



The Industrial Reorganization of U.S. Agriculture

An Overview & Background Report

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Preface

The Henry A. Wallace Institute for Alternative Agriculture is conducting a study of structural change in the agricultural sector of the United States. Increasingly, agricultural production in the U.S. is characterized by fewer farms and farmers, increases in average farm size, contract production in place of open markets, corporate ownership

of production operations, and the involvement of multinational firms. These structural changes are often referred to as the industrialization of agriculture.

The report results from the first part of a larger study on the reorganization of U.S. agriculture along industrial lines and how that reorganization affects elements of sustainability. It provides synthesized background information to policy makers and other interested parties on a set of prominent issues and debates within agriculture. To that end, a number of perspectives are presented on why agriculture is industrializing and what industrialization might mean for the future of American agriculture. Unlike other overviews of the phenomenon, most of which characterize industrialization from the perspective of a single professional discipline, a particular set of actors, or a fixed ideology, this report draws from the literature in law, sociology, economics and political science. It purposefully presents and takes into account different viewpoints, and attempts, as a consequence, to illustrate areas for future inquiry.

This report also includes the results of a series of four focus group interviews. The focus groups consisted of farmers, rural community leaders, food processors, environmental group representatives, farm labor representatives, and farm input suppliers and other stakeholders in the structure and sustainability of American agriculture. These people, who are in the midst of agricultural industrialization and its consequences, proved to be an exceptionally rich source of insightful commentary, useful research direction, and innovative policy needs.

1) Introduction

The structure of agriculture affects every aspect of the sector's performance. The production, distribution and price of food and fiber, the welfare of producers and consumers, agriculture's relationship to rural and global economies and the fundamental sustainability of the system are all influenced and shaped by structure. By the structure of agriculture, economists, sociologists and other analysts mean how agriculture is organized as a sector of the overall economy. To conclude something about the structure of agriculture an observer may ask a number of questions. How many farms are there? What is the average farm size? What are the characteristics and size of the agricultural work force? What are the major commodities? Where are particular agricultural products raised and sold; and under what arrangements? How is technology used in production and processing? And what is the role of the government in agriculture?

But the structure of agriculture is only pertinent if one takes into account the meanings it holds for those people participating in agriculture. Former Secretary of Agriculture Bob Bergland writes in his well known report, *A Time to Choose: Summary Report on the Structure of Agriculture* (1981), that policy makers too often concentrate their attention on "the big numbers" that help to describe the structure of agriculture. He intended his report as a "closer look at what is going on behind the totals and averages, where individual persons are living their daily lives under the influence of all those larger forces (pg. 7)."

Following the spirit of Secretary Bergland's report, this report presents an overview of dominant structural trends in U.S. agriculture. These trends are often referred to as the industrialization of U.S. agriculture. Primary statistics are provided, but I also present the interpretations of analysts, as well as those of participants in the agricultural economy, of those trends. That is, what do these changes mean for individuals within, and dependent on, the U.S. agricultural system?

To accomplish this, I first define agricultural industrialization. Then I compare and contrast several explanations of why agriculture is industrializing. Following this, I present a number of analysts' observations on the consequences of agricultural industrialization. To gather more information on the varied meanings of structural change for individual stakeholders, the results of four focus group interviews with a diverse set of stakeholders within the U.S. agricultural economy are then provided and discussed. The interview results include observations, concerns, emergent hypotheses, and policy suggestions in the face of an industrializing agriculture.

2) What is Agricultural Industrialization?

Industrialization is a term that has been applied to the historical development of agricultural production in the United States, and elsewhere, for a long time. Industrialization has traditionally referred to the process whereby agricultural production has become less of a subsistence activity and more of a commercial activity. Dairy production was said to begin to industrialize in the Northeastern United States, during the middle to late 1800s, when it moved away from self-provisioning, or farm household income augmentation, and toward specialization and commercialization (Pirtle, 1926; Selitzer, 1976). This process accelerated with the introduction of numerous industrially produced technologies aimed at boosting production (Breimeyer, 1962; Selitzer, 1976).

The literature within agricultural economics and the sociology of agriculture uses a number of indicators to reference the structural changes in agriculture and how those changes have moved the agricultural sector toward a more industrialized state. For example, Go win and Jones (1971) and Lyson and Geisler (1992) point to the drive to replace labor with capital, increasing size of the operation and the increasing use of managerial and cost accounting on the farm as indications of the rise of mass production strategies in agriculture. Other analysts emphasize the decrease in the number of owner-managers of farms and the increase in wage labor jobs (Mann and Dickinson, 1978), the specialization and routinization of tasks on the farm (Gilbert and Akor, 1988), and state sponsored increases in the capitalization of agriculture (Mooney, 1988). Still others point to the relative use of chemical fertilizers and pesticides to enable large scale, highly specialized production, as a symbol of an industrializing farm sector (Goodman, Sorj and Wilkinson, 1987).

Although these insights into industrialization are still relevant, structural changes in agriculture have pushed the current discourse around industrialization to center on the causes and consequences of an increase in coordination, concentration, and in some cases, globalization of agricultural production (Urban, 1991; Council on Food, Agriculture and Resource Economics, 1994). Coordination refers both to the integrated ownership of steps in the food system, such as production and processing, and the upsurge in contract production in agriculture (Table 1). Concentration refers to increasing average size and decrease in numbers of farms and other agribusiness firms (Box A; Table 2). And globalization means coordination and concentration on a global scale (Table 3; Figure 1).

Coordination is not new to agriculture. For example, small scale livestock producers vertically integrate if they grow their own feed. In addition, many livestock producers in the Midwest have historically been tied to buyers through purchasing contracts. However, current developments in the livestock industry can be distinguished from previous forms of coordination by the increasing concentration of the industries. For instance, a few very large firms process most of the pork produced (Box B). This market concentration potentially changes the nature of contract production such that buyers can gain more control over the production process. In addition, several firms have purchased land and built their own, large-scale, production facilities, moving beyond contracting. The changes in the pork industry mirror earlier changes in the beef packing industry, large portions of the fruit and vegetable industry, and the poultry industry. For example, Friedland et al., (1981) report that by the middle of the 1970s, Arizona and California produced 88% of iceberg lettuce in the U.S. and that four grower-shippers accounted for 35% of total U.S. production. Analysts predict similar changes in the dairy and grain sectors in the near future.

Another aspect of the industrialization of agriculture is global integration (McMichael, 1994; Henderson and Handy, 1994; Goldberg, 1994). Multi-national corporations (MNCs), including U.S. based MNCs, have increasingly acquired production and processing facilities in a number of different nations. Two primary means of accomplishing this is through foreign direct investment and strategic alliances (Henderson and Handy, 1994; Friedland, 1994).

Given these ongoing structural changes within the agricultural sector, industrialization, in this paper, refers to the interactive processes of coordination, concentration and globalization. Coordination is the degree of control an actor has over the various links in a commodity system—from production inputs to marketing to end users. Concentration includes the scale of an agricultural operation (Figures 2 and 3), as well as the ability to wield market power. And globalization refers not only to international trade linkages but coordination and concentration on a global scale. These aspects of industrialization should not be considered as discrete steps in a linear progression toward some

absolute level of industrialization. Rather they are mutually reinforcing and interactive aspects of industrial production.

Table 1: Alternative marketing mechanisms: contracting and integration.

Source: Economic Research Service, USDA; O'Brien, 1994

Commodity	Production and marketing contracts %		Integrated ownership %		Total %	
	1970	1990	1970	1990	1970	1990
LIVESTOCK						
Broilers	92	92	7	8	99	100
Turkeys	60	65	12	28	72	93
Hatching eggs	70	70	30	30	100	100
Market eggs	35	43	20	50	55	93
Mfg. grade milk	25	25	1	1	26	26
Fluid grade milk	95	95	0	0	95	95
Hogs	1	18	1	3	2	21
Fed cattle	18	12	7	4	25	16
Sheep/lamb	7	7	12	33	19	40
FIELD CROPS						
Food grains	2	7	1	1	3	8
Feed grains	1	7	1	1	2	8
Cotton	11	12	1	1	12	13
SPECIALTY CROPS						
Processed vegetables	85	83	10	15	95	98
Fresh vegetables	21	25	30	40	51	65
Potatoes	45	55	25	40	70	95
Citrus	55	65	30	35	85	100
Other fruit	20	40	20	25	40	65

Box A: Concentration in agricultural production.

- Less than 20% of the largest farms in the U.S. are responsible for over 80% of total production (1992 Census of Agriculture).
- The largest broiler operations (100,000 or more birds sold) accounted for 97% of sales nationwide in 1994 (GAO, 1995).
- Hog operations with 1000 or more hogs controlled 56% of the inventory of the top ten hog producing states in 1994. In 1988 they controlled 36% (GAO, 1995).
- Less than 4% of the largest farms (\$1 million or more in sales) produce 66% of vegetables, sweet corn and melons (1992 Census of Agriculture).

Table 2: Consolidation in the U.S. Food System, 1987 and estimates for 2000.

Source: Adapted from Goldberg, 1994

	1987		2000	
	No. of firms	Percent of sales	No. of firms	Percent of sales
Food processing	50	48	30	55
Food wholesaling	50	71	30	75
Food retailing	20	36	20	50
Food service	50	22	30	25

Table 3: World's leading food manufacturing firms, 1990.

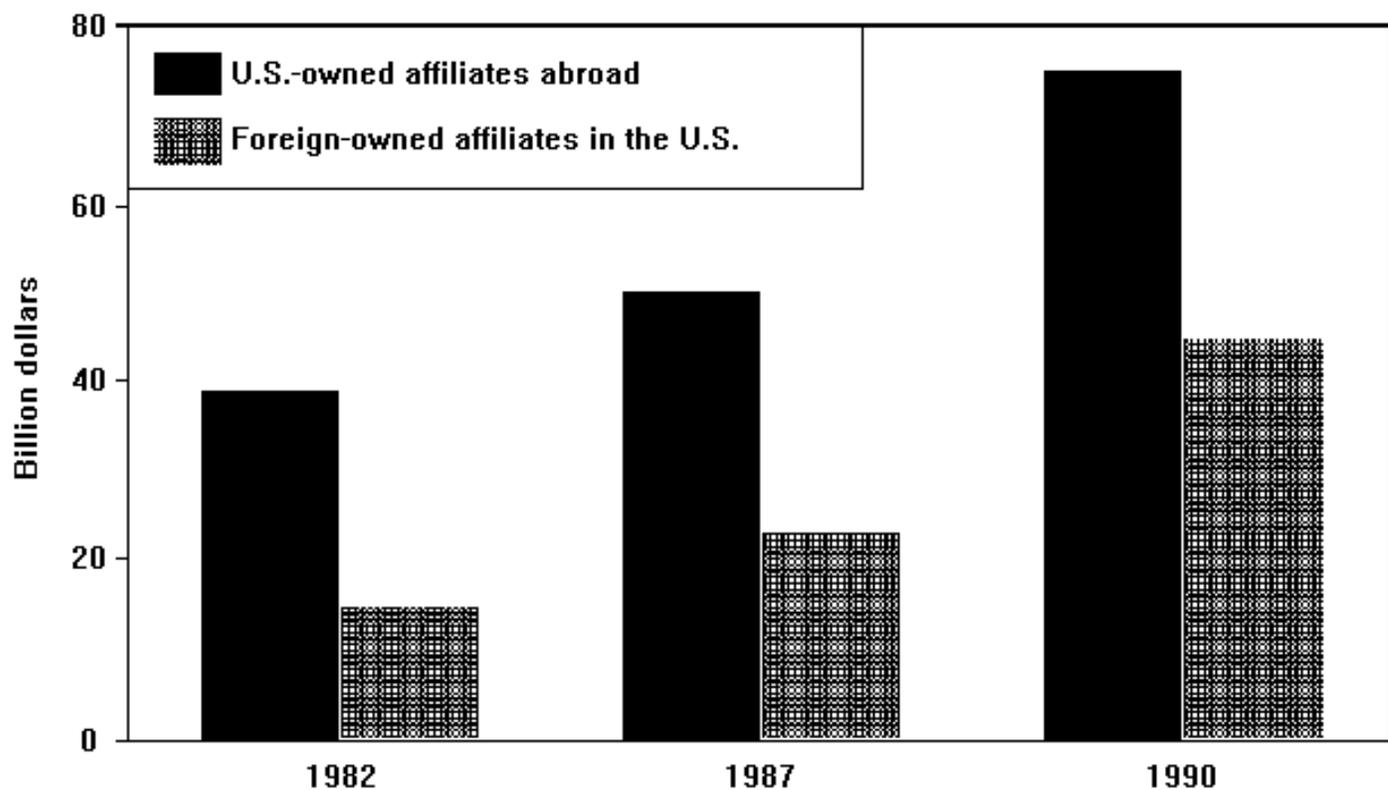
Source: Adapted from Henderson and Handy, 1994

Company	Headquarters	Food sales (US\$ mill.)	Food as a % of total sales	Foreign as a % of total sales
Philip Morris Cos. Inc.	U.S.	30,432.3	70.6	27.3
Nestle S.A.	Switz	28,103.7	96.0	98.1
Unilever N.V.	Neth/U.K.	18,128.0	50.0	NA
IBP	U.S.	10,185.3	100.0	NA
Pepsico Inc.	U.S.	9,991.7	65.6	17.9
Grand Metropolitan	U.K.	9,528.1	60.8	49.8
Anheuser-Busch, Inc.	U.S.	9,208.7	97.1	NA

Kirin Brewery Co., Ltd.	Japan	8,946.2	95.0	NA
Coca-Cola Co.	U.S.	8,908.2	99.4	55.1
Allied Lyons	U.K.	7,969.8	100.0	40.4
ConAgra, Inc.	U.S.	7,084.9	62.5	NA
Archer Daniels Midland Co.	U.S.	6,977.4	88.0	NA
BSN Groupe	France	6,859.1	90.5	36.9
MM/Mars	U.S.	6,750.0	90.0	NA
Erridania Gruppo Ferruzzi	Italy	6,438.1	100.0	79.8
Sara Lee Corp.	U.S.	6,424.0	45.1	32.5
H.J. Heinz Company	U.S.	5,800.9	100.0	40.1
RJR/Nabisco, Inc.	U.S.	5,783.0	45.3	13.4
CPC International, Inc.	U.S.	5,781.0	100.0	55.5
Campbell Soup Co.	U.S.	5,672.1	100.0	25.4

Figure 1: Sales by foreign food processing affiliates, 1982-90.

