11-30-2005

The Market Potential of a New High-Oleic Soybean Developed at UNL

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The introduction of genetically modified (GM) products into the food system has been a contentious issue eliciting divergent responses from the major players in the agri-food sector. While farmers have been embracing the agronomic benefits associated with the first generation of producer-oriented GM products, an increasing number of consumers have been raising objections to food containing GM ingredients in major markets around the world. Consumer reaction to GM products is founded on health, environmental, ethical and/or philosophical concerns, and has impaired the potential of agricultural biotechnology.

As a response, life science companies and researchers in academic institutions have been focusing their efforts on the development of consumer-oriented, second-generation GM products with augmented functional properties. A case in point is a new soybean developed by the soybean biotechnology team at the University of Nebraska. When compared to conventional soybeans, the new germplasm is high in oleic acid (>85 percent), which translates into increased quality of oil derived from the crop (Buhr et al., 2002).¹

¹ There are currently a number of oils of different qualities supplied in the world market. In terms of their market shares during 2002/03, soybean and palm oils enjoyed the greatest shares of the world market (30.54% and 27.21%, respectively), followed by canola (11.78%), sunflower seed (8.37%), peanut (4.34%), cottonseed (3.49%), coconut (3.17%), and olive oil (2.16%) (USDA, 2004). While there are many characteristics that differentiate these products, their oleic and trans-fatty acid content is viewed as a major quality differentiating attribute; the greater the oleic acid content of an oil and/or the lower its level of trans-fatty acids, the greater is the perceived quality of the product.
What will determine the market success of the new high-oleic soybean developed at UNL and how is the welfare of U.S. producers adopting the new product going to be affected? These issues were addressed and the market potential of this new high-oleic soybean was examined in a recent article published in *AgBioForum*, by Giannakas and Yiannaka (2004). Specifically, this study focuses on the market and welfare effects of the introduction of the new soybean and seeks to identify the factors that will determine the effectiveness of the new technology as well as the implications for domestic producer welfare if this technology were made available exclusively to U.S. producers at no cost to them. Any patenting and/or licensing costs involved would be incurred by the U.S. government, which would then make the new technology freely available to domestic producers that desired to grow high-oleic soybeans.

Our analysis shows that the market and welfare effects of the introduction of high-oleic soybeans will be determined by the relative prices of products utilizing the new soybeans as an input in their production process (which will, in turn, be determined by the structure of the different supply channels, their production technologies and the costs associated with the segregation and identity preservation of the new crop), the distribution of consumer preferences, and the benefits consumers perceive from the new product (i.e., the value consumers place on the high oleic acid content of the new soybean).

In particular, our results show that a relatively high price of the new soybean and a low consumer valuation of its oleic acid content will result in the innovation being *ineffective* (i.e., the new product will not capture any market share and will, therefore, not be adopted by producers) while an intermediate price and consumer valuation will result in the innovation being *non-drastic* (i.e., the new soybean will capture a positive market share but will not affect the variety of products available in the market). If the price of the new soybean is relatively low and the value consumers place on the new product attribute (i.e., high oleic acid), the greater the likelihood that the new technology will be *drastic*, and the greater the market acceptance and consumption share of the new high-oleic soybeans. If the new technology were licensed exclusively to U.S. producers, a high consumption share of high-oleic soybeans would translate into increased market share of the U.S. in the world market for soybeans, and welfare gains for domestic producers.

Overall, the analysis reveals that the effectiveness and success of high-oleic soybeans will be determined by relative prices and the consumer valuation of the new product attribute. Since altering production technologies, segregation systems and market structures across numerous supply channels (to affect relative product prices) is generally a formidable task, a successful commercialization strategy might need to focus on the consumer. Such a strategy mix would most definitely need to include the determination of the value that high oleic content adds to different products (such as soy oil) as well as an effective communication of potential health and other benefits to consumers.

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