
The Role of Intellectual Property Rights in Modern Production Agriculture

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The term “modern production agriculture” requires constant redefining because our food and fiber system continues to develop and change. Raymond Goldberg, head of the Agribusiness Program at the Harvard School of Business Administration, describes four factors that characterize the ongoing industrialization of agriculture:

- The consolidation of firms at every stage of the food chain;
- The coordination of the food system through long-term legal relationships;
- The biotechnology revolution; and
- The information revolution (Goldberg 1993).

These factors are contributing to the development of new, end-use oriented marketing systems that run alongside or, in other cases, displace traditional commodity systems. One such end-use oriented system is for products that derive from what are commonly known as “end-use tailored” or “identity-preserved” varieties. These varieties carry distinct traits that are preserved from the time of production through marketing to processing and consumption.¹

Trying to describe identity-preserved systems in a single sentence, I came up with: *The global coordination of research, development, production, processing and marketing of new animal breeds and plant varieties with special traits that fill a particular producer, processor or consumer need and which are protected by intellectual property rights.*

¹ Identity-preserved also refers to products produced according to a particular process, such as according to organic standards

Biotechnology and Identity-Preserved Systems

The life sciences, particularly biotechnology, will play a central role in the development of identity-preserved systems. Advances in physiology and classical and molecular genetics allow for the isolation, characterization and transfer of valuable traits. More generally, the majority of future productivity gains are expected to come from improved crop and livestock genetics.

Robert Fraley of Monsanto Company spoke at NABC 6 on the new products and industries that plant biotechnology will spawn (Fraley 1994). Many, if not all, of the new products for improved pest, disease and nutrient management; food processing; nutritional profiles; chemicals and polymers; and biofuels will be identity-preserved.

The technology behind identity-preserved systems will be consumer driven, not just in terms of the products, but in terms of the processes by which they are made. Speaking at NABC 6, R. James Cook, Chief Scientist at the United States Department of Agriculture's National Research Initiative Competitive Grants Program, said: "The very use of molecular methods to produce disease and pest-resistant varieties of some fruits and vegetables is being driven by consumer demand" (Cook 1994). This is because consumers not only demand fruits and vegetables free of pesticide residues, they demand those varieties that allow for pesticide use reductions.

By responding to downstream demand, identity-preserved systems will more closely link producers to consumers and other end users. Thomas N. Urban, President and CEO of Pioneer Hi-Bred International, Inc., who has written and spoken on the implications of identity preservation, noted: "We are getting to the point where we can almost identify certain farmers with certain shelf space" (Urban 1993).

The Role of Intellectual Property in Identity-Preserved Systems

Intellectual property rights will be critically important in identity-preserved systems for livestock, field crop and horticultural varieties. This is because intellectual property rights ensure the preservation and control of the value-added factor through the food chain.

There are two basic ways that intellectual property rights maintain the identity and profitability of value-added proprietary factors of identity-preserved varieties. First of all, intellectual property rights reduce research and development investment risk. This holds true for all commercial products requiring substantial research and development outlays and is the basic policy rationale behind intellectual property laws. The biotechnology industry presents an extreme case in that it is more capital intensive than most and its products easily copied. Thus, plant breeders' rights, trade secrets, trademarks and patents are particularly important in the agricultural biotechnology industry.

Pioneer Hi-Bred Patent Counsel, Michael J. Roth, writes: “. . . we need more protection for the fruits of our research than has traditionally been available By providing a higher level of protection . . . patents help to insulate protected technology against risk, particularly that the technology will be copied by persons who have invested and risked nothing in its creation” (Roth 1994).

Second, intellectual property rights allow those who control the flow of value-added components in the food chain to obtain downstream premiums. A quick look at the percentage of the consumer food dollar spent on upstream versus downstream added-value reveals that the lion’s share of profits in the food industry derive from downstream activities. For example, the annual retail market for fresh tomatoes in the U.S. is \$3.5 billion versus a \$300 million annual retail market for tomato seed.²

Identity-preserved products provide downstream added-value, for which the processor and consumer are willing to pay a premium. (Goldberg 1993). Identity-preserved products, separated from their cousins in traditional commodity markets and controlled by proprietary rights holders, will allow a greater portion of the downstream food dollar to flow to upstream actors.

