

Abstract 3:

A Review of the Economic Aspects of GM Animals in Food and Pharmaceutical Production Chains

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Animal Genetic Modifications (GM) in food and pharmaceutical chains are newly emerging technologies widely discussed in scientific and non scientific international literature. However, most of these applications are still far from the market and few studies focus on their potential economic impact. This paper reviews the potential economic effects of introducing GM animal in food and pharmaceutical chains, as well as the main factors (driving forces) affecting their application. We will focus on the main economic aspects of GM animals in livestock, aquatic and pharmaceutical production chains.

In general, the economic effects of transgenic animals on the market will depend on how the biotechnology affects production costs, product quality, or both. From an economic point of view, following the distinction made by Caswell for GM crops, animal biotechnologies can be divided into two broad category: a) cost reducing/quantity enhancing (e.g. growth-enhanced transgenic salmon) and b) quality enhancing (e.g. polyclonal antibodies from transgenic rabbits and cows).

Cost reducing and quantity increasing technologies can potentially increase producer profits by allowing producing a given amount of a product at lower cost or, in alternative, a higher amount of product at the same cost. This, in a competitive market, will cause a long run downward pressure on food market prices, generating benefits for consumers. Quality-enhanced food products can potentially increase producer profits by increasing the demand for the improved food. Moreover, quality-enhanced food can be theoretically sold on the market at higher prices compared to the conventional food, if consumers appreciate the quality change. Biotherapeutics derived from GM animals on the other hand offer new solutions to the dreaded diseases like HIV infection, cancers, Alzheimer's, etc and can potentially contribute to improvement of quality of life.

In some cases, the introduction of a biotechnology may modify the market structure. This might be the case of cost reducing/quantity increasing technologies, causing a decline in market prices and profit margins that can drive non-adopters and small enterprises out of business. In other cases, some kind of biotechnologies may be particularly well suited for larger companies.

Next to these direct economic effects, transgenic animals could provide significant indirect economic benefits for consumers and society, in the form of safer food produced by healthier livestock, healthier products, cleaner environment and biotherapeutics. On the other hand, GM animals may also have a negative ecological impact (e.g. risk of escape of transgenic fish) or increase food safety risks (e.g. allergies), thus incurring in external costs for society. The GM animal technologies also raise a number of non economic issues such as ethics, animal welfare, legal and regulatory aspects, etc. Besides, we will discuss the main driving forces affecting the adoption of GM animal in food and pharmaceutical chains, including producers' and consumers' acceptance, improvement in technical efficiency, public policies, etc.