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Traceability for Food Safety and Quality Assurance: Mandatory Systems Miss the Mark

Elise Golan, Barry Krissoff, Fred Kuchler,
Kenneth Nelson, Gregory Price and Linda Calvin
Economic Research Service, U.S. Department of Agriculture¹

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The Issue

Traceability systems are record-keeping systems that are primarily used to help keep foods with different attributes separate from one another. When information about a particular attribute of a food product is systematically recorded from creation through marketing, traceability for that attribute is established. Recently, policy makers in many countries have begun weighing the usefulness of mandatory traceability for managing such diverse problems as the threat of bio-terrorism, country-of-origin labelling, mad cow disease, and identification of genetically engineered foods. The question before policy makers is, When is mandatory traceability a useful and appropriate policy choice?

Implications and Conclusions

In the private sector, food suppliers and manufacturers have several motives for documenting the flow of food and food products through production and distribution channels – and a number of reasons for differentiating types of foods by characteristics and source. As a result, firms supply a high degree of traceability. Although tracing is commonplace in the food supply, market failure is still possible. In some markets, firms may not supply enough traceability to completely develop differentiated markets and food safety traceback. We argue that even in cases of market failure, systemwide mandatory



traceability is rarely the most efficient or best-targeted policy tool for stimulating market development or ensuring the prompt removal of unsafe products from the food supply. Mandatory programs may also result in the imposition of unnecessary costs on firms that are already operating efficient traceability systems.

Failure in Food Markets May Result in Inadequate Supply of Traceability

Firms have three distinct motives for establishing traceability systems: to improve supply-side management; to differentiate and market foods with subtle or undetectable quality attributes; and to facilitate traceback for food safety and quality. A firm may establish a traceability system to achieve any number of these objectives, and as a result the private sector has significant capacity for tracing. However, it is possible that firms do not supply the socially optimal level of traceability in response to private market incentives.

Markets may fail to function properly if private costs and benefits are not the same as social costs and benefits. In determining the efficient level and type of traceability system, firms weigh the costs and benefits to themselves. If the costs and benefits at the margin included in private firms' calculations are the same as social costs and benefits, the market supply of traceability will be optimal: the social net benefits of traceability systems will be maximized. However, when markets fail, as when the benefits firms actually reap are not equal to social benefits, the amount of traceback capacity may not be socially optimal.

Economic theory suggests a number of reasons why the private benefits of food traceability may be less than the social benefits. First, problems associated with the fact that food safety and quality are often credence attributes introduce the potential for market failure. Credence attributes are those that consumers cannot evaluate even in use. Consumers cannot usually discern before purchase, or even after consumption, whether a food was produced with the best or worst safety procedures, or whether a food poses a health risk. For example, consumers are unable to distinguish between raw ground beef contaminated with *E. coli* O157:H7 and uncontaminated ground beef. Consumers are unable to identify the contaminated meat by either appearance, smell, or price, and therefore are unable to gauge the true value of the food.

When consumers cannot discern the true value of a product, producers who produce high-quality or extra-safe products may not be able to successfully differentiate their products from those of their lower-quality competitors and therefore will not be able to benefit from their investments in food safety and quality. In fact, firms producing low-quality food could charge high-quality prices and, because of their cost cutting, have greater profits than high-quality producers. As a result, producers may have an incentive to provide lower-quality, higher-risk foods. If this incentive is left unchecked, the market equilibrium could result in the production of low-quality products with little or no product differentiation (Akerlof, 1970).

Traceability systems may help firms overcome problems of asymmetric information (where the presence or absence of an attribute is not something that can be detected by the consumer). Traceability systems, particularly those certified by third-party verifiers, help producers differentiate their products by providing evidence of quality or safety. For example, traceability systems provide evidence that a piece of fruit was picked from an organic farm or that a tuna was caught with a dolphin-safe net. Traceability systems can also help minimize the distribution of unsafe or low-quality products and help producers build a name for safety and quality. Producers marketing extra-safe, high-quality, or niche-market products may reap benefits from a good traceability system in the form of price premiums or expanded market share. When consumers pay a price equal to the costs of the traceability system, firms' private net benefits reflect social net benefits. In these cases, the firms' traceability systems can rectify the asymmetric information problem and there is no market failure.

