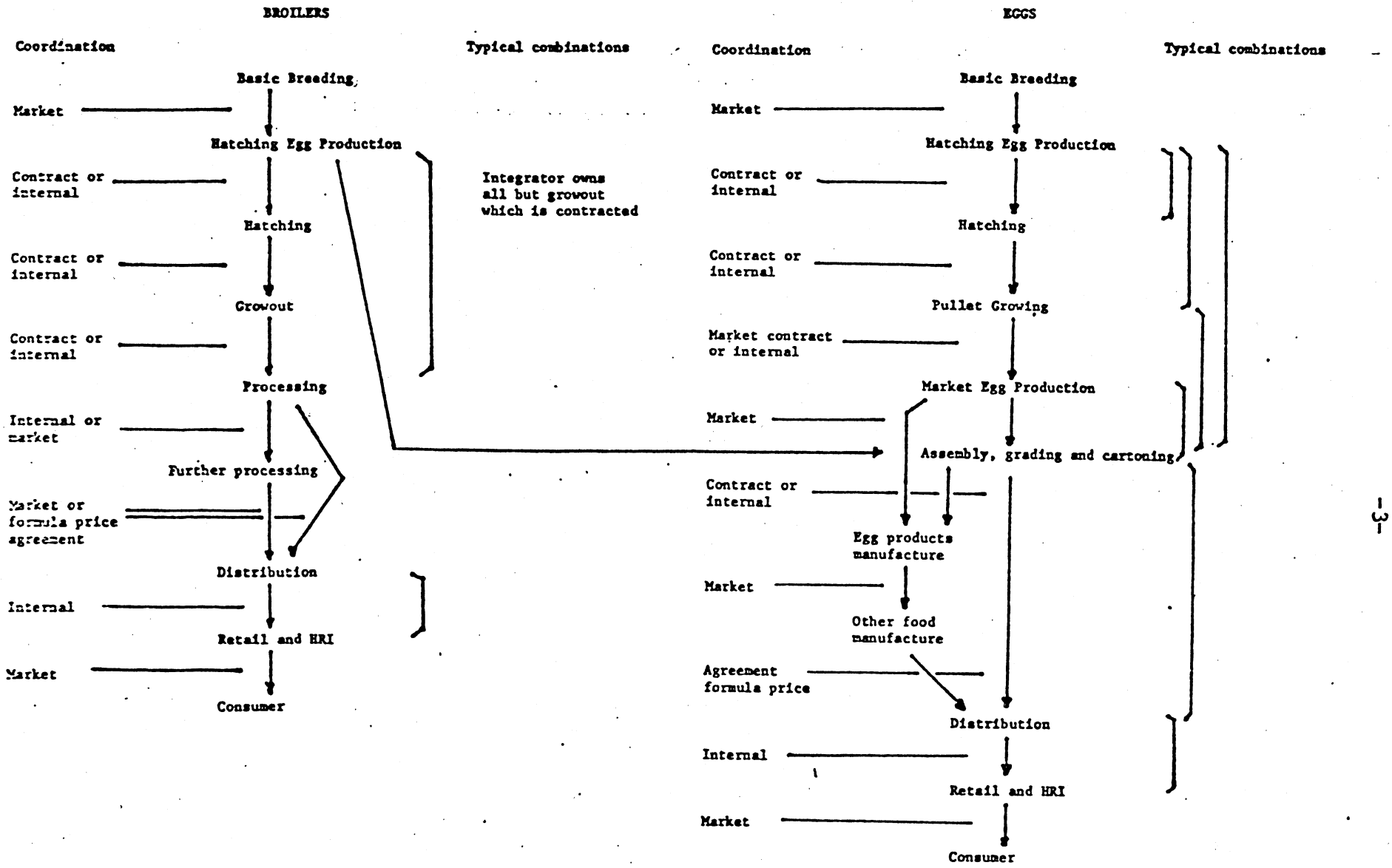
Yet the concentration of firms has not been such that it materially effects the competitive behavior in the product markets. Aggressive competitive behavior is the rule rather than the exception. The product markets are regional or national in scope, however, the individual seller of unprocessed products may face a much less perfect market.

The stream of technological change in breeding, feeding and mechanization has kept both subsectors in a state of change and has facilitated organizational changes as well as physical production changes. The pace of change has not allowed stagnation at any level. The improved technologies tended to be so far superior to existing technology that adoption was virtually assured. These changes have been so powerful that they forced organizational change even in the egg subsector where total demand has declined. The fact that the subsectors have been in a continuous process of adaptation to changing technology left them in a position to make other organizational and geographic adjustments in response to advantages which may have been too small to initiate change.

Short Marketing Channels

The marketing channel is short and simple for both eggs and chickens (Figure 1). Both products are perishable and neither provides much opportunity for varying the rate of product flow once the process is set in motion. In both cases, the identity of the product is preserved all the way from the farm to the consumer for the bulk of the output. Some broiler meat is further

Figure 1 Stages, Coordination and Integration in the Broiler and Egg Subsector



processed for use in other food products and approximately 14% of eggs used for food are broken commercially for egg products manufacture.

The development of large scale enterprises made closer coordination of the marketing process possible. Increased size of individual operations reduced or eliminated the need for a number of assembly and distribution steps which came into existence when production and processing units were smaller. The line of causation is certainly not clear. The need for coordination was a factor in the creation of larger units at the same time the existence of the larger units made coordination simpler. It is clear that transactions costs were high relative to value added at some of the levels of handling which existed in the past.

Integration and Coordination Patterns

Patterns of stage integration and contract coordination have been quite different in the two subsectors.

Contracting and integration was dominated by the feed supplier at the beginning of the broiler consolidation phase. Risk shifting and the need for financing motivated the grower. Profits and an assured outlet for feed motivated the contractor. The influence of the feed companies has decreased steadily in the broiler subsector. The processor stage has become a focal point of system control. The processing stage represents a bottleneck in the channel with scheduling of breeders, hatch, and growout keyed to processing capacity and the processors judgment of market demands. The most common arrangement is for the processor to own the birds and to contract for growout with family units and with the grower payment based, in part at least, on production performance. Only about 10% of the growout is integrator-owned. The processor-integrator either owns the hatching egg supply flocks and hatchery or maintains a continuing arrangement with these stages. The need to coordinate facility use is a major factor in

maintaining present coordinating arrangements. The investment and value added at the processing stage are relatively large.

Specialized firms dominate the broiler subsector. Diversified publicly owned companies have tended to leave the subsector because of highly variable earnings and in some cases earnings averaging below opportunity cost. Feed manufacturing has tended to be integrated into the processor-coordinator firm.

The pattern of coordination in the egg subsector is more diverse. One of the few generalizations which can be made is that pullet growing tends to be combined with either the hatching stage or egg production stage. Approximately 37% of market egg production is integrated with other stages in the process. Contract coordination of production represents about 43% with 20% of the production remaining largely independent. These forms of coordinating have grown, while contract marketing, an older form, has declined on eggs and virtually disappeared on broilers. In contrast to broilers - where integrated firms all look somewhat alike - integration or contracting proportions for eggs may vary from region to region. These differences may narrow over time. Feed suppliers continue to play in an important role and probably dominate the contract production. Egg assembly-grading firms may also be the centerpiece for a coordinated unit however, production and grading is often loosely coordinated by marketing agreements. Producing firms have tended to integrate forward into grading and distribution and some distributors and retailers have integrated backward into production. The processor level has not been the focal point for coordination, probably because the investment per unit of product and value added is low relative to the production stage.

There has been an expansion of the number of production-processing complexes in which eggs are moved directly from the production house to processing machinery located at the same site. Some expect this arrangement ultimately to dominate. No one system has established a dominant position at this time.

Non-price coordination dominates for short term decisions. Price is certainly an influence on the decision maker or makers but the messages are not in terms of price. That is, while the broiler processor includes price in his decisions the message to the grower is not in terms of price. Longer term decisions such as capacity expansion are clearly price responsive at all levels. So are decisions to reduce output, but often moderated by concerns with fixed costs or maintaining market shares.

Pricing

Pricing practices differ considerably between the two subsectors (Schrader). Weekly negotiated prices predominate in the exchange of ice-packed, ready-to-cook broilers at the processor-retailer interface. The proportion of transfers to the retail level represented by ice-packed broilers is decreasing. Prepackaged and special cut broilers tend to be formula priced against the ice-packed quotation. Negotiated trades account for about half the volume. While there is some concern about the amount of formula pricing, the ice-packed price as quoted by the USDA Market News is considered to be an accurate reflection of broiler values. As noted earlier, contract payments to growers tend not to be based on broiler prices.

The pricing of cartons of egg transfers is dominated by formula prices based on a private market report. Open, negotiated trades are few and often not reported. A relatively new institution, Egg Clearinghouse, Inc., provides a forum for open exchange of nest run eggs. It represents virtually the only source of information on open cash trading, however, trading there represents

only about 1/2 of 1% of all U.S. egg production. The Market Evaluation Committee interprets ECI trading and other information into benchmark nest run values for the East and Midwest. In recent years, collection and analysis of cartoning cost records has been used to offer a bridge between nest run and carton values. In effect, price is used to allocate income, not product, with longstanding arrangements and contracts determining the exchange partners and non-price terms of trade. Transfers to the egg products manufacturing firms are typically on an open market basis but not widely reported.

Participants in the egg subsector may want to use market price but evidence very little desire to participate in the process of discovering that price. As a result, prices and pricing are much more a point of conflict than is the case in the broiler subsector. Apparently, the benefits of formula priced transfers outweigh the desire for open market pricing. Both the processes of assembly of eggs from the farm and distribution of cartoned eggs to retailers is more efficiently accomplished when the exchange partners are established by longstanding arrangements. One can hardly imagine the problems associated with a daily restructuring of assembly and delivery routes if the entire exchange were negotiated daily. There are clear cost advantages in the present arrangements but the problem of pricing remains unsolved. Contracts and pricing arrangements at all levels in the egg subsector beyond the breeder may involve payments tied to a recognized price quotation.

Conflict and Equity

There appear to be more contractor - contractee conflicts in the broiler subsector than is the case in eggs. The broiler-grower has few alternatives. In most cases the system is so tightly coordinated that independent growing

is not a viable alternative. Often, there may be only one processor operating in the grower's area. The dominance of a single system restricts the alternatives of any of the actors in the subsector. The egg subsector presents more alternatives. There are more buyers and more contractors. No single system dominates and in most cases an individual producer has a number of market outlets. Independent production remains a viable alternative.

The existence of alternatives is a major factor in giving the feeling that a market participant is being treated fairly. It seems rather difficult to argue that the broiler grower is exploited to a large degree when production capacity is being expanded at an average rate of about 3% per year. If the payments are sufficiently high to encourage the building of efficient new facilities it appears to be consistent with a competitive result. The technological progress referred to earlier may be a factor in grower discontent. The level of contract payment necessary to bring in new production using current technology may not be sufficient to fully amortize cost resulting from an older technology.

There remains conflict between processors and large retailer organizations in both subsectors. There is an apparent residual disparity of market power between the large retailers and the sellers of both broilers and eggs, as was noted in 1966 by the National Commission on food marketing. The National Broiler Marketing Association represented an attempt on the part of broiler-processors to counter this disparity under the protection of the Capper-Volstead Act. Recent Court decisions indicate that the NBMA formula is not acceptable. United Egg Producers is a cooperative organization of egg producers organized to increase the influence of the producer which has not been challenged in the Courts.

A few broiler processors are cooperatives with coordinated systems. There has been some renewed interest in broiler cooperatives within the past several years.

Performance

Both the broiler and egg subsectors are models of production and marketing efficiency. Gains in efficiency have outrun cost increases to deliver products to the consumer at decreasing real prices. If any actors in the system have been exploited, the exploiters appear to have past the benefits to the consumer. Net returns from production and marketing activities, while somewhat variable from year-to-year, have not been high.

Feed use per unit of product has been cut more than 25% for eggs and nearly 30% for broilers since 1955. Production per man hour has increased by a factor of 6 in the poultry group (including turkey). Similarly, gains in productivity in marketing have been substantial, totaling almost 40% since the mid-1960's alone. Most, if not all, these gains have accrued to the consumer.

The rapid shift in technology has likely been more the cause of the organization of the broiler and egg subsectors rather than the result.

Table 1. Growth of Vertical Integration of Production in the Broiler and Egg Subsectors, 1955-1977[1/]

Year	Broilers		Eggs	
	Percent Contract[2/]	Percent Company Production	Percent Contract[2/]	Percent Owner-integrated
1955	88	2	13	2
1960	91	5	21	6
1965	92	6	32	13
1970	92	7	35	20
1975	91	8	47	32
1977	89	10	52	37

1/ Estimates, G.B. Rogers.

2/ Production and/or marketing. Contract production has expanded, and contract marketing has tended to decline since the 1960's.

Table 2. Measures of Efficiency in Production in the Broiler and Egg Subsectors, 1955-1977.

Year	Broilers			Eggs			All Poultry
	Lbs. feed per lb. live broiler[1/]	Age to market weight[1/]	Mortality per batch	Lbs. feed per doz. eggs[1/]	Eggs per year per average layer on hands[2/]	Annual Mortality[1/]	Output per hour of labor, index[3/]
	(no.)	(days)	(%)	(no.)	(no.)	(%)	(1967=100)
1955	2.85	84	15	5.50	192	15	32
1960	2.48	--	--	5.20	209	13	55
1965	2.28	--	--	4.95	218	15	87
1970	2.10	--	--	4.55	218	21	120
1975	2.10	--	--	4.25	233	14	175
1977	2.05	53	4	4.25	236	12	196[4/]

1/ Estimates, G.B. Rogers.

2/ SRS and ESCS statistics.

3/ ERS, Stat. Bul. 581, Nov. 1977.

4/ 1976.

Table 3. Changes in Productivity in Egg and Broiler Marketing (1965-69=100).[1/]

Period	Eggs			Broilers		
	Preparatory functions[2/]	Distributive functions[3/]	Total system	Preparatory functions[2/]	Distributive functions[3/]	Total system
1955-59	66	89	78	69	82	77
1960-64	80	90	85	85	96	96
1965-69	100	100	100	100	100	100
1970-73	108	120	115	105	119	114
1974-77	127	151	140	120	150	138

1/ Estimates, G.B. Rogers.

2/ Assembly, processing, long-distance transportation.

3/ Wholesaling, retailing.

Table 4. Percentage Net Returns[1/] in Egg and Broiler Marketing Compared with Long-term Bond Yields.

Period	Eggs			Broilers			Long-term bond yield
	Preparatory functions[2/]	Distributive functions[3/]	Total system	Preparatory functions[2/]	Distributive functions[3/]	Total system	
	%	%	%	%	%	%	%
1955-59	3.8	8.7	6.3	3.9	10.0	7.7	3.7
1960-64	2.9	8.0	5.8	3.8	9.4	7.5	4.4
1965-69	3.9	8.1	6.4	4.3	9.1	8.3	5.7
1970-73	5.0	10.8	8.4	5.0	10.8	8.7	7.5
1974-77	5.5	10.2	7.9	5.8	11.5	9.3	8.2

1/ Net returns as percentage of average margin. Estimates, G.B. Rogers.

2/ Assembly, processing, long-distance transportation.

3/ Wholesaling, retailing.

References

Marion, B.W. and H.B. Arthur, Dynamic Factors in Vertical Commodity Systems, A Case Study of the Broiler System, Ohio Agricultural Research and Development Center, Research Bulletin 1065, November 1973.

Benson, V.W. and T.J. Witzig, The Chicken Broiler Industry: Structure, Practices, and Costs, U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report No. 381, August 1977.

Schrader, L.F., H. E. Larzelere, G.B. Rogers and O.D. Forker, The Egg Subsector of U.S. Agriculture, A Review of Organization and Performance, forthcoming NCR-117 monograph.

Schrader, L.F., Pricing Problems in the Food Industry: Broilers and Eggs, Symposium on Pricing Problems in the Food Industry, March 2-3, 1978, Washington, D.C.

National Commission on Food Marketing, Organization and Competition in the Poultry and Egg Industries, Tech. St. No. 2, June 1966.

Rogers, G.B., Price Spreads, Costs, and Productivity in Poultry and Egg Marketing, 1955-74, U.S. Department of Agriculture, Economic Research Service, Agricultural Economic Report No. 326, February 1976.

Rogers, G.B., L.A. Voss, W.L. Henson and H.B. Jones, Marketing and Integration in the Poultry and Egg Industries, U.S. Department of Agriculture, Economic Research Service, PES-294, June 1977, pp. 39-43.

Rogers, G.B., Vertical and Horizontal Integration in the Market Egg Industry, 1955-69, U.S. Department of Agriculture, Economic Research Service, ERS-477, May 1971.

Rogers, G.B., Producer-Handler Exchange in the Poultry and Egg Industries, Paper NC-117 Seminar, Chicago, Illinois, November 15, 1974.

VERTICAL ORGANIZATION AND COORDINATION IN THE CATTLE-BEEF SUBSECTOR*

Clement E. Ward, Dennis R. Henderson and Marvin L. Hayenga**

Recent developments indicate the concern of many with market structure and pricing in the cattle-beef subsector. Among those developments are: (1) anti-trust lawsuits filed by cattle feeders against selected meatpackers and retail food chains; (2) an investigation underway in AMS, USDA, on beef pricing; and (3) a series of hearings in 1977-78 on meat marketing and pricing conducted by the Small Business Committee of the U.S. House of Representatives.

Major structural and coordination characteristics and changes in the subsector are the focus of this paper, along with reasons why changes occurred and implications resulting therefrom.[1/] A few potential changes are noted also. Organization of the paper parallels product flow and vertical linkages in the subsector, beginning with cow-calf production through cattle feeding, then cattle

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[1/] Three papers, (Henderson, Ward, Hayenga) each concerned with vertical organization and coordination in a single segment of the cattle-beef subsector, provide the basis for this paper.

*Paper for NC-117 sponsored symposium on Vertical Organization and Coordination in Selected Commodity Subsectors at American Agricultural Economics Association summer meetings, Blacksburg, Virginia, August 1978.

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feed through meatpacking, and lastly meatpacking through retail and food service distribution.

Cow-Calf to Feedlot

Little structural change has occurred in cow-calf production during the past two decades. Cow-calf production is characterized by a large number of relatively, small diverse producers ranging from full-time producers to hobby farmers. Production is seasonal, cyclical, and considerably more geographically dispersed throughout the U.S. than is cattle feeding. Producers market feeder cattle and calves in relatively small lots, often 10 head or less at one time, and cull cows and bulls for slaughter in even smaller lots.

The major structural change in this segment of the subsector has occurred on the buying side, in cattle feeding. Between 1962 and 1977 the number of larger feedlots (one-time capacity of 1,000 head or more) increased 31 percent while the number of smaller feedlots declined by 43 percent. Thus average feedlot size increased and larger feedlots increased their share of total fed cattle marketings from 36 to 68 percent. The major concentration of cattle feeding shifted from the Corn Belt to the High Plains. Larger feedlots, typical of those in the High Plains area, are specialized operations and cattle feeding is a year-round activity. That compares to the Midwest where cattle feeding is often seasonal and supplemental to other farming enterprises. Even in the Midwest year-round feeding in slightly larger feedlots is becoming more common.

Cattle feeding expanded significantly during the 1960's and 1970's in response to increased demand for beef. Shifts in feeding area paralleled expanded irrigation in grain production and development of hybrid milo

varieties, and larger feedlots emerged to capitalize on size economies. An influx of tax sheltered investment capital contributed to the rapid expansion of cattle feeding,growth of large feedlots, and to the subsequent period of large losses experienced by cattle feeders during the past 4 years.

Structural changes in cattle feeding increased the complexity of coordination. Larger feedlots mean a greater size disparity between cow-calf producers and cattle feeders and an increased need to consolidate small sale lots of feeder cattle into larger, economical truckload lots for shipment to distant feedlots. The need to sort and consolidate feeder cattle into larger lots of relatively homogeneous cattle also increased. Some feedlots specialize in certain types of cattle and most feed cattle in 100 head or more lots as a single unit, thus requiring greater uniformity in some characteristics of cattle within those lots. Shifts in cattle feeding caused changes in feeder cattle movement patterns. Larger feedlots demand a nearly continuous supply of feeder cattle to operate efficiently. Thus there has been a greater need to reduce the seasonality of feeder cattle marketing which has long been associated with the spring calving-fall marketing pattern of the cow-calf industry.

