

## Summary

U.S. food producers have developed an enormous capacity to track the flow of food along the supply chain, though individual systems vary. Some traceability systems are deep, tracking food from the retailer back to the farm, while others extend back only to a key point in the production process. Some systems are very precise, tracking food products to the minute of production or the exact area of a field where they were grown. Others are less precise, tracking product to farms in a large geographical area, such as the area served by a single grain elevator. Some traceability systems collect and track information on a broad range of attributes, while others track only a few. For example, some coffee producers may market and track attributes such as fair trade, fair wage, and shade grown, while others track none of these attributes.

This report describes the results of an investigation into the amount, type, and adequacy of traceability systems in the United States, focusing particularly on the fresh produce sector, the grains and oilseeds sector, and the cattle/beef sector. The results stem from research into the market studies literature, interviews with industry experts, and on-site interviews with owners, plant supervisors, and/or quality control managers in fruit and vegetable packing and processing plants; beef slaughter plants; grain elevators, mills, and food manufacturing plants; and food distribution centers. In some cases, site visits were conducted while in the company of auditors for USDA procurement programs. In these cases, the firms' complete traceability records were accessed.

U.S. traceability systems tend to be motivated by economic incentives, not government traceability regulation. Firms build traceability systems to improve supply-side management, to increase safety and quality control, and to market foods with credence attributes (attributes that are difficult for consumers to detect, such as whether a food was produced through genetic engineering). The benefits associated with these objectives include lower-cost distribution systems, reduced recall expenses, and expanded sales of high-value products. In every case, the benefits of traceability translate into larger net revenues for the firm. These benefits are driving the widespread development of traceability systems across the U.S. food supply chain.

Traceability is not, however, the only means to these objectives – and it alone cannot accomplish any of them. 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.

Firms use traceability systems together with a host of other management, marketing, and safety/quality control tools. The dynamic interplay of the costs and benefits of these tools has spurred different rates of investment in traceability across sectors – and continues to do so. Such variation is not an indication of inadequacy but of efficiency, the result of a careful balancing of costs and benefits. Such variation is evident in the three food sectors at the center of this investigation.

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 fruits 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—for the most part, however, quality and safety variation in grain and oilseeds has not warranted the cost of precise traceability systems. 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 to establish systems for tracking meat from the farm to the retailer. Though technological innovations are helping to reduce the costs of such systems, institutional and philosophical barriers have slowed their adoption.

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. Instances of such market failure could lead to a sub-optimal supply of traceability for product differentiation or for food safety. 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. Government-imposed systems tend to be ill suited to this task.

In cases where markets supply too little traceability for product differentiation, 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. If firms are not required to prove that credence attributes exist, some may try to gain price premiums by passing off standard products as products with credence attributes. One difficulty with mandatory traceability proposals is that they often fail to differentiate between valuable quality attributes, those for which verification is needed, and less valuable attributes for which no verification is needed.

In cases where markets supply too little traceability for food safety traceback, a number of industry groups have developed food safety and traceback standards. In addition, buyers in every sector are increasingly relying 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.

Government may also consider mandating traceability to increase food safety, but such a mandate may impose inefficiencies on already efficient private traceability systems. The already widespread voluntary use of traceability complicates the application of a central-

ized system because firms have developed so many different approaches and systems of tracking. If mandatory systems fail to allow for variations in traceability systems, they will likely end up forcing firms to make adjustments to already efficient systems or to create parallel systems.

Other policy options can encourage firms 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.

One area where industry has no incentive to create traceability systems is for tracking food once it has been sold and consumed. No firm has an incentive to monitor the health of the Nation's consumers in order to speed the detection of unsafe product. Government-supplied systems for monitoring the incidence of foodborne illness are one option for helping close this gap in the food system's traceability network. By better providing this public good, the government could increase the capability of the entire food supply chain to respond to food safety problems before they grow and affect more consumers.