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Commentary on the rural economy



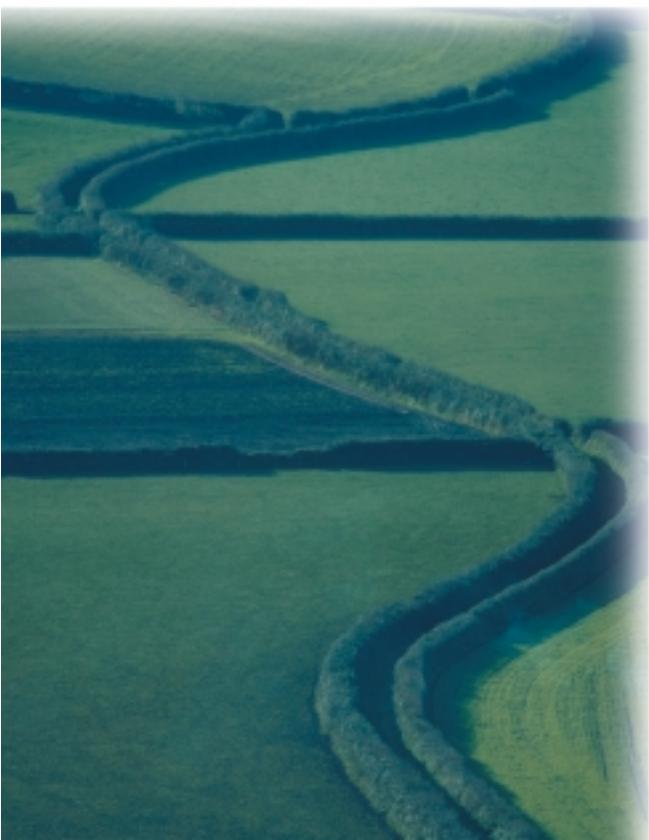
Ag Biotech: Bold New Promise or Bold New Risk?

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Biototechnology is sweeping U.S. agriculture. Like earlier technological advances, biotech promises new gains in productivity—but also offers much more. The new wave of biotech could give farmers more control over their products' attributes, enabling producers to tailor farm products for specific consumer needs.

Biotech also promises to help redraw the rural landscape, adding to the momentum toward fewer and larger farms and encouraging the recent shift toward product supply chains. While biotech could give a needed boost to rural communities that become processing centers for high-value, biotech products, it will also underscore the challenges facing producers and communities that stay tied to commodities.

The future of biotech rests on consumer acceptance. Some consumers are skeptical and believe that the environment and food safety may be at risk. Unless this hurdle of acceptance is cleared, biotech's promise of a bold new future could be at risk.



Biotech's New Wave

Biotechnology refers to the manipulation of the genetic code to create new and useful products. Now that the entire human genetic code has been deciphered, biotech terms like gene splicing and genetic engineering are becoming household words. It could be only a matter of time before biotech food products become just as widespread.

Biotech certainly isn't new to U.S. agriculture. The initial wave of biotech products in the industry focused primarily on improving farming methods and techniques. Striking examples are crop varieties engineered to be tolerant to widely used herbicides, helping farmers eliminate weeds from their fields without harming crops. Other crop varieties have been bio-engineered to resist common insect pests.

A new wave of biotech products will soon emerge from the nation's laboratories. In contrast to the first biotech wave, which focused on improving farming techniques, the new wave of biotech focuses on adding or improving product attributes for consumers. For example, peppers will grow with a firmer texture, tomatoes will live longer on the shelf, and potatoes will resist bruising.

More exotic examples of second-wave biotech products are "nutriceuticals," a new class of farm products that enhance nutrition or even produce medicinal benefits. An early nutriceutical is "golden rice," engineered to include genes from bacteria and daffodils. The result is an elevated level of beta-carotene, which is converted to vitamin A when consumed. Scientists hope the new vitamin-fortified rice will be grown in third-world nations where rice is the dietary staple of many of the world's poorest people. Scientists are also engineering varieties of bananas and other third-world crops so that they will offer resistance to hepatitis and other common diseases.

