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Intellectual Property Rights for Agricultural Biotechnology: Piracy and Its Ramifications for U.S. Agriculture

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Market Report	Yr Ago	4 Wks Ago	10/12/01
Livestock and Products, ***Average Prices for Week Ending***			
Slaughter Steers, Ch. 204, 1100-1300 lb Omaha, cwt	$67.43	$70.01	$68.20
Feeder Steers, Med. Frame, 600-650 lb Dodge City, KS, cwt	88.83	96.00	87.90
Feeder Steers, Med. Frame 600-650 lb, Nebraska Auction Wght. Avg	99.07	100.99	96.01
Carcass Price, Ch. 1-3, 550-700 lb Cent. US, Equiv. Index Value, cwt	103.92	109.50	108.48
Hogs, US 1-2, 220-230 lb Sioux Falls, SD, cwt	45.00	46.50	38.50
Feeder Pigs, US 1-2, 40-45 lb Sioux Falls, SD, hd	34.00	*	32.00
Vacuum Packed Pork Loins, Wholesale, 13-19 lb, 1/4" Trim, Cent. US, cwt	120.60	118.75	112.90
Slaughter Lambs, Ch. & Pr., 115-125 lb Sioux Falls, SD, cwt	65.25	*	*
Carcass Lambs, Ch. & Pr., 1-4, 55-65 lb FOB Midwest, cwt	153.00	122.10	122.99
Crops, ***Cash Truck Prices for Date Shown***			
Wheat, No. 1, H.W. Omaha, bu	3.16	2.90	2.79
Corn, No. 2, Yellow Omaha, bu	1.80	1.86	1.78
Soybeans, No. 1, Yellow Omaha, bu	4.38	4.65	4.05
Grain Sorghum, No. 2, Yellow Kansas City, cwt	3.09	3.54	3.37
Oats, No. 2, Heavy Minneapolis, MN , bu	1.25	1.73	2.06
Hay, ***First Day of Week Pile Prices***			
Alfalfa, Sm. Square, RFV 150 or better Platte Valley, ton	115.00	102.50	115.00
Alfalfa, Lg. Round, Good Northeast Nebraska, ton	67.50	65.00	77.50
Prairie, Sm. Square, Good Northeast Nebraska, ton	82.50	105.00	105.00

* No market.

Parallel revolutions in molecular biology and the legal framework that assigns intellectual property rights (IPRs) to plant genetic resources have resulted in the emergence of agricultural biotechnology and the introduction of genetically modified (GM) products into the food system. IPRs create economic incentives for research and development by making the innovator the residual claimant of the benefits associated with the new technology.

Whereas IPRs purport to protect intellectual property, full appropriation of the benefits associated with the innovation is not a given. Experience from various countries around the world indicates that IPR enforcement is far from being perfect and most (if not all) successful innovations are subject to piracy. This is particularly true in developing countries where there is a growing opposition to the very granting of IPRs for agricultural crops. In addition to the domestic surplus transfers to foreign firms/IPR holders in the form of monopolistic rents, concerns of developing countries include environmental safety and food security. The result is a widespread violation of innovators' IPRs in these countries that has become a major international issue.

The concerns about IPR infringement resulted in the Agreement on Trade Related Aspects of Intellectual Property (TRIPs) during the Uruguay Round of GATT negotiations. The TRIPs agreement is administered by the World Trade Organization (WTO), and allows countries whose innovating firms' IPRs are being violated to retaliate and penalize the violating country/enforcer of IPRs under the GATT. Even though the TRIPs agreement comes into force fully within the next few years, an agreement on the magnitude of the fines that can be imposed is yet to be reached.

While innovators have been active in lobbying for the effective enforcement of their IPRs, their pricing behavior reveals a preferential treatment of customers that respect their IPRs the least. It is usually the case that the prices charged by multinational firms/IPR holders in markets with lax enforcement of IPRs, are significantly lower than the prices charged in markets where IPRs are effectively enforced. In Argentina for instance, where 50 to 85 percent of the Roundup Ready soybean seeds grown are either seeds purchased from the black market (25 to 50 percent) and/or seeds saved by the farmer from the previous year's crop (25 to 35 percent), the prices charged by the innovating firm (Monsanto) are less than half the prices charged to U.S. soybean producers. This discrepancy has raised concerns by U.S. producers who feel that they are being penalized for being "honest." One of the conclusions of my research is that they are probably right.

This article discusses the economic causes of IPR infringement by producers/users of products of biotechnology and its consequences for the welfare of the interest groups, and the pricing and adoption of the new technology. Specifically, it focuses on the causes and consequences of unauthorized use by farmers of GM seed that is developed and produced by a foreign seed company, and is protected by IPRs (e.g., case of Monsanto in Argentina and most markets around the world). Although the enforcement of innovator's rights is an issue of relevance for most areas where IPRs are introduced, the focus here is on enforcement of IPRs in a developing country.

