



*Economic Research Service
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Traceability

in the U.S. Food Supply



Traceability systems are recordkeeping systems for tracking the flow of product or product attributes through the production process or supply chain. Recently, policymakers in many countries have begun weighing the usefulness of mandatory traceability for managing such diverse issues as bio-terrorism, country-of-origin labeling, mad cow disease, and genetically engineered foods.

How much food traceability do we have in the U.S.?

A lot, because markets motivate firms to develop and maintain traceability systems

Markets give food suppliers three primary motives for establishing traceability: supply-side management, product differentiation, and food safety and quality control.

The benefits associated with these motives include lower-cost distribution systems, expanded sales of high-value products, increased brand equity, and reduced recall and liability expenses. These benefits are driving the widespread development of traceability systems across the U.S. food supply chain.

1. Supply-side management.

A traceability system is a firm's key to finding the most efficient ways to produce, assemble, warehouse, and distribute products. During 2000, American companies spent \$1.6 trillion on supply-related activities, including the movement, storage, and control of products across

the supply chain. Firms have an incentive to find ways to reduce these costs. In the food industry, where margins are thin, supply-side management, including traceability, is an increasingly important area of competition.

2. Differentiation of foods with "credence" attributes.

Many food products have credence attributes that are impossible or difficult for consumers to detect. The only way to verify the existence of these attributes is through a bookkeeping record that establishes their creation and preservation. Without traceability as evidence of value, no viable market could exist for dolphin-safe tuna, fair-trade coffee, non-biotech corn oil, country-of-origin, or any other process credence attribute.

3. Food safety and quality control.

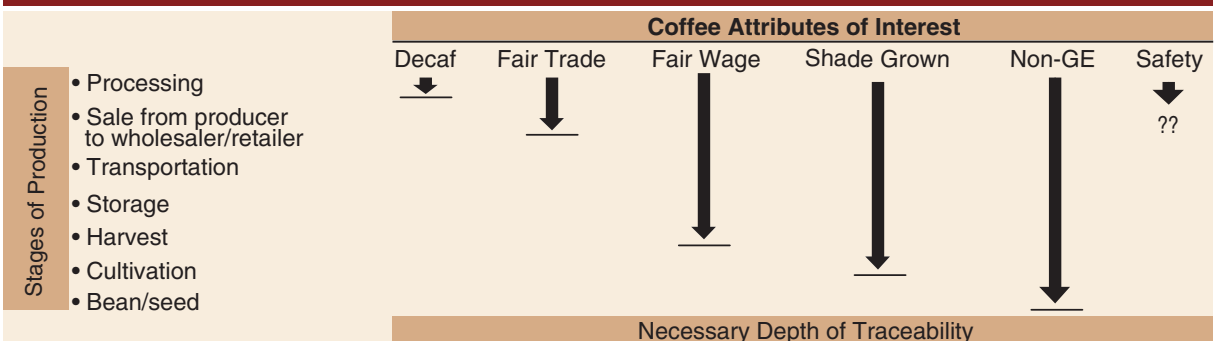
Traceability systems help firms minimize the production and distribution of unsafe or poor-quality products, which in turn minimizes the potential for negative publicity, liability, and recalls. The better and more precise the tracing system, the faster a producer can identify and resolve food safety or quality problems.

But systems vary across food sectors, reflecting variations in costs and benefits

Traceability costs and benefits vary across firms and industries. The dynamic interplay of different levels of costs and benefits has spurred different rates of investment in traceability across sectors of the food supply –

and continues to do so. The breadth, depth, and precision of each system varies depending on the attributes of interest and each firm's costs and benefits. Such variation is evident across three major U.S. food sectors.

The Depth of a Traceability System Depends on the Attributes of Interest



In the *fresh produce industry*, the development of traceability systems has been greatly influenced by the characteristics of the product. Perishability of and quality variation in fresh fruit and vegetables necessitate the boxing and identification of quality attributes early in the supply chain, either in the field or packinghouse. This has facilitated the establishment of traceability for a number of objectives including marketing, food safety, supply-side management, and differentiation of new quality attributes.

Virtually all *grains and oilseeds* produced in the United States are traceable from production to consumption – however, for the most part, quality and safety variation in grain and oilseeds has not warranted the cost of precise traceability systems back to the farm. Systems tracking product to elevators, at which point quality and safety are monitored, have been largely sufficient for the efficient operation of grain and oilseed markets. Growing demand for specialty crops, including non-genetically engineered products, has spurred the development of more precise traceability systems, though the elevator still operates as

an important quality-control point.