Producers who do not seek to differentiate their products have less incentive to invest in traceability. Less traceability is sometimes an efficient private and social outcome: consumers do not value the information generated by every traceability system. Probably very few consumers would want to know if the corn in their corn chips was grown in Illinois rather than Iowa or would be willing to pay for a system generating this type of information. In some situations, however, consumers may have been willing to pay for more information and better traceability systems. The potential for nondisclosure problems arises when an entire product category has an undesirable characteristic that cannot be changed appreciably. In these cases, no producer has an advantage in providing information about the negative attribute because no producer can offer a superior alternative.

The benefits to the firm of establishing traceability for credible product differentiation may also be dampened by the very existence of partial disclosure and innuendo. In some cases the possibility of deception may erode producers' incentives to establish traceability systems because widespread deception makes consumers doubt the veracity of claims made by all producers, even honest producers. For some honest producers, the cost of overcoming this high degree of consumer doubt will not be justified by the benefits.

As a result of the market failure problems described above, government regulators may determine that the development of markets for high-quality or extra-safe food products is inadequate. In these cases, policy makers may consider mandatory traceability to expand consumer choice and protect consumers and producers from fraudulent quality claims.

Though failure by private markets to supply adequate traceability for product differentiation is a concern to regulators, an even bigger concern is failure by private markets to supply adequate traceability for basic food safety control and monitoring. Food traceability systems enable public health officials to identify the source of a foodborne



illness outbreak and trace the flow of the contaminated food throughout the food supply system. When investigators trace diseases to their origin and contaminated foods are removed from the food supply, illnesses can be prevented and lives saved. Though the public sector maintains disease surveillance systems, investigators ultimately rely on documentation maintained by private firms to trace the flow of inputs into final food products and to track the distribution path of final food products throughout the retail sector.

Firms have their own incentives to maintain traceback documentation to facilitate the identification of the origin and distribution of safety problems. The better and more precise the traceability system, the faster a firm can pinpoint the source of food safety problems. Good traceability systems help minimize the production and distribution of unsafe products, thereby minimizing the potential for bad publicity, liability, and recalls.

In some cases however, the amount of traceability supplied by firms may be less than the social optimum because the social, public health benefits of traceability for food safety are larger than the firm's benefits. A firm's traceability benefits comprise the reduction in the potential for lost markets, liability costs, and recalls, while the potential social benefits comprise a long list of avoided costs, including medical expenditures and productivity losses due to foodborne illness, costs of pain and suffering, and the costs of premature death. Social benefits may also include the avoided costs to other firms selling the same or similar foods who might lose sales because of safety problems in the industry, even though their products are safe. When a firm's traceability benefits are lower than social benefits, the firm will likely supply less traceability than warranted by social benefits.

The degree of traceability supplied by firms may also be lower than the social optimum because firms may find value in some level of anonymity. If traceability systems increase the probability that a firm will be identified in the case of food safety problems and be exposed to liability, then the firm may have an incentive to underinvest in traceability: the value of anonymity may reduce the firm's incentive to invest in traceability systems.

Market failure for traceability may therefore occur in two distinct areas: product differentiation and food safety traceback. Asymmetric information problems may dampen the development of differentiated markets for high-quality or extra-safe foods. The divergence between the public health benefits of traceability and the benefits to private firms may reduce private firms' incentives to invest in traceability systems. These potential sources of market failure may therefore prompt policy makers to consider mandating traceability to achieve two objectives:

- (i) expand consumer choice and protect consumers from fraud and producers from unfair competition, and
- (ii) increase the food system's food safety traceback capabilities.



Unfortunately, even in those cases where market failure may justify government intervention to bolster markets and increase food safety, mandatory, systemwide traceability is not a simple, inexpensive fix-all. In the sections below, we examine the potential use and misuse of mandatory traceability in achieving the two policy objectives outlined above.