Coordination is accomplished largely through the market system rather than via contracts or other forms of integration. Auction yards and order buyers are the major marketing institutions. Auctions serve smaller, more dispersed cow-calf producers by providing a nearby market outlet and facilitating sorting and commingling feeder cattle into larger, more homogeneous lots. There, cattle feeders or their buying representatives buy selectively and consolidate small purchases into economical lots for shipment. Auction markets also perform the pricing function. Some terminal markets instituted

auctions for feeder cattle while many auction markets developed specialized feeder cattle sales. Several regional feeder cattle auctions have resulted and provide a higher volume pricing base for their area.

Buyers (feedlot operators) have increasingly utilized third parties, mainly order buyers, in the coordination process. These buyers aid in coordinating the number, type, timing, and location demands of cattle feeders by purchasing cattle from numerous auction and terminal markets or direct from cow-calf producers, and consolidating feeder cattle lots meeting feedlot demands. Feeder cattle dealers aid to some extent in smoothing the seasonality of feeder cattle marketing but this balancing function is increasingly being accomplished by stocker or growing operations that carry weaned calves on pasture and roughage until ready for placement in a feedlot.

As long as small, dispersed cow-calf operations remain dominant, direct purchasing arrangements by larger feedlots will be a less economical procurement system than the dominant auction market system for feeder cattle. However a coordination change is emerging. Electronic marketing, possibly in the form of a computerized exchange system using cathode ray tubes at several buyer and seller centers, is being studied and a proposal for pilot implementation in the near future is in progress. Electronic marketing offers the potential to improve the market coordination process by facilitating broader geographic market access by both buyers and sellers and enhancing technical and pricing efficiency.

Feedlot to Meatpacker

Meatpacking, especially slaughter of fed cattle, has shifted away from terminal markets near population centers to major cattle feeding areas in the past two decades. Since the late 1960's several specialized meatpackers

have grown rapidly and replaced older, full-line or multi-specie meatpackers as industry leaders. Current industry leaders (e.g. Iowa Beef Processors, MBPXL, and Monfort among others) tend to specialize in a single specie, i.e. fed cattle, and somewhat in the type of cattle slaughtered and processed, i.e. Choice or Good grade, yield grade 1, 2, or 3 cattle weighing 1,000 pounds or more. Rapid growth of specialized meatpackers stems in part from their being able to negotiate significantly lower wage rates than older, established meatpackers operating under master labor union contracts having higher wage rates and fringe benefits. These specialized firms and some multi-specie firms have built or remodeled plants to expand slaughtering and processing capacity and have taken advantage of more automated, labor-saving technology. Larger plants (e.g. a daily capacity of 1,000 head or more and an annual capacity of 250,000 head or more) capitalize on size economies in 3 key activities of meatpacking; procurement, slaughtering and processing, and meat marketing. As a result larger firms have increased their share of total slaughter.

Most of the larger firms in the industry have integrated slaughtering and processing. A few specialized cattle slaughtering-beef processing firms market 70-95 percent of their beef in boxed, vacuum packed form. Some multi-specie firms have expanded processing to the point where boxed beef accounts for 30-50 percent of their beef sales.

Relocation of slaughter plants and the resultant shift in major slaughter areas occurred because of cost savings in the procurement and beef marketing activities of meatpacking. A consequence of rapidly expanding, progressive firms utilizing more efficient facilities and processing techniques has been increased concentration. In 1974, the 12 largest firms accounted for 52 percent of steer and heifer slaughter in

23 states (those for which cattle feeding statistics are collected regularly). Though increasing gradually on a national basis, concentration within some States has proceeded more rapidly. The weighted average 4-firm concentration for these 23 states that year was 63 percent. A distinction can be made between concentration in slaughtering only and in processing. Since firms engaged in fabricating carcasses and selling boxed beef often purchase carcasses from other meatpackers, the concentration of fabricated beef sales from those firms is significantly higher than concentration ratios based on slaughter statistics alone.

Coordination systems in this segment of the subsector are highly market-dependent, as they are in the cow-calf to feedlot segment. However, the market coordination system has changed markedly during the past two decades, coincident with structural changes in cattle feeding and meatpacking. Most notable is the sharp decline in relative importance of terminal markets and increased relative importance of direct marketing by feedlots or direct procurement by meatpackers. Direct feedlot to meatpacker marketing without a third party dominates fed cattle marketing. In 1976, 78 percent of steers and heifers purchased for slaughter were by direct methods. In the 11 leading fed cattle marketing states that year (marketings in each state exceeded 500,000 head), direct marketing accounted for 85 percent of the total. With direct marketing, salaried (packer) buyers are responsible for coordinating the needs of meatpackers (volume and type of cattle and delivery time and location) with the output of feedlots, via the market pricing system. Terminal and auction markets still are the primary coordination system for cows and bulls and slaughter calves, and many plants slaughtering those species still are located near those markets.

In direct marketing (or procurement) a third party is sometimes utilized by the seller (or buyer). Since 1975 many cattle feeders in Iowa,

Illinois, and Minnesota have employed commission agents to handle their fed cattle marketing. These feeders, who market less frequently and market fewer truckloads annually, have adapted the commission selling concept from terminal markets to country marketing.

The shift to direct marketing has not appreciably changed the prevailing pricing method found in this segment. Prices are negotiated between two parties, either directly or with third party assistance. Either buyer or seller may be represented by the additional party, e.g. a commission agent or order buyer.

Direct marketing increased rapidly because of efficiencies in coordinating the available supply with demand. Meatpackers have more control over scheduling supplies because cattle may be purchased up to 10 days prior to shipment from feedlot to meatpacker. The marketing response to price changes occurs more rapidly than with terminal marketing due to more direct seller-buyer communications and involvement in the price discovery process. Thus meatpackers can depend on a large volume and steady flow of cattle to reduce per unit slaughtering-processing costs.

In addition to the shift toward direct marketing three developments may affect organization and coordination in this segment. First is a renewed interest in cooperatives entering meatpacking. Sterling Colorado Beef Co., which began as a closed, producer-owned corporation operating much like a cooperative, legally became a cooperative in 1977. Two new cooperatives (one in Montana and one in Utah) are being organized and plan to build slaughtering plants. Another cooperative venture into meatpacking involves Land O'Lakes, a large marketing and farm supply cooperative, which is in the process of acquiring Spencer Foods. This marks the first entrance into meatpacking by a cooperative on a scale competitive with the

larger firms in the industry. Recent interest in cooperative meatpacking is notable because producers seem more willing than in the past to commit their product to the cooperative, as producers have done in several other commodities for many years.

A second innovation is the Iowa Beef Processors (IBP)-North West Feeders Cooperative (NWFC) joint venture. Six feedlots in Idaho and Washington formed a cooperative and entered into a joint venture agreement (5 year contract) with Columbia Foods, a wholly-owned subsidiary of IBP. NWFC supplies IBP with 6,700 head of cattle weekly (348,400 head annually), which is about three-fourths of the slaughter needs of the 2 Columbia Foods plants in Idaho and Washington. IBP and NWFC share profits and losses from feeding, slaughtering, processing, and distributing beef from cattle supplied by NWFC under terms of the agreement. This may not become prevalent in areas of dense cattle feeding but in fringe feeding areas such arrangements offer the potential of assuring sufficient supplies to efficiently operate new or remodeled plants.

The third development also involves a guaranteed supply but is not limited to meatpacking. A subsidiary of Cargill, Inc. (Caprock Industries) purchases and feeds feeder cattle for a subsidiary of Keystone Foods Corp. (Cattle Development Corp.). Cattle are custom slaughtered and fabricated by MBPXL Corp., further processed by other Keystone subsidiaries and sold to McDonald's and other fast-food restaurants. The series of contracts is an effort to ensure dependable supplies meeting rigid specifications. As the cattle industry enters the expansion phase of the cattle cycle large volume meatpackers, retailers, and food service users of beef may have difficulty maintaining adequate, stable supplies of cattle and beef meeting their specifications. Similar innovative methods of coordination via

contracts or other forms of integration may surface to ensure supplies needed to operate efficiently and to satisfy consumer demand.

Meatpacker to Retailer and Food Service Industry

Structural changes have occurred on both the meatpacking and meat distribution side in the 1960's and 1970's. One of the most visible changes is the rapid growth in the food service industry (often referred to as the HRI industry-hotels, restaurants, and institutions) especially fast-food restaurants. Growth of fast-food hamburger restaurants is most evident, but significant growth occurred also in fast-food steakhouse restaurants. Away from home eating continues to increase both in terms of the proportion of the food budget spent on away from home meals and the proportion of meals eaten out of the home. A sizeable portion of total sales can be attributed to beef because on a per meal basis a high proportion of the menu price is for the meat item.

The market structure in food retailing (supermarkets) has changed little. Food retailing continues to be dominated by a few national chains and several regional chains. Concentration nationally is relatively low but is considerably higher on a local and regional basis. Some of the largest food retailers have integrated into large-scale, centralized beef fabrication and warehousing operations to serve their retail supermarkets in a metropolitan or regional area. Proximity to outlets dictates whether products bypass the vacuum-packing (boxed beef) process, but most centralized processing operations have their own boxed beef operations for primal and subprimal cuts.

Meatpackers cite cost savings and improved meat merchandising as reasons for expanding into processing (boxed beef operations). Some of the

more significant reasons include: (1) reduced transportation costs; (2) more efficient use of byproducts and conversion into higher valued products; (3) processing efficiency resulting from lower labor rates and increased use of automated technology; (4) improved inventory management and reduced storage space requirements; (5) greater flexibility in marketing cuts by meatpackers and in selecting cuts by retailers; and (6) increased storage and shelf life. As a consequence, 40-50 percent of beef sales are estimated to be boxed beef and this percentage is expected to increase further.

Similarly, reasons were given by retailers for integrating into centralized processing operations rather than purchasing boxed beef from meatpackers or processing carcasses in individual retail stores. Centralized processing was cited as being more profitable because of the following more significant reasons: (1) cost savings relative to in-store processing; (2) better quality control and more effective merchandising; and (3) better utilization of byproducts.

The dominant coordination system between meatpackers and retail food chains and food service firms for carcass and boxed beef is direct marketing. For smaller and independent food firms, third party assistance, e.g. food wholesalers (brokers or purveyors), is more common. Meat flows through several distribution channels in this segment. Meatpackers sell some beef through brokers to enhance their information system and some buyers prefer to purchase beef through brokers because of brokers' knowledge of suppliers and supplies. Many other third party participants provide services for distinct subsets of all meat retailers and the food service industry.

Pricing methods differ somewhat between carcass, boxed and ground beef

products. Formula pricing dominates carcass beef sales and is the most controversial. Two-thirds or more of all carcass beef is sold by formula. The percentage is higher for small and medium size retailers and higher on the East Coast. In most formula-priced transactions, buyer and seller negotiate a formula that includes a specified differential from a reported price in the National Provisioner Daily Market Service (the yellow sheet) for a particular product on a specific day. Thus they agree on the quantity of product and the formula but the actual transaction price is unknown to both parties until later (usually a day near shipment or delivery of the product). In some cases the formula is negotiated for each transaction, whereas in other cases, one formula applies to a series of transactions, (standing orders). Standing orders have characteristics of contract coordination or coordination via other forms of integration, rather than market coordination. However, many standing orders are unwritten agreements and may not be legally binding.

The remainder of carcass beef is priced by private negotiation or offer-acceptance pricing. Some large, national chains (e.g. The Great Atlantic and Pacific Tea Co. and The Kroger Co.) negotiate price, as well as several West Coast chains (e.g. Ralph's and Lucky Stores). Safeway and Acme Markets use offer-acceptance pricing in which suppliers offer a quantity of product meeting buyer specifications at a given price. The buyer then selects the quantity of products needed from the offers and notifies sellers as to which of their offers were accepted.

In contrast to carcass pricing methods, prices for a high percentage of boxed beef trades are negotiated for each transaction. A major exception is Iowa Beef Processors' Cattle-Pak (entire carcass in boxes) program in which price is based on a formula tied to the National Provisioner's

reported price for specific carcasses.

Long term standing orders (e.g. 6 months to one year) priced by formula, including negotiated markups relative to reported prices by the National Provisioner are common in the food service industry. Exceptions to this include McDonald's, which negotiates a profit target with its patty suppliers, then determines the weekly prices paid based on actual costs and revenues. Another exception is fast-food firms purchasing imported beef, where price must be established several weeks in advance of delivery.

Formula pricing is controversial and is under investigation. Primary concerns include: (1) the small volume of negotiated prices upon which price reports are based; (2) that market reporters quote prices based on no trades; and (3) that the small number of reported trades may enable price manipulation. Many large meatpackers and retail and food service firms that do negotiate prices do not report them to the National Provisioner, making the reportable base even more thin. Suggestions have been offered to correct alleged problems with formula pricing, including abolishment of all formula trades, mandatory price reporting, and instituting an electronic exchange, among others. Formula pricing facilitates long term, standing orders between suppliers and users and it protects buyers from paying more than competitors because they each pay the reported price. Buyers and sellers require little knowledge of current or expected prices and little expertise is required. Sellers (buyers) can not be accused of selling (buying) at a price that is too low (high) since their transaction price is yet to be determined and will be based on a reported market price.

Formula pricing is utilized less for boxed beef because of both frequent price fluctuations and wide daily price ranges reported on

fabricated cuts. Wide reported price ranges are partially attributable to variations in cutting quality and trim, size of trade (truckload or less than truckload lots), and an excess inventory or short supply situation in some parts of the market.

The future structural and coordination developments in this segment depend to some extent on what, if anything, results from current meat pricing investigations and litigation. One potential change apart from pricing relates to arranging dependable supplies of products in a cyclical production environment, especially for food service firms. The series of contractual arrangements from feedlot to meatpacker to processor to fast food distributor (the Cargill-Keystone-MBPXL-Keystone-McDonald's example of the previous section) may become more common.

Conclusion

Structural, operational, and product characteristics determine in part the coordination system dominating each segment of the subsector. Coordination systems may be viewed as being on a continuum ranging from loose forms of market coordination to tight forms of integrated coordination.

Relatively loose forms of market coordination dominate the cow-calf to feedlot segment and primary pricing methods are auction and private negotiation pricing. Cow-calf production encompasses many, relatively small, diverse, geographically dispersed production units. There are fewer feedlots but their coordination demands are less exacting than in other segments. A feedlot may have empty pens for one to several weeks without significantly adding to per unit costs. Coordination is relatively loose because feeder cattle tend to be relatively heterogeneous and thus difficult to specify or describe rigidly.

Market coordination also dominates the feedlot to meatpacker segment with private negotiation the most prevalent pricing method. There is evidence however of a tendency toward tighter coordination. The buyer side is more concentrated and large meatpackers have greater coordination demands than in the preceding segment. Because of customer demands and labor contract terms, interruptions in product flows even for short periods can significantly contribute to higher per unit costs. Slaughter cattle are relatively more homogeneous than feeder cattle and direct marketing (procurement) enables meatpackers to more tightly coordinate product flows within a short time period. The IBP-NWFC joint venture may mark a move toward tighter forms of coordination in given circumstances.

Coordination systems in the final segment are less clear because formula pricing and standing orders may not be considered characteristic of market coordination. Many more products and relatively distinct product markets can be identified in this segment, and within product markets firm concentration may be higher than in other segments. Products however may be described by relatively rigid specifications. Product flow and quality coordination demands are higher than other segments because firms deal directly with consumers. Thus tighter forms of coordination are found. The frequent use of standing orders and instances of more formalized contractual arrangements are evidence of the tendency toward tighter coordination, perhaps on the boundary of market coordination and integrated coordination systems. Two pricing methods (offer-acceptance and private negotiation) suggest market coordination but formula pricing fits less clearly there.

The outcome of current investigations and litigation, continual changes in operating practices, and current stage of the cattle cycle suggest continued structural and coordination changes in the near future.

Selected References

Hayenga, Marvin L. Vertical Coordination in the Beef Industry: Pricing and Distribution Systems Linking Packers, Retailers, and the Hotel, Restaurant, and Institutional Trade. NC-117 Working Paper (forthcoming), September 1978.

Henderson, Dennis R. and Robert B. Schwart, Jr. Vertical Coordination Between Beef Cow/Calf Enterprises and Feedlots in the United States. NC-117 Working Paper WP-13, November 1977.

Ward, Clement E. Vertical Coordination of Cattle Feeding and Slaughtering in the Cattle and Beef Subsector. NC-117 Working Paper WP-14, December 1977.

VERTICAL ORGANIZATION AND COORDINATION IN THE CITRUS AND TART CHERRY SUBSECTORS*

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INTRODUCTION

Tart cherries and citrus are both perennial tree crops grown by a large number of growers. Both of these crops move through at least two or three vertical stages between farmer and consumer. Cherries and citrus are both marketed as relatively undifferentiated commodities at certain stages of the subsector marketing system. There are a number of similarities in the vertical coordination challenges and linkages of these two subsectors. There are, on the other hand, some notable differences which contrast the two subsectors in regard to certain coordination features.

Crops such as citrus and cherries face a number of vertical coordination challenges. These include (a) short-run supply and price fluctuations, (b) substantial risks, (c) price discovery uncertainties, (d) differences in market power positions, (e) difficulties for effective commodity demand expansion and consumer access, (f) the need for a long-run supply-demand balance, and (g) inadequate market information for the participants.

Supplies and prices for both citrus and tart cherries often fluctuate substantially. Fluctuations occur primarily because of weather variations, e.g., a freeze.

Large supply and price fluctuations occur especially frequently with tart cherries. These fluctuations are probably the single most important coordination challenge for the cherry subsector. This situation affects market behavior of the cherry subsector participants in many respects. Supply and price fluctuations for citrus occur less frequently, but also have important effects on coordination and behavior in that subsector.

Both the citrus and the cherry subsectors involve substantial risks to the participants. These risks affect behavior in many ways and results in strategies

to reduce risk or to shift the risks to other system participants. Substantial risks are associated with the wide fluctuations in short-run supplies and prices. There are also risks associated with the long-term, highly specialized investments such as in orchards.

Some participant groups have been fairly successful in shifting certain risks to other particpant groups. For example, retailers have been able to shift most of the risks associated with short-run price changes and inventory ownership to processors. Processors in turn have been able in some cases to shift substantial risks to growers through such arrangements as participation plans. A key question relative to risk bearing is, "Are the risks borne primarily by participant groups who have the greatest ability to minimize the risks?"

Price discovery uncertainties arise in part because these commodities are sold through a marketing system with several vertical stages. Price discovery uncertainties are pronounced for tart cherries, since most are retailed as an ingredient in branded products such as frozen pies and desserts. Price discovery in the commodity markets for cherries (between processor and food manufacturer and grower and processor) is usually done in an environment of substantial uncertainty because of the wide market fluctuations. These features lead to special challenges for vertical coordination relative to the price discovery process.

Both the citrus and cherry subsectors need effective demand expansion and consumer access for their commodity. This is especially challenging since the retail and food manufacturer portion of the U.S. food system are not basically commodity oriented. The challenges are especially great for tart cherries which is a minor commodity. Both cherries and citrus need to attain effective consumer access through retail grocery display space, through product lines of

manufacturers and through the menus of food service firms. Advertising can also be important. Successful consumer access involves effectively working with and through grocery and food-service retailers as well as with food manufacturers with strong brands.

A number of vertical coordination challenges may be affected by differences in the market power position of the participant firms. Market power may be affected by a number of factors in addition to the size and number of firms such as measured by the concentration ratio. Factors affecting market power include an ability to make consumer-access decisions such as on shelf space, product lines, and network TV advertising decisions. Market power may also be affected by particular laws and/or by special institutions such as grower bargaining associations and laws designed to strengthen the position of grower bargaining.

Tree-crop industries such as citrus and cherries face particular vertical coordination challenges because the orchard investments are very long-run in nature and are highly specialized investments. Thus grower-investors must be commodity oriented and have a long-run orientation in their investments. Grower-investors need to balance aggregate productive capacity with aggregate long-run demand for their commodities. Accurately predicting long-run demand in the U.S. economy which can change rapidly is difficult. The vertical coordination challenge is complicated by the fact that those portions of the subsectors which are able to influence demand, i.e., manufacturers and retailers, do not have a long-run commodity orientation and may be several stages removed from the commodity grower-investors. The behavior patterns of retailers and manufacturers tend to be short-run in orientation toward commodities which is inconsistent with the requirements of the grower portion of the subsector with their long-run specialized investments in orchards.