The *cattle/beef sector* has a long history of identifying and tracking animals to establish rights of ownership and to control the spread of animal diseases. Producers in the meat sector have also developed traceability systems to improve product flow and to limit quality and safety failures. Recent developments are motivating firms to bridge separate animal and meat traceability systems and establish systems for tracking meat from the farm to the retailer. Though technological innovations are helping reduce the costs of such systems, institutional and philosophical barriers have slowed their adoption.



Do we need more?

Not usually

Variation in traceability across sectors of the food supply is often interpreted as an indication of inadequacy. It is more correctly an indication of efficiency, the result of a careful balancing of costs and benefits. Even firms or industries with little capacity to track may not need more.

Traceability is only one means to efficient supply-side management, product differentiation, and food safety – and it alone cannot accomplish any of these objectives. Simply knowing where a product is in the supply chain does not improve supply management unless the traceability system is paired with a real-time delivery system or some other inventory-control system. Tracking food by lot in the

production process does not improve safety unless the tracking system is linked to an effective safety control system. And of course, traceability systems do not create credence attributes, they simply verify their existence.

The optimal amount of traceability for food safety must be judged in relationship to the other safety and quality control options available to the firm. The characteristics of traceability systems for safety and quality necessarily reflect the control points in the overall system and vary across industries and over time depending on safety and quality technologies and innovations.

But market failure may result in a less than optimal amount

This is not to deny that there are cases of market failure, where the private sector supply of traceability is not the socially optimal amount. In some instances, the private costs and benefits of traceability may not be the same as

the social costs and benefits so that the private supply of traceability falls below socially desirable levels. Market failure could lead to a sub-optimal supply of traceability for product differentiation or for food safety.

How can we get more traceability where we need it?

Strengthen firms' incentives to build and maintain traceability systems



Both industry and government have a number of options to help correct market failure. The best options are those targeted at increasing firms' incentives to build and maintain traceability systems. Mandatory traceability is not usually well-targeted to this task.

Where market incentives result in limited consumer choice and the potential for fraud, individual firms and industry groups have developed systems for policing and advertising the veracity of credence claims. Third-party safety/quality auditors are at the heart of these efforts. These auditors provide consumers with verification that traceability systems exist to substantiate credence claims.

Government may also require that firms producing foods with credence attributes substantiate their claims through mandatory traceability systems. However, mandatory systems that include attributes that consumers do not value generate costs without compensating benefits. For example, the creation of a differentiated organic market requires tracing of organic foods only – not conventional foods.

Where market incentives fail to motivate firms to provide sufficient traceback for food safety, a number of industry groups have developed food safety and traceback standards. In addition, buyers in every sector rely increasingly

on contracting, vertical integration, or associations to improve product traceability and facilitate the verification of safety and quality attributes. Again, third-party auditors help verify that safety and traceback standards and obligations have been met.

The best-targeted Government options to strengthen traceback capabilities give firms incentives to strengthen their safety and traceability systems without requiring any specific process for doing so. For example, standards for mock recalls (in which firms must prove that they can locate and remove all hypothetically contaminated food from the food supply within a certain amount of time) give firms the freedom to develop efficient traceback systems while ensuring that such systems satisfy social objectives.

Policy aimed at increasing the cost of distributing unsafe foods, such as fines or plant closures, or policies that increase the probability of catching unsafe food producers, such as increased safety testing or foodborne illness surveillance, will also provide firms with incentives to strengthen their traceability systems. When the cost of distributing unsafe food goes up, so too do the benefits of traceability systems.

Government may also consider mandating traceability to increase food safety. However, the already widespread voluntary use of traceability complicates the application of a centralized system. Mandatory systems that fail to allow for variation are likely to impose unnecessary costs on firms that are already operating efficient traceability systems.



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For more information on traceability visit the ERS website at www.ers.usda.gov or contact:

Elise Golan (202) 694-5424 egolan@ers.usda.gov

Barry Krissoff (202) 694-5250 barryk@ers.usda.gov

Fred Kuchler (202) 694-5468 fkuchler@ers.usda.gov

Linda Calvin (202) 694-5244 lcalvin@ers.usda.gov

Kenneth Nelson (202) 694-5185 knelson@ers.usda.gov