

The Age of Contract Agriculture: Consequences of Concentration in Input Supply

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Dramatic increases in concentration in the seed business, coupled with aggressive efforts to vertically integrate the agricultural sector and to institute contract-based production of commodities, have raised questions about the economic position of producers. Disparate positions of market power by highly concentrated input suppliers on the one hand (particularly seed suppliers because of control over germ plasm and a monopoly position over seed varieties through plant patents or plant variety protection certificates), and producers in nearly perfect competition on the other, suggest that the revenue division from production is likely to be redefined in favor of the party with the greater market and economic power. Possible solutions include aggressive antitrust oversight over further mergers and consolidations, assuring that more germ plasm is in the public domain, and collective action by producers in bargaining for inputs.

Key Words: agriculture, antitrust, barriers to entry, collective action, concentration, contract, seed, vertical integration

The signs of increasing use of contracts are commonplace—especially on the production side of agriculture (see, e.g., Harl and Lawrence, 1998). Specialty grains, feeder livestock, even fruits and vegetables, are being produced under contract, and have been for some time. So what's the concern about the rising tide of contract agriculture? Basically, the concern is a tilt in market power with a possible shift in bargaining power as input suppliers and output processors (and first purchasers otherwise) gain greater economic power, undoubtedly at the expense of producers (see Harl, 1998, 1999).

It is assumed that the governing policy goals for the food and agriculture sector will continue to include: (a) availability of an abundant supply of food, at reasonable prices; (b) maintenance or enhancement of the productivity and environmental integrity of natural resources; and (c) a prosperous and productive economic climate for producers (including family farmers).

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Concentration in Seed Companies

Mergers, alliances, and various other forms of arrangements are reducing the number of players in input supply, particularly in seeds, and increasing the level of concentration. Figure 1 shows the extent to which arrangements between and among the major firms in the seed area have come to permeate the input supply sector. While the level of mergers, alliances, and consolidations is not a completely reliable indicator of competition, the fact that nearly \$15 billion of such amalgamations has occurred over the past three years, some at price levels difficult to justify under present economic conditions, suggests that (a) some are discounting revenue from a pot at the end of some unknown rainbow, (b) irrational behavior is being displayed, or (c) some acquiring firms are assuming that a greater share of the world's food bill can be claimed by seed suppliers.

But increasing levels of concentration among firms do not tell the entire story. The revolution in ownership of germ plasm, the feature of cells that determines the characteristics of offspring, also is moving rapidly toward concentration in a few hands. The high-profile alliance (and now merger) between DuPont and Pioneer Hi-Bred International, the Monsanto acquisition of DeKalb, and the Monsanto acquisition of Delta and Pine Land Company (which was terminated in late 1999) are recent examples of how the ownership and control of genetic material in crops is falling into the hands of a few, economically powerful players. Increased concentration is also leading to control by a few firms over the major processes by which genetic manipulation occurs, thus enabling those controlling the technologies to block use by other firms.

This development is partly related to the changing role of the land grant universities, partly to the ability in recent years to manipulate germ plasm through genetic engineering, and partly to the consequences of the ability to obtain a monopoly-like position over unique life forms and over the process of genetic manipulation.

- For decades, the land grant universities developed the basic genetic lines and made those lines available to the seed industry. Because of limitations on university funding and the near-revolution in genetic engineering, the private sector several years ago began pouring more money into basic research. Developments have progressed to the point that the payoff from research and development funding can no longer be used to compare the present with prior periods. Payoffs are expected to flow more readily than when biotechnology was in its infancy.
- The advent of genetic engineering meant that scientists could manipulate genetic composition—not through conventional crop breeding techniques, but through laboratory procedures—to change the genetic makeup of plant and animal life. That has produced herbicide-resistant crops, for example.

- Finally, the U.S. Supreme Court, in a 1980 landmark case, determined that life forms could be patented.¹ In addition to federal Plant Variety Protection (PVP)² and simply shrouding research efforts with secrecy, the ability to patent life forms provides a powerful tool to keep competitors at bay.

The Effect of Contracts

An important question is the effect concentration in the seed business and control by the few resulting firms over germ plasm will likely have on contract negotiations with producers. It depends on the options open to producers who don't like the terms of contracts offered to them. With numerous contract possibilities available from input suppliers, each offering inputs of roughly equal productivity and cost, the answer is perhaps "not much."