Can Biotech Change Rural America?

Advances in biotechnology promise to leave an indelible mark on U.S. agriculture

and the rural communities that rely on it. The eventual effects of biotech on farms and rural communities across America, however, could differ substantially.

Farmers were quick to capitalize on the first-generation of biotechnology. Since the commercial launch of herbicide-tolerant or insect-resistant crops in 1996, the share of U.S. crops planted to biotech has soared to about a fourth for corn and well over half for soybeans and cotton. This rapid adoption of biotech by farmers is not surprising in light of agriculture's long record of adopting the most recent technology to save time and boost crop yields. The time required to produce 100 bushels of corn, the nation's largest crop, has plunged from more than 80 hours a century and a half ago to only about two hours today (Chart 1).

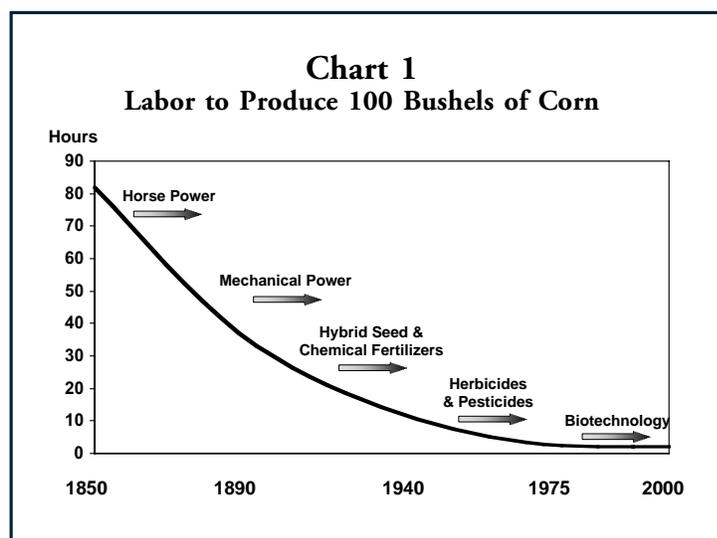
Like previous technological advances, biotech is likely to nudge the industry toward fewer and bigger farms. Farmers have captured greater economies of scale and have trimmed production costs, causing the size of the average farm to grow. Together with the increase in average farm size, another predictable result has been a marked drop in the number of farms, down from about 6 million farms a half century ago to about 2 million today. The nation's largest 200,000 farms account for roughly two-thirds of total U.S. output of food and fiber.

With the new wave of biotechnology catching on, however, we are likely to see a new twist in the industry's long-standing migration toward fewer and bigger businesses. Unlike most previous farm tech-

nologies, the second biotech wave is focusing on the attributes of farm products rather than on how products are produced. In essence, biotech is now letting farmers tailor their products for specific consumer niches, transforming agriculture from a commodity business to a product business.

The industry's new product focus is likely to encourage the development of product supply chains, which has advanced rapidly in recent years. Supply chains are carefully orchestrated production, processing, and marketing channels that stretch from farms to supermarkets. At each step along the chain, contract specifications ensure buyers that new biotech products meet intended specifications, to keep new bio-engineered farm products on target for their intended market niches.

How agriculture's emerging supply-chain structure will affect producers and



rural communities remains an issue of considerable debate (and an important focal point for research in the Center for the Study of Rural America). For producers, the new technology is sharpening the choice between a business plan focused on commodities and one focused on products. Commodity producers face volatile prices, razor-thin margins, and a relentless quest for scale economies to drive down

production costs. Value-added producers who join supply chains lose some management flexibility, but many producers would gladly trade this flexibility to share market risks and larger prospective margins with other chain members.

