# Report to the National Farmers Union

# CONSOLIDATION IN THE FOOD AND AGRICULTURE SYSTEM

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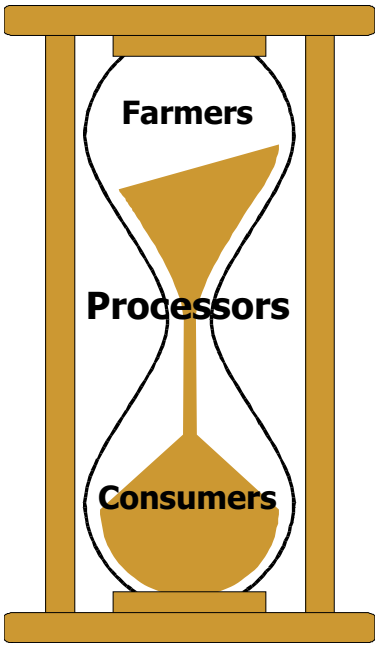
## Introduction

The organizational structure of the national/global food system is dynamic. New firm names emerge, often the result of new joint ventures, and old names disappear. But underlying these changes is a continuing concentration of ownership and control of the food system. These structural changes are so strong that they often undermine the desired and expected outcomes of much of the agricultural policy developed over the past couple of decades. These structural changes, often referred to as "the industrialization of agriculture," have progressed to the point that some agricultural economists now refer to the agricultural stage of the food system as "food manufacturing."

No longer can agricultural policy be discussed apart from the food system, because major engines of change that are impacting agriculture and muting the impact of agricultural legislation come from the larger food system. As one who has been studying the changes in the structure for over three decades, I am delighted the Congress has chosen to include a dialogue on the structure of the food system as part of the agricultural policy debate. Concentration of the food system must be a part of that debate, if the policy is to address some of the problems faced by farmers and the relatively few remaining rural communities that still depend heavily on an agricultural base.

One often hears the statement that agriculture is changing and we must adapt to the changes. Few persons who repeat the statement really understand the magnitude of the changes and the implications of them for agriculture and for the long-term sustainability of the food system. It is almost heresy to ask if these changes are what the people of our country really want or, if they are not what is desired, how we might redirect the change. The changes are the result of notoriously short sighted market forces and not the result of public dialogue, the foundation of a democracy. Neither are the changes the result of some mystical figure or an "invisible hand."




For well over a decade, several of us at the University of Missouri have been reporting the concentration ratios of the largest four processors of most of the major commodities produced in the Midwest. We liken the food system to an hour glass in which farm commodities produced by thousands of farmers must pass through the narrow part of the glass that is analogous to the few firms that control the processing of the commodities before the food is distributed to millions of people in this and other countries.

We focus on the largest four processing firms because the economic literature in the mid-1980's indicated there was general agreement that if four firms had 40 percent of the market, that market was no longer competitive. We realized that this selection was somewhat arbitrary, but it has provided a useful benchmark.

When we began collecting the data in the mid-1980's, this

information was relatively easy to obtain in trade journals, government reports, annual reports from corporations and other secondary sources. Over time, this information has become more difficult to obtain. Trade journals have come under pressure to not publish some of this information and government agencies often say that to reveal the proportion of a market controlled by a single firm in such a concentrated market is revealing proprietary information.

I once appeared on a panel to discuss the concentration of the beef sector with three others. Each of us had a different percentage of the market controlled by the largest four beef slaughtering firms. We agreed on the largest four firms and their ranking, and differed only slightly on the percentage of the market the four controlled. The range of difference was only about six percent and probably not really significant because we all agreed the top four had at least 75 percent of the market. Yet as a social scientist, I am uneasy about such differences. Differences of this magnitude can (and should) raise questions about the legitimacy of such research. We work hard to get these numbers and I'll defend the trends we highlight from the data, but I cannot defend each percentage.

The fact that these "CR 4 Tables" (see tables attached to this report) have become popular indicates that most people have not found information on market share to be very accessible. In a democracy where we expect the citizens to be involved in setting national policy, it is absolutely necessary that they have accurate information on some of the major drivers of change. At times I have appeared publicly with persons from some of the firms listed in our tables. My initial comment is that if my data differ from the data of the representative of the large firms, the audience must accept the data from the firm because primary data always trump secondary data and I only have access to secondary data. The public must have better data. I would urge Congress to seek better data and make it available to the public as it begins to debate the relationship between concentration and agricultural policy and rural issues.

Data in the table indicate that four firms control over 40 percent of the processing of the major commodities produced in the Midwest. In addition, a few firms appear in the list of the top four processing firms for several commodities. For example, ConAgra is on the list of top four processing firms for beef, pork, turkeys and sheep, as well as seafood, a commodity not listed in the tables. This year it has slipped to fifth place in broiler production and processing. The data also begin to suggest the vertical integration in the food system. For example, Cargill ranks in the top four firms producing animal feed, feeding cattle and processing cattle.

The data do not reveal the extent of vertical integration in the food system in the United States or the complex web of interactions among the top firms. This data cannot even attempt to address the global nature of the food system. In an effort to communicate the complicated interaction between the firms and reveal the structure of the food system, we have attempted to diagram some of the formalized working relationships between the dominant firms in the global food system. This information does not begin to exhaust the list of mergers, joint ventures and side agreements. We have only scratched the surface. These data are exploratory, but suggest the type of information needed to understand the concentration of the global food system.

We have already noted the difficulty of getting information in this country. Getting global information is far more difficult. To understand the U.S. food system, one must

understand the global food system; to understand the global food system, one must understand the operations of the major global firms such as Cargill, ADM, and ConAgra. Cargill has operations in 70 countries and is a privately held firm. How do we get all of the necessary information? We have exposed the tip of the iceberg, but exposure only indicates the type of information needed to understand the global food system.

The major concern about concentration in the food system focuses on the control exercised by a handful of firms over decision-making throughout the food system. The question is who is able to make decisions about buying and selling products in a marketplace. The focus of economic power is usually placed on the individual firm and its market share. For some of the global firms, this is still somewhat appropriate. However, decision-making can also be exercised through the various relationships in which a firm is involved even if it does not hold a majority share. The changing nature of the food system suggests that relationships among the firms are becoming much more complex and much more important.