But if there are just a few options, with the next best offering a much less attractive set of inputs in terms of cost and productivity, such as when a variety of seed is developed with significant yield premium over otherwise competitive varieties, the answer is "take what you're offered." A greater proportion of the value of the yield premium is expected to be captured by the seed supplier under those conditions than has historically been the case. The outcome is likely to be a tilting in the terms of contracts in favor of the input supplier. The division of revenue from production would be expected to shift over time in favor of the party with the monopoly or near-monopoly position. Seed companies and other input suppliers can be expected to drive the best possible bargain—which means, in the case of seed, capturing the greatest possible percentage of the value from any yield premium.

- The outcome would be a smaller share of the revenue from production going to the producer, resulting in less compensation to the producer and less to capitalize into land values.
- Seed companies would end up with a larger share of the pie with more to capitalize into the stock of the input supply firms. Even if unique corn derivatives produce revenue of \$2 million per acre, it's fairly clear that whomever holds the rights to the technology involved will capture the lion's share of the revenue, not the producer.

A good argument can be made that this perception of potential profits in the future is part of what is driving the intense push toward concentration in control over germ plasm now occurring.

¹ *Diamond v. Chakrabarty*, 447 U.S. 303 (1980) (bacterium having unique genetic characteristics is patentable subject matter under the general patent statute).

² Pub. L. No. 91-577, 84 Stat. 1542 (1970), 7 U.S.C. §§ 2321–2581; also see generally 12 Harl, *Agricultural Law* Ch. 110 (1999).

Figure 1. Concentration in the seed business

<p>I. Astra Zeneca ① (United Kingdom)</p> <p>A. Advanta BV ② (August 1996, 50% equity)</p> <ol style="list-style-type: none"> 1. Cooperative Cosum UA ④ (August 1996, 50% equity) 2. VandeHave ② (August 1996, 100% equity) 3. Interstate Payco ② (August 1996, 100% equity) 4. Garst Seed Co. ② (August 1996, 100% equity) <p>B. Mogen International NV ② (June 1997, \$78M, 100% equity)</p> <p>C. ExSeed Genetics LLC ② (December 1997, 30% equity)</p> <p>Note: Announcement in December 1999 that components other than Garst Seed Co. to be spun off into new entity, Syngenta, along with Novartis units.</p>
<p>II. Aventis SA ① (France)</p> <p>A. Hoechst AG ① (December 1998, joint venture, 50% equity)</p> <p>B. Hoechst Schering AgrEvo GmbH ③ (December 1998, equity to be decided)</p> <ol style="list-style-type: none"> 1. Schering AG ① (January 1994, 47% equity, \$161M) 2. Plant Genetic Systems International (PGS) ⑤ (August 1996, 75% equity, \$550M) 3. ProagroGroup ② (February 1999, 100% equity) 4. Kleinwanzlebener Saatzucht AG (KWS) ② (12% equity) <ol style="list-style-type: none"> a. Great Lakes Hybrids, Inc. ② (1988, 50% equity; 1993, 80% equity) <p>C. Rhone-Poulenc SA ① (December 1998, joint venture, 50% equity)</p> <ol style="list-style-type: none"> 1. RhoBio ③ (March 1998, 50% equity) 2. Groupe Limagrain ④ (15% equity) <ol style="list-style-type: none"> a. Biogemma ③ (1997, 56% equity) <ol style="list-style-type: none"> (1) RhoBio ③ (March 1998, 50% equity) (2) Pau Euralis ② (1997 acquired 25% equity in Biogemma) b. Callahan Seeds ② (July 1994, 85% equity) c. King Agro, Inc. ② (June 1994, 100% equity) d. Nickerson Seeds ② (October 1990, 100% equity) e. Biotechnica International, Inc./LG Seeds ② (October 1998, 80% equity) f. Mais Angevin ② (99% equity) g. Akin Seed Co. ② (March 1994, 100% equity)
<p>III. Dow Chemical Company ① (United States)</p> <p>A. Verneuil Holding SA ② (December 1996, \$9.4M, 18.75% equity)</p> <p>B. Advanced Agri Traits ③ (March 1999, 83.6% equity)</p> <p>C. Illinois Foundation Seed, Inc. ② (acquired 16.4% equity in Advanced Agri Traits in March 1999, and 29% of its equity was acquired by Dow in March 1999 for \$15M)</p> <p>D. Mycogen Corporation ② (January 1996, \$158M, 47% equity; December 1996, \$416.8M, 51% equity; March 1998, \$440.1M, 68% equity; October 1998, \$322M, 100% equity)</p> <ol style="list-style-type: none"> 1. Dinamilho Carol Productos Agricolas Ltda. ② (April 1998, \$32M, 100% equity) 2. Híbridos Colorado Ltda. FT Biogenetics de Milho Ltda. ② (September 1998, 100% equity) 3. Morgan Seeds ② (September 1996, \$34.5M, 100% equity) 4. United Agriseeds, Inc. ② (February 1996, \$72M, 100% equity) <p>E. Dow/Danisco JV ③ (Dow Agri Sciences LLC, May 1999, 50% equity) Also owned by Danisco Seed ② (May 1999, 50% equity)</p>
<p>IV. E.I. DuPont de Nemours & Co. ① (United States)</p> <p>A. Hybrinova SA ② (April 1998, 100% equity)</p> <p>B. Protein Technologies International ⑤ (December 1997, \$1.3B, 100% equity)</p> <p>C. Optimum Quality Grains, LLC ③ (August 1997, 50% equity)</p> <p>D. Pioneer Hi-Bred International, Inc. ② (August 1997, \$1.7B, 20% equity)</p> <ol style="list-style-type: none"> 1. Optimum Quality Grains, LLC ③ (August 1997, 50% equity) 2. Dois Marcos ② (March 1999, 100% equity)