In a number of these aspects such as price fluctuations, price discovery, demand expansion and a long-run supply-demand balance, vertical coordination

could be improved by accurate and comprehensive market information. This information needs to be available and transmitted vertically within the subsector. That is, growers and processors need complete market information on demand conditions both in the short-run and long-run. Information on supplies also needs to be transmitted forward through the system.

Coordination in the Citrus Subsector

The U.S. citrus subsector is a multi-million dollar industry with production concentrated in Florida, California-Arizona, and Texas. Florida is the dominate producer of both oranges and grapefruit and provides most of the processed citrus products within the U.S. In contrast, most Texas and California fruits are sold fresh. This regional difference in product utilization is one of the major contributors to differences in structural arrangements and coordination within the subsector. Further, significant structural changes in the subsector can be directly associated with the development of processing technologies in the early 1950's.

Citrus is like many other tree fruits at the initial stage of production. Once harvested, the fruit can be sold fresh, remaining in a perishable form. Whereas, the same fruit can be transformed into a storable semi-perishable product through processing. This latter alternative provides the subsector with a number of marketing options not available to those products limited to marketing in a perishable form. In fact, much of Florida's coordination centers around its ability to manage supplies once in the processed state. Likewise, many of the unique structural arrangements can be related to the needs for inventory management.

As we view the operations of the citrus subsector, four major products produced from oranges and grapefruit are of major importance: fresh citrus, frozen concentrated orange juices (FCOJ), chilled orange juice (COJ) and canned

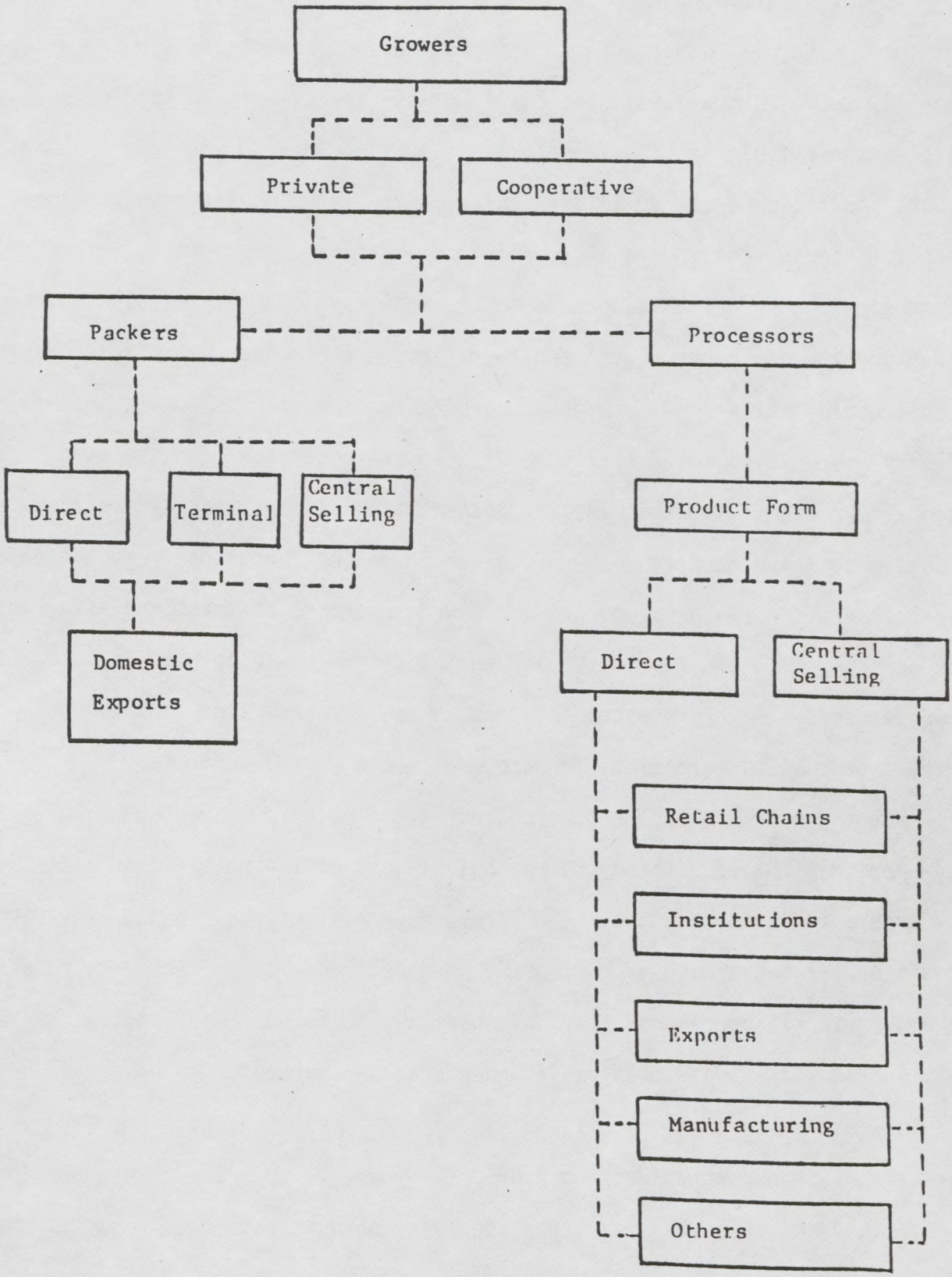
products (CSSOJ). Of these, those activities associated with the marketing of FCOJ lead to most of the coordination challenges and unique structural features found in the subsector. Figure 1 shows a general overview of the vertical linkages within the subsector. Note first that growers are coordinated with fresh fruit packers and processors through both cooperative arrangements and private firms. Within the California system the cooperative arrangement is predominate. Whereas, in all other producing regions both types of ownership arrangements play significant distribution functions.

The vertical linkage between citrus processors and retail, institutional, and export outlets differ by product form and a number of unique coordination arrangements have evolved to facilitate the flow of processed products. Many of the coordination problems and features of the subsector can be related to changes taking place among the final outlets for the processed products shown in Figure 1. We will consider these in the subsequent discussion.

Citrus is a seasonally produced commodity harvested from trees at least four or five years old. Considerable capital investment in groves are required prior to realizing any appreciable return. Concurrently, tree yields can fluctuate from season to season and groves are subject to freeze damage. These physiological characteristics of the trees lead to considerable production risk and, hence, uncertainty for the growers. Seasonal supply variability leads to high price risk to the citrus producer. In fact, over the last decade, the variability of prices to growers have been nearly twice that of the processing and retail sectors. Much of this difference can be directly related to the current coordination features between growers and processors.

The quality and juice content of citrus differs considerably between California and Florida. California citrus is better used for fresh while Florida's high juice yielding fruit is better for processing. Hence, coordination features differ as a result of these fruit characteristics. In particular, Florida growers

Figure 1. The Citrus Subsector -- Vertical Linkages



have more options for conversion of fruits into semi-storable products through processing.

The citrus growing sector is highly atomistic with very few extremely large producers. There is some backward integration from the packer and processor, but generally such integration is too small for any one firm to be totally supplying all of its own fruit needs. These growers must coordinate with packers and processors and the processors, in particular, have gained market power. Florida processors can be considered oligopolistic with a few very powerful firms providing significant price leadership to the industry. The distribution of market shares and the dominance of the top four firms has remained relatively stable since the mid-sixties. Many of the coordination features as well as general industry economic policies can be related to the positions of these large processors. Problems with this unequal distribution of power has led to industry proposals designed to place many of the coordinating functions, now controlled by processors, in the hands of growers. Growth of cooperatives and efforts to vest more power in the Florida Department of Citrus would be good examples of alternatives to large processors' impact on policies relating to inventory control, pricing, advertising, forward contracting, exporting, etc.

Recent growth of large retail chains have led to increased buyer power among a few national chains. These chains control most of the retail food distribution shelf space and are among the major volume buyers of citrus. Hence, they are in a position for exerting buying pressure when dealing with packers and processors. Currently over 75 percent of Florida's concentrate is sold under private retail chain labels while the remaining is under processor brands.

In addition to large retail chains, both the institutional (away-from-home) markets and the export markets have greatly expanded. In particular, development of efficient and effective means for supplying schools have been exceptionally

difficult. Likewise, methods for pricing products to many of these secondary markets has been both controversial and challenging. Providing a consistent supply of product to secondary markets during periods of rising prices has been a major problem.

A large share of processed citrus is initially produced in a bulk concentrate form and then later reprocessed into the major processed citrus packs. Maintaining an optimal storage quantity of bulk concentrate is the major coordinating task among processors. Inadequate inventories, excesses, or changes in the relative distribution of inventories among processors often create pronounced price adjustments and promotional allowances. Inventories generally provide a direct barometer of the forthcoming pricing policies. Adjustments in concentrate prices in order to correct for abnormal inventories are currently made by processors. These adjustments in turn have an impact on returns to the entire subsector. Often what appears optimal for the oligopolistic processor may not be optimal for the subsector, yet such policies often result from processor decisions. While inventory management skills are highly developed, the coordination of inventories consistent with the total subsector welfare continues to be a significant task.

Product allocation from bulk or raw fruit to the three major processed products is readily accomplished with a high degree of flexibility. Generally, both historical allocations and current prices will dictate the flow of product to the alternative uses.

The citrus subsector is somewhat unique among agricultural industries in that the industry trade associations are the most important sources of information on product utilization and distribution. Information flows freely throughout the subsector and is usually timely and in-depth. The subsector has excelled with its efforts to inform consumers of the benefits of consuming citrus. Advertising programs are highly developed and generic advertising is controlled by industry

organizations rather than individual firms. Also, there is considerable competitive advertising among the major producing regions.

Currently the most important task with the coordination of information relates to the economic role of branded versus generic advertising. Recently, efforts to change the advertising mix have occurred where a portion of grower taxes are used to promote brands in addition to generic advertising. It is not yet clear whether this attempt to coordinate the advertising mix will change the competitive nature among processors, expand demand, create advertising inefficiencies, etc.

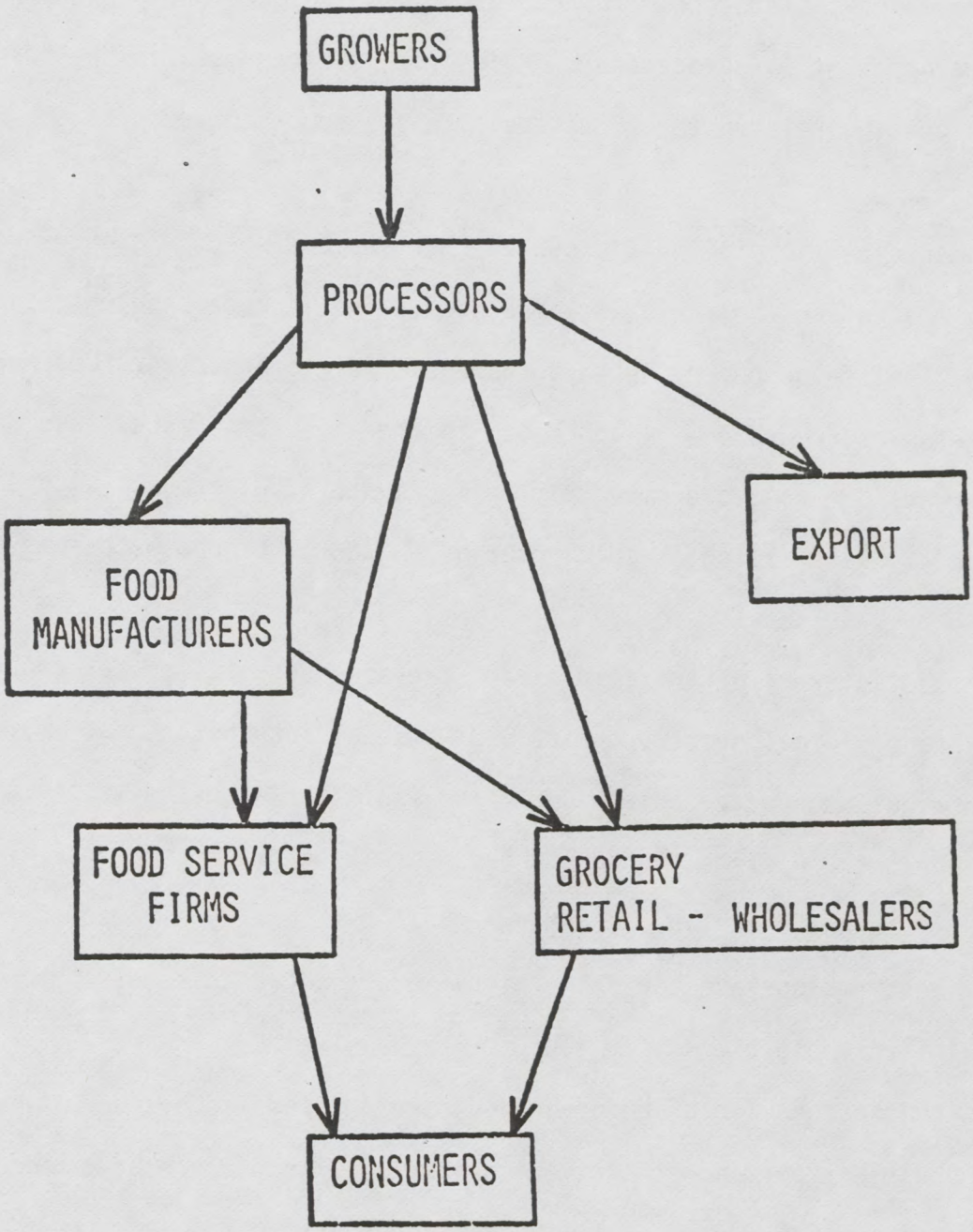
Coordination in the Tart Cherry Subsector

The main participant groups in the tart cherry subsector include growers, processors, food manufacturers, grocery retailer-wholesalers, food service retailers and wholesalers, and consumers. Although retailers, wholesalers and consumers would not consider themselves as part of a "cherry subsector," they are very important participant groups for the commodity-oriented grower and processor portions of the subsector. The vertical linkages of the major participant groups are shown in a generalized scheme in Figure 2.

Tart cherry growers market essentially the entire crop for processing. Processors include freezers, canners and pie filling manufacturers all of whom buy in the same raw-product market, but sell their processed products in somewhat distinct markets. An increasing percentage of processing is being done by cooperatives and by grower-owned, on-farm plants in which the grower processes mainly his own production. Thus the linkage between growers and processors is experiencing increasing vertical integration.

Frozen cherries are the most important market for processors -- representing about 65 percent of the cherry pack. Frozen cherries are sold by processors primarily to food manufacturing firms to be used as an ingredient for consumer

FIGURE 2. THE TART CHERRY SUBSECTOR -- VERTICAL LINKAGES



products such as frozen pies and prepared desserts. Frozen cherries are also purchased by bakery and food service firms and by pie filling manufacturers. Sales in the frozen cherry market are made primarily by individual negotiation between processor-sellers and manufacturer-buyers. Since frozen cherries provide the main market for processed cherries, it is often used as the "barometer" market for pricing related to other levels in the subsector such as the raw cherry market.

Consumer size pie filling and canned cherries are sold by canner-processors to grocery chains and wholesale organizations. The linkage and behavior patterns of this portion of the cherry subsector are similar to those for FCOJ and for canned vegetables which are well described in the paper by Campbell and Hamm.[1] Canned cherries are sold predominately as a private label product with some weak packer labels. Pie filling is sold under a few packer brands with some recent increase in private label sales.

Food manufacturers of frozen pies and prepared desserts market their branded products through retail grocery chains and wholesale organizations. Most of these food manufacturers are divisions of some of the largest diversified food firms or conglomerate firms in the country. Their behavior and vertical linkage at this point is not peculiar to tart cherries, but is very similar to the way manufacturing firms operate for other highly branded products sold through the grocery retailer-wholesalers.

Although the behavior of branded food manufacturers is not peculiar for cherries, their actions and effective linkages with grocery retailer-wholesalers are very important for a commodity like tart cherries. This is especially so since a high percentage of tart cherries are sold to consumers in the products of food manufacturers. Of perhaps greatest importance for other farm commodities

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[1] "Vertical Organization and Coordination in Processed Peas, Sweet Corn, and Snap Beans" by Gerald R. Campbell and Larry G. Hamm, Blacksburg, Virginia, Aug. 6, 1978.

is the fact that cherries provide a case-study example of behavior and linkages with large food manufacturers. The role and behavior of food manufacturers will likely become increasingly important for many other agricultural commodities because of their effective position with advertising and with their linkage through retail grocery firms.

Canned cherries in institutional sizes are now sold heavily into export markets, although some are marketed domestically to the bakery and institutional trade. The export market relies in its vertical linkage upon two or three layers of export brokers, import brokers and importers in the receiving country. These layers exist, in part, because of the special informational and trade regulation considerations in the international markets. By contrast, in domestic markets many brokers and wholesalers in the vertical linkages have been bypassed. Examples of this "streamlined" vertical channel are provided by the canned or frozen cherry sales which are done primarily by individual negotiation directly from processor to grocery chain or to large food manufacturer.

There are about 4,000 tart cherry growers in the nation. Grower numbers are experiencing a significant decreasing trend. An increasing proportion of the production is concentrated in the hands of the larger 25 percent of the growers. Almost all of the growers, including the largest farms, are owner-operators. The trend to fewer and larger cherry growers is occurring because of (a) economies of size related to mechanical harvesting, and (b) potential benefits from vertical integration into processing to reduce certain risks and to most fully exploit potential economies from mechanical harvesting.

Tart cherry growers could be described as atomistically competitive if there were no grower bargaining associations. Grower bargaining associations are, however, a significant feature in the tart cherry subsector. This adds a degree of oligopoly to the grower market behavior.

Freezer processors as sellers can be characterized as atomistically competitive. Although substantially fewer in number than cherry growers, with approximately 55 sellers of frozen cherries, each individual firm generally has very little market power. All firms essentially sell the same unbranded commodity of frozen cherries. Although some quality differences occur, these are not strongly identified with one processor or another (some freezers-sellers attempt to distinguish their product this way with limited success). It can be noted that in certain years, or in portions of the marketing season, there may be enough freezers-sellers who are sold-out so that the remaining firms with unsold inventory may be able to temporarily have a degree of oligopoly power. This, however, would be a fairly unusual situation with frozen cherry sellers.

As buyers of raw cherries some processors may have a degree of local oligopsony. This may be particularly evident in years of large crops. The impact of the local oligopsony feature has changed significantly with the increasing importance of processing cooperatives. Local oligopsony for raw cherries is a minor feature in the total situation of the tart cherry subsector. It is an interesting feature, in part, because many growers, particularly those interested in grower bargaining, perceive this oligopsony power of processors to be much greater than it now is. Processors did enjoy a greater degree of local oligopsony for raw cherries during earlier years until the distinct trend to grower-owned processing which has occurred in the 1970's.

On the buying side of the frozen cherry market apparently some oligopsony power is enjoyed by a few large manufacturing firms. Firms in this oligopsonistic core are large enough in their purchases to often be able to influence the frozen cherry market. In addition there are a greater number of firms which are smaller buyers of frozen tart cherries and which constitute a more competitive fringe for this market.

The specific behavior of food manufacturers as buyers of frozen cherries will depend in part upon their situation with their branded consumer products including product line decisions, continuity of grocery store shelf space, consumer product pricing, etc. Food manufacturers as sellers are generally strongly branded oligopolists. They are basically not commodity oriented as sellers. Cherries as an ingredient commodity must fit into the pie, dessert and other product lines of these branded food manufacturers or cherries will not be used by this important part of the vertical food system. This feature substantially affects behavior related to the market structure of food manufacturers both as buyers and as sellers.

Grocery chains and buying organizations have a substantial degree of buying power. This arises to a large degree from their "gatekeeper" position relative to shelf space and consumer access. Since most tart cherries marketed through grocery stores are sold by manufactures in pies, prepared desserts and pie fillings, these food manufacturing firms are the primary participants who deal with the market power position of chain stores and grocery buying organizations. Large manufacturing firms generally have substantial power and capabilities to effectively market their strong brands through grocery outlets. This is especially so in comparison to private-label processors of canned cherries (and other fruits and vegetables).

Special Coordinating Features for Citrus and Cherries

As suggested with the brief discussion of Figures 1 and 2, the major coordination features relate to the linkages between the grower and processor, processor and manufacturer, and the processor and the retail and institutional outlets. While a number of coordinating activities differ little from other similar subsectors, there are some specific arrangements while not necessarily unique but special to these two subsectors.