In fact, actors at any point in food chain who obtain proprietary rights in identity-preserved technology can profit from interactions at points upstream or downstream. For example, consider the food processor that contracts out the production of its proprietary identity-preserved variety and then processes and markets an identity-preserved product under its brand name. It also may license out the same identity-preserved technology to upstream research firms.

The distribution of proprietary rights and royalties under these coordinated systems will depend on one’s position in the food chain—whether a university, biotechnology firm, producer, processor, packer, retailer, etc. Moreover, the development of a harmonized global intellectual property system as a result of recent changes in the General Agreement on Tariffs and Trade (GATT) will facilitate these interactions on a global scale.

The Calgene Flavr Savr™ Tomato: An Identity-Preserved System

To illustrate these concepts, let us look at the most famous agricultural biotechnology product on the market today—the Calgene Flavr Savr™ tomato.

In 1984, Calgene, Inc. entered into an agreement with the Campbell Institute for Research to develop technology for production of premium vine-ripened tomatoes. According to the agreement, Calgene would obtain patents on any relevant isolated genes and Campbell Soup Company would receive an exclusive, worldwide license for their use.

²Calgene, Inc. 1995

In February 1989, Calgene, was issued a U.S. patent on the tomato polygalacturonase gene sequence and the use of its antisense orientation. In April 1992, the company was issued a broad process patent covering the use of antisense RNA technology in all plants. In 1991, Zeneca A.V.P., a subsidiary of ICI, Inc., filed and was granted an interference by the U.S. Patent Office between the 1989 Calgene patent and Zeneca's 1986 patent application on a similar technology. All three companies entered into negotiations and in February 1994, a final distribution of rights was determined.

Campbell and Zeneca co-own exclusive rights to grow and use Flavr Savr™ technology for processed tomato products. Calgene Fresh owns exclusive, worldwide, royalty-free rights to produce and sell fresh market tomatoes containing the Flavr Savr™ gene.

Let us see how the Flavr Savr™ production, handling and marketing system places it outside the larger traditional commodity tomato system, commonly known as the "gas green" system.

Flavr Savr™ or "Vine!Ripe" System

Calgene, Inc. scientists engineered Flavr Savr™ technology into tomato varieties bred in the 1950s for superior taste, but which had fallen out of production because they were inappropriate for the gas-green system. Because the Flavr Savr™ tomato requires special growing, packing and transportation to preserve the vine-ripened taste and consistency factors, Calgene decided to manage the entire system.

Calgene Fresh, a wholly-owned subsidiary of Calgene, Inc., was formed in 1992 to manage the Flavr Savr™ system. The company has entered into year-round production contracts with a number of growers in California and Florida, and expects to have growers soon in Mexico. Under the contracts, Flavr Savr™ growers do not take ownership of the seed or progeny tomatoes.

Contract growers must abide by a set of strict growing protocols that include integrated pest management and nutrient management techniques. The Flavr Savr™ technology allows the tomatoes to be picked ripe. Calgene Fresh sorts the tomatoes into three quality grade categories, the highest quality of which are designated for marketing under the brand name MacGregors®. Calgene contracts with shippers to transport MacGregors® tomatoes at temperatures above 50°F to supermarkets.

Calgene Fresh has developed its own marketing program for MacGregors® tomatoes that uses brand development and support techniques traditionally employed for processed and other branded food items. This involves the use of trained food brokers to sell and support the product in retail supermarkets. Each tomato carries a sticker denoting it as a product of genetic engineering and brochures on the product are available at the point of purchase.