Figure 1. (continued)

<p>V. Monsanto Company ① (United States)</p> <p>A. Hubri Tech Seed International, Inc. ② (1982, 100% equity)</p> <p>1. HybriTech Europe SA ③ (February 1996, 90% equity)</p> <p>a. Paul Euralis ② (February 1996, 10% equity)</p> <p>2. AgriPro Seed Wheat Division ② (July 1996, 100% equity)</p> <p>B. Jacob Hartz Seed Company, Inc. ② (1983, 100% equity)</p> <p>C. Sementes Agroceres SA ② (November 1997, \$150M, 100% equity)</p> <p>D. Agracetus, Inc. ⑤ (April 1996, \$150M, 100% equity)</p> <p>E. Delta & Pine Land ② (May 1998, \$1.9B, 100% equity; November 1998, share exchange)</p> <p>F. Calgene, Inc. ⑤ (April 1996, \$30M, 100% equity; November 1998, \$50M, 5% equity; May 1997, \$242M, 45% equity; total cost \$322M)</p> <p>1. Stoneville Pedigreed Seed Company ② (announced auction, January 1999)</p> <p>G. Holden's Foundation Seeds ② (January 1997, \$1.02B, 100% equity)</p> <p>1. Corn States Hybrid Service, Inc., Corn States International Sarl. ②</p> <p>H. Monsoy ③ (November 1997)</p> <p>I. DeKalb Genetics Corporation ② (March 1995, \$1.2M, 40% equity; May 1998, \$2.5B, 100% equity; total cost \$3.7B)</p> <p>1. Custom Farm Seed ② (July 1997)</p> <p>J. Asgrow Seed Company LLC ② (November 1996, \$240M, 100% equity)</p> <p>K. First Line Seeds, Ltd. ② (June 1998)</p> <p>L. Plant Breeding International Cambridge, Ltd. ⑤ (July 1998, \$525M, 100% equity)</p> <p>M. Cargill's International Seed Division ② (July 1998, \$1.4B (estimated))</p> <p>N. Renessen ③ (May 1999, \$100M, 50% equity, joint venture)</p> <p>O. Cargill, Inc. ② (May 1998, \$100M, 50% equity, joint venture)</p> <p>1. Cargill Hybrid Seeds ②</p> <p>Note: Announcement in December 1999 that merger with Delta & Pine Land would not be consummated; remaining units to be separately structured (in merger with Pharmacia and Upjohn) with an IPO as to a portion of ownership.</p>
<p>VI. Novartis AG ① (Switzerland)</p> <p>A. Wilson Seeds, Inc. ②</p> <p>Also owned by U.S. Cooperative System: Cropland Genetics, FFR, GrowMark, etc. ④ (Land O'Lakes, November 1998, 50% equity)</p> <p>1. Zimmerman Hybrids, Inc. ② (1998, 100% equity)</p> <p>B. Sturdy Grow Hybrids, Inc. ② (April 1998, 100% equity)</p> <p>C. Agritrading ② (August 1998, 100% equity)</p> <p>D. Maisadour Semences SA ② (December 1998, 40% equity)</p> <p>Note: Announcement in December 1999 that units of Novartis to be spun off into Syngenta, a new entity, with some units from Astra Zeneca.</p>
<p>VII. Other Companies ②</p> <p>A. Crow's</p> <p>B. Fielder's Choice</p> <p>C. Golden Harvest</p> <p>D. Stine Seed Co.</p> <p>E. NC+</p>