The citrus and cherry subsectors use a number of different arrangements for vertical coordination. These arrangements, or coordinating features, have arisen because of the special vertical coordination challenges of these commodity subsectors and the specific conditions affecting the subsectors.

A series of vertically linked markets and prices are a major element in the vertical coordination system for these subsectors, along with the operation of a number of proprietary food marketing firms such as processors and food manufacturers. In addition, there are a number of other specific institutions or arrangements which are used to affect the vertical coordination of these farm commodities. These include (a) processing cooperatives, (b) grower participation plans with processors, (c) grower bargaining cooperatives, (d) central sales organizations, (e) cooperative-corporations joint ventures, (f) marketing orders of various types, (g) trade associations, and (h) a futures market in citrus.

Storage and Volume Programs

One special coordinating feature aimed at stabilizing the fluctuating cherry supplies and prices is an industrywide storage program under a federal marketing order. Since typical price increases from large-crop years to small-crop years are substantially greater than storage costs, a storage program to stabilize supplies is economically feasible for this subsector. It is also designed to provide more dependable cherry supplies to manufacturers, retailers, and consumers.

The marketing order storage program is a new attempt to improve coordination. It has been used twice by the industry with some success. With more experience in the future, the industry will probably be able to use the storage program to even further stabilize supplies and prices for cherries.

The marketing order also includes a secondary provision that would permit nonharvest in large-crop years. The industry has used this provision to only a

very minor extent and probably will use it even less in the future because of favorable experience with the main storage provision. Use of the nonharvest provision in a major way would stabilize supplies somewhat by shortening large-crop supplies, but this approach would do nothing to increase short-crop supplies. If used in a consistent and major fashion, this provision would probably not be economically desirable for consumers and food manufacturers, nor in the long-run for the cherry growers and processors. It does provide some flexibility for unusual circumstances which have occurred only rarely in the past.

A program somewhat similar to the storage program for tart cherries has been proposed for Florida citrus. While processors including cooperatives currently manage all inventories of processed citrus at the wholesale level, there has been considerable effort to change the current structure. Since most Florida fruit is sold under a non-pricing arrangement through cooperatives or participation plans, the grower loses control over those inventory decisions affecting the returns for his fruit. As an alternative, a reserve pool concept has been proposed where a share of all fruit (after processing) would be placed in a grower-owned reserve pool. Product would be added to and released from the pool according to specific formula and the program would be administered by the Florida Department of Citrus. This program was initially proposed in order to provide an alternative product source to secondary and export markets when wholesale prices were extremely high. These markets would be assured of a continual flow of orange juice at subsidized prices when supplies were short. Of equal importance, however, is the fact that growers would gain some control over those storage decisions that influence the industry. As of this writing the industry-wide pool concept for citrus has not been adopted.

Federal market orders exist in each citrus producing region for both oranges and grapefruit. While these orders cannot directly control the available supplies

of citrus, they can regulate the variety, size, grade, and volume of shipments. Volume prorates may be implemented to coordinate the flow of fresh fruits into the markets. Frequently, within the Florida districts actual fresh shipments fall short of the prorate set for specific week(s). More importantly, however, strong control of quality and size has led to considerable improvement in the standards of fresh citrus reaching the markets.

Federal market orders in California-Arizona are defined for Navel and Valencia oranges. These orders are used in the same way as outlined above, i.e., grade and size limitations and rate-of-flow programs.

Market orders also facilitate quantity controls in the forms of market allocations and reserve poolings. A number of proposals for developing reserve pools for Florida frozen concentrate have been considered but currently all storage is still under the direct control of processors rather than that of producers using a market order. This is somewhat in contrast to the cherry subsector with its grower-owned market order storage pool.

Grower Pooling Arrangements

Coordination between citrus producers and first handlers are accomplished with both priced and non-priced arrangements. California producers sell most of their fruit through one large cooperative organization and, hence, share in the returns under the cooperative pooling system. Similarly, many private citrus processors and packers offer participation plans where growers pool their fruit in a manner not greatly different from that of cooperatives. These plans are contractual commitments to deliver all or part of a grower's supply with the price not being determined until after the product has been sold and the fruit pool closed. Processors make most major marketing decisions that influence pool returns but growers involved in the pooling bear nearly all price risk. One significant advantage for the growers is that they share in the average pooled price rather than facing higher price risk from spot transactions.

For the total subsector, cooperatives and participation plans account for over 80 percent of all citrus grown in the U.S. subsector. In contrast to that of tart cherry growers, citrus growers have limited bargaining power other than that resulting from that cooperative position The participation plans, while assuring the growers an outlet for their fruit, does not increase the bargaining position of growers.

Grower Bargaining

Bargaining has been used in the tart cherry subsector as an important co-ordinating feature with emphasis on raw-product pricing. Grower bargaining increased in importance primarily during the 1950s and 1960s when processing was predominantly by proprietary firms which usually paid a definite cash price to growers at harvest time. Bargaining was undertaken, in part, to: (a) aid in the price discovery process, (b) reduce risk to an individual processor that a competitor would be able to buy cherries more cheaply, and (3) to alter the market power situation in favor of the growers.

High risks in cherry marketing, along with strategies of other participants to shift the risk bearing function heavily to the growers, contributed to the development of grower bargaining. Grocery retailer-wholesalers were able to shift, most price and inventory risks to processors.[1] Food manufacturers were able to shift some risks to processors (although to a lesser extent than did grocery firms). Processors facing high risks shifted some risks to growers through (1) widespread "discounting" of the grower raw-product prices to allow for risks, (2) some participation plans, or (3) some custom processing. Use of these strategies was most pronounced in large-crop years when risks to processors are highest. The result was that growers bore a substantial amount of the short-run market risks while they had very limited market information and little ability to make changes which might reduce the risks.

[1] Grocery retailer-wholesalers' behavior was considerable more important when bargaining associations were first formed because a substantial percentage of the tart cherries were retailed as canned cherries in that period.

Grower bargaining has been used in the tart cherry subsector to shift some risks back to the processors. Although processors are often perceived by the growers to have strong risk-bearing capabilities, most processors are small, family-owned, specialized firms which are not well suited for this.

Bargaining has provided cherry growers a degree of market-influencing ability. Bargaining associations have provided more complete market information, especially to growers, but also to processors and other participants. Through their use of market information, influence, and risk shifting ability, bargaining cooperatives have probably aided in the price discovery process and have strengthened the growers' market power position from that of merely a residual claimant..

The market power of cherry bargaining associations is somewhat limited by (a) the tonnage processed by cooperatives, (b) the tonnage of growers who are not association members and (c) the highly perishable nature of the crop. Since bargaining for cherries has been approached through an association of state bargaining cooperatives, there is an element of national bargaining oligopoly, but this is limited by the aforementioned factors. The degree of oligopoly power of the bargaining association is also not particularly great in years of large production since processor-buyers can essentially ignore the bargaining association when supplies are large. This would be much less likely to occur, and the bargaining associations' position would be stronger, if bargaining were to be done in the future under Michigan's bargaining legislation which permits exclusive agency bargaining and mandatory arbitration.

Grower bargaining is centered heavily in Michigan where 70 percent of the nation's tart cherry production is located. Although Michigan's unique bargaining legislation permits exclusive agency bargaining, and tart cherries would be a logical commodity for use of this bargaining approach, tart cherry bargaining

has not been done on exclusive agency basis. This is primarily due to a court case challenging the new bargaining law. If bargaining for tart cherries were to be done on exclusive agency basis there would be a significant element of oligopoly in the market structure at this level. This oligopoly position would nevertheless be significantly limited by the factors that (a) the exclusive agency approach is presently limited to Michigan and (b) a substantial percentage of the cherry tonnage is now handled by processing cooperatives which are potentially exempt from Michigan's bargaining law.

Grower bargaining for tart cherries has probably been moderately successful from the point of view of growers. Because of the situation in other parts of the cherry marketing system bargaining has probably had little significant effect upon consumer prices.

In recent years the percentage of the cherries bought by proprietary processors has been decreasing while the percentage handled by cooperaties and on-farm grower processing has been increasing. Because of these trends the proportion of the crop which is directly affected by raw-product bargaining has been decreasing. Therefore this is becoming a "thinner" market.

Processing Cooperatives

Trends to more grower-owned processing, including cooperatives, have occurred in the tart cherry subsector because of: (1) the potential for close technical coordination of mechanical harvesting, cooling and processing, (2) reduced risk to the growers from insufficient processing capacity in large-crop years, (3) EPA, OSHA and other regulations which have forced some processors out of business, (4) high risks and low profits to processors which have resulted in unwillingness by some proprietary firms to reinvest in facilities, (5) the fear of some proprietary processors of operating under Michigan's bargaining legislation coupled with the processing cooperative exemption in that law, and (6) many large growers

being willing to make additional investments in processing facilities to protect their orchard investments. It is expected that these factors will continue to encourage the trend to an even higher percentage of the processing to be grower owned.

Although cherry growers who integrate into processing have an additional potential profit center, this forward integration also involves additional risks to the grower. There is no longer a specified, cash price for raw cherries to the growers using this approach. With weak or falling markets the growers will feel the disadvantage of carrying this risk, while strong markets will often provide growers favorable returns for bearing the additional market risks. Processing growers will also have increased risk from their investment in processing plant facilities.

With the increase in grower cooperatives and on-farm processing plants, there has been an increasing number of sellers of frozen cherries. Thus the freezer processors have become somewhat more atomistically competitive than a few years ago.

The increase in number of freezers-sellers has been held in check somewhat by the fact that some of the new firms have entered into centralized marketing arrangements. Some new firms have decided to market their cherries exclusively through an existing processor or broker. Some new grower-processors have formed a federated marketing cooperative. These and other coordination arrangements which center on the market for processed cherries, rather than on the raw cherry market as does bargaining, will likely become increasingly important in the future.

With the increasing percentage of the cherry tonnage handled by grower-owned processors and the possibility of increasingly strong bargaining under Michigan's new law, many of the remaining proprietary processors are concerned that they will be in a position of even greater risks in the future. They fear that they will be

pressured to pay a specified, cash price to growers at harvest time while they sell in competition with cooperatives which are not committed to a specified grower price. The cooperatives also usually delay full payment to growers until after the processed cherries are sold. This situation is especially risky to a proprietary processor when supplies are large. Because of their concerns about this situation a number of proprietary processors are threatening to (a) become a cooperative, (b) form a vertical corporation-cooperative joint venture, or (c) implement a participation plan such as in the Florida citrus industry.

Occasionally in the past some proprietary cherry processors have operated participation plans with growers, although this approach has been of minor importance in the cherry subsector. The widespread use of participation plans by proprietary processors of citrus has been a notable contrast to the tart cherry subsector.

Marketing Management

The coordinating linkage between citrus processors and retail outlets (Figure 1) is direct rather than through auctions. Two important coordinating mechanisms between the processor and buyer are that of central selling and non-price contracting with large chains. The central selling simply performs the marketing and pricing functions that were historically handled by each processor. Beyond those of pooling the marketing functions of a number of processors, the coordination with the central exchange differs little from that of processor selling direct.

A common practice among many processors is to establish verbal contracts with retail chains to purchase a fixed supply of private label citrus over a season. Processors then have some lead time for the labeling of cans to be shipped to the buyers. However, once the cans have been labeled with specific private labels, individual processors have actually reduced the number of potential buyers for that specific product. Since the product has been labeled but not priced to the buyer, this coordinating mechanism gives the buyer increased market power.

At the wholesale or fob market level, a coordinating mechanism often exists between buyers and sellers which allows wholesale buyers to purchase given amounts of a product following an announced fob price increase at the previous or lower price for a specified period of time. This procedure is referred to as a buy-in privilege or policy. The amount of product a wholesale buyer may purchase at the lower price depends on the buyer's recent purchase record. The more product a firm has recently purchased, the greater the amount of product that may be bought at the lower price.

Cooperative-Corporation Joint Ventures

Some joint ventures between a cooperative and a food marketing corporation have been used in the tart cherry industry. One large vertical joint venture has been operating in this subsector for several years. It is apparently viewed as successful by both grower-members and the food marketing company. At least two other joint ventures were tried in Michigan, but were unsuccessful and have been terminated. A number of existing proprietary processors have indicated that they are considering the use of a joint-venture approach to improve vertical coordination from their point of view.

The major cooperative-corporation joint venture for cherries provides the grower members advantages in regard to effective consumer access and demand expansion for cherry pie filling. Most grower-members in the cooperative sell only a portion of their cherry crop through the joint venture, and rely on other vertical coordinating mechanisms for the remainder of their crop. Cooperative members in this joint venture share in the profits from all food products of the company. This arrangement has provided in recent years some significant additional profit opportunities for cherry growers in this cooperative. Primarily because of the successful experience of this joint venture, it appears that vertical cooperative-corporation joint ventures may become somewhat more important in the

cherry industry in the future. Growth of joint ventures will probably be held in check somewhat by the experience with the unsuccessful joint ventures which were terminated.

Futures Market

A futures market is used by the citrus subsector. The tart cherry subsector, in contrast, does not have a futures market.

The frozen concentrated orange juice futures contract is a coordinating mechanism predominately used by Florida processors. It has little relevance for California and Texas as a hedging mechanism. The marketing structure of the citrus subsector dictates to a degree the usefulness of FCOJ futures. If an industry or a firm within an industry maintains complete control over prices, then the need for use of the futures market is questionable. Likewise, various structural arrangements such as strong vertically integrated links between producers and processors will alter the types of useful hedging programs. Programs to prevent unusual supply changes such as product reserves can reduce the probability of price changes and hence the need for hedging.

The Florida citrus industry is unique in that a futures market exists along with a market structure where strong price leadership prevails. Each trader in the industry anticipating hedging programs develops his hedging plans in accordance with his market position within the subsector. First considering the citrus grower, his hedging strategies will differ according to how he markets his fruit. If the grower is strictly a cash fruit operator, then he has in no way committed his fruit to be sold at a designated price. This trader is free to hedge his product. Although his fruit is uncommitted at the time of delivery, his options for futures delivery are not absolute since his product is still in raw fruit form. Generally, this grower must find a home for his fruit and lift his hedge through an offsetting contract purchase.

The structural arrangement of the citrus processors will usually better facilitate the use of hedging programs. Processors forward purchase a major share of their supplies through cooperative arrangements or participation plans. These supplies are carried as inventories and can be effectively hedged. However, the motivation for hedging may differ according to the particular processor structure.

Many citrus processors will hedge their non-pooled fruit (priced fruit) as it is carried throughout the season. The purchase price of this fruit is fixed; hence, it is the processor's equity which is subject to the price risk. In comparison, changes in the value of pooled fruit can be passed back to the grower with the full price risk being carried by the grower. There may be less economic motivation for the processor to hedge this fruit since the price risk can be passed on. If the processor is a cooperative, there should be an incentive for the cooperative board to protect all fruit since ultimately all returns to the cooperative are distributed back to the grower. In contrast, the economic incentive for hedging pooled fruit by corporate processors will depend upon how the gains from hedging are shared between the processor and grower.

Commodity Demand Expansion and Market Development

The Florida Department of Citrus (FDOC), as defined by the Florida Citrus Code under Florida Statutes, is a regulatory body responsible for setting and policing product standards, to support citrus research, and to develop broad generic marketing programs for Florida Citrus. The department taxes growers directly and all revenues must be used for those programs authorized by the Citrus Code. While the department is not directly involved in sales, they maintain a field staff of over 100 fieldmen throughout the U.S. who have the responsibility of working directly with retail and institutional outlets to promote Florida sales. Similarly, the department supports one of the largest generic advertising programs among agricultural subsectors. This includes national TV

advertising, radio, newspaper and magazine advertising, in-store displays and substantial consumer coupon activities. These programs represent a unique co-ordinating mechanism among subsectors.

The citrus subsector is expected to continue a strong advertising program. Competitive advertising between producing regions will most likely increase. More recently, efforts to change the advertising mix have occurred where a portion of grower taxes are used to promote brands in addition to generic advertising. Historically, grower citrus taxes have been marked for generic promotion only. Recent state legislation now allows a maximum fixed percentage of these funds to be used for branded advertising programs. This new policy arises partially from the belief that generic efforts may be reaching a saturation point and that generic and branded advertising are complementary. Also, these additional funds may create greater competition among processors and may strengthen the processor brands versus private labels. If brands are strengthened, then the market power of retail buyers could be reduced somewhat.

The other side of this issue is the possibility that processors may not increase their promotion. Rather they may simply substitute public for private advertising funds. Experiences by the Florida industry in its programs of joint advertising ventures with retail chains suggest that retail chains did in fact substitute Florida generic funds to maintain their on-going newspaper advertising programs. Whether or not the same will hold for processors using public funds has yet to be tested.

Secondly, generic funds diverted to brand advertising could stimulate small and inexperienced firms to develop advertising programs. If economies of scale for advertising exist, then considerable waste may occur when many smaller firms apply for generic funds.

Irrespective of the final impact of various advertising mixes, the subsector will most likely include a number of innovative and yet to be tested

advertising and promotional efforts. These programs will also apply to the international markets through three-party programs.

The federal government participates in the foreign market development of orange juice with support of brand promotion activities of distributors in European markets. A Three-Party Program is a direct method for the government to participate in coordinating market development where the Florida Department of Citrus, the Foreign Agricultural Service of the USDA, and the European distributor share the cost of promotional activities in Europe. Also federal tariff and duty drawback programs facilitate foreign market development by providing a mechanism for coordinating the imports and exports of citrus concentrate by placing a direct tariff on all orange juice imports with the option for the firm of regaining the tariff once exports are made.

Demand expansion for tart cherries is undertaken on an industry-wide basis supported financially by the growers. Funds for the demand-expansion program are collected from growers through the use of state marketing orders in Michigan, New York, Wisconsin, and Pennsylvania.

Some of the demand-expansion work is done through state promotional organizations. Most of the demand-expansion efforts, however, are done through a national organization (The National Red Cherry Institute) to which funds are contributed from each state marketing order.

The cherry subsector has a much smaller budget for generic demand expansion than does citrus. Funds for the cherry generic program amount to only about one percent of the generic demand-expansion budget for citrus. For this reason the mix of activities undertaken with the cherry program is by necessity considerably different from the citrus program.

Because a high percentage of tart cherries are sold as an ingredient for manufacturers of branded food products, much of the cherry demand-expansion

efforts are aimed at the product-line and merchandising decisions of food manufacturers and at menu decisions of food service and institutional establishments. The demand-expansion efforts also involve attempts to stimulate development of new manufactured products using cherries, to determine obstacles to expanded use of cherries and to work with food companies to overcome those obstacles for an expanding demand.

Trade Associations

There are no organizations of significance that directly represent a bargaining agent for citrus producers, except for that role provided by the cooperative organizations. Trade associations, while not involved in bargaining, are an extremely important structure within the citrus subsector. Most Florida producers are members of Florida Citrus Mutual, a producer trade association. This is a powerful organization providing leadership in all phases of the citrus industry. While this organization does not buy or sell products, it does provide market information to growers and reflects the grower point of view in all policies having an impact on Florida citrus.

The Florida Canner Association is a strong trade association and often works jointly to solve major citrus industry regulatory and marketing problems. Usually, the Florida Department of Citrus provides the mode or clearinghouse for addressing the various issues and coordinating the input from various citrus trade associations.

Trade associations are less powerful in the other citrus producing states primarily because Texas packers and processors are much more independent while California is dominated by one large cooperative.

In general, trade associations are an integral part of the citrus subsector and they provide significant coordinating functions, especially through their various informational publications. Their role in the political arena is

unquestionably essential as the citrus subsector continues to expand its world markets and face new competitors.

In the tart cherry subsector, the state and the national promotional organizations and the grower bargaining associations function as trade associations in regard to legislative matters and industry representation on important issues for the subsector (especially the growers). Since the instability of supply and prices has been a major obstacle to long-run demand expansion for cherries, the promotional organizations and the bargaining associations have been active in developing new industry-wide institutions such as the federal marketing order storage program to reduce this major industry problem. There are several state and national trade associations of fruit and vegetable processors which represent the interest of cherry processors on key issues.

Summary

Vertical coordination in the citrus industry involves a prominent role for processing cooperatives and participation plans, a large industry demand-expansion program and direct negotiation selling of private label products by processors to grocery retailer-wholesalers. In contrast to citrus, tart cherry coordination features have involved a substantial role for grower bargaining, an industry-wide storage program, and emphasis on commodity sales by processors to food manufacturers.

