

Future NWCTI vision



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The Oklahoma State University (OSU) National Whole Chain Traceability Institute's whole chain traceability (NWCTI) system is still in its infancy. Currently, it is a functioning pilot-scale system focused on beef-cattle. We are using the system to demonstrate the basic concepts and functionality of a whole chain traceability system to agricultural and governmental stakeholders. The primary long term goal for the NWCTI system is to be able to digitally trace the production history of all food products found in a grocery store. For example, envision picking up a frozen dinner at the grocery store and scanning a QR code with your cell phone and being able to learn about the production practices of all the ingredients in the dinner. This could include information on the beef, potatoes, green beans, gravy, spices, and the processing facility that manufactured that dinner.

Our second long term goal is to enhance food security. Food insecurity in the United States and around the world is generally caused by the inability to effectively get available food to those in need or because of food waste. By some estimates, the United States wastes roughly 50% of the food that it has available. Every time there is a food safety recall, the United States pulls tons of product off the shelf and disposes of it. If the time needed to identify the source of contamination could be reduced, so could the size of the recall. Whole chain traceability could eventually be the primary tool responsible for reducing the time to identify an issue and implement food safety recalls. Further, the system could improve recall response and reduce the overall number of recalled products. The third long term goal is increasing U.S. producer and processor profitability. Rapidly identifying contamination sources in multi-food products can save U.S. export markets billions of dollars. Markets, product branding, and company and producer reputations take considerable time, money, and diligence to build, but a single widespread product recall can be extremely damaging if not fatal to a company's reputation. A fully implemented whole chain traceability system that is inclusive of all food products can help minimize these risks and improve consumer confidence.

Developing an all inclusive whole chain traceability system will be a huge challenge. Think about a huge centralized data silo with databases for beef, dairy, poultry, swine, fruit, vegetable, melon, nut, grain, and field crop products. Think about the information that could be entered into the system by producers, processors, distributors, retailers, and consumers. Further, consider how this information would be merged when 20 individual products are combined to produce a single frozen dinner. Picture being able to walk down a grocery aisle, as shown in Figure 1, and find out the complete history of any of the products by scanning a QR code.



Figure 1. Imagine the quantity of products in a grocery store, and that each product is comprised of multiple ingredients. Being able to trace the origins of these ingredients throughout the supply chain represents an immense challenge in data storage and information processing.

To do this will require managing massive intertwined information databases. It is foreseeable that such a database may be accessed up to a million times a second on a regular basis. So the technological challenge becomes how is a system set up so it can be remotely accessed through the internet *and* be able to handle a million-plus transactions per second. Additionally, our system must be robust, as information that is needed for beef cattle products is completely different than the information that would be needed for watermelon.

To overcome these challenges, researchers are working with stakeholders to identify and standardize the information that would be stored in a whole chain traceability system. Considerable future efforts will have to focus on developing information search engines that query these large databases (Figure 2). These queries would be set up so that it could help government agencies more rapidly identify the vital information needed to locate the origin of an animal disease outbreak or food safety event. Our vision of developing a whole chain traceability system for all agricultural products is technologically feasible. However, developing such a system will require tremendous resources and support from stakeholders. These stakeholders could be local producers, processors, government agencies, equipment manufacturers, vendors, and even consumers. A system of this sort could save local producers and processors millions if not billions of dollars annually.

For more information about the NWCTI system, contact Dr. Michael Buser using the information below. YouTube videos related to the NWCTI system can be viewed at <https://goo.gl/MwPhoS>.



Figure 2. In the envisioned system, an individual scans a products barcode, which triggers a query for information about that product, which is presented to the user in an online interface.



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