Sources: Pioneer Hi-Bred International, Inc., and the Center for International Agricultural Finance, Iowa State University, Ames, IA.

Notes: ① = life science companies, ② = seed companies, ③ = joint ventures, ④ = cooperatives, and ⑤ = other companies.

Thus, a major issue is whether a shift in market power occurs between input suppliers and producers, whether that shift in market power is translated into enhanced bargaining power, and whether the enhanced bargaining power is employed to siphon a greater proportion of the economic return generated by the sector into the hands of input suppliers.

Other Shifts May Follow

The negotiating power of seed firms could well have other impacts.

- In an effort to control the germ plasm more completely, seed companies are likely to negotiate for ownership of the product with the producer under contract having only a contract right to payment, short of ownership of the crop or livestock involved.
- Similarly, the contract may contain what would appear at first glance to be an attractive feature—the input supplier bearing the price risks.

These seemingly innocent shifts would mean, however, that the economic position of the producer would be transformed from that of a risk-taking entrepreneur into a relatively riskless world of fixed compensation. Thus, a shift not only of compensation would occur in favor of the input supplier, but also a shift of management functions in the same direction. The outcome would be reminiscent of the limited role played by growers under broiler contracts.

Barriers to Entry

In general, one would expect high-handed economic behavior by near-monopolists to be met by entry of new competitors attracted by the generous terms of contracts in favor of the input suppliers. And that would likely occur if entry were possible. However, barriers to entry may be fairly high.

- One barrier is capital needed to mount the kind of research effort needed to maintain a product flow similar to that of the firms pressing for monopoly-like concentration levels. The capital needed is very substantial.
- Also, existing patent and plant variety protection may mean that potential competitors are frozen out of competition as a practical matter for the duration of the patent or PVP certificate, or the duration of a patent over processes by which genetic manipulation occurs.³

³ 7 U.S.C. §§ 2541(a), 2483.

The Position of Small Seed Firms

A major issue is whether smaller seed firms are likely to be able to acquire germ plasm and thus remain viable. Certainly the small firms have remained surprisingly healthy in recent decades as performance traits of the varieties and hybrids developed by the larger firms have tended to outdistance the performance of seed marketed by small firms.

But the era of transgenic hybrids produces both the incentive to maintain greater control over high-performing germ plasm and the technology and resources to challenge those who manage to obtain the germ plasm in clandestine ways. The larger firms may acquire some smaller firms to complete their distribution networks, and licensing germ plasm for a fee may well occur. However, it is unlikely that the dominant firms will generate additional competition by licensing to smaller firms.

Indeed, with the smaller firms predictably unable to maintain access to higher performing germ plasm, the price of lower performing seed varieties and hybrids is expected to reflect the economic disadvantage inherent in the lower performing varieties. At some point, many if not most of the smaller seed firms that are unaligned with the dominant firms will be unable to survive economically.

Antitrust Surveillance

Another possible area of protection against a sharp tilt in the economic terms of contracts is vigilance by federal (or state) antitrust agencies. Certainly the Federal Trade Commission (FTC) and the U.S. Department of Justice should be sensitized to the potential for economic abuses down the road.

Further consolidation in any highly concentrated sector merits scrutiny under the Clayton Act rules that impose limits on mergers expected substantially to diminish competition. So-called horizontal mergers or mergers of competitors are the most likely to be challenged. Other areas of antitrust challenge involve production (including price fixing), agreements to divide markets, and group economic boycotts. These are all per se offenses under federal antitrust law.

