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Social and Ethical Implications of Animal Growth Promotants

104

INTRODUCTION

American agriculture is on the threshold of a major technological revolution, one that will be propelled by the combined forces of the electronic age and a new wave of innovations based upon biotechnology. This revolution portends sweeping changes, both in terms of enhanced farm productivity/efficiency and in the potential for a major restructuring of the agricultural industry.

This paper examines two soon to be released products of this biotechnological revolution, bovine (BST) and porcine (PST) somatotropin. Both BST and PST are naturally-occurring hormones, produced in the pituitary glands of animals, that accelerate metabolism and growth rates. Recent biotech advances have permitted scientists to "manufacture" these substances in mass quantities, thereby making their use economically attractive in the swine and dairy industries. Both products are currently being tested by the Food and Drug Administration (FDA) and should be on the market within the next two years. This paper, using an ex-ante model of adoption, examines the receptivity of Iowa pork producers to PST.

PREVIOUS STUDIES ON SPEED OF ADOPTION AND IMPACTS

Virtually all of the research on farmers' propensity to adopt growth hormones has focused on BST; adoption studies of PST are virtually nonexistent. Two early studies of BST had a dramatic impact on the public imagery of the virtues and likely impacts of this product. In

1986, a much publicized Congressional Office of Technology Assessment (OTA) report concluded that biotechnological innovations would have revolutionary impacts on U.S. agriculture, bringing a dramatic decline in the number of farms and a startling increase in the concentration of agricultural production. It was also concluded that adoption of the new technologies would initially be concentrated on large, highly capitalized operations, thus further solidifying the economic advantages enjoyed by those units and accentuating the trend toward a dual farm structure.

The other study, conducted by scientists at Cornell University introduced the possibility of significant increases in milk production (by as much as 40 percent) from BST use. Through ex-ante assessment, a rapid adoption of BST was projected, with an estimate that two-thirds of New York dairy operators would adopt the product in the first year of its availability. It was concluded that the introduction of BST would accelerate the already rapid changes taking place in the dairy industry, and bring the demise of up to 1000 dairy herds annually in New York State alone.

185

More recent studies have shown relatively smaller productivity increases (10-15 percent) from BST, and slower rates of diffusion of this product among farm operators. Fallert, for example, argued that the effects of BST on the dairy industry will be less dramatic than earlier thought, and concluded that BST will merely reinforce a thirty year trend toward increased efficiency and diminished farm numbers. Recent studies also suggest that there is substantially more farmer resistance to BST than was initially predicted. Upwards of a third of the dairy operators in California and Wisconsin, for example, are not planning to adopt this product.

Societal impacts anticipated from the diffusion of growth hormones have ranged widely and have included an acceleration in the displacement of farm families, lessened viability and survival of rural communities, and increased degradation of the natural environment. The public response to growth hormones, especially BST, has been profoundly shaped by these perceived negative outcomes and has led in some states to legislative initiatives to place a moratorium on their use in some states.

That most of the public controversy has thus far centered on BST and comparatively little on PST is a result of the fact that:

1 socioeconomic impact studies have focused almost exclusively on BST and have projected major increases in milk production and a commensurate displacement of dairy farmers, 2 dairying normally has a high level of centrality in the total farming system, whereas pork is typically part of a more diversified operation, and 3 whereas BST brings substantial production increases in a food product for which there is already a chronic surplus, PST acts as a repartitioning agent and facilitates the production of a leaner, improved meat product.

THE IOWA PST STUDY

To assess the farmers' receptivity to PST, an ex-ante adoption study of porcine somatotropin was recently conducted. Two groups, a representative sample of Iowa pork producers (N=250) and a purposive national sample of large-scale pork producers (N = 19) participated in the study. The Iowa sample averaged 1,100 slaughter hogs marketed annually, compared to 181,000 slaughter hogs for the national sample.

186

Awareness of PST among the Iowa producers is quite low, especially when compared to awareness levels for BST (which recently have averaged about 80 percent of all dairy operators). Only 17 percent of the Iowa sample perceived themselves as well or very well informed about PST, compared to 81 percent of the large-scale producers.

SPEED OF ADOPTION

Ex-ante adoption studies permit the projection of social and economic impacts of innovations that are not yet commercially available. These studies require the preparation of scenarios that define parameters of the innovation. Generally, the scenarios are developed with current "state-of-the-art" knowledge and identify both the relative advantages and potential disadvantages of the product. Benefits of PST included in this study's scenario were improved feed efficiency, increased daily weight gain, improved carcass composition, and an attractive financial return on the operator's investment. Costs of PST included increased labor requirements (in the form of bi-weekly injections), increased protein requirements, more intensive management systems, the possibility of lower market prices, and the potential for adverse consumer reaction to the use of hormones.