Attribute-Specific Traceability May Expand Consumer Choice and Protect Consumers from Fraud and Producers from Unfair Competition

A well-targeted, mandatory traceability system may be necessary to encourage the development of differentiated markets and protect consumers from fraud and producers from unfair competition. The government may require that firms producing foods with valuable credence attributes substantiate their credence claims through traceability systems. However, mandatory traceability for all foods may not be the most efficient mechanism for verifying quality claims for the subset of foods with credence quality attributes valued by some consumers.

For example, a government may indeed have an incentive to require that producers of food with valuable attributes, for example, non-genetically engineered foods, verify that these foods actually are not genetically engineered, if the non-genetically engineered attribute is of value to some consumers. However, no such verification would be necessary for the genetically engineered foods currently on the market, because this attribute is not of value to consumers (most biotech products currently on the market boast attributes more likely to be valued by the producer than by the consumer). A mandatory traceability system for both genetically engineered and non-genetically engineered foods is unnecessary to protect consumers from fraud or producers from unfair competition. Such a system would raise costs without generating compensating benefits. Mandatory traceability for product differentiation that is not targeted to specific attributes of value to consumers will be costly and unnecessary.

Even in those cases where traceability systems are necessary to bolster market differentiation and verify valuable credence attributes, the government may not need to mandate a specific traceability template. Private firms operate a wide variety of complex, highly sophisticated traceability systems. A government-mandated system that required all firms to adopt the same template could be highly costly and inefficient. A flexible government-mandated system would be more efficient and less burdensome. In the United States, the proposed country-of-origin labelling law does not specify a traceability template, but instead requires flexibility in the application of the program. With the 2002 Farm Act, retailers are required to inform consumers of the country of origin for beef, lamb, and pork, fish and shellfish, fruits and vegetables, and peanuts. However, the act specifically states that the Secretary of Agriculture shall not use a mandatory



identification system to verify country of origin but may use certification programs already in place.

In addition, though government mandated traceability may be warranted, direct government administration of the traceability program may not be the most efficient option. Private firms offer a number of services to help firms establish credible, reliable traceability systems. In some cases, private firms will be able to offer more efficient, more flexible supervision. For example, the U.S. national organic food standard depends on private certifiers to provide flexibility to the system. Organic food certifiers, approved by the U.S. Department of Agriculture, work with growers and handlers to develop individualized record-keeping systems to assure that traceability of food products grown, marketed, and distributed is in accordance with national organic standards.

Mandatory Traceability is an Inefficient Policy Option for Increasing the Food System's Food Safety Traceback Capabilities

Policy makers may consider mandatory traceability to increase the food system's traceback capability. However, since the government's primary objective for food safety traceback is the swift identification and removal of unsafe foods, other policy tools may be more efficient than mandatory traceability. Policy targeted at providing firms with incentives to establish efficient recall systems will be less costly to firms and consumers and better targeted than policy mandating traceability.

Mandatory traceback may not be the most efficient policy tool because, like most process standards, it precludes efficient innovation by firms by stipulating the method for achieving the objective. Usually performance standards – rather than process standards – ensure the most efficient compliance systems. With performance standards, such as standards on pathogen contamination or recall speed, the individual firm chooses the most efficient process to achieve a particular standard. For some firms, plant closure and total product recall may be the most efficient method for isolating production problems and removing contaminated food from the market. For other firms, detailed traceback, allowing the firm to pinpoint the production problem and minimize the extent of recall, may be the most efficient solution.

Process standards such as mandatory traceability require that firms adhere to a common set of production or management systems, regardless of the size or technological characteristics of the firm. As a result, process standards tend to be less efficient than performance standards for achieving product standards. Likewise, mandatory, government-monitored traceability is likely to be a less efficient mechanism for building an efficient recall system than enforcement of recall and other food safety performance standards.