Source: Adapted from Henderson and Handy, 1994



Box B: Concentration in the processing sector; and integration with production.

- In the meat packing industry, the four largest firms control over 80% of the steers and heifers as well as boxed beef (Packers and Stockyards Administration reports; Cattle Buyers Weekly, April 1995), and almost 60% of hogs (Feedstuffs, November, 1995).
- In grains, the four largest firms control 24% of total bushels produced and 39% of the grain elevators (Grain and Milling Annual).
- IBP is the dominant processor in both beef packing and pork packing (Meat and Poultry, January 1994).
- ConAgra is one of the four largest firms in beef packing, pork packing and broiler production (Meat and Poultry, January 1994).
- Cargill is in the top four in beef packing, pork packing and control of grain elevators (Meat and Poultry, January 1994; Grain and Milling Annual).

Figure 2: Hog inventory and operations for the top ten hog producing states.

Source: GAO, 1995

*Information not collected before 1993.

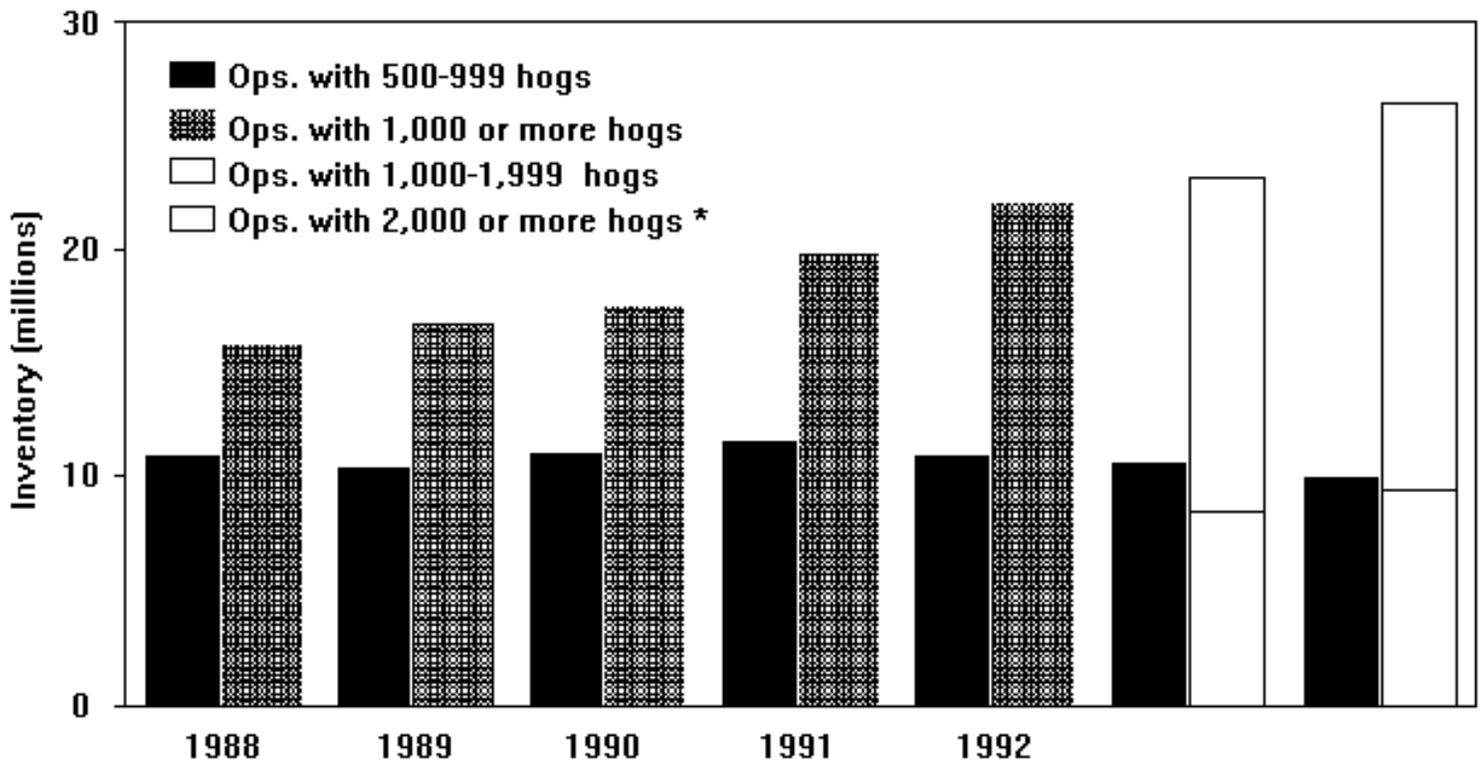
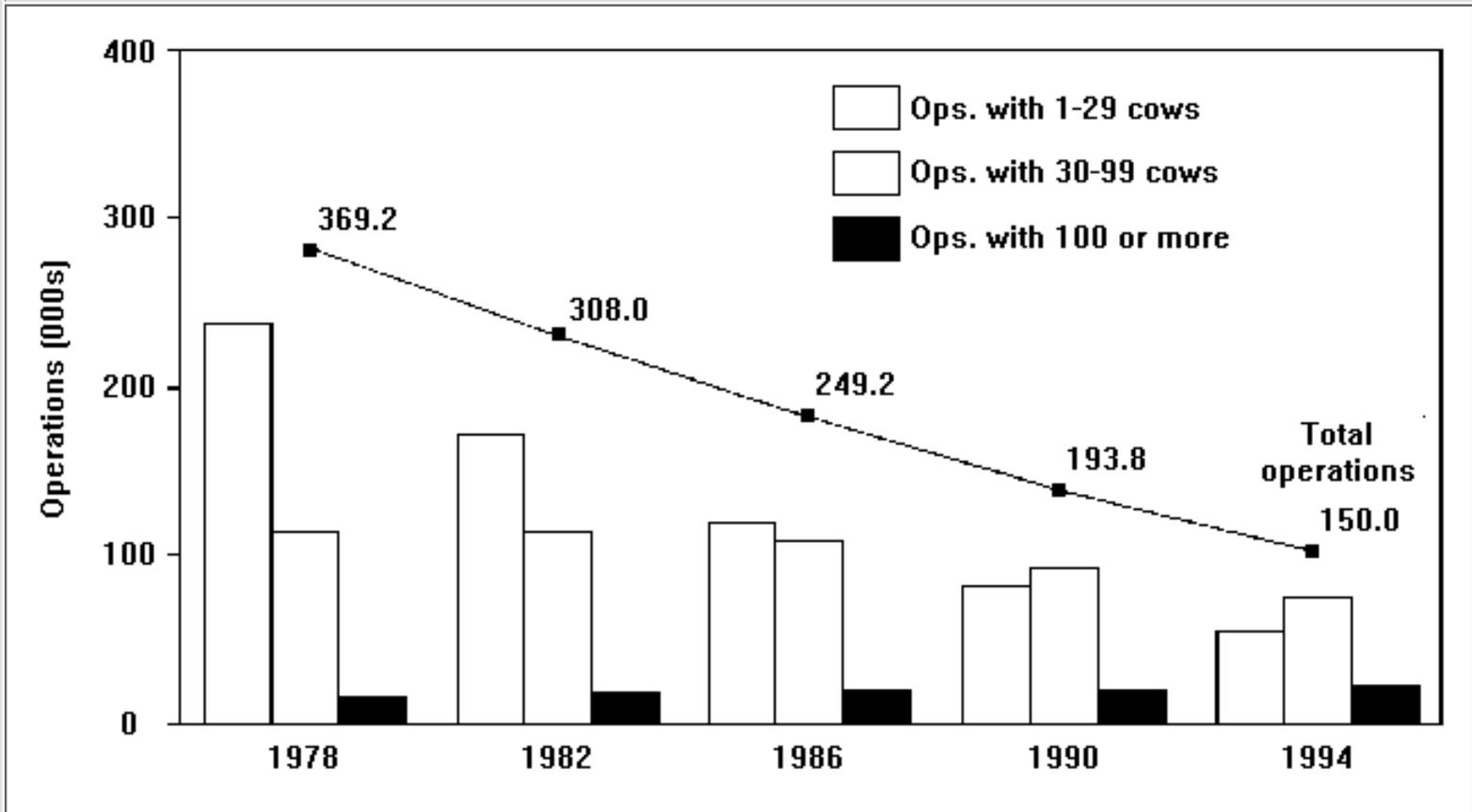


Figure 3: Dairy cow inventory and operations.

Source: GAO, 1995



3) Why is U.S. Agriculture Industrializing?

A commonly heard explanation as to why agriculture is industrializing is that the demands of the consumer have changed dramatically over the past decade or so requiring reorganization of the current food system to accommodate these new demands. Other observers believe that consumer demand is less important than shifting economic structural arrangements within and outside the agricultural industry; or the desire on the part of food processors to increase their control of the stages of the food system. The following discussion is not meant to be exhaustive but is intended to account for some of the more often heard explanations of industrial reorganization offered within policy circles, academia and the agricultural production community.

Accommodating Consumer Demands Explanation

Alan Barkema writes that:

"Consumers have become more discriminating, requiring the food industry to design its products more carefully. Meanwhile, new technology is giving the industry the means to tailor its products for the consumer's more discriminating palate. These changes are drawing consumers, processors, and producers together into a more compact market structure, improving the flow of information through the market, and ensuring that food products are designed with consumer tastes in mind (1993, pg. (1126)."

Some of the demand changes that Barkema refers to are convenience of preparation and less saturated fat, cholesterol, sodium and calories. From this perspective, the most efficient way to meet these demands is through

new technologies, such as biotechnology. For example, Calgene has engineered the "flavravr" tomato which is genetically engineered to have a longer shelf life (Barkema, 1993; Stacey, 1994).

However, to proponents of the consumer driven explanation, high technology is not sufficient to produce products to satisfy the finicky consumer. A social and economic reorganization is necessary to improve the transfer of information from one stage of production to another. Because consumers' demands change frequently and often are very specific (Kinsey, 1994), the links between steps in the food system must be integrated closely in order for the food industry to respond adequately (Barkema, 1993; Boehlje, 1995). In fact if multiple stages in the food system are contained within a firm, price is replaced by the firm's internal administrative procedures and structure (Barkema, 1993). Therefore, a clearer and more consistent message is sent as to what each stage of the food system desires from another stage if those stages are either contained within the same firm or closely linked through contractual relations. The processor gains more control over the production process earlier and thus has a better chance of correctly meeting the increasingly fragmented consumer demand, reducing costs and keeping consumer prices low (Drabenstott, 1994).

In addition, consumers are increasingly interested in the safety of the product. A closely coordinated food system allows for "trace-back capacity" such that an end product can be traced back through the food system to the original producer and corrections or adjustments can be made to prevent any contamination of food products (Boehlje, 1995).

Those favoring the role of the consumer as a primary determining factor, maintain an idealized view of the process of industrialization. Specifically, they argue that consumers demand products such as low fat, microwaveable frozen dinners, food that is ready-to-eat with no sodium and few calories, or fresh, and non-traditional, fruits and vegetables on a year-round basis. These types of specific demands push food manufacturers to more closely coordinate the different stages of agricultural production. From this perspective, firms exist to provide final products to consumers. If major changes have occurred then consumers must have changed in some way. Jean Kinsey (1994) provides evidence to support this position by detailing food consumption trends as influenced by demographic, lifestyle and attitude changes (Figures 4 and 5). The underlying theory is that production is primarily consumption driven. Although other factors, such as technological change, are important.

Figure 4: Change in time allocation. U.S. women and men, 1965-1987.