It is also likely that supply chains will create a new pattern of growth and decline among rural communities. The long-standing trend of farm consolidation and a corresponding drop in the number of farm families doing business locally has weakened many farm-dependent rural communities. Moreover, big farms are more likely to bypass local markets when purchasing production inputs and selling farm products. In contrast, supply chains may provide a boost to some rural communities, as additional local processing activity enables them to gain from the value biotechnology adds to farm products. Still, these new hubs of value-added activity may be relatively few and far between, resulting in a patchwork of rural growth rather than a fundamental groundswell.

Will Consumers Accept Biotech?

While the initial adoption of biotechnology by farmers has been quick and its promise appears huge, biotech's future remains uncertain. The key issue clouding prospects for further advances is consumer acceptance. During the past year, some consumers have expressed deep skepticism of biotechnology. Unless consumers are convinced biotech is safe, its promise will be lost.

Despite the claims of the scientific community to the contrary, some consumers perceive two important risks from biotechnology. The first is an environmental risk, stemming from the fear the new technology will encourage the evolution of especially hardy or harmful "super" weeds or insect pests, or that friendly insects—like the monarch butterfly—might be hurt when feeding on biotech crops.

The second perceived risk of biotech involves food safety. Some consumers fear that foods or food ingredients made from biotech crops might eventually prove unhealthy—so-called "Frankenfoods."

Whether real or imagined, consumer perceptions of both of these risks have become part of the market reality facing farmers, agricultural businesses, and food companies that wish to use the new technology.

Consumer perceptions of biotech risks appear to differ widely around the globe. U.S. consumers have been relatively accepting of the technology. That acceptance is probably built on a fundamental confidence in science and the well-developed apparatus that monitors it. The U.S. Department of Agriculture oversees field-testing and ensures that new crop varieties improved through biotechnology are at least as safe as those developed through traditional breeding programs. The Environmental Protection Agency ensures the safety of crops with pest protection characteristics. And the Food and Drug Administration guards the safety of all foods and ingredients developed with biotechnology or by other means.

In contrast, consumers in some international markets for U.S. farm products—especially the European Union—are considerably more skeptical. Underlying that skepticism might be recent food-safety scares, such as the outbreak of mad-cow disease in England, which have eroded confidence in food safety and its regulation.

Biotech proponents are searching for ways to gain consumer acceptance. One alternative is to segregate and label biotech and non-biotech products, offering discriminating consumers a choice. Segregating biotech and non-biotech commodities is a logistical challenge, though, that boosts costs throughout the marketing pipeline. And since first-generation biotech products offer no additional value over non-biotech products, consumers are unwilling to pay higher food prices to cover the added costs of pipeline segregation. Thus, a key economic trade-off is emerging as the industry weighs the additional costs of segregation against the productivity gains made possible by first-generation biotechnology.

Labeling food products that contain biotech ingredients also presents a quandary for food companies. Many food companies

are concerned that consumers will view a label indicating the use of biotechnology as a warning rather than a simple menu of ingredients. Thus, several food companies have already elected to exclude biotech ingredients from their product lines. If such exclusion becomes widespread, further development and deployment of biotech products could be brought to a halt. That is generally the situation in Europe, where consumers remain deeply skeptical.

The new wave of biotech products may help resolve the consumer acceptance issue. New biotech products like nutraceuticals provide enhanced benefits directly to consumers. As those new products are developed and come to market, consumers will be able to weigh a growing menu of product benefits against the perceived environmental and food safety risks. Eventually, the balance of rewards and perceived risks may tip in favor of consumer acceptance.

Conclusions

Biotech promises sweeping changes for farmers, rural communities, and consumers. For farmers, biotech promises further gains in productivity, far more control over product attributes and quality, and a stark choice between commodity and product businesses. For rural communities, the technology promises a new patchwork of growth and decline, as some communities become processing hubs for agriculture's new biotech products. For consumers, biotechnology promises an array of new and improved food products, with quality, nutritional, and even medicinal benefits hardly imaginable a few years ago. All of these promises, however, hang in the balance of consumer acceptance. Unless consumers perceive a more favorable balance of risks and rewards, biotech's bright promise could be denied.