In the past, most of the global grain firms were family-held operations that tried to maintain low visibility and were quite secretive about their transactions. These firms operated in one or two stages of the food system and in a very few commodities. Today the system is becoming much more complex starting with involvement in biotechnology, extending through production, and ending with highly processed food. Increasingly, these firms are developing a variety of different alliances with other players in the system. Acquisition is still a common method of combining two or more firms, but mergers, joint ventures, partnerships, contracts, and less formalized relationships, such as agreements and side agreements, are also utilized. We will use the concept "cluster of firms" to represent these new economic arrangements.

We have chosen to organize the information around the emerging clusters of firms that control the food system from gene to supermarket shelf. The term "alliance" is frequently used to suggest the "seamless system" which describes the emerging, fully vertically integrated food system from gene to shelf. Within this emerging system, there will be no markets and thus no "price discovery" from the gene, fertilizer processing and chemical production to the supermarket shelf. The only time the public will ever know the "price" of animal protein is when it arrives in the meat case. As this system evolves, even the price of the livestock feed and its ingredients, such as the corn, will not be known to the public, because like today's broilers the product will not be sold. The firm owns the chick and sends it to their processing facility from which it emerges, perhaps in a TV dinner. However, the prices along the line of production are never discovered until the chicken is sold to the consumer. In a food chain cluster, the food product is passed along from stage to stage, but ownership never changes and neither does the location of the decision-making. Starting with the intellectual property rights that governments give to the biotechnology firms, the food product always remains the property of a firm or cluster of firms. The farmer becomes a grower, providing the labor and often some of the capital, but never owning the product as it moves through the food system and never making the major management decisions.

The system is still evolving and it is not yet possible to determine how many clusters may evolve, but experiences in other economic sectors, like the auto industry, suggest we seldom see monopolies evolve. Even at the global level, where there are no anti-trust regulations, oligopolies, not monopolies, tend to emerge. We are predicting the development of four or five

food clusters, because the number of clusters will be heavily influenced by the number of firms who have access to the intellectual property rights. The underlying assumption here is that biotechnology will be accepted by most nations of the world, an assumption that may not be valid, because this acceptance is still in question in some countries. We will make this assumption here because the monopoly power that accompanies the intellectual property rights that leads to control of the gene pool will be most difficult for any new or emerging cluster to obtain. We are certainly open to a critique of our starting point. Disagreeing with our point of departure for the sake of organizing the data should not influence the relevance of the data we use to describe the evolving system.

## The Food Chain Clusters

### Cargill/Monsanto

Monsanto is one of the leading biotechnology firms. The joint venture between Monsanto and Cargill announced in 1998, clearly established one of the clusters. Cargill had already established its own food chain over the past several years by planned acquisitions. It was one of the largest seed firms in the world with seed operations, including research operations, in twenty-three countries of the world. However, Cargill did not have access to biotechnology and the new genetic products it would produce. As the *Wall Street Journal* (9/29/98) pointed out, "most seed companies have either aligned themselves with, or been acquired by, crop-biotechnology juggernauts such as Monsanto Co., DuPont Co. and Dow Chemical Co." Thus, they sold their international seed operation to Monsanto and their domestic seed operation to AgrEvo, a Berlin-based joint venture between Hoechst and Schering (*Wall Street Journal* 9/29/98). Cargill then formed a joint venture with Monsanto, the company that had the intellectual property rights to develop the genes and had a very comprehensive array of seed firms (*Knight-Ridder/Tribune* 7/28/98).

Perhaps most importantly, the Cargill/Monsanto cluster is now in the process of obtaining control of the "terminator gene" that can be inserted into plants to cause all of their seeds to be sterile. No longer will Monsanto have to depend on access to farmers' fields for collection of tissue samples to make sure farmers do not keep any seed from one year's crop to plant the following year. Use of the terminator gene will mean that all crop farmers must return each year to obtain their seed from seed firms, just as corn producers have done for the past half-century.

There are two points to be made from the above scenario. The first point is that the reorganization of the food system is very dynamic and new technologies and other changes coming from outside the system can greatly disrupt the plans and organizational structure that a firm or cluster has developed. The second point is that a firm the size of Cargill has access to such large sums of capital that it can usually acquire whatever assets are necessary to survive. In addition, they are recognized as such formidable firms in the system that they can easily find other partners eager to join with them because the new partner is also eager to remain an active player in a food chain cluster. The Cargill/Monsanto cluster brings together giants in their respective stages of the food system. They needed each other to be a part of a complete cluster.

They have a complete food chain, but they realize that very few clusters will survive so they continue to actively pursue other firms through acquisitions, joint ventures or other arrangements to increase their economic power.

The most recent proposed acquisition is the grain merchandizing division of Continental Grain. This acquisition brings with it almost 70 inland grain elevators and seven export terminals (*Wall Street Journal*, 11/10/98). The acquisition of Continental's grain division would appear to be relatively inconsequential if one examines the elevator capacity in bushels or the number of facilities, two items that are often used as indicators of "point of first purchase of grain" (purchase of grain directly from farmer). In certain regions of the country, such as along the Illinois and Ohio rivers, Cargill's acquisition does limit a farmer's choice to either Cargill or ADM. The largest four firms (Cargill, ADM, Continental Grain and Bunge) only have 24 % of the elevator capacity in bushels and 39 % of the facilities.

The importance of the merger becomes more obvious when the data show that the four firms control almost 60 % of the port facilities. The Cargill acquisition of Continental would mean that Cargill "would control more than 40 percent of all U.S. corn exports, a third of all soybeans exports and at least 20 percent of wheat exports." (Grainnet, 12/1998). At the global level, the merger combines what was reported at the start of the decade to be the largest two global grain traders (*Knight-Ridder/Tribune Business News*, 11/10/98). The emergence of ADM as a major global grain trader came through the acquisition of parts of Louis Dreyfus (originally a joint venture involving ADM leasing elevators) and Pillsbury (a part of Grand Metropolitan, a British firm that merged with Guiness). Bunge was third for a time, but a joint venture to share wheat handling facilities between ConAgra and Farmland Industries and the alliance between Cenex-Harvest States directly to ConAgra (through Peavey), and indirectly to Farmland, has reduced the number of global grain traders during the past decade.