Source: Adapted from Kinsey, 1994

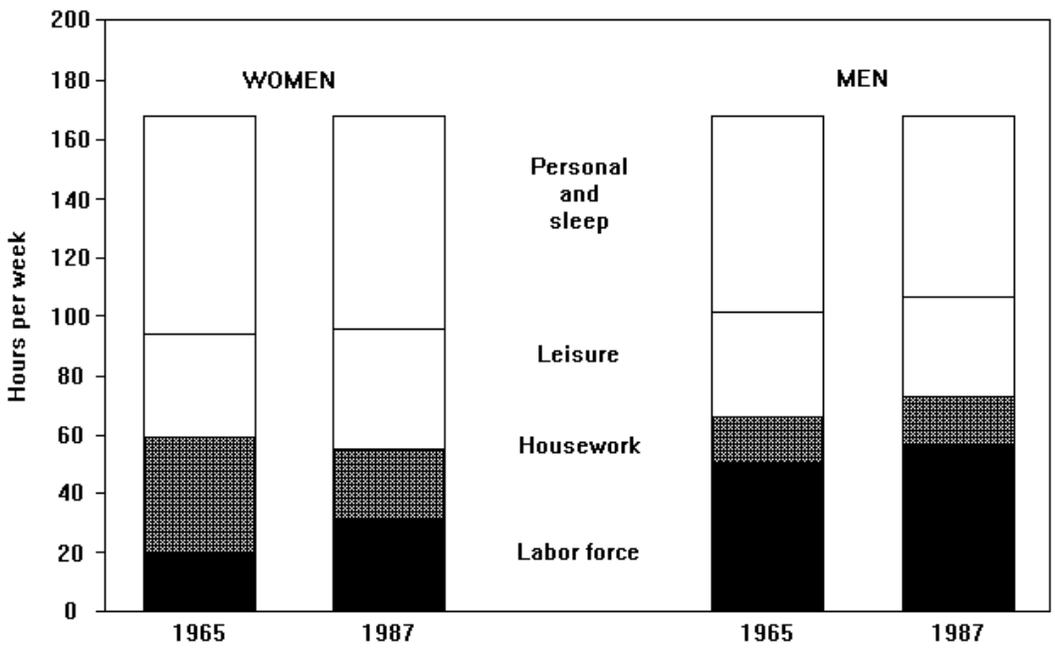
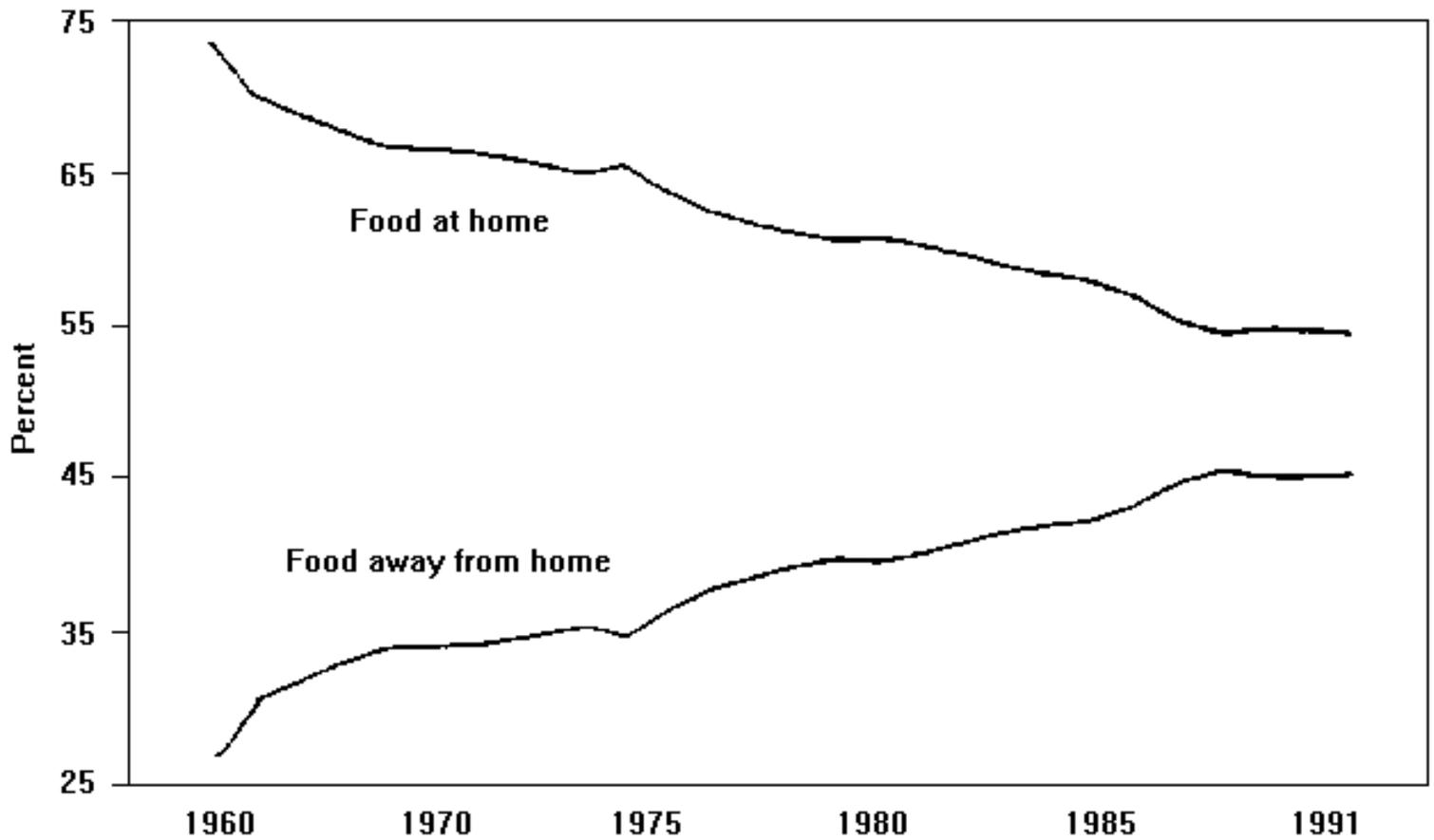


Figure 5: Food consumption inside and outside the home, 1960-1991.

Source: Adapted from Kinsey, 1994



Increased Profit Potential or Risk Management Explanations

Other analysts dissent from the consumer driven view of industrialization. For example, Rhodes (1993) believes that fragmentation of consumer demand has not played a significant role in the development of an industrialized system. To Rhodes, the drive for profits through expansion and being one of the first to get involved in contract production (innovator profits) is primarily responsible for the reorganizing of agricultural production along industrial lines. From this perspective, producers and processors, in an attempt to make more money, altered how commodities were produced. Meeting fickle and exotic consumer desires has not played a major role.

To support his view, Rhodes cites the earlier industrialization of the cattle feeding and poultry industries before the emergence of the discriminating consumer. He elaborates:

"Note that both poultry and cattle feeding experienced similar structural transformation some 20 to 40 years ago and, thus, before the recent fragmentation of consumer demand...(Rhodes, 1993, pg. 1138)."

Rhodes also notes that industrialization in hogs and dairy is prompting more complaints than did the earlier industrialization in poultry production and cattle feeding. He attributes this difference in popular discontent to the fact that:

"...the new factory system in poultry and cattle feeding displaced a minimum of existing producers because there was a tremendous concurrent growth of the markets for both broilers and fed beef - each from a fairly small base (Rhodes, 1993, pg. 1138)."

O'Brien (1994) argues that the health of large corporations, including those involved in food manufacturing, is largely determined by the behavior of the financial markets. This is so because "corporate debt loads have increased sharply over the past two decades (O'Brien, 1994, pg. 303)." Corporations are highly leveraged because of the need to raise capital to finance mergers in the 1970s and 80s and because technological development and capacity expansion is much more capital intensive than before.

Given this situation, along with some food industry specific factors such as the slow growth in demand for food, corporations felt the need to minimize risk wherever they could. One way was to vertically integrate or accelerate and intensify contract production.

Marsden and Whatmore (1994) concur with O'Brien to some extent in their look at firms operating in the global food system. Marsden and Whatmore argue that food demand is inelastic and corporations were forced to enter the value-added markets to remain profitable. They accomplished this through the acquisition of firms operating in established markets. As MNCs have increased the number of mergers and takeovers in an attempt to buy their way into lucrative food markets, they have developed sophisticated and complex links to international, national and subnational financial institutions. Marsden and Whatmore believe that the ability to raise very large amounts of capital through linkages to the financial system, at all levels, has enabled corporations to reorganize agricultural production along industrial lines.

O'Brien, as well as Marsden and Whatmore, look to the changing structure of the economy, national and international, to explain how production is organized. From this perspective, a relatively few actors shape the economic world and currently they are shaping the world to minimize risk in response to being highly leveraged and tied to the financial system. From this more structural perspective, if firms are reacting to consumers, they are doing it within parameters which have little to do with meeting diverse demand patterns.

Neil Hamilton (1994) also takes issue with those who point to consumer demands as the most influential determinant of agricultural industrialization. He argues that consumers do not have the power to force producers or processors to provide products they are not already willing to supply. Rather the desire to increase market share resulted in processors marketing value added, higher priced, products such as leaner pork. In addition, Hamilton sees no connection between the consumers desire for a product such as leaner pork and the need to organize an industrialized agriculture. As Hamilton puts it:

"If consumers are offered branded meat will they buy it? Probably, especially when encouraged with a "farm raised" ad (sic) campaign. But to argue the product was offered, and farm production restructured, because of demands by "discriminating consumers" is to be disingenuous about the methods of modern food marketing and the interests of consumers (his quotation marks) (Hamilton, 1994, pg. 641)."

Hamilton goes on to argue that the search for profits and the wish to shift risk from the processor onto the farmer are central to industrialization. Citing the poultry and swine contract industries, Hamilton explains that growers have little or no input into how contracts are written. Therefore, contracts are usually written to favor the integrator as far as being able to refuse excess production, terminate production if prices fall, and realize profits from value adding. The processor's ability to create and influence markets and to realize the majority of the profits from those markets are the key factors in the industrialization of U.S. agriculture.

Hamilton believes that consumption patterns are primarily a result of decisions made earlier in the food system and those decisions are made by the people with the most power to enhance their financial position, the processors.

A critical analysis of the differing perspectives reveals some potentially fruitful areas for future research and discussion. Rhodes' observation that the poultry and meat packing sectors industrialized years ago points to reasons other than diverse demand patterns for the cause of industrialization. That is, food manufacturing firms have a number of good reasons to want a more closely coordinated system in which they have a dominant position other than meeting consumer demands. These reasons include greater control of the production process to increase profits as well as the minimization of risk.

Also, Rhodes points out that poultry and meat packing were industrialized during a time of rising demand for products from those sectors. Therefore, perhaps industrial reorganization occurred later in swine production than poultry and meat packing because of the increased capital and technological requirements required to reorganize a commodity system in the face of flat demand. That is, faced with flat demand for a number of food products, some food manufacturers engaged in capital intensive value added strategies in the U.S. and overseas. Financing this expansion required the type of complex links with the international finance system that were developed during the 1980s (Marsden and Whatmore, 1994). The debt accumulated from this value added market development provided further incentive for food manufacturers to enhance their control of the production process, through increased coordination, in order to minimize their risk (O'Brien, 1994).

Identifying the driving forces behind the industrialization of agriculture will be a topic for debate for a long time. However, to the people involved in agricultural production, as well as consumers, and rural residents, why is not as important as what it means for them. What are the consequences of a concentrated, coordinated and globalized agriculture? We turn to this question in the next section.

4) The Consequences of the Industrialization of U.S. Agriculture

Although there are differences among analysts as to why the industrialization of agriculture is taking place, there is quite a bit of agreement on how U.S. agriculture will look in the near future.

Most analysts agree that the processes of coordination, concentration and globalization will continue to reshape agriculture along industrial lines. Farm numbers will continue to decline, perhaps at a faster rate, and average farm size will increase. This means fewer farmers. Contract production and large-scale corporate production will account for a larger share of total production. The number of processors who purchase agricultural products or produce them themselves will shrink and the processors will grow in size. MNCs will continue to buy their way into established markets and increase their world market share of agricultural production.

Disagreements arise in the interpretation of these processes. To what extent and to whom are these changes beneficial? To what extent, and to whom, are the changes deleterious?

The people who believe that the industrialization of agriculture is an inevitable and largely positive process see efficiency gains, increases in choice, consistency of product quality and a more profitable farm economy for all actors who can remain in it as the consequences of a move toward industrialization.

Critics believe that the benefits of industrialization are largely illusory; or that proponents are not employing a broad enough calculus to account for all the costs associated with an industrialized system. Critics ultimately see price increases for consumers, unsafe food, lower prices and less flexibility on the part of farmers, rural community deterioration and environmental degradation as the consequences of industrialization.

The remainder of this section presents differing perspectives on the implications of industrialization for consumers, farm households, rural communities, agricultural labor and the environment.

Implications for Consumers

Some observers of agricultural industrialization make the case that consumers will benefit because there will be consistent products of high quality and a greater selection of products (see Drabenstott, 1994). Also, some argue that prices will be affordable because of the greater efficiency of an industrialized production system. Production costs and costs associated with transferring product or information between different stages of production (transaction costs) are lower in a coordinated system (Barkema, 1993; Rhodes, 1993). In addition, although farm numbers have decreased, agricultural production continues to increase as each remaining farm produces more food.

Critics of these positions argue that the benefits to consumers are overstated. They believe that monopolistic power will eventually lead to higher prices (Heffernan, 1994). And many doubt that consumer demand accounts for the increasing number of food products for sale on the shelves. Rather the demand for these products is constructed through product development and marketing (Hamilton, 1994). Also, the number of commodities used to create those products is actually very small, giving only an illusion of choice (Harlan, 1976; Wilkins, 1995).

Others see food safety increasingly becoming an issue as agriculture industrializes. Nutrition Week (June 30, 1995) reports that:

"Observers ascribe the rising incidence of E. coli to a number of factors, including consumption trends and meat production practices. Since the 1970s, consumers have been spending more money on food away from home, entrusting restaurants and food services with the safety of their meals according to the USDA.

Moreover, consumers are eating more of their red meat as hamburger, which is the most common source of E. coli (p. 2)."

Consumers are buying products that are closer to being fully prepared. Critics of industrialization believe that this trend takes control out of the hands of the consumers and puts it into the hands of firms. This lack of control could lead to food safety problems. If a food manufacturer, restaurant or fast food outlet is preparing food unsafely, the potential is greater for large numbers of people to be affected than if individuals are preparing food unsafely in their home kitchens.

However, others counter that food safety concerns are part of what is driving industrialization. A closely coordinated system provides opportunities to trace the path of a food product from production to final sale, thus reducing the risk of contamination (Boehlje, 1995).