"Gas!Green" System

Most producers of fresh tomatoes in the "gas-green" system grow on contract for a packer/shipper. The varieties used were derived from publicly-released varieties developed for machine harvesting. These tomatoes are picked green and purchased by the packer/shipper, who sorts and packs them using special machinery. Prior to shipping, ethylene gas is applied to induce ripening. The tomatoes are sold to one or two repackers, who in turn sells to the retailer. These tomatoes are shipped at temperatures below 50°F. More time is required to take the product to the consumer under the gas-green system because of the middlemen involved.

Comparing the two systems, we can readily see how MacGregors® tomatoes fit Goldberg's description of identity-preserved systems: "The tailor-making of identity-preserved food products allows the input supplier to provide branded ingredients at the farm supply and farm level; these ingredients, in turn, enable both the branded food manufacturer and the private label food retailer ... to differentiate their final products to the consumer" (Goldberg 1993). Here, Flavr Savr™ technology is supplied at the farm level and preserved for the consumer under the MacGregors® brand name. On the other hand, there is no value-added factor preserved from production to consumption in the gas green system and no identifiable relationship between growers and consumers.

IDENTITY-PRESERVED SYSTEMS AND PRODUCTION AGRICULTURE

The mechanism by which the identity-preserved system links producers to the rest of the food chain is the production contract. Contract production in the U.S. is by no means a new phenomenon. Integrated systems based on contract production have existed for some time in poultry, fruit and vegetables and are increasing in hogs where the percentage raised under contract has grown from two percent in 1980 to 18 percent in 1990 (Kelley 1994). It is predicted that an increasing percentage of these contracts will involve identity-preserved varieties. For instance, Thomas Urban expects nearly 25 percent of all corn grain production in the U.S. to be on an identity-preserved, contract basis by the year 2000 (Urban 1991).

Minneapolis attorney Christopher R. Kelley classifies production contracts (here, between producer and processor) into four categories:

Market specification contracts — set the price, quantity and quality of the product;

Production management contracts — give the processor direct control over production methods;

Resource-providing contracts — allow the processor to provide all or part of the inputs, incorporating strict quality standards throughout the production process; and

Vertical integration contracts — completely shift production control to the processor, with the producer supplying only labor, land and other fixed inputs (Kelley 1994).

Production contracts involving protected identity-preserved varieties are licenses. Because such contracts license a specific quantity of the proprietary identity-preserved variety, they are called bailments.³ For example, the Flavr Savr™ contract producer takes possession of a fixed quantity but no property interest in Flavr Savr™ seeds or progeny. Therefore, as the number of identity-preserved systems involving proprietary varieties and special production practices increases, we would expect to see an increase in the last two types of contracts.

The primary advantage of contract production for both the producer and the contractor is risk management. By controlling the timing, quantity, quality and specifications of production, economic efficiencies may be realized. Coupled with long-term marketing arrangements, these factors can help promote stability. Contract production of identity preserved varieties may provide producers with better returns than those obtainable in traditional commodity markets. Thomas Urban writes, “As opposed to producing a commodity that is then transformed by some portion of the food chain, farmers themselves are going to receive a premium” (Urban 1993) for the identity-preserved factor. For example, I learned that retailers pay twice as much for the Flavr Savr™ tomato as for the gas-green tomato.

There are a number of factors that can impact a contract producer’s ability to obtain higher returns. In his book on production contracts, Drake University Law Professor Neil Hamilton discusses an important point about privately negotiated contract production systems — the loss of publicly discovered pricing mechanisms, so that the producer cannot learn the real market value of the products (Hamilton 1995).

Another factor influencing a producer’s return under a production contract is relative bargaining power. Recently, some contract producers have organized into associations to improve their bargaining position. Perhaps the most well known is the National Contract Poultry Growers Association, which has lobbied for state and federal legislation designed to prohibit unfair practices by integrators.

In an effort to improve returns over those available under contract production alone, some producers have moved into value-adding, downstream activities, such as processing and marketing of identity-preserved varieties. For proprietary varieties, this would necessitate a license to grow, process and sell products of the variety.