The pressures causing a firm like Cargill to continue to seek to enlarge its cluster is perhaps best summarized in a quote from the *Wall Street Journal* (11/10/98 p. A3):

> As grain handlers go, Continental Grain is at a big disadvantage because it doesn't have the facilities to mill and refine crops into higher-value products, such as flour and high-fructose corn syrup. When U.S. exports slow, as they have this year [1998], Continental Grain can't shift crops to domestic uses in the same way that Cargill and Archer-Daniels-Midland Co. can. Cargill and Archer-Daniels are major grain processors . . .
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> For Cargill, a deal with Continental Grain would increase the number of its grain-gathering facilities all along the Mississippi River and in important exporting ports such as New Orleans. In 1996, Continental Grain operated 70 inland grain elevators and seven export terminals. It isn't clear whether Cargill would close some overlapping operations.
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> Cargill's interest in Continental Grain follows several moves by Archer-Daniels of Decatur, Illinois, to increase its grain-storage capacity through joint ventures and acquisitions. Industry officials said Archer-Daniels can top about

500 million bushels of grain world wide. A pact with Continental Grain would allow Cargill to directly access more grain than Archer-Daniels currently can.

Continental was also feeling the pressures of a changing food system. According to the *Wall Street Journal* (11/11/98, pA10), Continental CEO Paul Fribourg was convinced that his company could not continue as a grain handler because of competitors expanding into "the more-profitable businesses of milling and crop biotechnology." In fact, the company considered merging with a commodity processor before selling the business to Cargill. The deal raises some interesting questions. What does ContiGroup, the remainder of Continental, plan to do for access to grain for feeding its hogs, cattle and poultry and where does it plan to get its cattle slaughtered? Does ContiGroup feel it can add to its processing capacity to meet its growth projections and compete with Smithfield, IBP, ConAgra and Cargill and the clusters it is joining? Is there some side agreement that has not yet been made public which will include ContiGroup within the Cargill/Monsanto cluster? What happens to the alliances Continental had with Harvest States (Tacoma Export Marketing Co.), Optimum, a joint venture with DuPont/Pioneer, ContiPasz, a feed company in Poland, and its venture with Quincy Soybean Company, now owned by ADM?

Industry analysts suggest one of the reasons Cargill needs more facilities is to position the company as a major grain trader as identity-preserved products come on line. Those promoting value-added opportunities for farmers have suggested that small, single facility firms, like new generation cooperatives, might find a niche in the handling of identity-preserved products because the big grain traders could not or would not come into such small markets. With the additional facilities Cargill has just acquired, it is in position to utilize a facility in the center of a farming region that could produce the new product and contract with surrounding farmers for the product. Cargill could use marketing contracts or production contracts much like it does in the poultry sector.

Reports suggest Cargill paid about one billion dollars for Continental (*Wall Street Journal*, 11/11/98 p. A10). That is only about half of their 1998 income. Cargill could buy two operations the size of Continental's global grain division with one year's earnings. That is economic power. There is freedom of entry into the global food system for those firms that can match that level of purchasing power. Cargill's corporate goal is to double in size every five to seven years that it says it has achieved for the past 40 years. Since the major firms in these clusters expect to make at a 20 percent return on their equity, the Cargill goal is very similar with other such firms.

## ConAgra

With diversified interests ranging from "farm gate to dinner plate," a ConAgra subsidiary can be found along most links of the food chain. ConAgra is one of the three largest flour millers in North America and ranks fourth in dry corn milling in the U.S. The company produces its own livestock feed and ranks third in cattle feeding and second in cattle slaughtering. It ranks third in pork processing and fifth in broiler production and processing. In its 1997 Annual Report, ConAgra explained that its United Agri Products (UAP) business is a leading distributor

of crop protection chemicals, fertilizers and seeds in the U.S., Canada, Mexico, Chile and U.K. UAP is moving into new markets around the world, such as through a joint venture with Zeneca Agrochemicals (now AstraZeneca) in the Cape region of South Africa which will establish a base for UAP growth on the African continent. ConAgra's annual report also noted that UAP is a leader in the distribution of new biotechnology products, principally seeds. As part of ConAgra, UAP identifies new applications for biotechnology in the food industry and provides links to other ConAgra companies, which can capitalize on the application potential for consumers.

In the handling and transportation of grain, ConAgra owns about 100 elevators and 1,000 barges and 2,000 railroad cars. ConAgra's grain trading company, Peavey, is ranked third in ownership of U.S. covered barge fleet. American Commercial Barge Lines, Inc., is number one, followed by Artco, a company owned by Archer Daniels Midland. According to the trade journal *Feedstuffs* (9/95), these top three controlled 53% of the nation's covered barge fleet.

Despite ConAgra's long history of being a company from "seed to shelf", we are unsure of the direction of their food chain cluster, although hints are to be found in their annual report. One indication is ConAgra's Agri Products division teaming with DuPont in a group of joint ventures, about a dozen developmental businesses. According to a *New York Times* article (10/30/97), ConAgra's range of expertise may make it especially attractive to potential business allies like DuPont. For example, DuPont has relied heavily on ConAgra for the initial commercialization of its new high-oil corn. Once United Agri Products found farmers to grow the corn under contract, ConAgra's chicken operations bought the grain.