This difference in emphasis over food safety is informative. Critics of industrialization focus on control over food preparation and distrust centralized control. Restoring control to individuals and households is seen as a preventative process. Those less critical of industrialization concentrate on the ability to find the problem and correct it within a centralized food production and preparation system.

Implications for Farm Households

Those who view industrialization as a positive trend argue that industrialization may eventually stabilize the number of farms and the agricultural economy in general because the price risks normally associated with farming are reduced under a coordinated system. Farmers operating under contracts receive a guaranteed price for their product. Processors will not have to deal with the vagaries of open markets since they either own the production stage outright or have a contract guaranteeing price, quantity and quality (Boehlje, 1995).

Other observers assert that the future farm economy will consist of farmers who are more secure in their position because they will be an integral and indispensable part of a worldwide agricultural economy which is efficient and flexible and profitable. Thomas Urban explains:

"The farmer within an industrialized system will have significant net worth in land and buildings, combined with an income stream linked to the final market for consumer goods. Not a bad combination (Urban, 1991, pg. 6)."

And although there will be fewer and larger farms, in order to capture economies of scale, and because integrators prefer to deal with fewer producers (Stanly, 1995), some believe that there will be other opportunities for displaced farmers in the new agricultural economy. For example, the remaining, larger, farms will contract out a number of services, depending on the commodity produced. Persons who leave farming can provide specialized agricultural services to those farmers who remain. It is argued that for many individuals, this type of employment may be more lucrative than farming (Armstrong, 1995).

However others argue that the increasing concentration in the world food industry has a number of negative outcomes. With the four largest firms in poultry, beef slaughter, pork slaughter, soybean crushing, dry corn milling and wet corn milling controlling well over 40% of the market, the flexibility of farmers in selling their crops is greatly reduced (Helmuth, 1995; Heffernan, 1994).

Heffernan (1994) and The Center for Rural Affairs (1990) report that concentration of this magnitude is considered by many economists to be undesirable because it reduces competition, which can ultimately result in lower prices for producers, higher prices for consumers and monopolistic profits for processors. In addition, Helmuth (1995) cites Marion and Geithman (1994) who found that packer monopsony power had a significant negative effect on cattle prices from 1971 to 1986.

"For the seven regions on which most of our analysis was done, cattle prices were estimated to be about 3% less in the most concentrated region/year compared to the least concentrated region/year (Marion and Geithman, 1994 from Helmuth, 1995, pg. 4)."

Other critics of the industrialization process question the ability of a non-organized, solitary producer to receive fair compensation from a large-scale processor which dominates the market. Citing data from university and industry studies, Mary Clouse of the Rural Advancement Foundation International (RAFI) concludes that:

"Income from broiler contracts with large vertically integrated processing companies is easily manipulated by the companies in order to keep [prices paid to growers] predictable and at a minimum.

The annual net income from a broiler contract is very low and can easily be negative (Clouse, 1995, pg. 23)."

Clouse also asserts that the fear of losing their contracts and thereby losing their investments in housing and equipment, keeps most growers from complaining even when they are dissatisfied with the contractual arrangements.

Bolstering RAFI's position is the fact that in the past few years there has been increased litigation involving production contracts. Also, there have been a number of recent attempts to organize growers into bargaining units. For example, one of the larger and more successful groups is the National Contract Poultry Growers Association. In addition, a number of states have implemented, or are considering, more stringent regulations of agricultural contracts (Hamilton, 1995b).

Interestingly, one of the earliest sectors to industrialize, vegetables for processing, is characterized by growers well organized into marketing cooperatives. These cooperatives bargain for the terms of marketing contracts signed with major processors (Marcus and Frederick, 1994; Hamilton, 1995a).

Disagreement over the benefits of contract production in agriculture may arise from different conceptions of risk and how it is allocated among contracting parties. Knoeber and Thurman (1995) found that under production contracts, price risk is shifted to the processors who are better able to deal with it than the individual producer.

However, there are other risks involved with agricultural production such as investment risk in buildings and equipment and risk from penalties of noncompliance with environmental regulations. How these risks have been, or will be, allocated between contracting parties along with price risk are important processes for understanding costs and benefits of contract production.

Perceptions of the nature of risk allocation as well as fairness of that allocation will probably continue to be an important determinant in the formation of grower organizations as well as state regulation of production contracts.

Implications for Rural Communities and Agricultural Labor

Industrialization proponents believe that rural residents in general will benefit from the greater scale and centralization of production and processing facilities because of increased employment opportunities. Large-scale

facilities bring industrial jobs and investment to areas where economic growth may have been stagnant. Also, benefits from an industrialized agricultural sector are concentrated while costs are widely disbursed and thus less painful (DiPietre, 1992; Iowa Business Council Livestock Industry Task Force Committee, 1989).

Critics of industrialization believe that impacts on rural communities from the concentration of production and processing activities have been, and will continue to be, largely negative. According to Heffernan (1994), the increasing control of the processing sector and the production sector through vertical coordination can have negative impacts on rural communities. Heffernan argues that all businesses allocate profits among labor, capital and management. Family labor farms obtain their labor, capital and management locally so their profits stay within the local community. How the family labor farm allocates its profits to labor, management and capital is not critical to local communities.

However, Heffernan explains that for large, non-locally controlled firms involved in farming:

"The "profits" are allocated to return on management and capital and are usually taken immediately from the rural community. They go to the company's headquarters or, if the corporation is a transnational corporation, the "profits" are very likely invested in the food system somewhere else in the world (his quotation marks) (Heffernan, 1994, pg. 4-5)."

John Helmuth (1995) points out that while North Carolina has been a leader in corporate hog production, Nebraska has constitutional restrictions (Initiative-300, or I-300) on corporate hog production. From 1986 to 1993, the number of hog farmers in North Carolina dropped 50%, the number of hog farmers nationwide decreased by one-third, and the number in Nebraska decreased by 4%. At the same time Nebraska's hog inventory increased at a steady rate (Center for Rural Affairs, 1994). Helmuth goes on to quote a Minnesota study which found that "...smaller livestock operations (under \$400,000 per year) make 79% of their business expenditures within 20 miles of the farm while larger operations only spend 49.5% (Helmuth, 1995, pg. 2)."

This perspective differentiates impacts on the community on the basis of farm structure and who controls the production process and the profits derived from it. From this perspective, a local economic actor invests money locally while a non-local or global economic actor removes money from the point of production.

Other analysts have investigated the link between farm structure and rural community well being (see Buttel et al., 1990; Labao, 1990; and, Durrenberger and Thu, in press). The term "the Goldschmidt hypothesis" is used to identify the concept that small-scale family labor farms have beneficial impacts on the communities they surround and large-scale agricultural production has detrimental impacts on rural community well being. An anthropologist, Walter Goldschmidt, made this finding in a 1940s study of two agricultural communities in California (see Goldschmidt, 1947/1978).

A number of researchers have found that a farm structure dominated by smaller farms has benefits for rural communities as measured by proxies such as per capita income (Buttel et al., 1990; Durrenberger and Thu, in press). Others have found farm structure less important than other factors, and that the dominance of an area by large farms does not necessarily result in declining rural communities (Buttel et al., 1990; Barnes and Blevins, 1992; Powers, 1995).

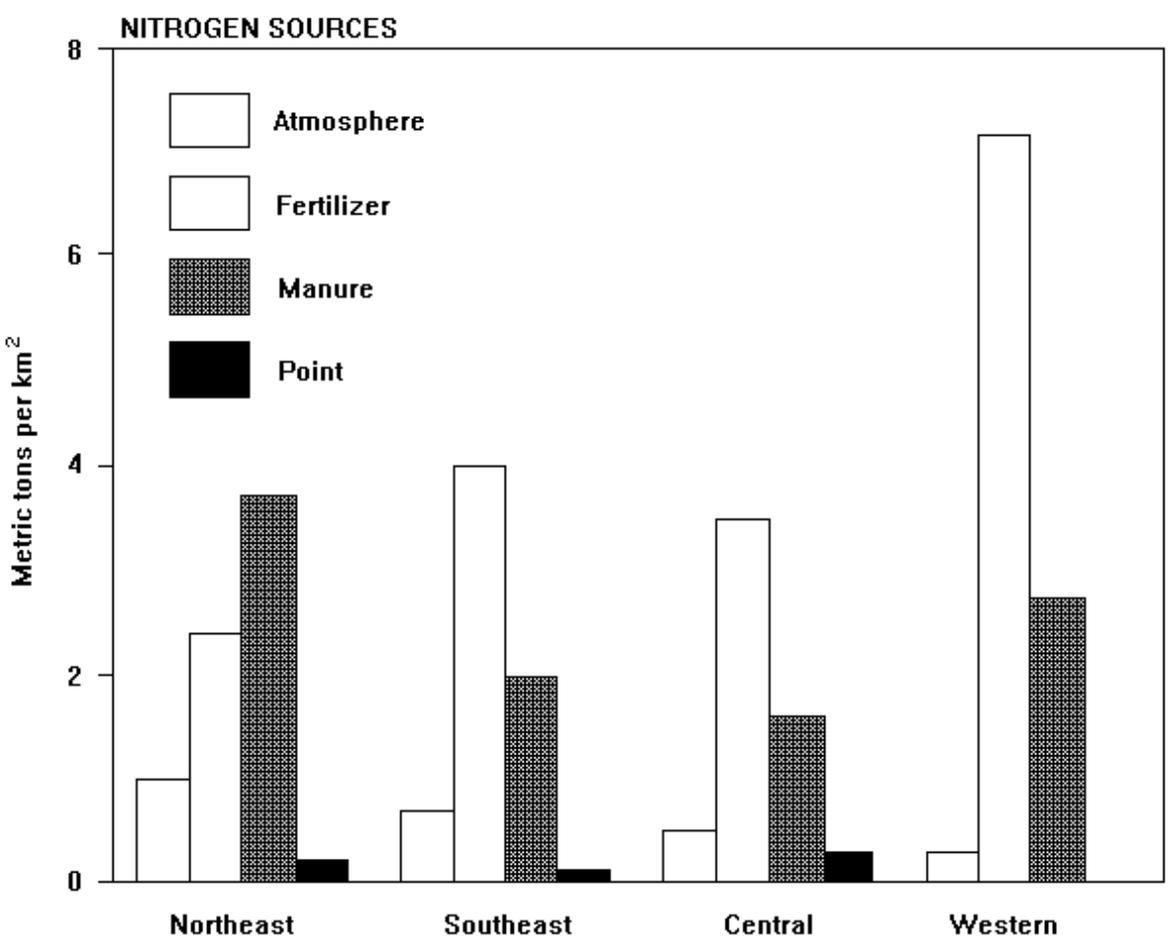
Beyond farm structure, some have questioned whether large-scale processing facilities, usually associated with industrialized agriculture, have proven to be viable drivers of economic growth. Meat packers have been criticized for extracting more from local communities than they give. Critics argue that packers often rely on non-union, immigrant labor which is easier to exploit. Another criticism is that the work and working conditions are often very difficult resulting in a high turnover rate. Also, many communities have problems meeting the needs of an influx of new workers, who often do not speak English, regarding housing and schooling for their children. This requires increases in social spending which dampens economic benefits from the jobs provided by the packing house (Stull, 1994; Stanley, 1994; Stull, et al., 1995).

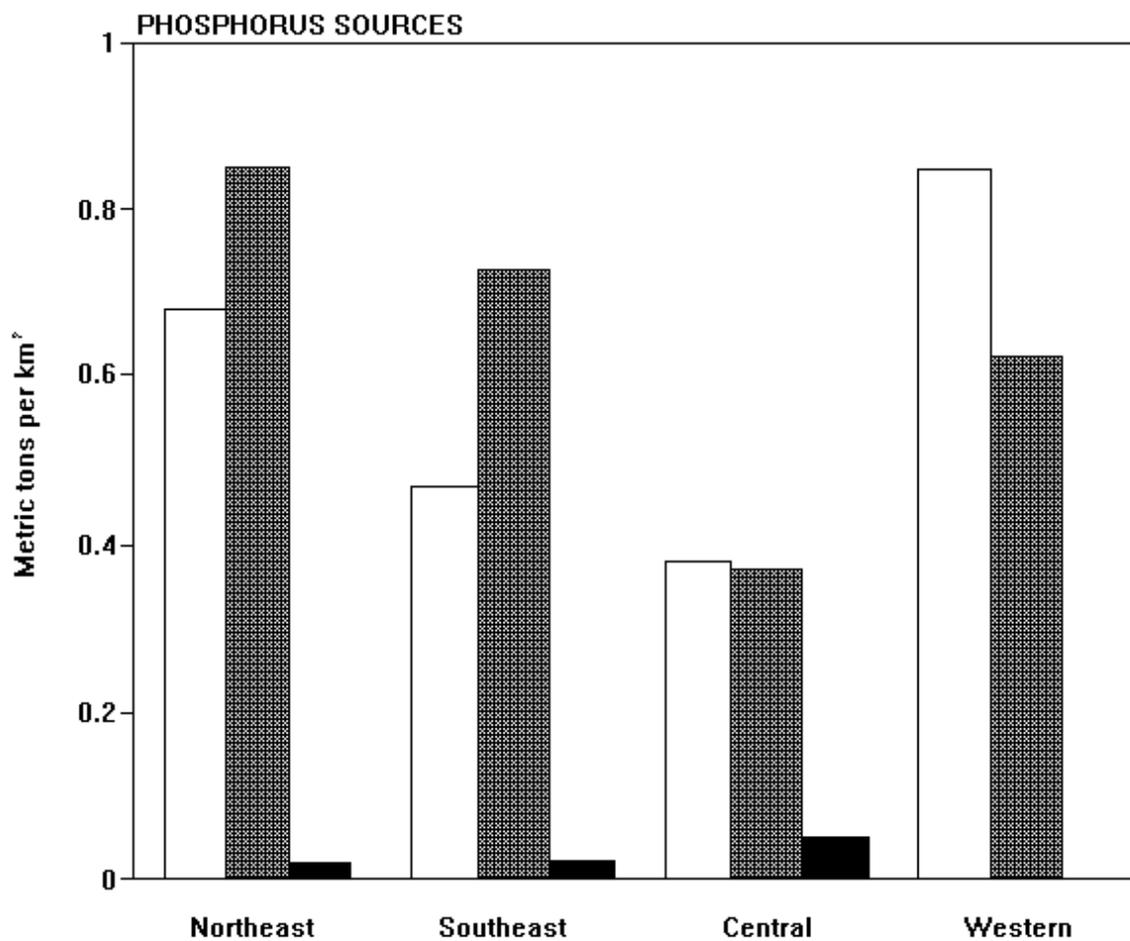
Regarding impacts on hired farm labor of an industrialized agriculture, large concentrated farming operations potentially provide opportunities for employment and fertile ground for union organizing. However, depending on shifting economic structural arrangements, large farming operations may also have the incentive and financial endowments to replace labor with capital investment in technology. Comparing the tomato and lettuce industries of California, Friedland et al. (1981) explain how specific economic and social arrangements drove the large-scale tomato growers to develop and adopt a mechanical harvester thereby reducing the need for field workers. Friedland et al. go on to argue that the greater integration and more secure capital position of the large-scale lettuce grower-shippers enabled the grower-shippers to continue their reliance on manual harvesting. The reliance on manual field operations potentially provides opportunities for groups, such as the United Farm Workers (UFW), to organize workers and improve the workers' bargaining position.