³The legal relationship created in the standard seed production contract is a bailment.

An example of the above is the American White Wheat Producers Association (AWWPA), a marketing cooperative of western and Midwestern wheat producers formed in 1988. AWWPA has exclusive licenses to grow, process and sell flour of two proprietary hard white wheat varieties. Members grow the varieties under contract with AWWPA, which retains marketing rights. AWWPA mills the wheat and sells flour to bakeries and processors. It has a trademark for its flour, which is displayed on wheat products. This eliminates a number of middlemen and has increased members' profits (Burchett 1993).

Another option for producer groups is to obtain proprietary rights in or exclusive licenses to identity-preserved varieties through research agreements or other strategic alliances with the private or public sector. Alternatively, producer groups may contract for research services or establish their own private research institutes.⁴

Traditionally, producers have funded land-grant university research with grants from private commodity groups and with checkoff funds managed by marketing order boards. Until recently, technology developed using these funds was considered a public good and transferred to state industry by state extension services and experiment stations. Today, land-grant universities protect inventions with intellectual property rights, enter into research agreements with and exclusively license technology to the private sector.

The legal status of a commodity group can affect its ability to take a proprietary interest in or license proprietary agricultural technology. For instance, federal and state marketing order boards are part of and serve in an advisory capacity to their respective departments of agriculture. As a result, marketing order boards are not separate legal entities and cannot take a proprietary interest in or license technology for commercial use. On the other hand, commodity commissions are created by specific legislation to perform the same function as marketing order boards but are separate legal entities within state governments and therefore can take a proprietary interest in or license technology for commercial use.⁵ &

Where producer groups choose to continue to fund land-grant university research, should the university give them a preference in licensing proprietary technology generated with such funds?

⁴For example, a coalition of California dairy industry groups have established a private dairy research institute at the California State University at San Luis Obispo.

Recently, some California state marketing orders have restructured as commissions in part to give themselves the option of owning or licensing the technology they funded independent of the State Department of Food and Agriculture. (See, for example, the Fresh Strawberry Program Act, Cal. F & Agric. Code §§77401-77505).

This is a topic of current debate in California. A 1994 report by the California Commodity Commission⁶ criticized the University of California's intellectual property rights and technology transfer policies and questioned the University's commitment to California agriculture:

The university's preeminent reputation . . . has resulted . . . from its close interaction with commercial farmers and from their strong support and cooperation ... A break in this close connection with and clear commitment to California agriculture increases the likelihood that technology developed with tax dollars or funds provided by private industry, commodity groups and agencies could become equally available to competing industries in other states and nations (California Commodity Committee 1994).

The report gives examples where new technology developed with state commodity program grant money was licensed to an out-of-state competitor before the state commodity group knew about the technology. The report recommends that the university adopt a policy to ensure that research is directed toward developing patents of practical value to California agriculture and that groups sponsoring research have preference in licensing and partnership agreements. The University is currently reviewing its policies with input from California commodity groups.

Conclusion

Identity-preservation is one type of end-use oriented marketing system which is changing the structure of modern production agriculture. Intellectual property rights play a central role in identity-preserved systems because they allow rights holders to reduce investment risk, preserve the identity, and control the use of value-added factors in downstream or upstream arenas. Production contracts are the main mechanism by which producers will participate in identity-preserved systems. Production contracts can reduce risks and offer premium prices, but they also can present new risks such as inability to learn the true market value of products. Producers may increase returns in identity-preserved systems by moving into downstream activities such as processing. Likewise, producers may decide to fund the development of identity-preserved varieties through research agreements or other strategic alliances with private or public organizations. Such activities will add to the need to re-examine the traditional relationship between the land-grant university and state agriculture. ⁶

⁶This committee represents California commodities that are organized under a marketing order, commission, or a related state or federal commodity marketing program.

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Recommended Reading

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Acknowledgments

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