Relationships that exist between the food chain clusters also complicate any kind of explanation of the food system. For example, ConAgra and ADM formed a joint venture in mid 1998 to operate the Kalama grain export facility in Washington State. The new company, owned 50-50 by the two giants, is known as Kalama Export and operates one of the most efficient export facilities on the West Coast. The facility was built by ConAgra and operated under its auspices from 1983 until the joint venture formed. In another grain-based alliance, ConAgra and Farmland Industries have linked together to improve both companies' services to farmers and grain marketing and export activities. The new alliance will consist of two entities, Concourse Grain and Farmland-Atwood. Concourse Grain will operate two ConAgra export elevators and two Farmland elevators (one export, one interior) and will market wheat originated by the two companies. This alliance will enable domestic and wheat customers to access multiple classes of wheat, and international customers to be served from multiple U.S. export points. Prior to these grain ventures, ConAgra created a joint venture with Harvest States Cooperatives in 1994 to operate three elevators in Iowa and two export grain terminals in Louisiana. The 50-50 partnership, called HSPV, was expected to improve efficiency and flexibility in grain origination, shipment and handling of grain exports for both Harvest States and ConAgra's grain export company, Peavey (*Feedstuffs* 9/12/94).

ConAgra follows the processing of food farther down the food chain than Cargill and ADM, ultimately selling labeled food items that most consumers would recognize such as Armour, Monfort, Swift, Butterball, Healthy Choice, Peter Pan Peanut Butter, Hunt's, and many others. It currently ranks second behind Philip Morris as the leading food processor in the U.S.

In its 1998 Annual Report, ConAgra noted 18 consecutive years of earnings per share growth at a compound rate of 15 percent. Fiscal 1998 sales totaled $23.8 billion and fiscal 1998 operating profit, $1.6 billion. Chief executive Bruce Rohde, who succeeded Philip Fletcher in September 1997, has set a goal of making ConAgra the world's largest and most profitable food company by the year 2005. This means passing not only Philip Morris, but also world-leader Nestle of Switzerland.

ConAgra's growth during the 1990s has been accomplished through a strategy of acquisitions, divestitures and adding value to their products. Under the leadership of Philip Fletcher, the company's practice was to have 80-100 acquisition candidates in screening at all times. ConAgra was able to report in 1998 that it had acquired or created joint ventures with approximately 150 companies during the past 10 years.

## Novartis/ADM

Novartis is a Swiss firm formed by the merger of CIBA-Geigy and Sandoz in late 1996. According to their 1997 Annual Report, the company has agribusiness operations in 50 countries worldwide. Their "agriservices" are primarily in crop protection chemicals, seeds and animal health. The merger of the two large chemical firms – plus the acquisition of Merck in 1997 – puts Novartis in the leading position in the global agrochemical field with sales of $4 billion in 1997 (*Chemical Week*, 5/21/97). This left Monsanto (not including its recent buying spree), Zeneca (a British firm that recently merged with a Swedish firm to create AstraZeneca) and DuPont all vying for second place in the global agrochemical field. In 1997, *Europe Chemical News* (4/28/97) estimated that Novartis had 15% of the global agrochemical market. Moreover, the company "has the largest R & D budget in the life sciences industry" according to their own press release in May 1997. Their emphasis on R&D is also reflected in their collaboration with the University of California-Berkeley, where they recently signed a 5-year $25 million research agreement to work "in all areas of functional genomics related to agriculture, including gene-library construction, sequencing, mapping and bioin-formatics." (*Chemical Market Reporter* 11/30/98)

The Novartis/ADM connection is established through Novartis joint venture with Land O' Lakes to develop specialty corn hybrids for the food and feed markets. Novartis purchased a 50% interest in Wilson Seeds Inc., a subsidiary of Land o' Lakes. The joint venture will also acquire genetics from Sturdy Grow Hybrids, already in a venture with Novartis to introduce a white corn hybrid with the Bt trait (*PR Newswire*, 10/14/98). Land O' Lakes maintains an alliance with Growmark (energy products) and recently took over Countrymark, a major eastern Corn Belt cooperative, both of which are in joint ventures with ADM. The link between Novartis/ADM is somewhat tenuous because Countrymark did not include their grain marketing division in the joint venture, a division that is already in a grain joint venture with ADM. However, the point is that the Novartis/ADM cluster, unlike Monsanto/Cargill, is really predicated on relationships with farmer cooperatives.

Though some might dismiss this Novartis/ADM connection as insignificant, one must raise the question of what these relationships could indicate in the future as firms jockey for

position in these food chain clusters. First, ADM, with its vast network of processing facilities, lacked access to farmers, a problem the firm remedied through a long-standing joint venture with Growmark and the more recent ones with Countrymark, Riceland, and United Grain Growers. The Growmark and Countrymark joint ventures, for instance, give ADM access to 50% of the corn and soybean market region, and 75% of Canada's corn and soybean market region (*Feedstuffs* 8/12/96). The 42% share ADM gained in United Grain Growers – a former cooperative that is now publicly owned with major stakeholders also being the Alberta and Manitoba wheat pools – gives ADM widespread access to farmers in western Canada.

For the cooperatives who lacked the muscle of large firms in downstream processing – as in the case of Minnesota Corn Processors, a new generation wet corn milling cooperative that sold a 30% non-voting share to ADM – ADM offered a far-flung global network in which to sell their grain. No one put it more succinctly than the president of Harvest States, who said when the Cenex-Harvest States merger was announced, that "agriculture cooperatives must operate today 'in a land of giants' where capital and scale 'are absolutely necessary'… in a market where corporate multinationals rule." (*Feedstuffs* 11/24/97) ADM's own partner, Growmark's CEO Norm Jones, commented that the joint ventures with ADM positioned Growmark and Countrymark in the global agricultural industry, which represents the only expansion possibility for most cooperatives. (*Feedstuffs* 8/12/96) ADM has also used joint ventures with cooperatives such as Goldkist and Ag Processing Inc. (AGP) in the feed business. A spokesperson for Consolidated Nutrition (ADM's joint venture with AGP) said that cooperatives "recognize the importance of partnerships as instruments to be competitive in an industry consolidating as substantially as the feed industry." (*Feedstuffs* 12/22/97)