Although processing cooperatives have historically been relatively minor for tart cherries, cooperatives in that subsector are now exhibiting a definite growth trend. Thus in respect to cooperatives, the cherry subsector is moving to a pattern more like that for citrus.

The citrus subsector is noted for its large and successful demand-expansion program. Broad-based financing and a substantial volume industry enable citrus to have a large budget for demand expansion which includes several program

aspects such as national TV advertising, other media advertising, consumer coupons, in-store displays and trade fieldmen. Efforts to develop foreign markets for both fresh and processed citrus have taken on growing importance in recent years. The cherry subsector also has a generic demand-expansion program, but with a much smaller budget. Thus the cherry demand-expansion program by necessity involves a substantially different mix of activities and has a smaller impact on industry coordination.

The wide fluctuations in annual supplies and prices for cherries have an important impact on many aspects of vertical coordination in that subsector. These wide fluctuations, and the accompanying risks, are more pronounced and all-pervading for the tart cherry subsector than for citrus. The cherry storage program is a relatively new industry institution designed to improve performance on this most basic coordination problem for the cherry subsector. Although citrus has a similar supply fluctuation problem, it occurs less frequently and is not so all-pervading as in the cherry subsector. Citrus relies on individual processor inventories and storage to stabilize market supplies.

The important role of grower bargaining for cherries in contrast to essentially no grower bargaining with citrus raises a question regarding why this difference has evolved in the two subsectors. A notable difference in farm ownership pattern between the two subsectors seems to be one relevant factor. A large share of citrus groves are owned as a capital investment by absentee owners with primary income from other sources, while almost all tart cherries are produced by owner-operators for whom cherries provide a major source, or the only source, of their family income. A great instability in cherry growers' net returns plus the high grower risks for this crop also have led cherry growers to be interested in bargaining to provide greater stability and reduced risks with somewhat higher grower prices. Net returns on investment by citrus

growers have apparently averaged higher than for cherry growers. This net return difference appears to be another factor which is related to the stronger interest in bargaining by cherry growers than by citrus growers.

With the increase in cherry processing cooperatives and on-farm processing, the role of raw product bargaining for the tart cherry subsector will probably be less significant in the future than in the past. Bargaining will, however, likely remain a significant feature with cherries, in contrast to the citrus subsector.

Despite the differences in coordination of the citrus and tart cherry subsectors, trends indicate that the two subsectors will likely become somewhat more similar in the future in regard to certain key coordinating features. Processing cooperatives, participation plans and joint ventures are likely to become more important in the cherry subsector, increasing the similarity to citrus. Effective coordination for the processed commodity thus is very important for both citrus and cherries, since much of the raw fruit is moved from grower to processor under non-price arrangements. The citrus subsector may develop and implement a grower administered storage program similar to that for cherries. Thus several changes in the two subsectors indicate somewhat more similarities for future vertical coordination. Notable differences in coordination are likely to remain as well because of inherent differences in the basic nature of the two subsectors.

VERTICAL ORGANIZATION AND COORDINATION IN PROCESSED PEAS, SWEET CORN, AND SNAP BEANS*

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Introduction

Vegetables for processing are not major components of agricultural income in the United States.[1/] They are, however, of substantial regional importance and in general display some interesting coordination mechanisms. In this paper, we attempt to outline the general system of production, processing and distribution for peas, sweet corn, and snap beans and to discuss the features of coordination systems at the farmer-processor and the processor-retailer level.

General Production Characteristics

Peas, sweet corn, and snap beans are all annual crops with production concentrated in three regions: northeast, upper midwest, and northwest. The varieties of these crops grown for processing are in general distinct from those grown for fresh market outlets; thus the processing sector is in general independent of fresh market production.

Sweet corn and peas are highly perishable, losing quality if they are not processed within a few hours after picking. Snap beans can be held up to about 24 hours after picking without substantial losses in product quality. Their perishability characteristics are reflected in the location of processing facilities relative to production. Peas and sweet corn production are generally concentrated within 50-100 miles of processing facilities. In contrast, snap beans may be transported several hundred miles from production regions to processing plants.

In general, the production of all three of these vegetables occurs both as a complementary enterprise on grain-livestock farms and as a major enterprise for specialized vegetable farms. The pattern of specialization has a regional element with a greater portion of production occurring on specialized farms in the northwest than in the midwest and east. Snap beans are also more likely to be produced on specialized vegetable farms.

In those regions where production of these vegetables occurs primarily on diversified family farms, a major part of the specialized production and harvesting machinery and production technology is provided by the processor. In these situations, growers in general provide land and labor. Production decisions are supervised and coordinated by processor fieldmen.

In all three of these vegetables, perishability is a primary consideration encouraging close coordination between production and processing. In order to maintain an even and efficient flow of product through fixed processing facilities, it is necessary to space plantings over time. This insures that products will not mature in greater amounts than can be handled by processing facilities. In the case of snap beans, production timing is also manifested by production in different locations at different times of the year. Wisconsin snap bean processors may, for example, secure early season snap bean supplies from as far south as Arkansas. Later in the season, Arkansas processors will secure snap bean supplies from Wisconsin. In peas and sweet corn, limitations on the ability to transport raw products long distances reduce the geographic procurement range for a single plant. Irrigated production may also serve to lengthen the production seasons.

In addition to perishability, the nature of the major processing technologies also encourages close technical coordination between production and processing. Canning and freezing are the major processes for the transformation of peas, sweet corn, and snap beans from perishable raw products to storable consumer products. In general, canning and freezing as applied to these products produce minimal changes in the characteristics embodied in the raw products. Thus, if the final consumer product is to have certain characteristics of color, texture, sugar content, etc., then these characteristics must, in general, be embodied in the raw product. With the limited ability to change product characteristics

after production, it is essential that the desired characteristics be produced through the correct choice of seed and specific husbandry practices. In general, the close coordination of production and processing is accomplished through production contracts.

Processing Characteristics -- Market Structures

Several general characteristics are useful in describing the processing industry for peas, sweet corn, and snap beans. In general, processing plants for these products are multi-product. While some single product processors continue to exist, they are fast disappearing. The multi-product firm can achieve economies in the utilization of processing technology and can satisfy the demand for mixed shipments of several varieties of vegetables. In addition, the multi-product firm may be able to spread the cost of product differentiation, selling costs, and other transaction costs across several products.

Firms in this industry can be reasonably classified in two categories, national brand and private label. While some regional brands continue to exist, they are not a major portion of production. National brand manufacturers generally operate plants in several if not all major production regions. The multi-regional character of these firms allows them to reduce some of the risk of production variability. In addition, the multi-regional firms may have some transportation cost advantages in meeting regional demand with regional production.

The structure of the farm to processing market generally approaches local oligopsony. Scale economies in processing operations combined with limits on the geographic procurement area engendered by product perishability seldom allow more than a few minimal optimal size plants to operate in a given region. On the farm production side, peas, sweet corn, and snap beans may be produced on relatively unspecialized land, and in those regions where processors provide

specialized resources, can be produced with little or no specialized skills. Thus, there are a large number of potential growers. A key consideration in the nature of competition at this level is the fact that growers usually have several alternatives to vegetable production. In those regions where specialized vegetable production dominates, the number of potential growers tends to be less and their economic alternatives tend to be fewer. In these regions, both bargaining and processing cooperatives play a greater role. This reflects, in part, the increased stake which growers have in vegetable production. Where processing cooperatives are important, they tend to produce for the private label market. In general, they have not been successful in developing their own brands in any significant degree.

Major structural change in the vegetable processing industry has been rather slow. National concentration ratios have not shown substantial or rapid change. In peas, sweet corn, and snap beans, national four-firm concentration ratios have increased to about 60 percent. Changes have been more substantial at a regional level with the number of firms generally declining, especially for the small single-product firm. This trend will likely continue as environmental and safety regulations push the industry toward new capital investments. In addition, average returns to processors have been at or below competitive levels (for undifferentiated commodities) for several years. Thus, several factors will combine to produce increasing concentration, especially at the local market level. In some cases, the reduction in the number of alternative buyers will lead to the growth or formation of processing cooperatives as a way to protect market access.

Coordination Between Growers and Processors

As has been pointed out above, there are several technical reasons for close coordination between production and processing of peas, sweet corn, and

snap beans. In addition, there are some economic incentives for coordination. Given perishable commodities and a limited number of buyers, both growers and processors have an incentive to establish prices prior to initiation of production. The supply of vegetables at harvest is extremely inelastic; thus changes in demand at this time would cause wide fluctuations in prices. Local oligopsony with recognized interdependence reinforces the potential volatility of prices at harvest. Thus, it is quite logical for both growers and processors to attempt to establish prices in advance of harvest. This not only reduces price volatility but allows more time for the seeking of alternative buyers (sellers) and thus reduces the risk of a bad bargain.

Vegetable production can be quite risky in terms of yields, especially during early or late production periods. Processors can increase plant utilization rates by lengthening the processing season and lower average fixed cost. Thus, growers are seeking assurance of adequate compensation for early or late season production and processors are willing to pay a premium for this production. Without explicit agreements, it would be difficult to accurately communicate the mutual needs of the two groups. In some cases, processors resort to growing their own commodities, especially for early and late season supplies. This may be done for lack of a mechanism which can accurately measure risks and appropriate rewards.

Vegetable processing is somewhat unique among agricultural commodities in that initially canning firms often began as completely vertically integrated in farm production. As demand grew, firms began to lease land to complement that which they owned. In recent years, processors have relied mainly on production contracts with vertical integration accounting for 10-15 percent of production. The typical production contract puts the locus of control on most dimensions of production in the hands of the processor. The contract specifies

the production from a specific land area will be the exclusive property of the processor. Most aspects of husbandry will be specified or approved by the processor fieldman. Price schedules relating quality and price will be established as will the cost of any inputs supplied by the processor. Contract negotiation and agreements will take place prior to planting. Information available to processors at this time includes inventories from the preceding year, historical bookings with their buyers, and general industry information on the supply and demand outlook for the coming year. Critical information for the farmer generally centers on the price outlook for alternative crops. Uncertainty surrounding cropping alternatives can lengthen the contracting process. For example, uncertainty concerning the set-aside program for feed grains delayed the signing of many contracts in Wisconsin this spring until the last possible moment. Price uncertainty for alternative crops has encouraged experimentation with contracts which index vegetable prices to field corn prices. The extent of these contracts is not known; however, they are apparently not new. Several industry sources indicated that such contracts have historically appeared whenever price uncertainty for alternative crops has threatened the processor's ability to negotiate with growers.

A key limitation on coordination as accomplished by the contracts currently in use for peas, sweet corn, and snap beans is the persistence of yield variability. The acreage form of contract does not provide control over gross tonnage produced. This may cause problems if total tonnage from contracted acreage exceeds the desired season pack or if weather variations cause excesses within the season relative to processing capacity. In the past, processors controlled this problem through the use of a passed acreage clause in their contracts. This clause dealt with compensation for crops which were suitable for processing but were not harvested at the processor's discretion. Historically, the passed acreage

problem has been an issue of controversy. In recent years (with the development of organized bargaining in some regions and the increase in prices for alternative crops), processors have generally improved the provision for passed acreage to more equitably compensate growers. This has, however, severely limited the use of passed acreage as a quantity adjustment device and has encouraged processors to avoid passing acreage.

Processors have also been pressed especially hard by high short-term interest rates. As processors assumed the inventory function for the subsector, their short-run capital costs were greatly accentuated. In addition to processor-provided inputs (in some cases, seed, pesticides, harvesting, and planting) which were financed through the production season, processors were also burdened with financing finished product inventories. In some cases, processors have attempted to pass part of these inventory costs to growers through delayed payments for the product. The pressure for delayed payment provision has been drastically increased in recent years. When processors have not had the market power to accomplish delayed payments to growers, the pressure to move inventories rapidly has been intense.

In general, the coordination of production and processing through production contracts has been successful in accomplishing technical harmony between the two stages. It has not, however, been able to alleviate the economic uncertainty which processors face. In fact, the relatively fixed commitment of processors puts increasing pressure on this industry to seek effective coordination of the distribution function. It might also be added that the annual nature of the grower-processor contracting process does not provide a means for encouraging long-run stability. While in some senses a limitation on long-run coordination, annual contracts do allow for flexible response in the short-run.

Organization of Retail Procurement

Sweet corn, snap beans, and peas are biologically distinct and require specific individual consideration in growing and processing. These crops, however, tend to lose their specific identities as they move up through the food system. To grocery buyers, individual vegetable crops become part of either a canned or frozen vegetable family group. Each of these groups in turn are included with other canned or frozen products to form the canned and frozen goods product categories. To understand the vertical coordination of these commodity subsectors, it is helpful to understand the behavior and motivations of food buyers.

Processed vegetables, like all food, are sold through the two food channels; the grocery store (at-home) and the away-from-home (restaurants and institutions) channels. The largest market segment for processed vegetable products is sold from grocery store shelves.[2/] Thus grocery store buyers play a pivotal role in the coordination of these commodity subsectors.

Processed peas, corn, and snap beans are sold either under differentiated brand labels or the private or controlled labels of food distributors. There are significant differences between procurement and sales of branded and private label products. There are also significant differences between canned and frozen forms of processed peas, corn, and snap beans. The industrial and institutional market channels are relatively more important for frozen vegetables. As a result, the retail grocery market is not the driving force leading to coordination in this segment. Private label products dominate the sales of frozen vegetables to a much greater extent than in canned products. Also, the ability to run sales and merchandise frozen products is more difficult than for canned products. All of these factors result in different coordinating mechanisms and forces at work in the canned and frozen segments of the subsector. The coordination

process discussed below is most directly applicable to the canned corn, pea, and snap bean segment. Since the vast majority of these products is grown and processed in the upper Midwest, the conclusions reached will be applicable directly to the firms and institutions in that part of the U.S.

Although branded and private label vegetables are sold beside each other on the grocery shelves, they go through different procurement channels in the retail firms. Recognizing the organizational and behavioral differences between the buyers in each of these channels provides a foundation for understanding how coordination takes place in the subsector.

Branded food products are purchased by buyers located at the distribution headquarters of food retailers. In food chains, the buyers of food products are located at headquarters for the single division chains and at division or regional headquarters of large national chains. The independent grocer has products bought at wholesale or retail cooperative headquarters of the buying organization to which he/she is affiliated. While the control of distribution of the product to the stores differs between chains and independents, all branded product buyers usually buy canned vegetables in similar ways. A buyer's attention span for any product is usually limited to current needs to reorder that product. Should prices need to adjust in the system, manufacturers issue promotions and allowances to buyers to induce them to alter shelving or pricing policies on their products. These manufacturer-sponsored promotions may be tied to the manufacturer's advertising and sales force actions. A promotion on a canned vegetable product is weighed against promotions available on all other grocery products. In other words, buyers view peas and Pringles as perfect substitutes for their attention. Therefore, those branded product manufacturers who understand buyers' concerns and needs are able to structure their promotions properly and gain improved access to grocery shelves. There are

varying degrees of expertise among branded vegetable manufacturers. Some national firms are very proficient, others are not. Some regional firms are excellent marketers, others are not.

Unlike his branded product counterpart, the private label buyer usually has considerable expertise and historical knowledge about the individual products he buys. This is because there are fewer private label items and each buyer has fewer products under his control. In addition, private label products are undifferentiated commodities until the private label distributor adds labels and marketing expertise. Therefore, the private label buyer has to be much more familiar with the specifics and conditions under which his products are produced. As a consequence, private label buyers are specialized buyers. They usually get training from internships with large specialized private label organizations or from extensive training in the canning industry. Often they do not have actual store management experience which is usually required of branded product buyers.

Another unique feature about private label buyers, in addition to their expertise, is the observation that there are fewer private label buyers than brand buyers for the same types of products. Private label buying is more concentrated than brand buying. The main reasons for this are the facts that large chains have one set of private label buyers for the whole chain, whereas each division has a set of brand buyers. Also, many retailers and retail organizations buy private label products through private label buying organizations. The private label procurement system contains a variety of different buying and organizational arrangements. Some span several different firms.

Vertical Coordination Retail-Processor

Buyers, both branded and private label, work within the internal structural arrangements of their corporate bureaucracies. These bureaucracies filter the

economic forces at work in the general economy into definable rules or standard criteria by which buyers must operate. The most pressing criteria established which affect both types of buying involve rules on inventory management. The rapid rise a few years ago in short-term interest rates forced many retailers to adopt rules which require buyers to minimize inventory costs. This is done by carrying minimum safety stocks and requiring frequent and smaller shipments of products. The adoption of these procedures has important implications for supplier selection.

Corporate bureaucracies also impose rules for buyers generated by the internal needs of the bureaucracy for continuity and harmony among the various internal factions in the firm. What a buyer does impinges on warehouse, headquarters, and store personnel's performances. One binding condition on buyers is the stock level in the stores. If a product is out-of-stock on the shelves, consumers vent their concerns on store personnel. To keep internal harmony, firms impose stock level criteria on buyers. Given minimum safety stocks, one delayed shipment will often cause a product to become out-of-stock. Buyers, therefore, place great importance on reliability. They select suppliers accordingly.

Vertical coordination at the retail-processor level is, therefore, a direct consequence of the composite behavior of branded and private label behavior and the resultant reactions of processing firms. Between harvest and final consumer sale, each can of product needs to undergo a processing, marketing, and procurement function. Processing is simply the act of converting raw perishable products into storable canned products. Procurement refers to the act of buying or deciding to present the product to consumers. Marketing refers to that whole set of functions which transform an undifferentiated processed commodity into an identifiable product sold to the consumer. All these are necessary. Who in the subsector has responsibility for which of these functions

determines the details of vertical coordination.

Branded canned vegetable manufacturers, for the most part, process their own product needs. In years when their own processed production falls below their needs, they will purchase canned products from other processors. With branded canned vegetables, the manufacturers perform the majority of the marketing functions. They design the labels, formulate market strategies, execute advertising plans, and are basically responsible for the performance of their products. Food retailers decide shelf location and in-store merchandising strategies. Within the constraints set by retail firms, brand manufacturers control the destinies of their products.

Retail buyers buy on a demand on order basis. Typically, the buyer will order X hundred cases at some point in time. This pattern of buying is altered only when manufacturers offer promotions or special deals. Buyers will adjust their patterns to take account of these deals. This type of buying does not transmit any information about future demand and requires no forward product commitment by the retail sector. Variations in supply or demand which require subsector adjustments, therefore, fall directly on the manufacturer. To the extent that manufacturers have the ability to shift needed adjustments to grocers, they will attempt to do so.

Given a contracted acreage, the production of that acreage will be processed. If yields are above normal, brand manufacturers will adjust their promotion/advertising and/or sell surplus product to the private label market. Conversely, below normal yields will force cancellation or redirection of advertising and promotional effort. Sometimes brand manufacturers will go on the open market to pick up additional supplies from other canners. Adjustments in subsequent seasons will be accomplished via changes in contract acreage. In addition, those manufacturers who make the buyer's job easier will be favored. Buyers

are particularly concerned about transportation arrangements and reliability, in the structure of trade deals, fair and equitable treatment, help with store work, etc. Those brand manufacturers which successfully implement needed coordination strategies and consistently provide retailers with the mix of service they want prosper. Those firms who do not, gradually lose sales and market share.

The coordination of private label canned vegetable channels differs remarkably from the brand product channel. The private label manufacturers do not have control of the marketing function for the products they process. The marketing factors are added by the retail private label buying organization. Private label buying organizations design quality specifications, labels, advertising schemes, and all the things typically done by brand manufacturers. These are in addition to pricing, shelf policies, and merchandising display functions normally the prerogative of retail organizations. Therefore, any adjustments needed by the private label processing sector need the full and conscious marketing support of the retail buying sector. The level of vertical coordination in this channel is thus dependent on the formal and informal relationships between private label processors and private label buyers and merchandisers.

The buyers and sellers are linked formally via a product booking system. When a buyer books a canned vegetable product, he/she is saying "I will buy X thousands of cases of No. 303 canned sweet peas packed to my specification during the next pack year, subject to my approval of product price and quality at time of shipment." Bookings for canned peas, sweet corn, and snap beans which are made before pack time, but after the contracting and planting season, give suppliers some idea about the amount of product being demanded. Thus bookings only help processors allocate committed acreage to various markets (retail or institutional). Bookings are non-binding, non-contractual relationships. Given abnormally high yields, suppliers need to move larger processed

inventories. The only option available to a private label processor is to lower prices to the retail buyer. Since the buyer and his organization have the marketing function, it is up to them to make the necessary advertising, display, and/or pricing decisions which would result in increased movement. Conversely, they would need to make the adjustments if suppliers were really short. The processor can only regulate price.