A benefit/cost scenario was presented to the respondents, and, after securing their general reaction to the product, they were asked how quickly they would adopt it. The Iowa respondents were cautious—only two percent said that they would likely adopt PST immediately

for use on their farms, and an additional 22 percent anticipated they would likely adopt the product within a year. Twenty-five percent said they would adopt PST in one to two years and seven percent would take more than two years. Thirty-five percent of the Iowa sample said they would not adopt PST.

In comparison to the Iowa sample, the national sample of large scale producers were enthusiastic about PST, with 32 percent planning to adopt it immediately, and another 37 percent within the first year. Ten percent said they would take more than a year to adopt, and five percent (one operator) did not expect to ever adopt it.

Revised versions of the scenario (in which financial return and number of injections required were altered) were presented to the respondents to gauge the significance of these changes for their speed of adoption. As expected, increased financial returns brought accelerated adoption—a \$5:1 rate of return, instead of the \$3:1 rate specified in the scenario, jumped the first year rate of adoption from 24 percent to 50 percent among Iowa producers and from 69 percent to 90 percent among large-scale producers. A reduced return of \$2:1 led to 17 percent of the Iowa sample and 47 percent of the national sample adopting in the first year.

187

Alterations in the delivery system of PST also had a pronounced impact on the anticipated speed of farmers' adoptions. Dropping the required number of injections from four (as specified in the scenario) to two increased the number of first year adoptions from 24 percent to 50 percent among Iowa producers and from 69 percent to 79 percent among large-scale producers. Conversely, doubling the number of required injections from four to eight prompted a significant decrease in first year adoptions, which fell to five percent of the Iowa sample and 42 percent of the national sample.

CORRELATES OF ADOPTION

Ex-ante studies of the adoption of BST have generally shown early adopters to be better educated, more efficient, and milking larger herds than persons adopting later or nonadopters. These findings have prompted the conclusion that large, more capital intensive farming operations will reap disproportionate benefits (windfall profits) as a result of their increased outputs, lower per unit production costs, and higher profits in the marketplace from early adoptions. Because of increased productivity and lower market prices, persons adopting later

are typically denied these financial benefits. For the Iowa sample, positive relationships were found between speed of adoption and size of the hog operations, knowledge of PST, innovativeness, risk orientation, and perceived consumer acceptance. Age was not important for speed of adoption and education and acres farmed were of only minor importance.

WHO BENEFITS?

An industry representative has recently concluded that the introduction of PST will be a “win-win-win” situation, with the interests of hog producers, packers, and consumers all being served. When asked for their perceptions of the likely beneficiaries of PST, the Iowa sample was divided on their assessments. Whereas 80 percent perceived that large operators would benefit from PST, only 42 percent and 18 percent, respectively, anticipated that benefits would also accrue to medium and small-scale producers.

188

Large-scale producers were generally more optimistic about the equity of PST impacts, with 47 percent anticipating that small producers would benefit, and 63 percent and 79 percent, respectively, feeling that medium- and large-scale producers would benefit. Sixty-two percent of the Iowa sample and 84 percent of the national sample felt that meatpackers would benefit from PST, while 33 percent of the Iowa sample and 95 percent of the national sample saw consumers as beneficiaries. A sizeable proportion of the Iowa sample (40 percent) were uncertain whether PST would benefit or harm consumers.

CONCLUSION

Ex-ante studies of adoption have been heralded as permitting the prediction of future conditions and as informing public policy about potential impacts of innovations prior to their release. But it is clear that current agricultural policy cannot prevent potentially adverse outcomes, such as labor displacement from the introduction of new technologies, even if these outcomes are accurately predicted. The question is thus “whether, the ex-ante study*!” Increased public and scientific debate on this question seems warranted. A possible starting point for this debate has been suggested by Dupuis and Geisler, who note that ex-ante studies need to pay greater attention to the institutional structures that undergird agriculture. They conclude that the claimed scale neutrality of new technologies, such as BST and PST, are not in-

evitable, but only a possibility that depends upon existing institutional contexts. Ex-ante studies can play an important role by identifying institutional barriers to the equitable transfer of new technologies and by providing needed information for better anticipation and structural consequences of their adoption.