The Novartis/ADM connection is also important because Novartis – while a truly global and powerful company with substantial sales in chemical, seed, animal health and human nutrition products – lacked access to further processing in either grain commodities or food products. Novartis will need ADM's grain handling and processing web to be able to guarantee producers using their seed stock a downstream market. ADM, on the other hand, lacked access to biotech and needs Novartis' genetics, seed stocks and chemicals. As spokesman Martin Andreas of ADM said in a *Feedstuffs* interview (1/12/98) " 'If you're not plugged into the global market today,' a company will have limited opportunity to prosper. . . . An international network 'is critical [and] if you are not tied into an international system, then you are not a traveler.' "

Novartis' genes, seeds and chemicals compliment ADM's far-flung grain collection and processing network, created through the aggressive pursuit of joint ventures and alliances in Europe and Latin America. ADM's stake in A. C. Toepfer, one of the world's largest grain trading firms, and Dwayne Andreas' claim that "my partners in the EU are 12 of the biggest farmers' cooperatives in the world…"[1] allowed ADM to process 45% of the commodities entering Eastern Europe from the West in 1993. ADM has also pursued joint ventures and acquisitions in Latin America in the last few years. Just their purchase of parts of Glencore's holdings in Brazil and Paraguay generated a 4% increase in their share of the world's soybean trade (*Feedstuffs* 6/9/97). Moreover, they maintain joint ventures in a variety of different

[1] Bovard, James. 1995. "Archer Daniels Midland: A Case Study in Corporate Welfare." Cato Institute Policy Analysis #241.

commodity processing and feed operations in Brazil, Paraguay, Bolivia and Mexico – and these are the alliances that are most easily documented. ADM has also advanced into the Chinese market through its oilseed refining, feed and broiler processing operations, where ADM is the junior partner with the Chinese government and a local processor. In discussing China's dilemma of balancing the need for food security or economic security, Martin Andreas, ADM's spokesman, commented "It means that China is resigned to importing food and paying for it with products made from their overabundant supply of cheap labor." (*Journal of Commerce* 2/17/98)

While ADM appears to be firmly networked at the commodity processing level, what is not so apparent is how they are going to substantially enter branded food products – as ConAgra has done – or production and processing in the livestock sector. ADM's venture into production and processing of livestock has been undertaken through their joint venture with AGP, Consolidated Nutrition, which has sow production on line, as well as ADM's steady increase of its stake in IBP, the largest U.S. beef packer and second largest U.S. pork packer. Although data are not readily available, IBP appears to have contracts with large feeding operations to guarantee captive supplies of beef – and some pork although not as widespread as beef contracts. In a more surprising move, ADM has chosen to decrease its holdings in Pilgrim's Pride to 6.4%, a firm in which they had an almost 20% stake in 1992 according to *Feedstuffs* (7/13/92), at the same time they maintain a broiler processing plant in China. IBP has also moved into the Chinese market, bringing a fully integrated pork production and processing facility on line in 1997 (*IBP Annual Report).* We are not sure what this means in terms of the food chain cluster for beef, pork, turkey or broiler production and processing. Are Smithfield and Tyson poised to join this chain? Or will they move somewhere else while ADM pursues its relationship with IBP?

It is clear that we have only scratched the surface of the Novartis/ADM/IBP cluster. Data are very difficult to obtain, particularly reliable data about global operations. For instance, who are ADM's EU cooperative partners, besides the ones we have listed? How do ADM's operations in China impact farmers in the United States? What role does ADM's own brokerage firm, among the top 40 largest in the US, play in currency and grain futures trading, particularly when ADM is a major grain handler and processor in Europe, North and South America and Asia?

Finally, the development of feed additives and other derivatives from wet corn milling remains a fascinating and potentially lucrative market as shown by Cargill's interest in entering the additives market through joint ventures with firms like Degussa. ADM is quite powerful in the production of lysine and citric acid – as evidenced by their recent legal troubles in the U.S. and EU in regards to both products – and is gaining ground in such new products as Vitamin E and soy isoflavones. The key question, which none of the major cluster firms has yet addressed, is what happens with further processed branded food products and supermarket sales? Novartis has their Gerber baby food, ADM has Haldane foods in Britain and their continuing production of Harvest Burger vegetarian alternative for Worthington Foods in the U.S., and IBP acquired institutional processor and supplier FoodBrands Inc. However, none yet have the presence of ConAgra – or Philip Morris for that matter – on the shelf or in the cooler in supermarkets. These questions still remain and are particularly relevant to public policy debates.

## Moving Beyond the Data

There are a host of major players in the food system which are not included in our three food chain clusters. Some have already begun to form alliances and others are still acting in a rather individualistic manner. Most likely, some of these will join together to form new food chain clusters, while others may join the clusters we have identified. Pioneer and Mycogen can form the anchor for other chains. Firms like American Home Products, DuPont, Dow, AstraZeneca, and Aventis, a recent joint venture of Rhone-Poulenc and Hoechst-Schering, are likely to join a cluster, as are some of the fertilizer firms. Bunge, a major grain trader, and some major animal production and processing firms like Tyson, Perdue, Smithfield and its alliance members Carroll's Foods and Murphy Family Farms, might well develop a working relationship. There are already relationships between many of these firms for which we have not indicated a cluster and some of them have or have had relationships with firms in the three clusters we have identified.

Watching the clusters develop by forming new relationships and breaking some of the old and speculating on what other relationships might develop is like watching a chess match and trying to anticipate the players' next moves. In this game, there can be four or more winners. The system is very dynamic. However, a look at the list of acquisitions and mergers during the past decade, or as we have shown within the last five years, suggests far more names were lost as firms joined another management unit than new names emerged. Many of these new names are simply the realignment of existing firms.

The diagrams help to communicate three points. The first is that a very small number of dominant food chain clusters appear to be emerging. Some are organized around one or two dominant players as exemplified in the cases of Cargill/Monsanto and ConAgra, which is only loosely connected to a biotechnology firm. The Norvartis/ADM/IBP case suggests another method of building a food chain cluster that is probably the path many of the major key players not yet involved in a cluster will follow. At least during the formative period, a dominant firm from the biotechnology area, one from the grain trading and processing area, and one from the meat production and processing develop a working relationship that is a bit more tentative than a merger. We are not suggesting these relationships are set in stone, even acquisitions can be sold. But the freedom of entry is restricted.