Environmental Implications

The environmental impact of very large production facilities for livestock, especially swine, has been well documented (Figure 6). Neighbors of large scale hog production facilities in North Carolina and Iowa have complained about the nauseating smell emanating from these facilities as well as other health effects (Thu, 1995). And large manure lagoons have been identified as the source of ground and surface water pollution in some areas of the country (for example, see Lively, 1993a and 1993b; Warrick and Stith; 1995; Smothers, 1995; and GAO, 1995).

Figure 6: Annual median inputs of nitrogen and phosphorus to watersheds, by region.
 Source: USGS' National Water Quality Assessment data





Without denying that environmental problems related to industrialization exist, Ervin and Smith (1994) believe that it is unclear whether agricultural industrialization will ultimately improve or degrade environmental quality. The keys will be the interaction of structural forces with pollution processes, technology innovation and adoption, and environmental regulation.

Ervin and Smith argue that increasing concentration, especially of livestock operations, has environmental risks. However, they also believe that concentration can potentially lead to greater ease in tracking pollution from agricultural sources and imposing regulations.

Technology development which alleviates pollution from concentrated production could lead to an acceptably green industrialized agriculture if such technologies are adopted by operators or firms. However, if stewardship behavior depends on control over the production process, capital assets and decision making, then operators within an industrialized system may be less motivated to take farm-level actions that conserve natural resources or enhance environmental quality.

Ervin and Smith conclude that current agrienvironmental policies assume some decision making autonomy on the part of farm operators. As industrialization advances, this assumption becomes invalid and a different type of approach, perhaps one that is less reliant on voluntarism, may emerge.

Another potentially serious problem with an industrialized agricultural system is the lack of diversity within the crops and livestock (Raeburn, 1995). An industrialized system stresses uniformity and selects for certain attributes such as durability, productivity and consistency (Friedland, 1981 and 1994; Friedmann, 1994). This emphasis has resulted in very narrow genetic bases for the majority of the major crops and livestock in U.S. and world agricultural production (Box C).

Box C: Biological diversity issues.

- In 1970, the southern corn-leaf blight destroyed 15% of the U.S. corn harvest, largely because of corn's genetic uniformity (Raeburn, 1995).
- The U.S. potato crop depends on six varieties (Raeburn, 1995).
- Four hundred varieties of winter wheat used in the U.S. originate from 74 ancestors (Raeburn, 1995).
- Less than twenty apple varieties account for 95% of U.S. commercial production (Doyle, 1985).
- The broiler industry relies extensively on the Rock Cornish hen (Doyle, 1985).

The lack of diversity makes U.S. agriculture vulnerable to disease outbreaks. For example, the southern corn leaf blight of 1970 resulted in a loss of 15% of the total corn harvest in the U.S. The uniformity of widely used corn varieties contributed greatly to the size of the impact of this disease (Doyle, 1985).

And, although public policy attempts to preserve genetic diversity through seed banks other interventions are regarded by large numbers of scientists as effective (NRC,1993), others have criticized these efforts as ineffective and under funded (Doyle, 1985; Fowler and Mooney, 1990; Raeburn, 1995).

Where You Are Determines What You See

In the United States, independent household based production has historically been responsible for a substantial part of total agricultural production. This phenomenon has puzzled many analysts (see Buttell et al., 1990), since independent household production of non-food products was largely displaced by factory production in the nineteenth century.

However, agricultural production in areas historically dominated by independent household production have become, over a substantial time period, more and more like other sectors of the economy. That is, for whatever reasons, factory production of commodities, such as pork, is rapidly displacing independent household based production. Also, many of the households which remain involved in production have entered into contractual relations not unlike the franchising arrangements common in non-agricultural economic sectors.

A number of observers believe that many of the arguments which emphasize the negative consequences of these structural changes are primarily based on fear of change and romantic yearnings to cling to traditional ways of organizing farming. According to these observers, giving in to these fears and romantic notions would lead to economic malaise (Sonka, 1995).

These analysts view issues such as market power, environmental concerns, fairness of contracts, industrial and labor relations and community impacts as possible externalities of certain manifestations of industrial production. Any substantial externalities should be handled through public policy (Boehlje, 1995; O'Brien, 1994). However, public policy should not interfere too much since market power is often overstated in its price effects and government regulation of business can do more harm than good (Sumner, 1994).

But the critics of industrialization argue that the problems they cite are not merely external to the system but rather the predictable and unwanted consequences of the industrial organization of agriculture.

Those who criticize industrialization argue that fear of change is not the issue. Rather, the issue is who decides what changes take place and who benefits from these changes. The type of change is the important factor.

Critics of industrialization point to the alternative agriculture movement as a driver of change, but one that promotes a less industrialized, less centralized, and more diverse structure of agriculture (Friedmann, 1993; Lyson and Welsh, 1993; Ikerd, 1995). A major part of the alternative agriculture movement has been an effort by a growing, but still

relatively small, number of people to develop a modern agricultural system which continues to rely on independent household production. Underlying this effort is a renewed interest in producing for local and regional markets and constructing local food sheds which rely on minimizing the distance between farmers and consumers (Wilkins, 1995). For example, the number of farmers' markets in the U.S. is at an all-time high (Hilchey et al., 1995). And recent figures point to continued expansions in organic sales in the U.S., with an increasing number of supermarkets and grocers carrying organic food products (Natural Foods Merchandiser, 1995).

These differing views of change, and how it should take place, have different implications for many of the issues surrounding agriculture today, such as individual welfare and environmental protection. People who work in the agricultural economy in different roles, and within different sets of social and economic relations will see the interaction between agricultural structure and the well being of farmers, rural residents, agricultural laborers, and the environment differently. Where the individual stands in the overall agricultural economy is an important determinant of what that person sees.

Diverse viewpoints originating in diverse life experiences are important to understanding the meaning of structure and structural change. The voices of people who live and work within an industrialized agriculture or who are striving to construct an alternative system, add substance to academic and policy discussions and must be included in debates over the future of agriculture in the U.S.

5) Insights into Industrialization: the results of four focus group interviews

In previous sections I reviewed the literature on agricultural industrialization. In order to understand the meanings that individuals ascribe to agriculture in the context of structural change, I set-up four focus group interviews. By holding focus group interviews with a broad array of stakeholders with different experiences and different expectations I hoped to tap into a rich source of information and ideas about the nature of change in U.S. agriculture. In addition, I wanted to gather ideas about the appropriate role of government in the face of structural change in agriculture.

The interviews took place in New York, Iowa, California and Georgia. Participants included representatives from processing firms, farmers, local government officials, local environmental group representatives, farm labor advocacy group representatives, farm input suppliers, persons involved with developing direct and value added markets for agricultural products, and family-farm advocacy group representatives (Box D).

Each focus group emphasized one or two agricultural commodity systems. The New York interview concerned dairy; Iowa focused on pork and grain production; California emphasized fruits and vegetables; and Georgia consisted of persons connected with the poultry industry. This was done to capture regional diversity and to talk to people involved in commodity systems which are characterized by varying degrees of coordination, concentration and globalization.

Focus group participants were presented with statistics and other information that illustrated structural changes in U.S. agriculture. After reviewing the information, participants were asked what the changes outlined have meant and will mean for:

- farmers and farming,
- rural residents and rural communities,
- the agricultural work force,
- the environment and natural resource base?

Box D: Focus Groups.

- The New York focus group consisted of an agricultural labor service provider, two large-scale dairy producers, a smaller scale producer who employs intensive rotational grazing, a smaller scale producer who has an on-farm bottling operation, a rural county planner, an environmental activist, the former owner of an independent dairy processing facility, and an employee of a multi-national food products company and an employee of an agricultural inputs supply company.
- The Iowa focus group consisted of a large-scale independent hog and grain farmer, an employee of a feed supply company, an individual who is organizing independent farmers into marketing cooperatives, a member of a family farm advocacy group, the mayor of a small rural town, a farmer who is involved in the development of markets for specialty grains, an employee of a pork processing company, and a retired hog and grain farmer active in opposing large-scale hog confinement facilities.
- The California focus group consisted of an employee from Campbell's Soup Company, an employee from Del Monte foods, the head of a local farm land preservation group, the manager of a farmers' market, a large scale tomato grower, an attorney working on organic agriculture issues, a small-scale organic vegetable producer who is a county commissioner and who used to work with the United Farm Workers, and the head of an organization active in research on agricultural structure issues and farm labor advocacy.
- The Georgia focus group consisted of three poultry growers one of whom is a county commissioner, a public relations representative of a large-scale poultry processor, an employee of a poultry feed supplier, and two environmental activists.

Participants were next asked to give their opinions on the types of actions the government (national, state, local) should take given the changes outlined in the fact sheets and discussed in the first set of questions? That is, what policies are needed?

Responses were tape recorded and transcribed. The remainder of this section discusses the answers to the questions posed to focus group participants.

Farmers and Farming

The participants in the New York, Iowa and Georgia focus groups agreed that farm numbers would continue to decline and average farm size would continue to increase. In the California focus group there was some disagreement regarding farm numbers in the future. In California farm numbers increased during the eighties and decreased from 1987 to 1992.

Some California group members argued that numbers of all types of farms would decline, while others asserted that the growth in farmers' markets in California could well stabilize small farm numbers and even increase the number of small farms.

All participants, in all the groups, agreed that farming had changed dramatically in the last several decades. One change is that farmers work more as managers of hired labor and contracted services than as an owner/manager/laborer. Some farmers indicated that the rising cost of living was forcing farmers to increase the size of their operations in order to survive. Other farmers argued that the high cost of the newest technologies was forcing more and more capital into farming, thereby changing agricultural production, and making it very risky for people to enter. As one farmer put it:

"...what has happened is that now we have changed the technology so much it is coming at a much higher cost. The people who are entering [farming] today have a technology advantage but that advantage comes at a cost. And to assume the risk that comes with that kind of capital exposure is very troubling for someone starting in agriculture."

Contract production was mentioned as a way to spread some of the risk. That is, under contract production, the grower gives up a degree of control over how the product is produced. The processor dictates more of the production process and in return the grower receives some degree of price stability for his or her product.

Whether this exchange was equitable was a matter of debate among the participants. The poultry growers indicated that since their bargaining position versus the processors was very weak, the poultry contracts were written to favor the processor.

One California vegetable producer said that environmental groups and government regulatory agencies have pressured her to improve her environmental performance while her flexibility in making production decisions, which effect environmental performance, was limited because of contractual agreements with the processor. She explains:

"Our own industry [vegetable processors] tells us how many tons we need to grow per acre to meet our contracts. That sort of forces us to do the best we can [within constraints beyond our control]."

One farmer added his perspective on how crop production and marketing have changed:

"I have the opportunity today to buy soybeans that are Round-up ready and which are tied to Monsanto for marketing. The soybeans cannot be marketed through [open markets] because the genetics and biotech involved has not been approved by Japan and Europe. Therefore, Monsanto has kept controls on how the soybeans are marketed.

Also Pioneer bought out BT (Bacillus thuringiensis) genetics for corn. Agricultural chemical companies are developing herbicide resistant corn and other crops linked with specific herbicides. I am concerned that chemical companies are gaining control of production agriculture."

In general, participants agreed that young people entering agriculture would be likely to work for a firm involved in agricultural production rather than operating their own farm. Also, the several New York focus group participants argued that industrialization has meant that even on large scale family owned farms, farm household members are less likely to work on the farm. Rather, as farms have grown in size and complexity, hired labor is used in place of family labor. A New York dairy producer explains:

"...no longer does your wife have to wash the utensils or clean the milking equipment or feed the calves and all the things that go along with the family farm. Now this is not necessarily good."

Other dairy producers put it this way:

"...farm households on those farms [that are] successful businesses, are going to look a lot more like non-farm households. We have to. That is what our society demands."