Notice, the booking system does not convey any longer-term planning information. Given a long crop, retail buyers are not legally bound to take "their" bookings from a processor if that processor does not match current market prices. Yet in a short crop year, the buyer "expects" to be shipped his full booking. Under this system, the supplier receives little information and bears all the risks of price change.[3/]

Since the retail organization has total marketing responsibility, the buyers place great stock in the processors' service and quality levels. The retailer's name on the product requires that the product be the designated quality. Service level is a catchall phrase used as a proxy for all other retail-oriented prerequisites. The biggest component of this service level is transportation or shipping lead time and reliability. Given inventory costs, buyers want processors who can ship minimum order sizes with regular frequency. They have a distinct preference for multi-line processors who can ship mixed trailer loads on a regular basis. Given that all suppliers have similar prices, buyers then select on the basis of processor service level and quality control.[4/]

Total subsector coordination depends on the actions of the retail private label marketers. Their behavior, as it turns out, is directly connected to the actions of the branded product manufacturers. Simply stated, private labels cannot exist without brand label products against which they are compared. Basically, private label products take their identity from their comparative

value to a national brand product. Retail trade practice is to price private label products at some set and fixed percentage lower than national brands. If the price differential between a branded and private label product narrows, consumers will shift to branded products. The reverse happens if the spread widens. Thus private label coordination tends to be linked to branded product coordination. It is changes in branded product prices and practices that induce retail private label merchandisers to induce private label buyers to alter their buying patterns. Thus price movements in both channels are closely linked and move in the same direction. For the most part, brand manufacturers achieve their desired levels of sales and product movements because they control the majority of the marketing process. Private label processors, however, need to have the retail sector respond in the proper ways in order for the sales and movements of products to be those necessary for coordination of the system. In many cases, a price decrease in branded products causes a price decrease in private label products, but retail merchandisers will choose to promote branded products. This is because brand manufacturers require this as a condition for receiving the price reduction and retailers get more "store drawing power" by advertising national brands. The end result is that private label prices have decreased but expected and desired movement has not been forthcoming. Therefore, private label prices will remain at lower levels after the branded producers raise their prices. Whether these still low prices will result in increased product movement is still dependent on the retail private label buyers' and merchandisers' decisions. Some private label merchandisers will promote, others will not. The composite effect of this behavior is that suppliers of private label processors then bear the cost of disposing and/or carrying the surplus inventories. Their only choice is to reduce contracted acreage for the coming year. The failure of retailers to merchandise excess supplies results

in cyclical price and acreage movements of greater magnitude than probably would have occurred had the subsector been better coordinated.

Potential Changes in Organization and Coordination

Several implications follow from the above analysis. First, smaller specialized vegetable processors characteristic of the upper Midwest production region will have a difficult time surviving in the future. Bargaining and increased returns to alternate crops has prevented processors from using passed acreage clauses to balance supplies with anticipated demands. Thus processors must pack the production of all contracted acreage. If the retail sector does not adjust merchandising and pricing practices to help coordinate the pack movement, the specialized private label processor bears the cost of inventory holding and production adjustments. Those larger private label firms which pack a variety of products can internally cross-subsidize a given commodity item which is out of adjustment. Combining this with the decided preferences of buyers for multi-product processors who reduce transportation and inventory costs, this suggests that many smaller firms must expand or leave the business. Given the capital requirements of expansion and compliance with government regulations, many of these small processors will exit from the industry.

Mechanisms now in place to shift supply uncertainty in the subsector might result in significant structural change. Private label processors who have little marketing power now bear the cost of subsector adjustment. Many processors faced with strong bargaining at the grower level, strong buyers at the retail level, and short- and long-term capital needs have stated they will leave the industry. This position may spur growers to buy the processing facility and operate it as a cooperative processing firm. This institutional change shifts risk-taking back to the grower. Costs of coordination still are embodied

in the processed inventory, but now it is grower-owned and financed. Distressed sales below total costs will be financed by the depreciation of grower-owned plants. In addition, cooperatives have distinct financial advantages over comparable proprietary firms.[5/] Thus the move to cooperatives induces other proprietary firms to convert to cooperatives. In some geographic areas, in some commodity subsectors, processing cooperatives dominate private label processing. Of the three functions, procurement, marketing, and processing, processing has the greatest amount of risks. Given large cooperative processors, national brand manufacturers have shown some interest in disintegrating processing and marketing. In the future, the large national vegetable processors may no longer contract and process peas, sweet corn, and snap beans. Rather, they may buy processed products from cooperative and/or specialized processors and apply their marketing expertise and labels. This scenario implies a different subsector organization than we now have.

Casual observation indicates that the pea, sweet corn, and snap bean subsector of the upper Midwest has yet to undergo the significant organizational changes witnessed in the California, and to a lesser extent, the Pacific Northwest processed fruit and vegetable subsectors. Production and grower organization in the upper Midwest will temper some of these organizational effects. However, the forces set in motion by the current state of vertical coordination will probably drastically alter the organization of this subsector.

Summary

The processing vegetable subsector is a subsector in gradual evolution. To facilitate comparison with other subsectors, the following summary highlights are presented.

1. The nature of these vegetable products requires close coordination of production and processing. Production coordination is generally accomplished through production contracts.

2. Persistent output variation among these crops generates risks which must be borne by someone in the system.

3. Returns to alternative crops and grower bargaining have reduced the availability of using passed acreage contract provisions to shift risks to growers.

4. Processed vegetable products are sold through semi-autonomous branded and private label product channels.

5. The ability to balance processed vegetable inventories caused by output variation depends on successful marketing. Branded product manufacturers execute their own marketing programs. Private label processors must rely on the marketing actions of food distributors.

6. The effects of failing to coordinate sales with supply, servicing retail accounts, and changing government regulations are combining to induce structural and institutional change in the subsector.

FOOTNOTES

1/ This paper was prepared as a supplement to symposium discussion. We have chosen not to document in detail. Documentation and sources will be found in two publications in process.

Gerald R. Campbell and Annie Yuen, A Subsector Analysis of Peas, Sweet Corn, and Snap Beans, University of Wisconsin, Department of Agricultural Economics, Working Paper in Process.

Larry G. Hamm, The Implications of Food Retailer Procurement Practices for Food System Organization and Coordination, forthcoming Ph.D. dissertation, Michigan State University.

2/ In 1976, approximately 76 percent, 85 percent, and 84 percent of the peas, corn, and beans, respectively, canned were put in consumer-size cans.

3/ If retail buyers consciously "overbook" product, the information communicated is actually of negative value.

4/ Depending on the image that the private label buying organization wants to project, they may pay higher prices to some suppliers in order to get the quality and/or service they desire.

5/ Lower total tax rates, federally subsidized capital, and deferred product payments to growers are several of these advantages.

Vertical Organization and Coordination in Selected Commodity Subsectors: An Interim Report on Cross-Subsector Analysis

by

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This paper was prepared for a symposium on Vertical Organization and Coordination in Selected Commodity Subsectors held as part of the American Agricultural Economics Association annual meeting, Blacksburg, Virginia, August 6-9, 1978.

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Vertical Organization and Coordination in Selected Commodity Subsectors: An Interim Report on Cross-Subsector Analysis[1/]

Introduction

A major thrust of NC-117 research on the organization and control of U.S. Agriculture has been work on vertical coordination systems. We have adopted a subsector approach in attempting to outline the changing structure, coordination and performance aspects within selected commodity subsectors. While the subsector approach remains a new and not well defined analytical approach we believe that it is essential to go beyond the single level, static approach of traditional industrial organization models. A subsector approach involves analyzing the entire production-distribution system for a commodity. Thus it involves both horizontal and vertical interactions between the firms and industries which participate in the subsector. In addition an attempt has been made to explicitly identify changes in the organization or coordination of the various subsectors. We hypothesize that the organization of a subsector strongly influences subsector coordination which in turn strongly influences subsector performance. Thus, analysis of the entire vertical system is called for.

We also believe that commodity subsectors in agriculture are sufficiently similar to allow meaningful comparisons among them. Our early discussion of producer-first handler coordination systems led us to conclude that the comparison of several subsectors would be useful especially in the development of hypotheses concerning structure-coordination-performance relationships.[2/] Thus, a common outline of "relevant" subsector dimensions which would describe subsectors in sufficient detail to illustrate alternative vertical coordination systems and the economic context in which they operate was adopted.

This common outline was generally followed by the authors of the various subsector papers.[3/] In essence this gave us a descriptive analysis of the several commodity subsectors which would allow comparison. Each of the subsector papers provides a unique attempt to describe the economic organization, coordination and performance of a commodity production-distribution system. Some of the greatest potential lies in a comparative analysis of the subsectors. While the ultimate goal is to develop new insights into the way in which structure, coordination, and performance of commodity subsectors are linked we have not progressed sufficiently far to report on that here. Rather, we wish to illustrate major similarities and differences across several subsectors, to examine specifically how alternative vertical coordination mechanisms are used across subsectors and why they are used in different situations, and develop some hypotheses regarding causal relationships for further testing.

Subsector Structure -- Similarities and Differences

It is obvious from the presentations today that each subsector has unique characteristics which influence the vertical production-distribution system but there are also common elements which effect all commodity subsectors. We have attempted to illustrate common and unique elements through the development of a set of charts in the appendix. Those charts illustrate the system stages for beef, dairy, broilers, eggs, processed sweet corn--snapbeans--green peas, tart cherries and citrus. Further, the charts outline major structural changes, major modes of coordination, major attributes of performance and key environmental and endogenous factors influencing change. A brief examination of the charts will make it clear that the comparison of subsectors is an extremely complex and difficult task.

Several common structural changes are apparent. Since 1950 in nearly all the subsectors' farm/firm size has increased and the degree of specialization has increased. This has been accompanied by increasing geographic specialization. The number of participants at the production stage of the subsectorshas generally been declining, coincident with a general decline in the number of market alternatives for producers in most subsectors. At the distribution stage there has also been a decline in the number of firms, with increasing concentration. In general the growth in average firm size and increase in concentration have been associated with technical change which has increased minimal optimal plant size. The effect of these technical changes on concentration have been bolstered by marketing economies available to larger firms associated with changes in transportation, advertising, market information and merchandising. Each subsector has also experienced some changes in the extent of participation of firms not formerly involved in the subsector. In general this investment in agricultural commodities by firms from other sectors of the economy has been limited at the production stage. In processing and distribution, conglomerate investment has been more significant but as yet is not the predominant mode in most of the subsectors reviewed.

Product differentiation has also changed importantly. In general raw commodities in each of these subsectors are sold as undifferentiated commodities. However in all of the subsectors at the processing and distribution stages there has been a general increase in attempts to differentiate products. In some cases this has meant the branding of products which were formerly sold as commodities. Perhaps of greater importance has been the continuing development of retailer brands as competitors for manufacturer brands. In some subsectors this has resulted in a structural distinction between those processors who control brands and those processors who produce retail-controlled "private label" products. Brand product differentiation

associated with advertising is often associated with some distinctive quality characteristics. This has generally meant that the development of branded products requires closer coordination between all stages of the production-distribution system than for non-branded products.

Each of the subsectors examined in the charts has some unique and noteworthy characteristics. The stages in the broiler subsector are closely coordinated due to the technical interdependencies among the stages, with firms exhibiting a very uniform configuration of vertically linked processes. Broilers have been subject to revolutionary technological changes which have resulted in a system which bears little resemblance to that which existed prior to 1950. Egg production and distribution has also experienced major technical change, but the system has not had the radical metamorphosis that occurred in broilers. It continues to be geographically dispersed with a combination of vertically integrated complexes as well as single stage firms. In addition grower cooperatives play a larger role in the egg subsector.

The dairy subsector is distinct in the predominance of collective rules through government pricing programs, marketing orders and producer cooperatives. The beef subsector is the most widely dispersed of the subsectors and continues to be the most fragmented and loosely coordinated of the subsectors. The beef subsector continues to exhibit relatively independent stages and a large number of firms at each stage. This structural configuration continues despite rapid technical change in feeding systems. There have been some recent dramatic shifts in the functional integration of the beef processing and distribution system, with rapid growth of slaughter-processor boxed beef systems, and the shifting of retailer beef processing into more centralized beef cutting and fabrication facilities.

The production-distribution system for processed peas, sweet corn and snapbeans has a long history of close coordination between production and

processing. This subsector clearly has strong national brand firms operating alongside private label processors.

The citrus and tart cherry subsectors are both marked by high fixed resource investments and short run supply variability which result in substantial risk. Weather conditions are particularly associated with yield and quality variations. The tart cherry industry appears particularly characteristic by the complete transformation of the commodity into other products for retail sales. Thus, the raw product demand is heavily influenced by the demand for several dessert products where cherries are a major ingredient.

Shifts in Coordination

The general trend toward increasing specialization has been accompanied by the development of different systems of coordination. In general a narrowing range of acceptable product standards has required improved communication between production stages. In addition the specialization of plants at different stages has generally increased the potential losses from quality, quantity, and price fluctuations for inputs or products. Technical economies of close interstage coordination have been a concomitant feature of technological developments. Thus, incentives for development of improved vertical coordination between stages have come from several sources. While we cannot as yet predict the ways in which coordination systems will change we can examine how and why several coordination mechanisms have been used across selected subsectors.

Vertical Coordination Mechanisms: Selected Similarities and Differences

Contract Coordination

An important change in many subsectors has been the increasing use of formal contract arrangements to specify multiple terms of trade.

Grower-processor production contracts -- While solid numbers on the share of output accounted for by production contracts are not available, these contracts are clearly important in processing vegetables, broilers, eggs, and citrus. In processed vegetables, production contracts specify quantity through acreage specifications, set price in advance of planting, and place the control of production in the hands of the processor. Growers provide labor, land and little else although they assume some production risk. Broiler production contracts are quite similar with growers providing labor, facilities and utilities while the processor provides feed, birds and other inputs. In general broiler contracts do not specify price but provide for a per unit payment for grower services with possible bonuses. Some egg production contracts are similar to those in broilers while some are profit sharing arrangements. In about two-thirds of the egg contracts, price is based on actual price received or the Urner-Barry report. In citrus there are some production contracts which specify acreage, though some have quantity limits. In general, returns to growers in citrus are based on participation plans with processors. Prices are thus based on prices received by processors after adjustment for negotiated processing and marketing fees. Although production contracts in beef are not currently numerous, the recently announced arrangement between IBP and Northwest Feeders may signal a change toward more production contracting.

While production contracts in each of the subsectors differ slightly, they appear to have been adopted for similar reasons. From the buyer point of view these contracts insure a relatively stable supply of commodities which meet rather strict quantity, quality, or timing specifications. Thus they allow buyers to strategically influence the production process without direct ownership. Growers in general assure themselves of a market outlet, and may receive some additional resources, or a more assured income

flow. The impact of such contracts on the overall coordination of sub-sector quantity produced appears to be minimal as long as a large number of processors operate without some form of horizontal coordination. Production contracts appear to be generally used in standardizing quality and stimulating more rapid change in production technology. Pricing efficiency with such arrangements may not differ significantly from spot markets, although several concerns are raised. Primary among these concerns is the generally limited public information about alternative contract terms. Even in situations where several processors are available to growers, the information barriers may limit effective competition, possibly leading to changes in relative producer-processor equity and price levels, which may or may not be consistent with the risks taken. Further increased use of contracts which establish prices through private negotiation continue to remove information and volume from other price discovery processes, raising concerns about "thin markets".

Formula-price contracts -- A second type of contract causing increasing concern especially with respect to pricing is the so called formula price contract. Some production contracts such as those described above for eggs fall into this category. However many formula price contracts do not embody production controls but rather specify terms of trade such as product specifications with price based on some fixed formula. In beef, carcasses and ground beef are commonly transferred with price to be established based on the "yellow sheet". In butter and cheese the Chicago Mercantile Exchange and the National Cheese Exchange are the primary pricing base for formula contracts. In eggs both the Urner-Barry report and U.S.D.A. market news report are used in pricing formulas. In broilers the U.S.D.A. market news price is used as a base in formula transactions.

In all the above cases the use of contracts with pricing formulas appear to be adopted for similar reasons. Such arrangements facilitate continuing buyer-seller relationships by specifying general terms of trade which will remain stable over time. They simplify the price negotiation process by reducing the necessity to bargain with each transaction and thus reducing transaction costs. Participants are assured that they will not be "out of line" with competitors and are thus not subject to the risk which fixed price contracts might contain. The implications of such contracts for coordination are unclear. While the contracts may facilitate interstage coordination and improve efficiency, they may not significantly impact overall resource allocation decisions in the subsector. However, formula pricing arrangements do reduce the share of output going through public pricing processes, which in turn effect the representativeness of the price base used in the contracts, and the ease of possible price distortion or manipulation.[4/] In addition the pricing efficiency of subsectors may be reduced where formula prices are based on "thin markets". These "thin market" problems appear to have become a frequent topic of concern in the beef, broiler, egg and dairy subsector.

Vertical Integration

It is not unusual for several vertically related production, product transformation, and distribution stages to be done by a single firm in these subsectors, yet the extent of vertical integration (as the term is commonly used) is limited (broilers may have been an exception). Of primary concern are changes in the nature of vertical integration which represent significant changes in traditional vertical combinations.

In dairy, tart cherries, beef, broilers and citrus several examples of forward and vertical integration are apparent. In the dairy industry vertical

integration through grower cooperatives has long been a part of the scene. However, the entry of fluid milk cooperatives into the manufacture of dry milk, butter and cheese has been relatively more recent. In large measure the entry into these processing operations have allowed dairy cooperatives to control alternative outlets for fluid milk and improved their ability to balance fluid milk supplies with demand. Ownership of manufacturing facilities gives the cooperatives the ability to operate plants as needed and assure an outlet for surplus fluid milk. In tart cherries the primary example of changing forward-vertical integration has been the expansion of some large growers into processing. This has been primarily the result of mechanical harvesting which requires that growers have rapid access to processing facilities. Through integration these growers assure an outlet for a highly perishable product. There has also been some fear that proposed mandatory bargaining will result in the exit of some current buyers. In beef the forward integration of slaughter firms into processing especially in the development of "boxed beef", has resulted from labor and transportation efficiencies. The integration of slaughter and processing have also facilitated improvements in storage and product differentiation. Feed companies assured market outlets by integrating into broiler production, though some disintegration has also taken place. In citrus, producer cooperatives were formed to serve processing and marketing functions. This provided more assured market outlets and, in the Sunkist situation, facilitated the development and marketing of differentiated products.

There are clearly several reasons why vertical integration has occurred. It appears however, that in all of these cases the desired control over the stage which was integrated could not have been accomplished without ownership.

Two notable examples of backward vertical integration occur in the dairy and beef subsector. In dairy large retailers have integrated the

processing of fluid milk and other dairy products. This move has occurred primarily as a result of profits to be gained in large scale processing and the gains possible through coordinating private label merchandising programs. In beef large retailers have developed centralized cutting and fabrication plants. In this case substantial processing efficiencies can be realized compared to "back room" cutting. Quality control and standardized products can also be tailored to retailer preferences. Retailers may be able to increase profitability as compared to purchasing boxed beef. In both the above cases profit opportunities and increased control encouraged the acquisition of an additional stage.

The examples of vertical integration both forward and backward given above are primarily a new ownership combination of adjacent stages with the impacts centered at those stages. There have been few if any attempts to integrate the entire production-distribution system. The broiler subsector, although a mixture of contract and ownership integration, remains the closest example to a vertically integrated system. Recent efforts of some broiler integrators to control merchandising through the development of branded products may represent a form of forward vertical integration which would place nearly all elements of control within individual companies. Coordination of quantities produced in the subsector would likely continue to be a problem as long as horizontal control is relatively dispersed.

Cooperative Bargaining

While cooperative bargaining may be thought of as a pricing device, it may facilitate coordination of production and marketing activities. Dairy, tart cherries and the processing vegetable subsectors all evidence substantial cooperative bargaining activity. In these three subsectors, grower bargaining associations have grown out of a perception of market

power inequities and the belief that returns were not proportional to the risks or responsibilities of growers. In dairy, bargaining cooperatives have long had a role in negotiating price levels, and more recently have also had major responsibility for balancing supplies of fluid milk among alternative uses. In processing vegetables bargaining has become important for specialized producers with limited market alternatives. In several cases bargaining has concerned several terms of trade including price and the allocation of risk. In tart cherries, producer bargaining with processors has grown out of perceived inequities and the desire to raise producer status above that of a residual claimant. Grower bargaining in Michigan has attempted to set a uniform grower price level and enhance grower prices.