The second point is that the food system is becoming very complicated and difficult to describe. The complication in describing the system results from the fact that there is not a group of individualistic firms out there competing with one another. We are especially interested in all the relationships that exist within the clusters and those crossing from one food chain cluster to another. Some of these are the result of firm A having a relationship with firm B, and then developing a new relationship with firm C. But some of the relationships crossing cluster boundaries are new. The whole system is woven together by a host of working relationships between firms and, at least for the short run, the system looks pretty fluid. One is left asking the question: just how much competition is there in the system? We know there are examples of rivalry between firms and in some cases the firms are spending millions of dollars in court to settle their differences. Maybe the society would benefit most if the differences were to be

settled in a competitive market! Knowing that Nippon Meats of Japan has a twelve to fifteen year joint venture with Cargill producing broilers in Thailand makes it hard to believe there are not some constraints in the competition they exercise in this country as Nippon becomes a hog producer and processor in United States.

The third point is that as the food chain clusters form, with major management decisions made by a small core of firm executives, there is little room left in the global food system for independent farmers. The experts, even the leaders of cooperatives, are telling farmers they must give up their independence and join an alliance. This is another way of saying "give up your decision-making prerogatives to the food chain cluster if you want to maintain an economically-viable farming operation."

In most of the livestock commodities, the production stage is integrated into the larger food system. Ninety-five percent of the boilers are produced under production contracts with fewer than 40 firms. Essentially, there is no price discovery for chicken feed, day old chicks or live broilers. The food product does not sell at these stages. Basically there is no national market for live broilers. (There are niche markets emerging for range poultry and other specialty poultry, but processing is emerging as a major problem.) The production system is about the same for turkeys and eggs. At the end of low hog prices, which may last for at least another year, there will be few independent hog producers remaining. The issue is not who can produce the hogs the most efficiently. The issue is who has the deepest pockets and market share. Even now, the issue of market access for producers who do not have special relationships with feed or slaughtering firms has become obvious. Twenty feedlots feed about half of the cattle in the US and these are either owned by the slaughtering firms or have contracts with the processing firms. Operators of "independent lots" tell us that they seldom see buyers from more than one firm. Dairy farms are being consolidated, leaving only the cow/calf sector out of the integrated system. The cow/calf sector is the most highly subsidized sector of agriculture, subsidized by non-farm income. The cow/calf producers without access to non-farm income are facing economic hard times.

The movement toward increasingly differentiated products is bringing more contracts into field crop production. Two recent technologies will hasten the process of vertical integration in the crop sector. The first is biotechnology and the terminator gene that places the farmer at the mercy of the food cluster for seed to plant the crop. If the firms in the processing stage of the cluster require specific genetic material and the farmer cannot get that seed, he/she has no market access. The second technology is precision farming's global positioning system. It is no longer necessary for the farmer to have personal contact with their land and crop to make appropriate management decisions. Most of the decisions can now be made in the farmer's office. Any decisions that can be made without contact with the land and the crop can be made in an office in a distant city. In the not too distant future the person operating the corn planter will not know much about the genetic material of the corn being planted - just like the broiler grower does not know about the genetic stock of the birds he/she feeds. As the "farmer" watches the big truck with the computer on board reading from a satellite, he/she will not know much about the fertilize or chemical being applied to the field – just like the grower does not know much about the feed fed to the birds he/she cares for but does not own. The crop farmer will be paid on a piece rate basis just like the grower.

Increasingly we hear about the need for only 20,000 to 30,000 farms in the United States to produce for the global food system. The next question becomes what is a farm? In business administration literature, firm usually applies to a management unit. Traditionally the term farm has also referred to a management unit. If the integrating firm becomes the management unit as is implied in the case of broiler production, how many farms will there be in the United States in the future?

## Concerns about the Food System

Many different groups and individuals in this and other countries are raising serious concerns about the globalizing food system. One concern focuses on the consequences for rural communities of this restructuring.

Today, most rural economic development specialists discount agriculture as a contributor to rural development. The major reason why agriculture contributes so little to the community is because of the emerging structure of the food system. In a family business, such as family farm, a family grain elevator, or a family grocery store, the family subtracts its annual expenses from its income to determine profits that are then allocated among labor, management and capital. For the economic well-being of the family and the rural community, it makes little difference how the profits are allocated among the three costs of labor, management and capital. The local family spends much of the "profit" in the local community. In addition, when the rural community
retained all of income related to the three factors of production, the funds circulated more in the community. Not just the family farms, but all of the family businesses providing the agricultural infrastructure contributed to the economic well-being of the community. In the past when family businesses were the predominant system in rural communities, researchers talked of multiplier effects of three or four. Newly generated dollars in the agricultural sector would circulate in the community, changing hands from one entrepreneurial family to another three or four times before leaving the rural community. This greatly enhanced the economic viability of the community.

Large non-local corporations, whether hiring labor as wage earners or piece rate workers as in the case of growers, see labor as just another input cost to be purchased as cheaply as possible. The "profits" then are allocated to return on management and capital and are usually taken from the rural community. They go to the company's headquarters and are then sent to all corners of the globe to be reinvested in the food system. One can ask the question, why were agriculturally based rural communities, with an ample natural resource base, more economically viable than mining based rural communities which also had an ample natural resource base? The answer lies primarily with the economic structure of the major economic base. Increasingly, our agriculturally based communities, like regions with major poultry operations, are looking like mining communities.

Increasingly, the major decisions in the food system are being made by an ever-declining number of firms, a growing number of which are involved in the food system clusters. They are primarily concerned with maximizing their profits. That is the purpose of such corporations.

ConAgra says its major mission is to increase the wealth of its stockholders. But, these firms are in position to decide which people in the world will eat. Their decisions are based on whether one has the money to buy food. We hear a lot about the growing population of the world and how feeding the increasing millions will provide great opportunities for farmers in the United States. The problem is that much of the population increase is in the "have-not" nations of the world, in countries where the people earn only a few hundred dollars a year. These families cannot afford to buy imported food! The global firms travel the world "sourcing" their products from those countries where they can get the product the cheapest and selling them into the countries that will pay the most. This raises the question of whether the countries with rapidly growing populations will be our farmers' customers or their competitors.