It has been well established for decades that firms with monopoly power over a product should not be able to “tie” other products to the transaction and extend the monopoly position (see, e.g., Neale, 1970, chapter XI). Such contracts are used to create “economic leverage” by using monopoly power in one market (the market for the tying good) to create monopoly power in a second market (the market for the tied good). Such arrangements, which involve tying products over which a firm does not have monopoly power (such as financing, insurance, or risk management) to a product over which the firm does have monopoly power (such as a seed variety), are also illegal per se unless it can be demonstrated that the product in monopoly status wouldn’t work as well with other firms’ products. And that is rarely the case.

In a 1936 U.S. Supreme Court decision, IBM was prevented from requiring purchasers of its calculators to buy punch cards from IBM for data entry.⁴ Similarly, in *United Shoe Machinery Corp. v. United States*,⁵ a seller occupying a “dominant position” in the shoe machinery industry, without more, violated the Clayton Act⁶ by contracts tying to the lease of its machines the purchase of other types of machinery and incidental supplies. In a 1947 U.S. Supreme Court decision (*International Salt Co. v. United States*),⁷ which involved conditioning the leasing of patented machines for dispensing industrial salt on the lessee’s purchase of the lessor’s salt, the court said that it is “unreasonable, per se, to foreclose competitors from any substantial market” if the seller enjoys a monopolistic position in the market for the tying product or if a substantial volume of commerce in the “tied” product is restrained.⁸

In finding that the leases violated the Clayton Act, the court relied on International Salt’s patents as establishing its market power in the tying products (the salt-dispensing machines) and on the substantial dollar volume of business in the tied product which was foreclosed to competitors as establishing the requisite competitive effects. Once the minimum threshold conditions were met, the court held that a violation had occurred. As the court stated:

We think the admitted facts left no genuine issue. Not only is price fixing unreasonable, per se, but also it is unreasonable, per se, to foreclose competitors from any substantial market. The volume of business affected by these contracts cannot be said to be insignificant or insubstantial and the tendency of the arrangement to accomplishment of monopoly seems obvious.⁹

The court rejected the defense that the tying arrangement was necessary for the effective functioning of the potential product (or product over which the firm had monopoly power). As the court stated, “[b]ut it is not pleaded, nor is it argued, that the machine is allergic to salt of equal quality produced by anyone except International.”¹⁰

Some economists have criticized the antitrust treatment of tying contracts as not leading to economic leverage in all instances (see Warren, 1974, pp. 192–202).

If the objective is to maintain significant levels of competition in input supply, the FTC and the Department of Justice should scrutinize all seed industry mergers carefully for anti-competitive consequences and all practices by seed companies in tying credit, insurance, risk management, or other needed inputs to seed availability. One problem in relying on the FTC or the Department of Justice is that both agencies

⁴ *International Business Machines Corp. v. United States*, 298 U.S. 131 (1936).

⁵ 258 U.S. 451 (1922).

⁶ Clayton Act, § 3.

⁷ 322 U.S. 392 (1947).

⁸ *Id.*

⁹ *International Salt Co. v. United States*, 332 U.S. 392, 396 (1947).

¹⁰ *Id.* at 398.

seem to believe that the agricultural sector is the last bastion of perfect competition and is competitive by a comfortable margin. Moreover, the agencies tend to view mergers on the basis of impact on consumers, not on the basis of impact on producers. The problem is not one of diminished competition among producers, but among those who supply inputs and process or handle products from the producing subsector with a resultant impact on producers.

The GMO Controversy

The degree of consumer acceptance of genetically modified organisms (GMOs) will likely have a major impact on the speed with which consolidation and vertical integration in the seed business are translated into economic benefit for the major seed companies. Although resistance to GMOs was originally centered in the European Union, resistance has spread in recent months to other countries—notably Japan, South Korea, Australia, New Zealand, India, the Philippines, Russia, and Thailand in terms of imposition of labeling requirements. Initial steps were taken in Japan in July 1999 to implement product labeling in that country. Resistance may spread to products involving GMOs, most notably meat and meat products, which would close off nonsegregated markets.

Continuing consumer resistance would be expected to result in a two-track marketing system with the prospect of some degree of discounting of GMO crops and, concomitantly, discounting of GMO seed. Widespread consumer resistance could slow perceptibly the move toward consolidation and vertical integration.