"My kids now live in a lot of ways like a kid in a city would live. They [the children] are isolated from the process of production much more than I was when I grew up on a farm."

However, the assertion was also made that contract production was a vehicle for keeping the family labor farm from disappearing since most poultry contracts are between a processor and family owned and operated poultry operations. One processor representative said this about his companies' situation:

"...our company contracts with [several hundred] farms in this region. 98 or 99 percent of those [contracts are with] family farms. Still mom and pop operated. Not an absentee owner nor an investment owner..."

Overall, group participants agreed that the structural changes in agriculture had greatly influenced farm household members as well as the practice of farming. Processors argued that contract production could maintain the family farm. Several farmers asserted that if farmers adopted mass production strategies and were extremely efficient, low cost producers they could stay in agriculture. The large amount of capital investment necessary to follow the latter option was mentioned as a serious obstacle.

Some of the participants saw market structure and the availability of direct marketing outlets, as well as the adoption of alternative production systems such as rotational grazing, as potentially the most feasible ways for smaller scale, less capital intensive, farms to stay in agriculture and remain independent. And still others believed that farms which remained small and had some off-farm income to draw on could remain in farming as long as they had access to markets to sell their products. Elaborating on the last point a large-scale farmer said:

"[a small scale producer in the group] is in a position that when times are tough he can rely on his wife's [off-farm] income. My wife going to work [off the farm] is not going to make that much difference to whether we survive or not."

Rural Residents and Communities

The increasing concentration and coordination of an industrializing agriculture was cited by all participants as having a variety of consequences for rural communities and the people who live and work in them.

One local official summarized his observations on the impacts of an industrializing agriculture on rural communities:

"We used to have 160 acre farms. Each farm had a husband and wife and let's say four kids. You had sixteen people in every section [of 640 acres]. What we have today [on a 640 acre section] is one farm family and maybe two kids. What is happening to rural communities is we are going from sixteen to four...and we are losing school systems."

"Our town has a large scale corporate hog production facility and it employs 250 people. We are glad those people are there. They are helping our main street stay alive and viable. On the other hand there is a cost for having those jobs: a drop in farm numbers."

Other participants noted the increase in stratification in their communities as smaller scale family labor farms were replaced by large farms and very large corporate production facilities:

"In some towns there are management jobs but in other communities people are not paid enough to make a decent living. They cannot add much purchasing power to the community. Also, a lot of these lower paid workers are foreign born and they send a substantial portion of their wages back to [their country of origin]."

Another participant agreed:

"We [in rural communities] have been immune to large degrees of income disparity and [ethnic] differences. But that is where we are headed."

One California participant elaborated on the use of foreign born labor in large-scale operations:

"[There are towns in rural California] where 25% or more of the population is Latino. Many of these communities are composed of people who do hired work. There are relatively few landowners or entrepreneurs. A large share of the population is working, though in poverty. At the same time a very large fraction of this population are not citizens and therefore cannot vote. They cannot participate in school board elections and things like that."

Some participants emphasized the differences in appearance and community life of rural towns as the economic structure on which the towns depend changes.

"What is going to happen to rural America is that it is going to look like suburbia...Because you are going to have a lot more people employed who, when five o' clock comes, are going off to do their own thing at the bar or the golf course or whatever. Because they are production workers."

Some participants countered that many of the criticisms, comments and concerns were moot considering the importance of the agricultural industries for employment in rural areas. A representative from a poultry processing

company saw the poultry industry as the main source of livelihoods for the majority of residents in Northeast Georgia.

"The poultry industry is the dominant economic engine for the region in terms of number of employees that it directly employs or employs through the technical services, processing, milling etc. Without question, the poultry industry is the economic backbone of this region."

Participants generally agreed that a highly concentrated, vertically coordinated agriculture has substantial implications for many rural communities. A number of focus group participants believed that it was important to allow communities, instead of state or federal governments, to control local resources and regulate agricultural production and processing facilities. In their opinion, this would be the most effective and equitable way to minimize negative consequences and maximize benefits of an industrialized agriculture as well as promote alternatives.

Agricultural Work Force

The discussion of rural communities and residents necessarily contained information relevant to the agricultural work force. Some consistent themes emerged. In agriculturally dependent regions, concentration and coordination in agriculture result in structured work weeks. The bureaucratic organization of large-scale production and processing facilities necessitates a stratified work force with higher paid middle and upper management jobs and lower paid skilled and unskilled labor jobs.

Participants also talked about issues internal to the work force in agriculture today. One participant from California cited some statistics about the growing use of hired labor in place of family labor in California agriculture:

"15% of all the farm work in the state [CA] is done by farmers and family members and 85% by hired workers. 45 years ago probably 40% of the work was done by farmers and family members and 60% by hired workers."

Concentrations of labor on large farms can have positive impacts for agricultural workers. Some participants pointed out that larger farms could often offer steadier employment and more generous employment packages than smaller farms.

Also, large amounts of labor enabled unions to organize workers more effectively and thereby improve their bargaining position via farm owners. One participant who had previously worked with the United Farm Workers (UFW) had this to say:

"I was talking with UFW organizers...and they [the organizers] felt that family farms were totally irrelevant to them [as labor organizers]. There are not enough workers on family farms [per farm unit] to make organizing worthwhile."

Other aspects of labor-management relations brought up by participants regarded the processing sector. A Georgia participant had this comment to make:

"...[in poultry processing] concerns such as carpal tunnel syndrome and line speeds have fueled worker organizing drives."

While a California participant related this story:

"A Teamster Union member told me that a [walnut processing] operation [in California] had built a new factory over the border [in Mexico] and told the workers [in the California plant] that if the workers did not take a pay cut [the company] would move the jobs over the border [to the Mexico plant]."

A number of participants, however, cited factors such as infrastructure, climate, and technology development that would make it difficult to use moving facilities as a bargaining chip against labor.

Several participants took a different tact in considering the question of an industrializing agriculture and changes in society and the agricultural work force. They argued that as agricultural production becomes more complex

technologically, the type of training necessary to do the job changes from the knowledge handed down through farming generations to a more standardized technical knowledge. And the pool of eligible workers is insufficiently trained to perform well in a technologically sophisticated agriculture. One dairy producer had this to say:

"We are shifting away from the manager/owner/laborer all wrapped into one to specialized labor that is more poorly trained and has a narrower perspective. We cannot rely on grandpa as a trainer anymore, we have to rely on institutions which just are not there to do the job. There isn't anyone out there training farm employees that I know of..."

...big tractors, sprays, complex technology are all part of an industrializing agriculture and we are putting all this into the hands of a poorly trained labor force."

In the future, labor-management issues and personnel training and compensation will be at the forefront of agricultural issues. Large-scale production and processing facilities employ substantial amounts of labor. Firms have tried to keep labor costs low thereby fueling union organizing. However, the increasing technological complexity of agricultural operations may create a demand for well trained, and possibly more expensive, labor.

Natural Resource Base and the Environment

Most participants agreed that the concentration of livestock production in large-scale production facilities, has had deleterious effects on the environment.

Large-scale independent livestock operations as well as corporate livestock operations were cited as sources of ground and surface water pollution from manure runoff and lagoon spills.

One New York participant had this to say:

"Larger operations have a larger mess, the more acres you spread over, the more potential for run-off."

Others followed up:

"As farm size increases, the potential problems are only going to get bigger. You have bigger odors and bigger lagoons full of waste to utilize or dispose of."

"I agree that with the concentration of a lot of cows, pollution is a real problem."

In addition, participants in the New York, Iowa and Georgia groups mentioned odor problems from concentrated livestock production. Two of their observations follow:

"Irrigation guns are one of the biggest nuisances. Family farmers may run an irrigation gun for a couple of days. [Large scale corporate run] hogs farms near me run it for two weeks. [The odor] drives people from their homes, interferes with air quality and property rights."

"I think it is two issues. It is the reality of how well we treat the environment and the public perception of it. Nothing screws up public perception as much as odor. You cannot tell if there are nitrates in the groundwater, but you can sure tell if someone is spreading manure...as these operations get bigger and need more storage, the odor is going to get worse. If we do not get our act together as far as controlling these odors, and not raising the issues in peoples' minds...we are going to get more restrictive laws."

The Georgia participants also discussed environmental issues related to poultry production, particularly dead bird and manure disposal. Growers and environmental activists asserted that the relatively uneven distribution of both profits and responsibilities for dead bird and manure disposal between processors and growers, to the advantage of the processors, within the contracting system created or exacerbated environmental problems. One poultry grower put it this way:

"If you get together with a bunch of poultry growers you will always hear someone say that the birds are the company's birds until the birds die. The litter is mine until the company finds a use for it."

Another grower emphasized the need to move beyond conflict between growers and processors to solve environmental problems:

"...it cannot be growers against processors. It has to be growers and processors working toward environmental issues such as bird disposal and manure disposal."

An environmental activist mentioned some of the consequences of not addressing environmental concerns associated with poultry production:

"A lot of counties are putting regulations on the books concerning livestock that are very restrictive and are aimed at discouraging construction of poultry houses. Other counties are following that example."

Representatives from poultry processors and input supply firms emphasized the responsibilities their firms currently have for environmental issues. One industry representative explains:

"We poultry processors have our own set of environmental and regulatory issues to handle. For example, we are in the waste water treatment business. By law we have to treat waste water which we generate before it goes into the municipal system."

Another added this:

"We spent over a million dollars last year on waste treatment."

Regarding pesticide use, the California participants observed that farm-scale could influence pesticide use in different ways. The following exchange provides insight into this issue.

"...outside of the organic types and people who really want to push the envelope, the very large farms are more able to experiment with alternative [to pesticide use] practices. The big guys have the resources to be able to work with things such as pheromone and mating confusion programs to reduce pesticide use. [Bigger companies] can afford to take the risks involved with experimentation."

Another participant added this:

"I have had the opposite experience at the farmers' market. The larger farmers seem to be the last to [reduce pesticide use]. [The larger-scale farmers] have a certain output [they want to maintain]. It seems that the little guys are willing to experiment to reduce their pesticides."

The original commenter followed up by saying:

"It may be a bimodal distribution with very small farms and very large farms more able to experiment with alternative practices and thereby reduce pesticide use."

In addition, there were observations in the California group concerning the relationship between farmland ownership arrangements and stewardship issues. Two participants had this exchange:

"...farmers that own their own land and intend to hand it down have a different view toward soil building and wild life enhancement and toward maintaining the viability of the small part of the environment they control. They have an advantage over someone who lives in Philadelphia [for example] and owns the land and some contractor farms it for them. There is a big psychological difference there."

"I would like to give the contrasting argument. I agree that in many cases, farmers who are knowledgeable about environmental issues can be the best stewards and particularly when it comes to soil tilth and erosion and the quality of the farm. But as we start looking at...the future, given the consolidation, [large firms in agriculture] realize that they have a lot on the line and they do not dare do anything illegal and so it becomes not a moral standard but a government standard. Companies involved in vegetable production and processing put more emphasis on the environment [than most farmers]. There are so many ways to misstep in agriculture that you have to have a big group you can

assign to the problem. Large firms can say you are the environmental guys. You make sure we do it right."

While another farmer felt that environmental concerns had a generational component:

"I think we are all learning as we go along. Some of the older farmers will never want to tackle something new while the younger ones are more educated and know more about the environment. I think that is a positive sign."

Another issue brought up by a number of participants in the focus groups was the lack of genetic diversity in an industrialized agriculture because of the emphasis on uniformity. This lack of diversity was viewed as a potential problem in controlling disease outbreaks. One participant who worked for a large international food products firm extended the discussion to include genetically engineered varieties and had this observation:

"Genetically engineered varieties work off a narrow genetic base. The engineers will not be able to take advantage of the broad diversity out there. They will not get the interbreeding that is essential to maintain diversity. That is, potentially, the failure of genetically engineered varieties."

Overall, participants agreed that the industrialization of agriculture had serious implications for the environment and natural resource base. Some relationships such as the link between concentration of livestock production and potential pollution and odor problems, were clear. Other issues such as pesticide usage and stewardship in relation to farm scale and ownership arrangements, as well as environmental performance under production contract relations, were more problematic and complex.

Degree and Form of Coordination Influence Level and Type of Concern

Although issues (e.g., rural community vitality; farmer well-being) were brought up separately, focus group participants' responses tended to move back and forth across issues. They saw many links between and among the changing structure of agriculture, farming, rural communities, the agricultural work force, and the environment.

Participants in general recognized that the structure of agriculture in the United States was changing rapidly and dramatically. They overwhelmingly agreed that these changes have had and will continue to have profound implications.

Although it is difficult to draw generalizations from focus groups, some differences and similarities based on region and commodity seemed to emerge from the interviews. The major concerns of the New York group centered around the environmental impact of the independent large-scale dairy producers who dominate milk production in that state.

That is, large-scale producers wanted to expand without damaging the environment or being criticized as polluters. And other participants wanted to help producers control pollution through technical assistance or regulations. Also, the large-scale dairy producers from New York believed that factory milk production would not occur in New York because the large-scale independent producers were so efficient and ran such low cost operations. Interestingly, the hog producers in Iowa indicated that they had held similar beliefs before the advent of factory hog production in their state.

Environmental concerns were important to the Iowa participants but the large-scale independent producers were under less scrutiny than the corporate hog factories. The potential for non-point pollution from large-scale independent farms appeared to be viewed with less alarm than the large manure spills which have occurred in Iowa and around the nation.

The Georgia participants were primarily divided over the distribution of power and revenues from contract poultry production. Concerns and disagreements over environmental problems as well as income equity between growers and processors flowed from this difference in views of the contract relationship between growers and processors.