One hears a lot about agri/food exports from the United States and the potential benefits for our farmers. Much less attention is given to United States food imports. On a dollar basis, the exports and imports have been growing at about the same level for the past two decades. This means that on a percentage basis, imports have been increasing more rapidly, because imports started at a lower dollar value. For example, about one-third of the vegetables consumed in this country are imported. The United States is also a net importer of beef.

Issues of food quality and especially food safety are also receiving increased attention. Perhaps the bigger issue is whether the global food system is sustainable. The production, processing and distribution stages have all been built on cheap petroleum. Considerable debate exists on when the world's petroleum resources will be depleted, but most agree the price will begin moving up in the not-too-distant future. Will the resulting price shocks cause the whole food system to restructure again?

Another question being asked, given the financial problems faced by some nations, is: What would happen if the United States were to experience a depression like that of the 1920's and 1930's? A depression is a major disorganization of the economic system. Think for a moment what that would mean in a system of "just-in-time delivery." Will food products get to the stores on a regular schedule? Will my neighbor be able to get a replacement engine from England for his new New Holland combine if it breaks down during harvest? Will the seed, chemicals and fertilizer, coming from all parts of the world, get to the farmer in time? A shutdown of the agricultural production system for a few weeks can have quite different consequences than shutting down an automobile assembly plant for the same amount of time. A lengthy delay in agricultural production could mean the loss of the year's crop.

The control of the animal genetics pool is also concentrating and the genetic base for domestic animals is narrowing. For example, over 90 percent of all the commercially produced turkeys in the world come from three breeding flocks. The system is ripe for a new strain of avian flu to evolve for which these birds have no resistance. Similar concerns exist in hog, chicken and dairy cattle genetics.

These are food issues and not just agricultural and rural issues. The global food system is becoming more like many of the other economic sectors. But food is different from all other goods and services exchanged in the international market. Food is a human necessity and it is needed on a regular basis. Those who control the global food system have the ultimate in

economic power. As Dwayne Andreas, former chairman of ADM, said:

> The food business is far and away the most important business in the world. Everything else is a luxury. Food is what you need to sustain life every day. Food is fuel. You can't run a tractor without fuel, and you can't run a human being without it either. Food is the absolute beginning. (Reuters, 1/25/99)

One hears much about "niche markets" as new opportunities for farmers. Such opportunities do exist. There is a major rebirth of farmers'markets, local food routes, subscription sales and other forms of direct marketing between farmers and consumer, with small processors involved when needed. As the food firms get larger and cover wider geographic and cultural areas, they leave behind a growing number of small markets they do not serve. The more consumers learn about the ways their food is grown in far away places, the more many of them are concerned with where their food is produced, who produces it, and how it is produced. The structural vulnerability of the emerging food system is called into further question when one remembers the situation in the former Soviet Union. The Western world began to realize there were major problems in the centralized food system of the former Soviet Union when it was learned that small farm plots were producing a significant proportion of the country's food. Large centralized organizations have problems adapting to change. They commonly have problems with management, with coordination, and with worker satisfaction.

These are good reasons to predict that the evolving system is vulnerable. It will probably be restructured again in the future. A vulnerable food system will most likely be "restructured" numerous times in the future – but at what social and economic cost to whom? When "restructuring" occurs, some people pay a very high price for the changes. It is highly questionable whether society as a whole really benefits.

If the number of farms is reduced to about 25,000 in the next decade, there will be many farm families who will be involuntarily removed from their land. In the mid 1980's, Congress allocated funds for helping the families who followed the advice of the experts and by doing so lost all of their assets. These funds were used wisely and they helped many families during their transition from the farm. The motto then was "We may not be able to save every family farm, but we can save every farm family."

Perhaps the policy emerging from this dialogue on concentration in the food system can lead to a new system that will save both. Just a quarter of a century ago, our decentralized system of agricultural production was held up as a model for the world.

The centralized food system that continues to emerge was never voted on by the people of this country, or for that matter, the people of the world. It is the product of deliberate decisions made by a very few powerful human actors. This is not the only system that could emerge. Is it not time to ask some critical questions about our food system and about what is in the best interest of this and future generations?

# CONCENTRATION OF AGRICULTURAL MARKETS
**January 1999**

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**"CR4" is the concentration ratio (relative to 100%) of the top four firms in a specific food industry. Fifth and sixth top companies are occasionally shown as supplemental information.**

| BEEF PACKERS [CR4 = 79%]* | Capacity/Day* | Plants* | 1990 | 1995 | 1998 |
|---|---|---|---|---|---|
| **1. I B P Inc.** | **38,800** | **13** | **72%** | **76%** | **79%** |
| **2. ConAgra Beef Companies** | **23,600** | **8** | | | |
| **3. Excel Corporation (Cargill)** | **21,800** | **5** | | | |
| **4. Farmland National Beef Pkg. Co.** | **8,700** | **2** | | | |
| **5. Packerland Packing Co.** | **4,750** | **3** | | | **CR5 = 83%** |

**Source: *Beef Today (Nov-Dec 1998)**

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| CATTLE FEEDLOTS* | Head Office | Capacity / Feedlots |
|---|---|---|
| **1. Continental Grain Cattle Feeding** | **Boulder, CO** | **405,000 / 6 lots** |
| **2. Cactus Feeders Inc.** | **Amarillo, TX** | **350,000 / 6 lots** |
| **3. ConAgra Cattle Feeding** | **Greeley, CO** | **320,000 / 4 lots** |
| **4. National Farms Inc.** | **Kansas City, MO** | **274,000 / 7 lots** |
| **5. Caprock Industries (Cargill)** | **Amarillo, TX** | **263,000 / 4 lots** |