Causes and Consequences of IPR Infringement

When infringement of IPRs is profitable, farmers' compliance with the provisions of IPRs is not assured. Given the possibility of purchasing seeds from the black market at a lower price and/or using GM seeds harvested from the previous year's crop (farmer-saved seeds), producers may find it economically optimal to utilize the new technology without paying the fee associated with its use. The farmers' decision to not comply with the provisions of innovator's IPRs as well as the extent of IPR infringement, depend on the level of IPR enforcement in the developing country. The less the penalty is for IPR infringement and/or the lower the probability that the producer will be detected using the GM seeds illegally, the greater the expected gains from cheating, and the more extensive the IPR violation is expected to be.

IPR infringement affects the welfare of the interest groups (producers and innovators), and has important ramifications for the pricing and adoption of the new technology in the developing country. Specifically, the purchase of GM seeds from the black market and the use of farmer-saved seeds reduce the demand for GM seeds faced by the innovator. Since IPR infringement reduces the demand for GM seed in the developing country, it reduces the price of the new technology and the rents that can be extracted by the innovator/IPR holder. The greater the extent of IPR infringement, the lower the innovator's ability to obtain value for its biotech traits.

The reduced price of the new technology under imperfect IPR protection means that while IPR infringement reduces the rents accruing to the innovator, it increases the welfare of *all* biotechnology users in the developing country. An imperfect IPR enforcement increases the welfare of producers that use the GM seed illegally, and it also increases the welfare of those producers that purchase the GM seed they use. "Honest" producers benefit due to the lower price charged by the innovator in the presence of IPR infringement. In addition, the reduced price of the GM seed and the economic incentives for illegal use of the new technology when enforcement of IPRs is imperfect, result in an increased adoption of the GM technology in the developing country.

Determinants of IPR Enforcement

Consider the decisions of the developing country's government ("domestic government") that is responsible for the enforcement of innovator's IPRs. Since IPR infringement increases the welfare of domestic producers while reducing innovator rents, the level of enforcement in the developing country is determined by the political preferences of the government. The less importance the domestic government places on (foreign) innovator rents, and the lower the level of IPR protection, the lower the innovator's ability to obtain value for its biotech traits.

Since the level of IPR protection in the developing country is determined by the political preferences of the domestic government, the question that naturally arises is what are the determinants of the weight being placed by the government on innovator rents. Factors affecting the importance the domestic government places on innovator rents (and thus its enforcement policy) include: (1) the political influence of the innovating firm in the developing country, (2) the bilateral relationship with, and the fear of retaliation from the country of origin of the innovating firm, (3) the severity of the sanctions in case the developing country is successfully convicted for imperfectly enforcing the innovator's IPRs, (4) the conjectures of the domestic government regarding the effect of its enforcement policy on the future development of (and domestic access to) new technologies, and (5) the size of the enforcement costs.

Obviously, the greater the political influence of the innovator, and/or the stronger the relationship between the developing country and the country of origin of the innovating firm, and/or the greater the likelihood that imperfect IPR enforcement will be detected and successfully con-victed, and/or the greater the severity of potential retaliatory sanctions, and/or the stronger the belief of the government

that extensive violation of IPRs will adversely affect the future development of new technologies (and domestic producer access to them), and/or the lower are the resource costs associated with IPR enforcement, the greater is the level of IPR protection in the developing country.

Enforcement of IPRs and Differential Pricing of the New Technology

Different governments can be expected to have different attitudes towards innovator rents, and thus, different enforcement policies. Since the price of the new technology falls with the extent of IPR infringement, differences in the level of IPR protection provide an alternative justification for (and explanation of) differences in the pricing of the new technology in different countries around the world – a strategy adopted by leading innovators in the sector.

Consequently, IPR infringement increases the competitiveness of domestic producers that utilize the new technology, by placing foreign producers that comply with the provisions of innovator's IPRs at a cost disadvantage. The greater the extent of IPR violation, the lower the price of the new technology, the greater the cost advantage of domestic producers relative to producers in countries where IPRs are more effectively enforced. Lax IPR enforcement can thus be used strategically by governments aiming at increasing the competitiveness of their producers in the international arena.

Infringement of IPRs and the TRIPs Agreement

Given the absence of an effective supranational monitoring agency, and the lack of an agreement on the penalties associated with IPR violation, the benefits from IPR infringement rationalize the lax enforcement and widespread violation of IPRs in developing countries. In terms of the TRIPs agreement, it seems to be well understood that the outcome of the on-going negotiations on the magnitude of fines for IPR infringement will be critical for the future level of protection enjoyed by innovators/IPR holders. What needs to be understood equally well however, is that if IPRs are to be effectively enforced it is necessary for the TRIPs agreement to go beyond the norms of GATT.

Given that developing countries gains from lax IPR enforcement exceed the innovator's losses, if the penalties determined under the TRIPs agreement follow the custom of retaliatory sanctions under the GATT and reflect losses to the innovator, they will be proved insufficient in providing adequate incentives for IPR protection. Unless the WTO manages through the TRIPs agreement to "exceed its limits" and establish an effective enforcement mechanism, enforcement of IPRs will remain imperfect and innovators' ability to obtain value for their biotech traits will still be limited. However, given the lack of a precedent and developing countries opposition to IPRs, an agreement on the establishment of fines that would exceed innovator damages will not be easy.

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