Several participants in the Iowa focus group had read hog production and poultry production contracts and concluded that hog production contracts were written more fairly from the producer's point of view. They believed

this was the case because there was still a substantial amount of independent hog production, while poultry production is nearly 100% integrated. That is, the hog producer has more options so the production contracts need to provide more incentives.

If this observation is true, then poultry and hog producers may wish to expand and maintain alternative marketing arrangements to contract production in addition to organizing themselves to bargain with processors.

Regarding agricultural labor, Georgia, California and Iowa participants spoke in-depth about controversial issues in production and processing in poultry, vegetables and hogs respectively. Adverse working conditions, low wages, negative impacts on rural communities and union organizing were all mentioned. The New York focus group emphasized the need for better trained workers and for minority group members to gain access to dairy production jobs which paid better than other types of commodity production. If integrated production begins to dominate dairy, the type of labor-management issues brought up in other states' focus groups may well assert themselves in dairy too.

When asked to offer policy suggestions to address some of the issues raised in the focus group interviews, participants tended to offer two types of policies. One set of policies concerns minimizing negative consequences from the industrialization of agriculture. The other set promotes an alternative structure of agriculture. The alternative structure entails, among other aspects, smaller production units, more control over the production process by farm household members and direct links between farmers and consumers. Interestingly, the poultry focus group offered no policies to promote an alternative structure. This may be because poultry is the only commodity system included in the interviews in which virtually no independent production exists. Participants in the poultry focus group may have had difficulty visualizing alternatives to contract production.

Focus group participants' policy suggestions are presented in Box E. In Box F, sets of concerns, observations and emergent hypotheses derived from focus group participants' responses are provided. This information is intended to serve as a summary of issues of concern and assertions made during the interviews. Participants often did not agree. Therefore, many of the assertions listed are contradictory. Also, this information is not edited for factual accuracy—the interpretations and perceptions of the focus group participants determined what was included. These individuals' reactions, responses, and ideas provide a rich source of ideas for research and public policy development.

Box E: Policy Options/Implications Suggested by the Focus Groups.

Focus group participants often disagreed; therefore, policies may seem contradictory. Information is based on interpretations of participants and is not checked for accuracy.

NEW YORK FOCUS GROUP

REDUCING NEGATIVE IMPACTS FROM AN INDUSTRIALIZED AGRICULTURE

- Nutrient Management Plan legislation based on animal units per acre.
 - Provide limits on animal units and allow farmers to integrate farming systems across farms in order to comply (share land and manure).
 - Requirements should be uniform between states to prevent competitive advantage from insufficient regulation.
- Members of communities surrounding large scale livestock operations should have a planning role regarding farm expansion and regulation of farm businesses.
- The extension service should promote links between farm and local residents through planning assistance in developing on-farm activities open to local residents. The objective is to tie the farm business into the community and educate non-farm neighbors. Some activities underway in New York are:
 - farm tours and farm days,
 - farm to community newsletters announcing potentially controversial activities, such as manure spreading, and
 - building halls and community centers on very large farms open to local residents.

- The public and private sector should cooperate to develop and fund institutional training to produce professional/skilled agricultural laborers. Such laborers are needed in the emerging high technology agriculture.

PROMOTING AN ALTERNATIVE STRUCTURE

- Reform milk marketing orders to remove obstacles to the development of alternative/small scale dairy enterprises (e.g. on farm bottling and home delivery).
- Dairy farmers should receive payments from the government to enable a switch to rotational grazing systems to reduce ground and surface water contamination from manure runoff.
- The general obligations law should be reformed to encourage community activities on the farm including pick-your-own and other agritourism operations.
- Some type of portable health insurance, not tied to the job site, is needed for smaller scale, land-based enterprises to develop in large numbers.

IOWA FOCUS GROUP

REDUCING NEGATIVE IMPACTS FROM AN INDUSTRIALIZED AGRICULTURE

- Stricter enforcement of the anti-trust provisions of the Packers and Stockyards Act.
- Concrete standards for large scale hog production facilities should be comparable to the standards for interstate highways.
- Fines for violations of laws and regulations should be high enough to deter even very large, well financed firms.
- Empower state and especially local actors to regulate and fine large scale livestock production operations for environmental contamination.

PROMOTING AN ALTERNATIVE STRUCTURE

- All regulations and enforcement provisions should be designed to favor or exempt the smaller scale, non-corporate, production facility. Primary regulatory efforts should be aimed at large scale, corporate owned production facilities.
- Change estate tax policies to stop inhibiting the passing of family farms to future generations of farmers. A farmer should not have to sell the business to change generational ownership.
- Independent agricultural research not tied financially or strategically to particular corporate interests is needed to maintain or increase the number of independent family farms.
- Productive farm land should be protected from non-farm development through legislative and regulatory actions.

CALIFORNIA FOCUS GROUP

REDUCING NEGATIVE IMPACTS FROM AN INDUSTRIALIZED AGRICULTURE

- One-stop shopping to learn about relevant regulations and to handle any administrative requirements should be made available to farm operators and others involved in agricultural production activities.
- Empower local communities to regulate and actively manage their own natural resources such as land and water.
- Remove or reform regulations that impeded producers, of any size or organization type, from employing less chemically intensive production practices.
- Provide resources to enforce laws currently in place such as environmental protection and worker safety.
- Publicly funded agricultural research and extension is necessary to provide information to operators of all types of farms that is independent of agricultural chemical companies.

PROMOTING AN ALTERNATIVE STRUCTURE

- Extension should continue to receive government funding and be retooled to take direction from farmers who cannot afford to buy research and consulting services and to promote ecologically oriented agriculture.
- Add the promotion of eating locally grown fresh fruits and vegetables to the elementary school curriculum.
- High density housing in urban areas should be promoted. This will limit urban encroachment into rural areas and reduce non-farm development of farm land.
- Rural communities should be compensated, monetarily, for the loss of control of water resources to urban areas.

- Mimic the agricultural policies of Switzerland and the Netherlands. The federal government should actively intervene to keep large numbers of smaller scale farmers producing on the land.

GEORGIA FOCUS GROUP

REDUCING NEGATIVE IMPACTS FROM AN INDUSTRIALIZED AGRICULTURE

- The processors should be financially responsible for dead bird and litter disposal rather than the growers.
- Responsibility for dead bird disposal should be placed on growers and processors equally.
- Research and education is needed regarding litter spreading rates on a variety of soil types.
- There should be a program for people who are planning to enter the poultry industry which details the potential problems and educates them regarding the relevant laws and regulations.
- Poultry marketing boards should be created in the United States which mimic Canadian marketing boards.
- National legislation is needed which gives growers bargaining rights regarding contract design and implementation.
- Contracts should be altered such that the price a grower receives for birds is not a relative standard based on the average cost of all growers contracting with the processor each week. Rather prices should be based on an absolute standard such as feed conversion costs which potentially every grower could meet.
- A waste water permit fee system for processing facilities is needed with funds allocated to the monitoring of water quality.
- Need to have ongoing government assessment of the poultry industry to identify the negative and positive aspects with the goal of improving the livelihoods of everyone involved and eliminating or greatly reducing environmental problems.
- Processors should be required to pay communities to assist in the provision of social services to the lower paid processing plant workers and families of these workers.
- A federal government fund should be established to assist communities in the provision of social services to the lower paid processing plant workers and families of these workers.

Box F: Concerns, Observations, and Emergent Hypotheses from the Focus Groups.

Focus group participants often disagreed; therefore, assertions made here may be contradictory. Information is based on interpretations of participants and is not checked for accuracy.

NEW YORK FOCUS GROUP

INDUSTRIALIZATION...

- ...has decreased the number of dairy farms and thereby diluted their political strength.
- ...has led to energy intensive agricultural production.
- ...will and has supplanted agricultural production roles of farm women and children with hired labor.
- ...of livestock sectors, such as dairy, will result in a decrease in ground and surface water quality from manure runoff.
- ...in livestock sectors, such as dairy, will result in externalities from odor.
- ...will result in the increased utilization of low cost imported labor on the farm and in processing facilities putting stress on the social services of the surrounding communities.
- ...of the dairy sector will not occur in dairy regions typified by independent production at lower than average cost.
- ...of the dairy sector is impeded or will not occur if milk prices remain stable.

IOWA FOCUS GROUP

INDUSTRIALIZATION...

- ...will harm rural communities because rural community well being is linked to the number of agricultural producers in an area and not total agricultural output in an area.
- ...concentrates large numbers of jobs in some rural towns which provides needed population and income base.
- ...concentrates low paid immigrant labor in rural communities which provides cultural diversity but an insufficient income base to positively impact rural economies.
- ...has resulted in a movement from owner operators to agricultural production workers. This movement will cause the character of rural communities to become similar to urban and suburban communities regarding work and leisure schedules.
- ...has reduced the number of people it takes to produce agricultural commodities which has resulted in a drop in population in rural towns to the detriment of community institutions, such as schools.
- ...has resulted in national and international actors investing in rural areas and removing profits from those areas.
- ...will result in a decrease in the percentage of people within the agricultural production work force who work in positions that combine management and ownership of the factors of production.
- ...will accelerate the trend away from family owned and operated farms and family control of the production process toward non-family corporate control of the production process.
- ...provides the opportunity and context for family owned farms to expand their operations and provide income opportunities for their children on the family farm.
- ...and especially contract production can help mitigate the risk inherent in the high cost of the newest agricultural technologies at the cost of losing some degree of control over the production operation.
- ...has resulted in smaller scale farms receiving less favorable prices from pork processors for their hogs than large scale corporate owned and operated pork production facilities even when the products are comparable.
- ...has resulted in the need for a hog farmer to invest a minimum of \$250,000, to build two hog houses, to have a chance of being competitive and successful under current conditions.
- ...has changed the nature of agricultural lending such that less loans are made and are primarily made to well capitalized operations.
- ...has created opportunities for large scale concentrated livestock production which is directly linked to odor problems, livestock disease problems, and ground and surface water pollution problems.

CALIFORNIA FOCUS GROUP

INDUSTRIALIZATION...

- ...has accelerated and will continue to accelerate the loss of farm numbers and an increase in the average size of farms.
- ...has resulted in a counter-trend of small scale farms linked to consumers through direct marketing arrangements, primarily farmers' markets, as a number of consumers, producers and processors reject a highly concentrated, large scale, global and corporate dominated agriculture.
- ...has had less of an impact on the reductions of small farm numbers in California than urban growth and increasing urban control of water resources.
- ...has changed farming such that farmers tend to contract out more and more farm tasks rather than performing the tasks themselves.
- ...and the resulting concentration of production and processing promotes the linking of large scale, often corporate, production operations with large scale corporate processing operations often to the detriment of the small scale producers.
- ...has resulted in a skewed distribution of control of land resources (ownership and leasing arrangements) such that the majority of land is controlled by only a few holders.
- ...has negatively impacted rural communities as large scale farms purchase their inputs in large amounts outside the rural community.
- ...has resulted in a significant number of rural communities in the State of California containing large numbers of foreign born farm workers who pay taxes but who are not citizens and therefore cannot participate in public

life.

- ...and the concurrent globalization of production has provided processors with leverage (threats to move jobs overseas) to keep U.S. wages low in the food processing sector.
- ...has created the opportunity for steady employment of farm labor that is not available on smaller scale family farms.
- ...and the resulting decrease in the number of farmers has eroded the political clout of farmers in regards to issues of water control and access.
 - urban and environmental interests have allied to dominate water politics in the State of California.
- ...has enabled substantial resources, personnel and money, to be invested in reconciling production goals with maintaining environmental quality.
- ...promotes mass production, uniformity of product as well as durability such that the genetic diversity of the major agricultural commodities is greatly reduced.
- ...promotes genetically engineered commodities which are linked to a narrow genetic base. This process increases the risk of catastrophic impacts from plant and animal diseases.
- ...is linked to out-of-state or out-of-country investor ownership of farm land which results in a lower degree of land stewardship, and resulting increase in environmental degradation, than an owner operator situation.
- ...is compatible with organic production.

GEORGIA FOCUS GROUP

INDUSTRIALIZATION...

- ...has resulted in improved genetics, and higher productivity, in major crops and livestock.
- ...has resulted in more effective disease control technologies and management methods.
- ...has resulted in a poultry industry where a majority of growers make no money or lose money.
- ...and poultry contract production has helped to retain family owned farms.
- ...has forced many growers to accumulate debts such that they stay in the poultry business because they cannot afford to leave the industry.
- ...in the poultry industry has been the primary driver of rural economic growth in many areas.
- ...has resulted in large numbers of low paid workers employed in the poultry processing plants, which has put stress on the social services of many rural communities.
- ...has been fueled partly by the ability of the industry to externalize the environmental and social costs of the production system.
 - forcing the industry to internalize environmental and social costs may make alternative production systems more competitive and economically attractive.
- ...has created environmental problems in the poultry industry regarding dead bird and poultry litter disposal.
 - processors dictate contract terms such that growers are responsible for waste disposal and growers are the least able to pay for waste disposal.

6) Conclusion

In this report I have attempted to provide some insight into, and delineation of, the issues and debates surrounding the changing structure of the U.S. agricultural economy. To that end I have compiled a review of the literature and performed interviews with individuals involved in agricultural production issues at a number of levels.

Based on the reviewed literature as well as the views of the focus group participants, there seems to be some agreement that two agricultural production streams are emerging in the United States. If policies such as Nebraska's I-300 are not widely adopted, and current trends persist, two discrete agricultural production systems should

continue to emerge. One system will consist of large-scale corporate enterprises and contract production dominated by a few buyers, often MNCs. This system will be characterized by capital intensive technology development and adoption, proprietary control of some information enabling production, as well as worldwide marketing and distribution. In addition, there will likely be government regulation of production contracts and command and control environmental regulation. Also growers, food processing workers and farm workers will probably continue to organize themselves into bargaining units.