**Source: *Beef Today (Nov-Dec 1998)**

**NOTE: At end of 1998, the top 30 operations had pen space to feed 4.89 million head of cattle.**

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| PORK PACKERS [CR4 = 57%]* | 1987 | 1989 | 1990 | 1992** |
|---|---|---|---|---|
| **1. Smithfield (Gwaltney, Cudahy, Morrell, Lykes)** | **37%** | **34%** | **40%** | **44%** |
| **2. IBP Inc.** | | | | |
| **3. ConAgra (Swift)** | | | | |
| **4. Cargill (Excel)** | | | | |
| **5. Farmland Industries** | | | | |
| **6. Hormel Foods** | | | | |

****Packers & Stockyards Programs GIPSA, USDA; February, 1996**

**CR6 = 75% (NYTimes, 1/7/99)**

**Source: *National Hog Farmer (March 1998)**

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| PORK PRODUCTION | # of Sows In 1998* | Production Base |
|---|---|---|
| **1. Murphy Family Farms** | **337,000** | **NC, MO, OK, IL** |
| **2. Carroll's Foods** | **183,600** | **NC, VA, IA, UT** |
| **3. Continental Grain (inc. PSF)** | **162,000** | **MO, NC, TX** |
| **4. Smithfield Foods** | **152,000** | **NC, VA, UT** |
| **5. Seaboard Corporation** | **125,500** | **KS, CO, OK** |

**NOTE: The 50 largest producers (assuming their sows each produce 20 pigs a year) market half of the pigs in the U.S.**

**Source: *Successful Farming (October 1998)**

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| BROILERS [CR4 = 49%]* | *Weekly Production (mil.lb) | | | CR4 | | | |
|---|---|---|---|---|---|---|---|
| | 1990 | 1995 | 1998 | *1986 | 1990 | 1994 | 1998 |
| **1. Tyson Foods** | **74** | **90** | **155** | **35%** | **44%** | **46%** | **49%** |
| **2. Gold Kist** | **24** | **45** | **55** | | | | |
| **3. Perdue Farms** | **24** | **42** | **47** | | | | |
| **4. Pilgrim's Pride** | **16** | **25** | **35** | | | | |
| **5. ConAgra Poultry** | **32** | **35** | **30** | | | | |
| **6. Wayne (Continental Grain)** | **11** | **20** | **25** | | | **CR6 = 58%** | |

**Sources: *Feedstuffs (Annual Reference Issues)**

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| TURKEYS [CR4 = 42%]* | Million lbs live | *1988 | 1990 | 1992 | 1994 | 1996 |
|---|---|---|---|---|---|---|
| **1. Jennie-O Turkeys** | **891** | **31%** | **33%** | **35%** | **38%** | **40%** |
| **2. Butterball (ConAgra)** | **846** | | | | | |
| **3. Wampler Turkeys** | **650** | | | | | |
| **4. Cargill Turkeys** | **514** | | | | | |
| **5. Shady Brook (Rocco)** | **489** | | | | | |

**Sources: *Turkey World (Jan-Feb issues)**

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ANIMAL FEED PLANTS

**1. Cargill (Nutrena)**
**2. Purina Mills (Koch Industries)**
**3. Central Soya**
**4. Consolidated Nutrition (ADM + AGP)**

**Sources: Feedstuffs, 10/28/91 and 2/21/94**

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MULTIPLE ELEVATOR COMPANIES [CR4 = 24%]*Control by Top Four:

**1. Cargill**
**2. ADM (ADM Milling Co.)**
**3. Continental Grain**
**4. Bunge**

**Capacity in Bushels = 24%**
**Number of Facilities = 39%**
**Port Facilities = 59%**

**Source: *1997 Grain & Milling Annual (Milling & Baking News)**

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FLOUR MILLING [CR4 = 62%]* Mills | Daily Capacity

| | | | |
|---|---|---|---|
| **1. ADM Milling Co** | **30** | **311,300 cwts** | ****1982 1987 1990** |
| **2. ConAgra, Inc.** | **29** | **264,900 cwts** | **40% 44% 61%** |
| **3. Cargill Food Flour Milling** | **18** | **223,000 cwts** | |
| **4. Cereal Food Processors, Inc.** | **9** | **82,900 cwts** | |

**Sources: *1997 Grain & Milling Annual; **Milling & Baking News, 12/1/92**

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| DRY CORN MILLING [CR4 = 57%] | Plants | 24hr. Grind |
|---|---|---|
| **1. Bunge (Lauhoff Grain)** | **2** | **120,000** |
| **2. Cargill (Illinois Cereal Mills)** | **2** | **95,000** |
| **3. ADM (Krause Milling)** | **2** | **70,000** |
| **4. ConAgra (Lincoln Grain)** | **3** | **52,000** |
| **5. Quaker Oats** | **3** | **45,000** |

**Sources: Corn: Chemistry & Technology (1989)**

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| WET CORN MILLING [CR4 = 74%]* | Plants | |
|---|---|---|
| **1. ADM** | **4** | **1977 1982 1987** |
| **2. Cargill** | **4** | **63% 74% 74%** |
| **3. A.E. Staley (Tate and Lyle)** | **4** | **(Census of Manufacturing)** |
| **4. CPC** | **3** | |

**Source: *Milling & Baking News, 1990 Milling Directory**

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SOYBEAN CRUSHING [CR4 = 80%]*

| | **Plants/States** | | |
|---|---|---|---|
| **1. ADM** | **19** | **12** | **1977 1982 1987** |
| **2. Cargill** | **16** | **12** | **54% 61% 71%** |
| **3. Bunge** | **8** | **5** | **(Census of Manufacturing)** |
| **4. AGP** | **6** | **3** | |

**Source: *Feedstuffs (9/22/97)**

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ETHANOL PRODUCTION [CR4 = 67%]*

| | ***mil.gal/year** | **locations** |
|---|---|---|
| **1. ADM** | **750** | **IA, IL, ND** |
| **2. Williams Energy Services** | **130** | **IL, NE** |
| **3. Minnesota Corn Processors** | **110** | **MN, NE** |
| **4. Midwest Grain Products** | **108** | **IL, KS** |
| **5. Cargill** | **100** | **IA, NE** |

**Source: *www.ethanolrfa.org/prodcap.html**