The implications of grower bargaining for coordination are unclear. While the countervailing power sometimes achieved can reduce inequities, the natural tendency of grower bargaining associations is to maintain high output levels. There are few bargaining efforts where supply control has been successfully practiced. In part this occurs because (with the possible exception of dairy) bargaining associations are not sufficiently strong to impact on total subsector supply. In addition voluntary bargaining continues to suffer free rider problems which limits potential long term quantity control. On the positive side, bargaining may facilitate communication and the improvement and standardization of product quality, and contribute to technical efficiency in grower-processor transactions.

Government Programs

A variety of government programs may facilitate vertical coordination. Marketing orders are most specifically directed at improving market coordination. Price support programs may provide an element of risk reduction which substitutes for other risk shifting mechanisms commonly associated with vertical integration. Storage programs under either device

clearly attempt to coordinate supply and demand. Market news, statistical reporting, grades and standards, tax programs, and trade policies may also influence subsector coordination.

Marketing orders have been adopted in dairy, tart cherries, citrus, and eggs. In dairy marketing orders implement the classified pricing system for fluid milk, in some regions provide funds for generic promotion and at a state level may set prices at various levels in the system. In tart cherries, marketing orders facilitate storage in surplus production periods. In citrus, orders control quality and facilitate orderly product marketing within the marketing year. In eggs, marketing orders provide funds for advertising and promotion.

In nearly all the cases described above, marketing orders facilitate the stabilization of market supplies within or between crop years. In most cases, supply stabilization and allocation has raised short run average prices received by growers. Quality control and supply stabilization through marketing orders, have also facilitated market development programs. In the case of citrus and dairy, the marketing order programs have complemented coordination functions of cooperatives.

Dairy is the only subsector examined here in which price support programs directly impact on coordination. The floor prices for manufactured products set by these programs has stabilized returns to producers of manufactured products, and may have mitigated other actions which might have been taken to reduce price risk. In general the coordination impact of price supports appears to have encouraged an accumulation of surplus manufactured dairy products in government hands. Thus the program has probably prevented resource adjustments and made the system less sensitive to long run demand shifts. Both marketing orders and price support programs appear to be defensive mechanisms which increase price stability, enhance prices, but slow long run supply adjustments.

Market news, statistical reporting and grading services serve coordinating functions in all of the subsectors examined. All of these activities have facilitated communication within subsectors and have thus likely facilitated coordination. In all subsectors, some problems exist with these facilitating functions. In part these problems arise because of an inability for procedures to adjust promptly to changing activities within the subsector

Tentative Hypotheses

To this point our cross-subsector research has been largely descriptive. Thus, our work has primarily provided evidence for the formation of hypotheses rather than conclusions. Some of the hypotheses presented below will be familiar to any who are familiar with the literature on vertical coordination in agriculture. Others arise out of our attempt to look at complete production-distribution systems across several commodities. The following hypotheses are intended to be illustrated rather than exhaustive. We invite suggested modifications or additions.

(1) Producer collective action to coordinate production and marketing will occur under the following structural conditions:

a) Production of the commodity is highly geographically concentrated;

b) Producers are typically highly specialized or highly dependent on the commodity as their major income stream;

c) Limited flexibility of resource use in the short run typifies the farm production stage (Human Capital and Fixed Assets);

d) Growers face a limited number of alternative buyers for the raw commodity or there is threat of buyer exit;

e) The raw product is highly perishable; and

f) There are perceived inequities in risks, responsibilities, and returns between producers and buyers.

(2) Grower owned cooperatives will generally attempt to develop coordination mechanisms which limit the need for control of raw product supply. In general such mechanisms will be short run oriented and may exacerbate long run adjustment problems.

(3) High levels of coordination on product quality and timing between two stages of a subsector do not insure that overall subsector vertical and horizontal coordination will be achieved. Further in those cases where vertical coordination is high throughout the subsector horizontal coordination may not be achieved.

(4) Vertical coordination mechanisms currently in use in agricultural subsectors are short-run oriented, focused primarily on interaction between two stages, and sufficiently devoid of horizontal control to facilitate long run resource adjustments.

(5) Backward vertical integration will be used only when there is:

a) Unstable supply of product within desired specifications;

b) An inability to secure product through alternative sources;

c) An inordinate profit rate for suppliers;

d) A volatile price structure for inputs avoidable if the buyer runs the assets for self supply;

e) Compatibility of production operation and management with current enterprises, and

f) High technical complementarity between enterprises.

(6) Forward vertical integration will be used only when there is:

a) Unstable market outlets (price and availability);

b) An inability to effectively market products through currently available outlets;

c) An inordinate profit rate for buyers;

d) Compatibility of production operation and management with current enterprises; and

e) High technical complementarity between enterprises.

(7) Production contracts will occur where there is a need for close technical coordination between adjacent production stages which would be conducive to vertical integration except that:

a) Capital requirements, management constraints or limited returns discourage joint ownership of adjacent stages;

b) Risk of the joint enterprise would make ownership prohibitive for a single firm;

c) Legal restraints prevent joint ownership; and

d) Optimal plant sizes are incompatible at adjacent stages for combined ownership.

(8) Coordination between processors and retailers for unbranded products tends to be based on frequent contact with the evolution of standard working arrangements which may infrequently be specified through formal contracts. This is especially true for perishable products.

(9) Coordination between processors and retailers for branded products is controlled by the brand franchise holder. The access of brand franchise holders to a variety of merchandising strategies allows them to control product quality and influence product movement;

Corollary: Private label coordination is predominantly controlled by retailers through pricing and merchandising strategies. Private label processors only have the ability to influence price.

(10) Development of vertical coordination mechanisms which contain multiple product specifications may improve communication between stages but increase the complexity of collecting and disseminating information. As these mechanisms increase in importance the prices

reported for more standardized exchange terms such as those at terminal markets become less representative of trading. This contributes to the problem of "thin markets" and may add to incentive to develop alternative coordination mechanism.

(11) In markets where vertical integration, production contracts, and formula price contracts become predominant there is increasing price volatility, and greater potential for price distortion or manipulation in the residual spot market.

(12) In the presence of strong oligopsony at manufacturing or retailing and strong horizontal control by growers, intermediate growers will be squeezed. Thus growers may be forced to integrate into processing to maintain market outlets.

Footnotes

[1]This paper is intended as an interim report. As such the paper contains some statements which are educated guesses, some statements of opinion, and some statements of fact. The paper was prepared to complement the discussion during the symposium and was not reviewed by the subsector paper authors.

[2]See "Coordination and Exchange in Agricultural Subsectors", NC-117, Monograph No. 2, Research Division, College of Agricultural and Life Sciences, University of Wisconsin-Madison, January 1976.

[3]Individual subsector papers are completed or nearing completion for dairy, eggs, beef, citrus, tart cherries, peas-sweet corn-snapbeans, lettuce, and potatoes. In addition a paper on cross-subsector comparison will be prepared during the next year.

[4]See "Pricing Problems in the Food Industry (With Emphasis on Thin Markets)", NC-117, Monograph, Forthcoming.

APPENDIX

A Comparative Outline of Structure, Coordination and Performance in Selected Commodity Subsectors

This comparison is based on information provided by subsector research groups including:

Dairy

- H. Cook (WI)
- R. Jacobson (OH)
- L. Blakely (OK)
- R. Knutson (TX)
- R. Milligan (NY)
- R. Strain (FL)

Beef

- M. Hayenga (WI)
- C. Ward (OK)
- D. Henderson (OH)

Broilers and Eggs

- L. Schrader (IN)
- O. Forker (NY)
- H. Larzalere (MI)
- G. Rogers (ESCS)

Peas--Sweet Corn--Snapbeans

- G. Campbell (WI)
- A. Yuen (WI)
- L. Hamm (MI-ESCS)

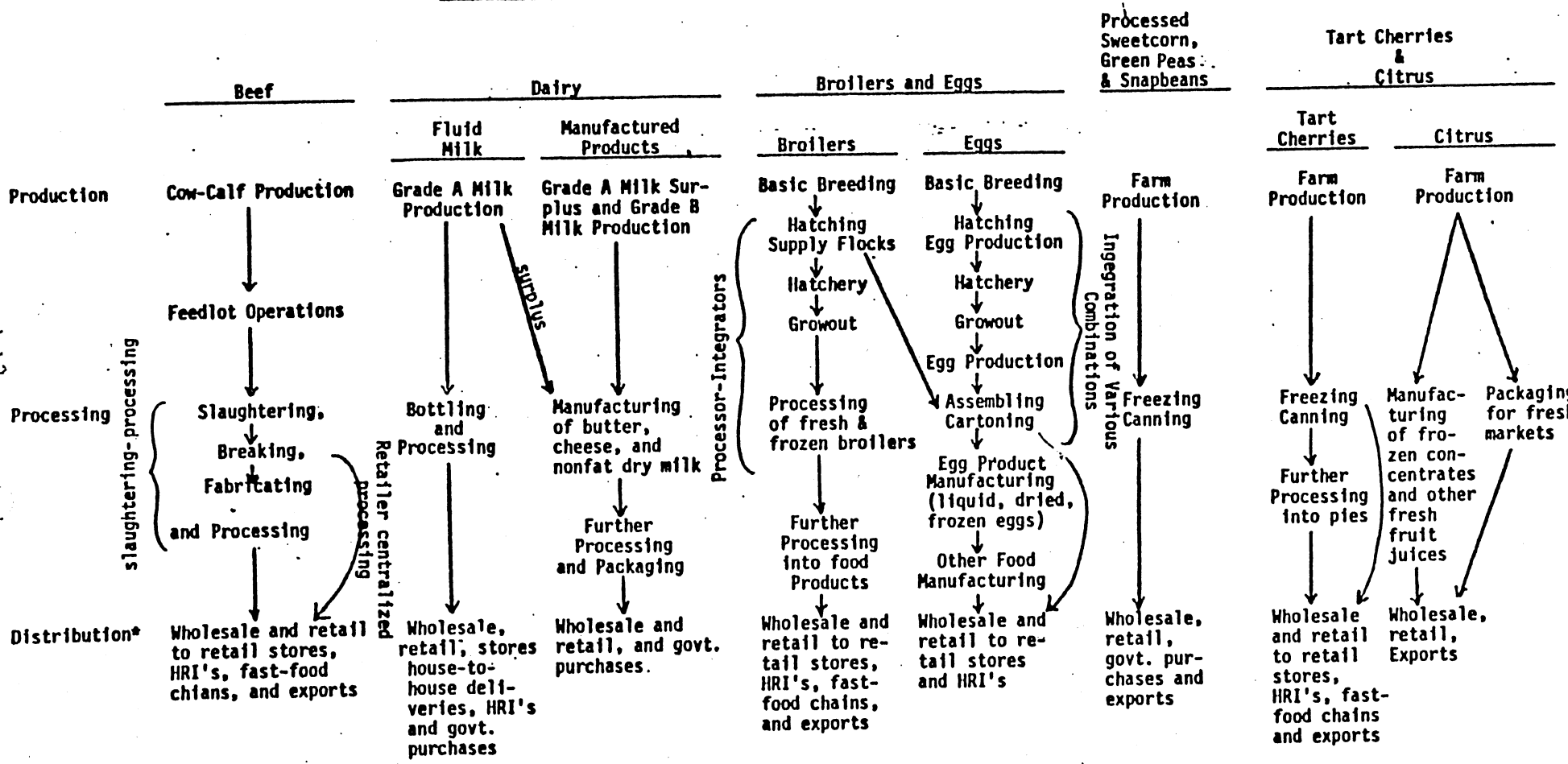
Tart Cherries

- D. Ricks (MI)
- L. Hamm (MI-ESCS)
- W. Chase-Landsdale (MI)

Citrus

- R. Ward (FL)
- R. Kilmer (FL)

Systemic Stages of Selected Commodity Subsectors



* (The wholesale-retail level may be considered as a single market level due to the existing high degree of integration. At this stage, these commodities become part of the total production mix offered to consumers. Product competitiveness at this level relates to distributors' merchandizing strategies.)

HRI's = Hotels, restaurants, and institutions..

Major Structural Changes in Selected Commodity Subsectors

dominant feature

	Beef	Dairy	Broiler and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Change in number and size of farms	Sharp decline in no. of small feedlots, and small processing plants, "old-line" packing plants, breakers, processors and fabricators.	Decline in no. of dairy farms, no. of processing plants, and no. of small processors.	Decine in nos. and and increase in size at all stages in broilers and eggs.	Sharp decline in no. small farmers and small, single-product processors.	Decrease in no. growers of tart cherries in all regions; more large growers.
- Change in number and size of processing and distributing firms (horizontal integration)	Concentration of commercial feedlots and slaughtering plants, e.g., Iowa beef, Missouri beef. Fed cattle marketings from commercial feedlots increased from 36.3% to 64.5% between 1962 and 1975.	Larger herd size esp. in the West Coast. Consolidation and federation of dairy cooperatives, decrease in no. of coops; expansion of processing plants and creameries, growth of medium-sized processors.	Significant increase in size of breeders and integrators: Multiple-plant and Multiple-State integrated firms for broilers and eggs; 40 broiler interators account for 2/3 of processing, consolidation through mergers and acquisitions of breeders and integrators in eggs. e.g., Cal-Maine.	Processing establishments with 100-499 employees have significantly increased; Yet with no. of processors fewer than growers; local oligopsony.	Tart cherries: more freezing plants because of increase in coop processing; increased concentration of manufacturing buyers for tart cherries; oligopolistic citrus processors in Florida; Sunkist dominates California.
- Shift in geographic locations of farms/firms	Cattle feeding and meat packing from Corn Belt to Great Plains States.	N.E., Great Lake States, and California remain leading states; declining production in Corn Belt; increasing production in the Pacific region; Wisconsin, leading state.	For eggs, from West-North Central, North Atlantic, East North Central to South Atlantic, South Central, and Pacific regions. For broilers some shifts in importance of various southern states, Arkansas now leading state.	From the East to the Midwest, and to the West.	Expansion of tart cherry production in New York, Utah and Michigan; citrus remains predominant in Florida, California, and Arizona, with bearing acreage in Arizona increasing.

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Grean Peas and Snap Beans	Tart Cherries and Citrus
- Growing geographic concentration of farms and processors	Commercial feedlots and "specialty" packing plants, in Texas, Nebraska, Ioa, Kansas, Colo-radio and California.	Regional differences in scale operations related to availabil-ity of alternative agricultural enter-prises; further con-solidation of fluid milk plants likely in Washington-Oregon area where above-average no. of plants exists.	Increasing density of production in both broilers and eggs in South Atlantic and South Central regions.	Freezing plants in the West; canning in Midwest and in the East.	95% of tart cher-ries production in Michigan, New York, Wisconsin, and Pennsylvania. Citrus in Florida, Texas, California, and Arizona Florida supplies 98% of frozen concentrate and other orange juice.
- Greater specialization in production/ processing	Commercial feedlots slaughtering-proce-ssing plants for boxed beef.	72% of butter produced in specialized butter and milk powder plants; 73% of cheese in specialized cheese plants; fluid milk processing plants make a variety of fluid dairy products.	At all levels for broiler production; e.g., Holly Farms and Swift and Co.	Processing plants in the West specialize in vegetable-freezing, though specialization is not commodity-oriented.	Generally, grower grow a few kinds of fruit trees aside from tart cherries; multi-product proc-essing plants; diversified food manufacturing firms.
- Extent of non-farm involvement in production; vertical integration	Proprietary cow/calf farms still dominant; Cargill, a feed manu-facturing firm, inte-grated into cattle feeding; small amount of packer integration into feedlot operations except forward inte-gration into slaught-ering by Monfort; some cooperative involvement in beef slaughtering.	Many family dairy farms remain in the Lake States; extensive coop-erative marketing; large retail chains process fluid milk.	Backward integration into production by integrators in broil-ers; forward integra-tion by producers and input-supply firms into egg production.	Backward integration into production by processors; forward integration by pro-cessors into can manu-facturing.	For tart cherries; little non-farm ownership of cherry orchards; producer coops into processing, remanufacturer firms into freez-ing; large coop-erative marketing for citrus, e.g., Sunkist and Flor-ida and growers Association; also can and bottle manufacturing by processors.

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Product differentiation	Many more differentiated boxed beef primal and subprimal cuts at wholesale level than in carcass distribution system; product differentiation significant in HRI's outlets.	Marked increase in variety of fluid milk, processed cheeses, and cultured products available at retail level; significant proportions of sales in private-label products.	Significant increase in differentiated processing of broilers with some branding-Perdue, Holly Farms, etc.; increased processor branding of eggs.	"Dressed up" vegetables including combinations with special sauces, "boil-n-bag", etc.	Tart cherries: Raw product largely undifferentiated; strong brand differentiation for frozen cherries, pie fillings, and pies; private labels and weak packer brands for canned cherries; citrus for fresh markets; private labels and brand names for processed fruit juices.
- Conglomeration/diversification	Many meat packers are more part of conglomerates; e.g., Armour by Greyhound, Cudahy by General Host, John Morrell by United Brands, Swift by Esmark, Wilson by LTV.	National dairy companies heavily conglomerated, e.g., Borden.	Conglomerates entered, then left, broiler and egg production due to cyclical earnings.	Diversification by processing coops and processing plants; e.g., Tri-Valley growers purchased S&W Fine Foods, and Green Giant into restaurant operations in U.S. and Canada.	Few and declining tart cherry plants owned by conglomerate food manufacturing firms.
- Expansion of markets	Rapid growth in beef used by fast-food chains and other HRI outlets featuring beef, e.g., McDonald's Burger King, etc.	Growing markets for processed products such as cheese, yogurt, and cottage cheese; butter and whole milk markets have declined.	Expanding domestic and foreign markets for broilers; egg consumption continues to decline.	Market growth for frozen products, declining for canned.	Growth in institutional manufacturing and exports markets for citrus, e.g., grapefruit to Japan; domestic market for tart cherries.

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	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Sectoral interdependence	Cattle feeding and grain production	Dairy cattle culling and beef production.	Level of production of broilers highly responsive to price and availability of red meat.	Interdependence with grain and other vegetable crops.	Interdependence with other fruits.

Major Modes of Coordination in Selected Commodity Subsectors

dominant feature	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Change in importance of spot markets (at production and processing levels)	Sharp decline in the use of terminal and auction markets for fed cattle, feeder cattle auctions are quite important.	Insignificant volume in spot markets, except pricing is dominated by National Cheese Exchange and Chicago Mercantile Exchange butter spot markets.	Thinly-traded spot markets, except for iced-packed, ready-to-cook broilers.	Insignificant spot markets. Some inter-processor transactions.	Increasing cooperative sales and less spot markets for tart cherries. Small proportional volume traded through metropolitan terminal markets for fresh citrus; or direct marketing for citrus (roadside stands, etc.).
- Importance of other institutional mechanisms of coordination					
. Production and Marketing Contracts	Market specification contracts between large cow/calf producers and feedlot operators for feeder cattle; extent not documented; also contract between Northwest Feeders and IBP.	Between producers and cooperatives at country points; between cooperatives and handlers: hauling contracts, stand-by pool arrangements; also contracts between processing and retailers for private label milk.	Resource-providing contracts; in 1977, 98% of the nation's broilers and 80% of eggs produced under contracting and ownership integration, of which about 10% for broilers, 37% for eggs produced under ownership integration.	Production-management contracts between growers and processors; currently about 99% of farm production is contracted.	Tart cherries: between growers in processing coops.
. Ownership Integration	Limited, at feeding and slaughtering levels, also retail chains into slaughtering.	Cooperatives into processing and marketing, e.g., Land O'Lakes; retail chains into private-label fluid milk processing.		About 1-15%, varies slightly among the three crops.	Tart cherries: grower-owned processing facilities; small amount of processor-owned farms.