The other system will consist of smaller scale farms which employ strategies of on-farm diversification of enterprises, as well as limited off-farm input use to control costs and minimize environmental impacts. This system will be characterized by the development of markets based on locality of production, production practices, consumer health concerns, farm structure, and the production of diverse varieties of crops and/or livestock. Growers may also organize to share production information, utilize capital-intensive technologies, and/or to facilitate marketing and distribution efforts.

There remains much to be learned about the causes and consequences of agricultural industrialization. This background study points to the need for research into how changes in the structure of agriculture impact individuals, economies, and the environment. There is a particular need for the empirical investigation of the relationship between industrialization and biological diversity in agriculture. In addition, the impact of industrialization on rural communities, residents and agricultural workers needs more illumination. The role of production contracts in influencing on-farm environmental performance is another area where research is needed. How do contract terms influence the environmental awareness and propensity to take action on the part of farm households?

These are only a few questions raised by the debates and issues surrounding structural change in U.S. agriculture. Socioeconomic and multidisciplinary research is needed to inform intelligent policy that addresses identified concerns and promotes social, economic and environmental well being. Without information-based policy reform, it may not be long before agriculture's uniqueness relative to other sectors has dissolved, leaving in its wake abandoned cultures, communities, and relationships long valued by the American people.

7) References

Armstrong, Jay. 1995. "Reactors to consequences of industrialization- panel one." Proceeding of the Industrialization of Heartland Agriculture: challenges, opportunities, consequences, alternatives. July 10-11, 1995 in Minneapolis, Minnesota.

A Time to Choose: Summary Report on the Structure of Agriculture. 1981. U.S. Department of Agriculture.

Barkema, Alan. 1993. "Reaching consumers in the twenty-first century: the short way around the barn." American Journal of Agricultural Economics, 75:1126-31.

Barnes, Donna and Audie Blevins. 1992. "Farm structure and the economic well-being of nonmetropolitan counties." Rural Sociology, 5(3):333-346.

Boehlje, Michael. 1995. "Industrialization of agriculture: what are the consequences." Proceeding of the Industrialization of Heartland Agriculture: challenges, opportunities, consequences, alternatives. July 10-11, 1995 in Minneapolis, Minnesota.

Breimyer, H.F. 1962. "The three economies of agriculture." Journal of Farm Economics, 44:679-89.

Buttel, F.H., Olaf F. Larson and Gilbert W. Gillespie. 1990. The Sociology of Agriculture. New York: Greenwood Press.

Center for Rural Affairs. 1990. Competition and the Livestock Market. Walthill, Nebraska.

- Center for Rural Affairs. 1994. Spotlight on Pork. Walthill, Nebraska.
- Clouse, Mary. 1995. Farmer Net Income from Broiler Contracts. Pittsboro, NC: Rural Advancement Foundation International - USA.
- Council on Food, Agricultural and Resource Economics. 1994. The Industrialization of Agriculture: Policy, Research and Education Needs. Report of a Symposium, July.
- DiPietre, Dennis D. 1992. "The economic impact of increased contract swine production in Missouri." Missouri Farm Financial Outlook 1993, University Extension, University of Missouri-Columbia, Department of Agricultural Economic-78.
- Doyle, Jack. 1985. Altered Harvest. New York: Viking Penguin.
- Drabenstott, Mark. 1994. "Introduction." in Schertz and Daft (eds.) Food and Agricultural Markets: The Quiet Revolution. Washington, D.C.: National Planning Association.
- Durrenberger, E.P. and Kendall Thu. in press. "The expansion of large scale hog farming in Iowa: the applicability of Goldschmidt's findings fifty years later." Human Organization.
- Ervin, David E. and Katherine R. Smith. 1994. "Agricultural industrialization and environmental quality." Choices, Fourth Quarter: 7.
- Fowler, Cary and Pat Mooney. 1990. Shattering: Food, Politics, and the Loss of Genetic Diversity. The University of Arizona Press.
- Friedland, William H. 1994. "The global fresh fruit and vegetable industry: an industrial organizational analysis." in McMichael (ed.) The Global Restructuring of Agro-Food Systems. Cornell University Press.
- Friedland, William H., Amy E. Barton and Robert J. Thomas. 1981. Manufacturing Green Gold: capital, labor and technology in the lettuce industry. New York: Cambridge University Press.
- Friedmann, Harriet. 1993. "The political economy of food: a global crisis." New Left Review, 196:29-57.
- Friedmann, Harriet. 1994. "Distance and durability: shaky foundations of the U.S. food economy." in McMichael (ed.) The Global Restructuring of Agro-Food Systems. Cornell University Press.
- GAO (General Accounting Office). 1995. Animal Agriculture: Information on Waste Management and Water Quality Issues.
- Gilbert J. and R. Akor. 1988. "Increasing structural divergence in U.S. dairying: California and Wisconsin since 1950." Rural Sociology, 53(1):56-72.
- Godwin, M.R. and L.L. Jones. 1971. "The emerging food and fiber system: implications for agriculture." American Journal of Agricultural Economics, 53(5):806-14.
- Goldberg, Ray A. 1994. "New international linkages shaping the U.S. food system." in Schertz and Daft (eds.) Food and Agricultural Markets: The Quiet Revolution. Washington, D.C.: National Planning Association.
- Goldschmidt, Walter J. 1947/1978. As You Sow. Montclair, NJ: Allanheld Osmund Publishers.
- Goodman, David, B. Sorj and D. Wilkinson. 1987. From Farming to Biotechnology. New York: Basil Blackwell Ltd.
- Hamilton, Neil. 1994. "Agriculture without farmers? Is industrialization restructuring American food production and threatening the future of sustainable agriculture?" Northern Illinois University Law Review, 14(3):613-57.
- Hamilton, Neil. 1995a. A Farmer's Legal Guide to Production Contracts. Philadelphia: Top Producer.

- Hamilton, Neil. 1995b. "State regulation of agricultural production contracts." *The University of Memphis Law Review*, 25(3):1051-1106.
- Harlan, J. 1976. "The plants and animals that nourish man." *Scientific American*, (235):88-97.
- Helmuth, John W. 1995. "Buyer concentration in livestock markets: trends, impacts and implications." Address to Dakota Rural Action (Brookings, South Dakota), July 10-12.
- Henderson, Dennis R. and Charles R. Handy. 1994. "International dimensions of the food marketing system." in Schertz and Daft (eds.) *Food and Agricultural Markets: The Quiet Revolution*. Washington, D.C.: National Planning Association.
- Heffernan, William D. 1994. "Agricultural profits: who gets them now, and who will in the future?" Paper presented at the Fourth Annual Conference of Sustainable Agriculture: People, Products and Profits. August 4. Leopold Center for Sustainable Agriculture, Iowa State University.
- Hilchey, Duncan, Thomas A. Lyson and Gilbert W. Gillespie. 1995. *Farmers' Markets and Rural Economic Development: Entrepreneurship, Business Incubation, and Job Creation in the Northeast*. Ithaca, NY: Cornell University Farming Alternatives Program.
- Ikerd, John E. 1995. "Sustainable agriculture: an alternative model for future pork producers." Prepared for NE-165 Research Conference: Vertical Coordination in the Food System. June 5-6, Washington, D.C.
- Iowa Business Council Livestock Industry Task Force Committee. 1989. *Job Creation in Animal Agriculture in Iowa*. Iowa Business Council.
- Kinsey, Jean. 1994. "Changes in food consumption from mass markets to niche markets." in Schertz and Daft (eds.) *Food and Agricultural Markets: The Quiet Revolution*. Washington, D.C.: National Planning Association.
- Knoeber, Charles R. and Walter N. Thurman. 1995. "Don't count your chickens...: risk and risk shifting in the broiler industry." *American Journal of Agricultural Economics*, 77(3):486-496.
- Labao, Linda M. 1990. *Locality and Inequality: Farm and Industry Structure and Socio-economic Conditions*. Albany, NY: State University of New York Press.
- Lively, Janet. 1993a. "A big stink in dairyland." *Democrat and Chronicle* (Rochester, New York), Sunday, April 25.
- Lively, Janet. 1993b. "Manure trial's relationships tangled." *Democrat and Chronicle* (Rochester, New York), Saturday, May 8.
- Lyson, Thomas A. and Charles Geisler. 1992. "The second agricultural divide: the restructuring of American agriculture." *Sociologia Ruralis*, XXXII(2/3):248-63.
- Lyson, Thomas A. and Rick Welsh. 1993. "The production function, crop diversity and the debate between conventional and sustainable agriculturalists." *Rural Sociology*, 58(3):424-439.
- Marion, Bruce W. and Frederick E. Geithman. 1994. *Concentration-Price Relations in Regional Fed Cattle Markets*. Food Marketing Policy Center, Research Report #25, University of Connecticut, Department of Agricultural and Resource Economics:19-21.
- Mann, Susan and James Dickinson. 1978. "Obstacles to the development of a capitalist agriculture." *Journal of Peasant Studies*, 5:466-81.
- Marcus, Gerald D. and Donald A. Frederick. 1994. *Farm Bargaining Cooperatives: Group Action, Greater Gain*. U.S. Department of Agriculture, Agricultural Cooperative Service, Research Report 130.

- Marsden, Terry K. and Sarah Whatmore. 1994. "Finance capital and food system restructuring: national incorporation of global dynamics." in McMichael (ed.) *The Global Restructuring of Agro-Food Systems*. Cornell University Press.
- McMichael, Philip. 1994. "Introduction: agro-food system restructuring-unity in diversity." in McMichael (ed.) *The Global Restructuring of Agro-Food Systems*. Cornell University Press.
- Mooney, Patrick H. 1988. *My Own Boss? Class, Rationality and the Family Farm*. Boulder, CO: Westview Press.
- National Research Council. 1993. *Managing Global Genetic Resources: Agricultural crop issues and policies*. Washington, D.C.: National Academy Press.
- Natural Foods Merchandiser. 1995. "Organic Market Overview." Boulder, CO: New Hope Communications, June.
- Nutrition Week. 1995. "CDC: reported incidence of E. coli rising, varying." *Community Nutrition Institute*, XXV(25):2.
- O'Brien, Patrick. 1994. "Implications for public policy." in Schertz and Daft (eds.) *Food and Agricultural Markets: The Quiet Revolution*. Washington, D.C.: National Planning Association.
- Pirtle, Robert. 1926. *History of the Dairy Industry*. Chicago: Mojonnier Bros. Co.
- Powers, Ron. 1995. "Consequences of industrialization on communities." *Proceeding of the Industrialization of Heartland Agriculture: challenges, opportunities, consequences, alternatives*. July 10-11, 1995 in Minneapolis, Minnesota.
- Raeburn, Paul. 1995. *The Last Harvest*. New York: Simon and Schuster.
- Rhodes, V.J. 1993. "Industrialization of agriculture: discussion." *American Journal of Agricultural Economics*, 5:1137-1139.
- Selitzer, Ralph. 1976. *The Dairy Industry in America*. New York: Dairy Field.
- Smothers, Ronald. 1995. "Waste spill brings legislative action." *New York Times*, Friday, June 30.
- Sonka, Steven T. 1995. "Forces driving industrialization." *Proceeding of the Industrialization of Heartland Agriculture: challenges, opportunities, consequences, alternatives*. July 10-11, 1995 in Minneapolis, Minnesota.
- Stacy, R.N. 1994. "Biotechnology and the globalization of the U.S. food industry." in Schertz and Daft (eds.) *Food and Agricultural Markets: The Quiet Revolution*. Washington, D.C.: National Planning Association.
- Stanley, Kathleen. 1994. "Industrial and labor market transformation in the U.S. meat packing industry." in McMichael (ed.) *The Global Restructuring of Agro-Food Systems*. Cornell University Press.
- Stanly, Michael. 1995. "Consequences of industrialization on public policy issues and industry practices." *Proceeding of the Industrialization of Heartland Agriculture: challenges, opportunities, consequences, alternatives*. July 10-11, 1995 in Minneapolis, Minnesota.
- Strange, Marty. 1988. *Family Farming: a New Economic Vision*. University of Nebraska Press.
- Stull, Donald D. 1994. "Of meat and (wo)men: meat packing's consequences for communities." *The Kansas Journal of Law and Public Policy*, Spring:112-18.
- Stull, Donald D., Michael J. Broadway and David Griffith (eds).1995. *Anyway You Cut It: Meat processing and small-town America*. University Press of Kansas.
- Sumner, Daniel. 1994. "Concentration and the food system: the role for public policy." in Schertz and Daft (eds.) *Food and Agricultural Markets: The Quiet Revolution*. Washington, D.C.: National Planning Association.

Thu, Kendall M. 1995. "The social consequences of large scale swine production." Paper presented at the Social Consequences Session of Understanding the Impacts of Large Scale Swine Production: An Interdisciplinary Scientific Workshop. June 2-30, Botanical Center, Des Moines, Iowa.

Urban, Thomas N. 1991. "Agricultural industrialization: it's inevitable." Choices, Fourth Quarter:4-15.

Warrick, Joby and Pat Stith. 1995. "New studies show lagoons are leaking." The News and Observer. Sunday, February, 19.

Wilkins, J.L. 1995. "Seasonal and local diets: consumers' role in achieving a sustainable food system." in Schwarzweller (ed.) Research in Rural Sociology and Development. Greenwich, Conn.: JAI Press.

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