Nancy Novack, a research associate in the Center, helped prepare this article.

Survey of Agricultural Credit Conditions

Federal Reserve Bank of Kansas City

June 30, 2000

Highlights from the second quarter survey.

- After two quarters of strong gains, district farmland values held steady in the second quarter of 2000. Dry conditions in Missouri, Oklahoma, and western Nebraska put downward pressure on cropland values, but values remain modestly above year-ago levels. District rangeland values, on the other hand, rose 1.2 percent in the quarter and remain well above year-ago levels. Favorable conditions in the livestock sector have combined with nonfarm influences such as urban sprawl, scenic amenities, and recreational activities to lift district rangeland values in recent quarters.
- The district farm commodity price index rose 1.1 percent in the second quarter to a level 12.9 percent above the previous year. Drought conditions lifted wheat and soybean prices in the district, while hog and cattle prices continued to climb. Since the second quarter, however, improved weather conditions and forecasts of another large fall harvest have dampened crop prices. Strong consumer demand for meat has supported cattle and hog prices, despite a steady flow of livestock to market this year.
- The demand for farm loans remained healthy in the quarter, but repayment rates edged down and loan renewals or extensions were flat. The loan-to-deposit ratio continued to climb with more respondents indicating their ratio was above desired levels. Bankers remain concerned about producer's ability to repay loans without government aid, the source of nearly half of U.S. net farm income this year.
- Rising interest rates have been another concern for district bankers and producers. At the end of the second quarter, average interest rates on new farm loans were 41 basis points higher than the quarter before. Interest rates on new farm loans averaged 10.52 percent for operating loans, 10.35 percent for feeder cattle loans, 10.31 percent for intermediate-term loans, and 10.06 percent for real estate loans.

Note: 287 bankers responded to the second quarter survey.

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Farm Real Estate Values

June 30, 2000
(Average value per acre by reporting banks)

	Nonirrigated	Irrigated	Ranchland
Kansas	\$641	\$1,025	\$372
Missouri	911	1,078	624
Nebraska	856	1,436	355
Oklahoma	504	738	348
Mountain states*	333	1,130	217
Tenth District	\$671	\$1,165	\$368
Percent change from:			
Last quarter+	0.97	0.32	1.16
Year ago+	2.45	1.72	7.07
Market high	-20.45	-19.07	-9.48
Market low	69.55	71.38	120.07

* Colorado, New Mexico, and Wyoming combined.

+ Percentage changes are calculated using responses only from those banks reporting in both the past and the current quarter.

Source: Federal Reserve Bank of Kansas City

Selected Measures of Credit Conditions at Tenth District Agricultural Banks

	Loan demand (index)+	Loan Fund availability (index)+	Loan repayment rates (index)+	Average renewals or extensions (index)+	Loan-to-deposit ratio* (percent)	District farm commodity price index (1980=100)
1998						
Jan.-Mar.	120	108	93	109	65.9	94.3
Apr.-June	123	100	78	118	68.0	92.2
July-Sept.	112	99	58	136	68.4	78.7
Oct.-Dec.	107	108	55	138	66.9	80.7
1999						
Jan.-Mar.	105	113	56	143	65.7	86.0
Apr.-June	107	107	71	127	66.5	87.8
July-Sept.	103	90	74	126	67.7	87.0
Oct.-Dec.	100	99	86	115	67.7	91.2
2000						
Jan.-Mar.	107	95	92	108	67.1	97.9
Apr.-June	112	78	86	108	70.4	99.1

* At end of period.

+ Bankers responded to each item by indicating whether conditions during the current quarter were higher than, lower than, or the same as in the year-earlier period. The index numbers are computed by subtracting the percent of bankers that responded "lower" from the percent that responded "higher" and adding 100.

Source: Federal Reserve Bank of Kansas City