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Ownership Integration (continued)	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
. Cooperative associations	Insignificant to date.	Preeminent in fluid milk, butter, dry milk and cheese sales.	Marketing cooperatives handled large proportion of the eggs sold; National Broiler Marketing Association provided market information to members.	Bargaining coops in Washington, Idaho, and California, marketing cooperatives; e.g., California Canners and Growers; Tri-Valley Growers.	Citrus: grower-packers: cooperative processing and marketing. Moderate bargaining coops and increasing coop processing for tart cherries; Sunkist Growers, Inc. controlled 77% of the California-Arizona citrus production in 1972-1973; approximately 80% of citrus move from producer to processors through coops; also trade associations for citrus.
. Corporate/cooperative joint ventures and partnerships.		Of minor importance; e.g.; Kraftco and 6 cheese factories; Knudson and food chains in California.		Limited but increasing e.g., Agway-Curtis-Burns-Pro-Fac; Del Monte co-packs with coops in California; Stokley Van Camp contracts with coop for new products.	Some tart cherry processing; Florida Orange Marketers and Minute Maid in citrus; also participation plan in citrus.
. Futures markets	Chicago Mercantile Exchange for fed cattle. Kansas City futures market for feeder cattle.	Chicago and New York Mercantile Exchanges for butter; small trading volume.	Chicago Board of Trade for iced broilers, Chicago Mercantile Exchange for fresh eggs; thin volume trading.	---	Citrus: New York Cotton Exchange for frozen orange concentrate; used predominantly by processors in junction with storage program.

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
. Exclusive franchises	Very important at HRI level, esp. fast food chains.	---	Very important for broilers, at HRI level, esp. fast food chains.	---	---
. Electronic markets	Insignificant, e.g., Virginia Tel-O-Auction for feeder and slaughter cattle.	---	Though thinly traded, Egg Clearninghouse Inc. affects egg pricing.	---	---
- Government intervention and programs					
. Price and income support programs	---	Price support and storage programs for butter, nonfat powder, and cheese; purchases by Commodity Credit Corporation at specified support price, which is currently maintained between 80-90% of parity.	---	---	---
. Tax concessions	Increased importance in cow/calf and feedlot operations stimulated by limited partnerships, tax savings through income deferrals; yet advantages reduced by Income Tax Reform Act of 1976.	---	Cash accounting provisions of IRS may stimulate capital investments in egg production.	---	Investment credit applies to orchards.
. Marketing orders	---	Federal and state orders which establish and enforce classified pricing of milk according to its final use; Minnesota-Wisconsin price series is the base.	State marketing orders for promotion purposes; mandatory national check-off for egg promotion and federal order for research.	---	Tart cherries: State marketing orders for promotion purposes; federal marketing order storage programs for

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
Marketing orders (continued)					stabilization of supply; federal market orders and state agencies for proration of citrus marketings.
. U.S. Government grades	"Prime," "Choice;" "Good," "Standard," and "commercial grades"; very important; however, beef available at retail stores is mostly "choice".	Grade A and Grade B milk; grades AA, A, B for butter and cheddar cheese; important at producer and processor levels.	Grade A, B and C for broilers (and other poultry); grades AA, A, and B for eggs; moderately important for eggs; not important for broilers.	Grade A (Fancy), Grade B (choice or Extra Standard), and Grade C (Standard) for canned, frozen, and dried products; U.S. Fancy, U.S. No. 1, and U.S. No. 2 for fresh produce; of moderate importance.	
. Market news and information		U.S.D.A. Market News, etc.	(Urner-Barry is dominant in eggs; U.S.-D.A. Market News is important in broilers.	---	---
. Trade policies	Meat Import Law (1964)	Import quotas.	---	---	---
- Pricing mechanisms	"Yellow sheet" formula pricing; private treaty; "offer acceptance".	State marketing orders, private negotiations; formula price for butter and cheese.	Eggs: formula pricing based on Urner-Barry quotations and U.S.D.A. Market News (West Coast); Egg Clearinghouse Inc.	Price leadership of dominant processors; private negotiation.	Tart cherries: Private negotiations between processors and manufacturers; influenced by market power of food manufacturers; Citrus: private negotiations.
	Wide use of "yellow sheet" as price base in most wholesale transactions; yet	Butter prices resulting from thin volume trading at the New York and	Broilers: thin to non-existing trading in intermediate producing stages due to vertical	No organized pricing markets at any level.	Tart-cherries With the increase in coop processing and owner-inte-

Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
"yellow sheet" prices based on insignificant volumes transacted; terminal markets are declining in importance for live cattle.	Chicago Mercantile Exchanges are widely used in sales between factories and primary receivers.	integration; significant formula-pricing.		gration processing grower raw produce prices increasingly based on thinner markets.

Major Attributes of Performance in Selected Commodity Subsectors

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Growth in output and productivity?	Labor productivity gain esp. at feeding (commercial feedlots) slaughtering, processing, and distribution levels (boxed beef, etc.).	New production and processing technologies with resulting efficiency; production per cow, per farm, and per worker has increased rapidly.	Total production of eggs has changed little for the past three decades, but greater no. of eggs per layer; significant increase in total broiler production; increased labor productivity due to use of new equipment and mechanization; direct marketing has led to efficiency.	Overall increase in total production; share of total processed vegetable production remains stable; production yield increasing for snap beans, stable for sweet corn, declining for green peas.	Tart Cherries: fluctuating supplies cause high risks and curtail long-run development of tart cherry production. Citrus: increasing yields.
- Progressiveness (product innovations and product improvements)?	Some modest improvements in the lean-fat ratio for fed cattle; new processing and packaging methods, assembly line; boxed beef, hamburger patties, and portion-control processing procedures.	Improvements in quality of milk (lower bacteria count). Innovations in packaging; and coordinated promotion programs, increased reliance on retail stores for distribution, elimination of inefficient door-to-door delivery.	Much shorter production period and more favorable feed conversion ratio; reduced labor requirements; better environmental control and reduced mortality rates; cut-up broilers and fast-food carry-out chickens have stimulated overall demand.	Quality of products improved but with few product innovations.	Some but limited new cherry products developed; improved product quality for citrus and cherries through standardization and quality control; use of electronic sorters and new pitters.
- Cost effectiveness?	Scale economies of scale achieved through large feedlots and slaughtering plants though underutilization of capacity in feedlots and meat packing plants is not uncommon; direct sales	Improved feed conversion ratio; large economies of scale realized in fluid milk processing and manufacturing of butter and cheese.	Significant cost reduction and efficiency gains due mainly to technological innovations, fuller utilization of capacity, and vertical integration benefits passed on to consumers in forms of lower prices.	Physical efficiency gains offset by rising costs of containers, fuel, and labor.	Tart cherries: Growers quite cost effective, esp. mechanical harvesting; freezer processors (esp. grower-processors) quite cost effective.

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
Cost effectiveness? (continued)	at various levels reduce procurement and distribution costs.				low overhead with efficient vertical integration; though underutilization of facilities associated with instability of supply may lead to high overhead costs at times; Citrus: Centralized selling contributes to distribution efficiency.
- Stability of production?	Cattle boom-bust cycle of 10-12 years duration, related to biological constraints and producers' decisions based on expectations.	Govt. price support and marketing orders ensure adequate supply of fluid milk; stability also maintained by coop marketing through farm quality control, intermarket transfer, and surplus management.	Though production of broilers and eggs is relatively stable, price swings are still severe, esp. for eggs.	Production cycle of 4-7 years, related to weather and processors' decisions based on inventory levels.	Short-run inelastic supply; wide annual fluctuations of tart cherries and citrus production supply manageable only through storage and inventory programs.
- Level and stability of prices?	Unstable; price variations greatest for calves, followed by feeder cattle, and slaughter cattle.	Short-run variations directly related to seasonal production; long-run upward trend reflecting effects of inflation and ensured by price support.		Prices at farm level vary widely with alternative crop prices and current inventories; wholesale-retail prices vary with costs, carryovers, and current production; national brands higher than private labels.	Wide price fluctuations corresponding to supply variation; For citrus, prices higher for differentiated branded products; e.g., Minute Maid.

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Competitiveness of markets?	Market dominated by large commercial feedlots, integrated slaughtering plants, and conglomerated firms, small producers and processors are disadvantaged.	Dept. of Justice alleged that through full supply contracts, vertical integration, pool loading, restrictions on milk movement reblending, block voting, etc., coops achieve inordinate control of market.	Generally competitive; profits low to moderate; Dept. of Justice alleged that NBHA has violated antitrust regulations.	Local/regional oligopsony on the buyer side at the production level, (i.e., oligopsonistic processor-buyers); competitive national markets for canned and frozen products; barrier to entry low; oligopsonistic private-label procurement by retail chains.	Bargaining associations provide grower oligopoly versus weak oligopsonistic processors; freezer processors highly competitive and increasing in number; at the processing level, market power lies with some food manufacturing buyers; product differentiation is insignificant at the processor level. Citrus: Florida citrus processors oligopolistic California dominated by Sunkist Growers; product differentiation through advertising.
- Adequate information flows?	Inadequate for small producers; also alleged inaccurate price reporting in "yellow sheet".	Generally adequate; information furnished by federal and state market orders; Bureau of Labor Statistics; USDA, and others; less information available to small country plants.	Imperfect communication about contract terms and basis of grower payments; growth of formula pricing has significantly reduced available price information.	Inadequate at the farm level esp. to small isolated growers complicated contract terms; information on contracts generally available after the transactions are made.	Tart cherries: Pricing information for growers improved with bargaining coops; lack of information flow on consumer demand between "non-commodity-oriented food manufacturers

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
Adequate information flows? (continued)					and processors, or between processors and producers. Citrus: Adequate information on production, cost of production and processing, and price available to growers and processors.
	(Extensive market information is essential for equitable distribution)				
- Level and stability of returns/ equitable distribution of responsibilities, risks, and returns?	Inadequate information and inaccurate pricing put small producers at a great disadvantage; returns to cow/calf production and cattle feeding are sporadic and cyclical, accentuated at the cow/calf level; yet over the long-run, cattle feeding has been a profitable enterprise; low rates of returns to meat packing due to underutilization of plant capacity.	Producers benefit in income from cooperative marketing; returns stable and adequate; pooling reduces inequities among dairy farmers federal purchasing programs improve producer income; yet benefits may be regressive due to "per unit basis", large producers benefit more; equity problems among members and non-members of cooperatives; returns to bottlers generally low; generally stable margins for manufacturers, partly assured by the government.	Returns low to moderate; and cyclical for both broilers and eggs; returns typically correspond to risk taken; in the short run, integrators absorb risk in broilers, more risk sharing in egg contracts; yet in the long run, use of quoted price for income allocation is a source of conflict between egg producers and contractors; integrators typically fare better than contract growers for broilers; distributors usually fare better than producers-processors.	Growers as price-takers passed acreage; market power of retail chains on processors through procurement of private labels; processors bear inventory risk; generally low returns to processors except differentiated products.	Tart cherries: Growers bear all orchard investment risk; co-op growers bearing more and more of pricing, marketing, and processing risks; prices and net returns for growers highly unstable; presently, some processors pay cash price at harvest before final sales of product, may bear risk in the short-run; yet in the long-run passed to growers whose returns average 4-5% ROI, market power with

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
Level and stability of returns/ equitable distribution of responsibilities, risks, and returns? (cont'd).					oligopsonistic remanufacturer buyers, information on profitability at the processing and remanufacturing not available. Citrus: Variable grower returns due to fluctuations in supply; income distribution among growers in generally equitable due to participation plan.
- Adequate consumer protection? (consumer concerns)	Inadequate grading standards to reflect quality; growth stimulants and feed additives; mechanically deboned products.	Open dating of fresh products; choesterol controversy over eggs and milk fat.		Need nutritional labeling; drained weight vs. filling weight.	Tart Cherries: Some blemished cherries sold in market, fewer than years ago.
- Flexibility?	Quite inflexible; not many alternative uses for feeding and processing facilities, evidenced by no. of bankrupt firms.	Trend toward specialization decreases flexibility and increases risk.	Fixed and specialized facilities for broilers and eggs; limited transferability.	Biological and physical compatibilities among the three crops promote flexibility in growing, processing and marketing arrangements.	Highly inflexible orchard investments; somewhat more flexible processing plants; multi-product processing plants reduce risk associated with supply fluctuations.

Major Environmental Forces Influencing Change

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Technological innovations (mechanical, engineering, and biological)	New and improved slaughtering, breaking, and fabricating techniques.	Refrigerated bulk tank; spray dryers; mechanical milking machines; pipe-line milkers; pasteurization, and other processing and packaging innovations.	Significant breeding and feeding techniques, handling and housing facilities.	Mechanical planting and harvesting; canning, freezing, and drying techniques.	Mechanical harvesting for tart cherries; electronic sorting and new pitters processing techniques for frozen cherries and fruit juices and concentrates; research related to decay prevention, pesticides, and crop forecasting.
- Government programs and regulations	Packers and Stockyard Administration Act (1974); Wholesale Meat Act (1967).	Capper-Volstead Act for cooperative exemptions from antitrust laws; Agricultural Marketing Agreement (1937) to establish minimum prices; government price supports; FTC antitrust policy encourages growth of medium-sized dairy firms, but divestments of large dairy companies.	NBMA incorporated under Cooperative Marketing Act of Georgia; U.S. Supreme Court denies Antitrust exemption for NBMA; disappearance of small processing plants related to Poultry Products Inspection Acts (1957) and Wholesale Poultry Product Act (1968).	EPA and OSHA regulations drove out small processing establishments; increased minimal optimal plant size; Capper-Volstead Act for coop organizations; Michigan Agricultural Marketing and Bargaining Act for exemptions of processing coops.	
- Influx of capital (based on profitable farming enterprises, land appreciation, tax savings)	Tax shelters for professionals, feeding clubs, limited partnerships, (extent now limited by the 1976 Tax Reform Act); capital from grain companies.	Not as tax shelter by nonagricultural interests; producer-entrepreneurs.	Mostly internally-generated capital for production; feed companies provided short-term working capital and built processing plants.	---	High risk associated with unstable tart cherry supply deter inflows of non-farm capital.

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Growth of retail chains	Centralized breaking and fabricating facilities of retail chains e.g., Kroger, A&P, Safeway, and others.	Increase in private-label milk processed by retail chains; growth of retail chains as distribution outlets.	Retail chains "specialing" strategy; and private label eggs give retailers a large share of retail sales of broilers and eggs.	Market power of retail chains over processors of private-labels vs. national brands.	Citrus: buying power of retail chains; private labels vs. national brands. Tart Cherries: large manufacturers have effective consumer access through retail chains; commodity processors much less so.
	(Generally has affected changes in vertical linkages)				
- Change in consumer preferences	Increase in per capital consumption more than 50% in the past 20 years; meals away from home now about 1/3 of total food expenditure.	Decline in use of butter fat and cream; increase in cheese; cholesterol concerns.	Increase in per capital consumption of broilers from 0.5 lb in 1934 to 40.4 lbs in 1976; declining for eggs from 365 in 1957 to 276 in 1976, related to the fat-cholesterol controversy and decline in breakfast as a family meal situation; inelastic demand for eggs.	Increasing demand for beans, stable for corn, declining for peas.	Switch from retail canned cherries to cherry pie filling and pies; expanding market demand for citrus.
- Interregional competition (locational comparative advantages)	Surplus grain in Great Plains states (in particular, Texas) encouraging cattle feeding and slaughtering in that region; lower wages in the South.	(climate, soil, pasture, and transportation cost advantages are particularly responsible for the geographical concentration/shift of production/processing areas).			Favors Michigan for tart-cherries.

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Development of new and improved substitutes	Pork and poultry.	Imitation milk; margarine; vegetable fat as substitutes for milk fat.	Minor importance; egg substitutes, e.g., Egg Beaters, a partial egg substitute.	Not a problem; presently cheap in comparison to other fresh or processed vegetables.	Several substitutes for tart cherries e.g., apples, blue berries, peaches and strawberries; also fluffy desserts; substitutes not a threat to citrus production.
- Weather	Direct effect on feed conversion ratio, death rate, etc., indirect effect by influencing grain production.		Effect diminished with light- and temperature-controlled housing.	Affects planting, pesticide spraying, harvesting and processing operatios, and quantity product quality.	Spring frosts greatly affects tart cherries production; freeze loss for citrus production.
- Availability of feed, labor	Grain supply affects overall production, price and profits; labor affects operating processes and costs of production.		Grain supplies influencing profit levels.	Availability of farm workers and production, workers of processing plants affects production, harvesting, and processing schedules.	Mechanical harvesting has greatly reduced the risk of labor shortage.
- Improvements in infrastructure (transportation, communication, etc.)	Partly influence location of slaughtering plants near commercial feedlots and the shift of processing and packaging functions back to slaughtering plants.	Allow expansion of fluid milk markets, from local to regional.	Allow regional specialization; improve transport and handling processes.	Instrumental in developing frozen-vegetable processing in the Northwestern states, and frozen-orange-juice processing in Florida.	

Key Endogenous Factors Influencing Change

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Technological/Biological Factors					
. Perishability	Inhibits storage and encourages the boxed beef system.	Requires federal and state regulations to ensure healthful supply.	(Speedy handling and shortened market channels minimize problems related to perishability)	Requires close coordination between growers and processors; encourages production contracts.	Encourages on-farm processing of tart cherries.
. Existance of economies of size	Encourages formation of large feedlots and specialty packing plants.	Fosters specialization of processing operations and formation of large processing plants.	Induces horizontal integration of breeders and integrators; fewer and larger processing plants; an incentive for vertical integration and to utilize total plant capacity.	Scale economies at processing level, yet extended limited by procurement costs and quality deterioration related to distance.	Tart cherries: Increasing for cherry growers; larger for canneries than freezers.
. Technological interdependance among subsector functions	Insignificant.	Perishability requires very close coordination of stages in all phases of production, processing, and distribution.	Significant in terms of genetic characteristics of birds relative to product quality and feed conversion; stimulates vertical integration to realize economies of scale and to apply technological innovations.	Varietal selection and production timing is crucial to the end-product quality.	Tart cherries: mechanical harvesting and processing interdependent.
. Biological constraints	Partly responsible for the boom-bust cattle cycle.	Long lag for increasing total population of dairy cows.	Short production cycle allows flexibility in expansion and contraction of production.	Seasonal production partially responsible for cyclical production patterns.	Result in show changes in bearing acreage over time; fluctuations in supply in alternating years.

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	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
- Management motivations					
. Risk avoidance	Induced the establishment of futures market as a mechanism to shift risk.	Reason for government price supports which minimize producer risk; highest level of risk in subsector is product loss through quality deterioration.	Original impetus on broiler contracting was for producers to transfer price risk to integrators, and acquire capital for production facilities.	Makes contracting attractive; ensures market outlets for growers, allows control by processors on quality, quantity and timing of delivery; encourages diversification by processing firms.	Provides incentives for formation of bargaining and processing coops to reduce risk in price discovery process. Conducive to multi-crop and multi-product operations avoids risk from freeze loss and price change leading to non-price arrangements to share risk; federal market orders to stabilize supply; joint ventures to reduce risk; and storage programs to improve inventory management.
. Rates of return	Profitability of cattle feeding prior to 1972 encouraged influx of capital; loss in 1973-1975 saw outflow of capital.		Profitability in early years encouraged expansion and attracted entrants; yet variability of returns led to exit of public companies for both broilers and egg production and processing.	Low rates of returns discourage entrants and product development for canned vegetables and tart cherries.	
. Imbalance of market power	Will encourage growth of producer cooperatives in the future.	Reason for fast growth of large cooperatives; retail chains are quite powerful.	Responsible for formation of United Egg Producers and National Broiler Marketing Association; retailers have greatest market power.		

	Beef	Dairy	Broilers and Eggs	Processed Sweet Corn, Green Peas and Snap Beans	Tart Cherries and Citrus
. Desire for market power		Induces consolidation of cooperatives.	Market-share goals of integrators may inhibit production cutbacks in periods of low return.		
. Conflicts among participants	To a limited extent, induce backward integration by processing firms into cattle-feeding to ensure long-run stability; encourage contracting between feedlot operators and processors, e.g., between Northwest feeders and IBP; also arrangements between McDonald's and Keystore, and the latter with Cattle Development Corp. and MBPXL.	Work toward consolidation and federation of cooperatives.	Ongoing conflicts between contract-growers and integrators, and those between integrators and retailers may lead to future changes.		
. Provision of financing resources	Promotes custom-feeding.		Encourages contracting between growers and integrators.	Fosters corporate-cooperative joint ventures.	
. Minimization of marketing and distribution costs	Promotes direct marketing at feedlot level and facilitates centralized processing and fabrication by retail chains to reduce labor costs for cutting in individual stores to realize higher returns.		Induced shortening of market channels for eggs and broilers, made production and consumption relatively more attractive.		