Currently in the United States, the two federal agencies responsible for food safety, the U.S. Department of Agriculture (USDA) and the U.S. Food and Drug Administration (FDA), encourage firms to perform mock or simulated recalls to ensure that potentially contaminated foods can be tracked and removed from the system in an expedient manner. Third-party quality control certifiers often include timed mock recalls as part of their safety audits. Any policy aimed at ensuring that foods are quickly removed from the system, while allowing firms the flexibility to determine the manner, will be more efficient than mandatory traceability systems.

Another way to put pressure on firms to develop good traceback is to increase the cost and likelihood that if they sell unsafe food they will be caught and penalized. One method to increase the likelihood that firms selling unsafe food will be caught is to improve public surveillance capabilities. In the United States, federal government and other public health officials have taken strides in building the infrastructure for tracking the incidence and sources of foodborne illness.

The Foodborne Diseases Active Surveillance Network (FoodNet) combines active surveillance for foodborne diseases with related epidemiologic studies to help public health officials better respond to new and emerging foodborne diseases. FoodNet is a collaborative project of the Centers for Disease Control and Prevention (CDC), nine states, the USDA, and the FDA. Another network, PulseNet, based at CDC, connects public health laboratories in 26 states, Los Angeles County, New York City, the FDA and the USDA to a system of standardized testing and information sharing. PulseNet helps reduce the time it takes disease investigators to find and respond to foodborne outbreaks. Both FoodNet and PulseNet differ from passive surveillance systems that rely on reporting of foodborne diseases by clinical laboratories to state health departments, which in turn report to CDC. Under passive information gathering, only a fraction of foodborne illnesses are routinely reported to CDC.

With better surveillance, regulators are able to increase the likelihood that unsafe foods and producers of these foods will be identified. If identified, it is more likely that these firms will bear some of the costs of unsafe production, including recall, liability, and bad publicity. Increased surveillance therefore increases the potential costs of selling unsafe food, providing producers with increased incentive to invest in safety systems, including traceability systems. Beefed-up traceability systems not only help firms avoid distribution of unsafe product, they also help firms minimize the cost of recall. The better and more precise the traceability system, the smaller the recall size, and the less expensive the recall. If firms expect more recalls, they will have the incentive to improve their traceback systems to reduce the cost of recall.

In fact, any policy that increases the probability and cost of getting caught selling unsafe food may provide producers with incentives to increase their traceback capabilities. Policies strengthening recall authority, food safety performance standards, or

liability could potentially encourage both development of more efficient systems for the swift removal of unsafe foods and investment in safer food systems – which is the ultimate objective of the public health sector.

Mandatory, Systemwide Traceability is Costly and Inefficient

Traceability is not a panacea for problems related to insufficient product differentiation or food safety traceback capacity. Mandatory traceability is usually an inefficient policy option that is rarely the best policy tool. Even in those cases where traceability is necessary for the development of differentiated markets, mandatory traceability often misses the mark. Systems that include attributes that are not of value to consumers generate costs without any corresponding benefits. Only systems that focus on attributes of value to consumers actually facilitate market development.

Mandatory traceability systems for food safety may be poorly targeted. Policies targeted at providing firms with incentives to establish efficient recall systems will likely be less costly and more successful than policy mandating traceability. Such policies include the following: recall and other food safety performance standards; any policy that increases the likelihood that producers of unsafe food will be identified and punished; and any policy that increases the punishment for producing and selling unsafe foods.

Even if mandatory systems prove to be the best-targeted policy option, heavy-handed application of mandatory systems could negate the benefits. Private firms have developed many sophisticated tracking systems for quality control and supply-side management. Paradoxically, the widespread voluntary adoption of traceability complicates the application of mandatory systems. Mandatory systems that prescribe one traceability template and fail to allow for variation across systems are likely to impose costs that are not justified by efficiency gains. The characteristics of an efficient traceability system will vary from industry to industry and firm to firm. Mandatory systems that fail to allow for variation will impose unnecessary costs on firms that are already operating efficient traceability systems.



References

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Endnotes

¹ The views expressed here are those of the authors and do not necessarily reflect official USDA positions.