Solutions

If sufficient public interest and political will are generated, three solutions seem to lie within the feasible set.

Antitrust Oversight

First, aggressive antitrust oversight at the federal level (and among the states) is the traditional way for proposed mergers and alliances and other anti-competitive practices to be evaluated on the basis of potential anti-competitive effects. The objective should be to ensure that all sectors and subsectors have equal, and low, economic power. Because of the importance of food and the policy significance of maintaining a healthy producing sector, it may be necessary for the Department of Justice to be funded specifically to maintain a substantially higher level of oversight over structural shifts in food and agriculture.

Collective Action by Farmers

One possible strategy for farmers is to forge alliances among producers (which is specifically allowed by federal law so long as it does not “unduly enhance”

price).¹¹ The push to achieve such countervailing power was the driving force behind the formation of labor unions a century ago. Historically, however, farmers have been unwilling to accept such a disciplined approach to achieving bargaining power.

Section 1 of the Capper-Volstead Act of 1922¹² provides protection from antitrust challenge for producers who seek to bargain collectively with seed companies and other input suppliers.¹³ A resolution, passed in 1917 by the National Board of Farm Organizations (comprised of the National Cooperative Milk Producers Federation, the National Grange, the National Farmers Union, and other farm organizations), provided that:

Producers and consumers are bound together by economic laws which they did not make and which they cannot repeal. Between these two are powerful agencies whose only interest it is to take such toll as they may, as products are passing from producer to consumer. These agencies, by reason of their financial connections, exercise an influence far greater than is warranted by their numbers or the service they perform. We therefore urge upon Congress the necessity of such an amendment to the anti-trust laws as will clearly permit farmers' organizations to make collective sales of the farm, ranch, and dairy products produced by their members. Such organizations, with liberty of action, can insist that the agencies engaged in processing and distribution sell such products at prices as low as may be consistent with the cost of production and distribution (USDA/Farmer Cooperative Service, 1917, p. 4).

This was the beginning of the drive for legislation to address the perceived problems of agricultural cooperatives. The objectives of the proposed legislation were to remedy two problems encountered under Section 6 of the Clayton Act in 1914 (which provided a limited agricultural exemption to antitrust enforcement): (a) the limitation of the protection in Section 6 of the Clayton Act against antitrust challenges to organizations "not having capital stock," and (b) the failure of Section 6 of the Clayton Act specifically to permit certain cooperative marketing activities.

The Capper-Volstead Act provides that "persons engaged in the production of agricultural products as farmers, planters, ranchmen, dairymen, nut or fruit growers, may act together in associations, corporate or otherwise, with or without capital stock, in collectively processing, preparing for market, handling, and marketing in interstate and foreign commerce, such products of persons so engaged."¹⁴ The Act goes on to allow "[a]ssociations [to] have marketing agencies in common; and such associations and their members may make the necessary contracts and agreements to effect such purposes."¹⁵

¹¹ Capper-Volstead Act, 7 U.S.C. §§ 291, 292; also see generally 14 Harl, *Agricultural Law* § 137.04 (1999).

¹² 7 U.S.C. §§ 291, 292.

¹³ See generally 14 Harl, *Agricultural Law* § 137.04 (1999).

¹⁴ 7 U.S.C. § 291. See *Green v. Associated Milk Producers, Inc.*, 692 F.2d 1153 (8th Cir. 1982) (transportation of milk is handling activity protected by Capper-Volstead Act; employees of dairy cooperative acting within scope of their authority could not be guilty of conspiracy with cooperative because employees and cooperative are part of same entity; cooperative members and cooperative are considered one entity and incapable of conspiring with each other).

¹⁵ 7 U.S.C. § 291.

To come within the protection of the Capper-Volstead Act, an organization must: (a) be operated for the mutual benefit of its members; (b) either limit each member to one vote regardless of the amount of stock or membership capital the member owns or, if dividends are paid on the basis of members' stock or membership capital, the dividends must be limited to a maximum of eight percent per annum; (c) not handle a greater amount of products from nonmembers than from members; and (d) not be operated for profit.¹⁶

The grant of immunity from antitrust challenge was further limited by a provision that if the Secretary of Agriculture finds that an association "monopolizes or restrains trade in interstate or foreign commerce to such an extent that the price of any agricultural product is unduly enhanced thereby, he shall issue . . . an order . . . directing such association to cease and desist from monopolization and restraint of trade."¹⁷

The key question is whether producers will be willing to sacrifice independence of action in order to bargain collectively for access to seed, and possibly other inputs. The most likely avenue for such collective action is through cooperatives, although the large regional cooperatives are unlikely to fill that role.

More Germ Plasm in the Public Domain

Another potential solution is for the public to increase its support for crop breeding by land grant universities and other public agencies with transgenic hybrids and varieties made available to smaller seed companies. This would restore the land grant universities to the role played before the advent of genetic manipulation and the dramatic increase in private sector funding for new varieties and hybrids.

To a considerable extent, this possible outcome is dependent upon the perception in state legislatures and the Congress as to the public interest (long term) in maintaining a greater degree of competition in seed supply. Legislative bodies are more likely to respond if convinced that dominance of seed supply by a few large firms, worldwide, could affect food costs by influencing the supply of food through contractual mechanisms.

The Role of Institutions

Arguably, what is likely to emerge over the next few years is a heightened awareness of the efficacy of institutions in limiting or constraining economic activity. To the extent that institutional intervention is successful, a major concern is how to keep institutions in adjustment with changing economic circumstances. Markets reflect changes day by day, minute by minute. Yet, institutions tend to remain in place, frequently producing economic rents for some, until sufficient momentum is generated to effect change. To a considerable degree, institutions limit (as well as facilitate) market operations, but without the same self-adjusting features as markets.

¹⁶ Id.

¹⁷ 7 U.S.C. § 292.

Is Objective to Vertically Integrate the Sector?

The moves made by the major players, particularly the seed companies, could lead one to conclude that the objective is to vertically integrate the sector. Such an objective could be pursued for several reasons: (a) to gain and maintain greater control over patented products or products subject to intellectual property protection otherwise, (b) to apply economic pressure on producers to relinquish functions in favor of the integrator (such as risk management) or to merely provide an opportunity for risk to be off-loaded onto the integrator, (c) to enhance profits of the integrating firm, or (d) to achieve greater market share on an assured basis.

Some readily concede that an objective of vertical integration is one of the forces driving the push toward a contract-based agriculture. As one seed company CEO has stated, in responding to a question asking what farmers could do to back away from the trend toward vertical integration:

Absolutely nothing, because these are property rights owned by the companies and so the farmer is going to become more and more at the mercy of the few who own intellectual properties. Again, it goes back to the shortsightedness of funding basic research in such a parsimonious fashion. The universities are becoming branches of whoever they can get a contract from (Jerry Caulder, CEO, Mycogen Corp., quoted in Wyant, *Farm Futures*, 1999, p. 25).

In response to a follow-up question asking how farmers could participate in the upside associated with specialty crops, this same CEO replied:

In order for the American farmer to participate, we have to make sure that intellectual property goes back into the public domain. As long as our government is so shortsighted that they continue to de-fund basic research at the universities, the U.S. farmer has a huge problem facing him. Without government funding, companies are going to fund research and control it (Jerry Caulder, CEO, Mycogen Corp., quoted in Wyant, *Farm Futures*, 1999, p. 24).

In Conclusion

Agricultural production may never be transformed as dramatically as indicated by the scenario outlined in this article. But, it's well within the range of feasibility. Other scenarios could be posited, including (a) one where producers are left relatively unaffected as the shift occurs to a contract-based transaction system for the agricultural sector, and (b) a scenario in which producers may benefit from such a shift. The latter, it would seem, is relatively unlikely over the long term.

In the meantime, the prudent course would suggest careful evaluation of mergers and alliances now occurring in rapid succession and careful consideration of the level of resources flowing into the development of transgenic hybrids and varieties in the public domain.

If economic abuses develop, producers may resort to collective action in acquiring germ plasm needed in their operations. Producer and producer groups have often resorted to lobbying for institutional limits or constraints on the market in an effort to achieve a more favorable (to them) sharing of the economic pie. The key questions are:

- What policy variables would need to be manipulated?
- What impact would such intervention have on consumers, on economic efficiency, and on competitiveness globally?
- What is the feasibility of such intervention politically?

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