



# Farm to Fork

A supply chain odyssey

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“Farm to Fork” is a popular expression implying visibility and control over various food products from the time they are produced until they arrive on consumers’ plates. But is this really possible with today’s processes and technology? A plethora of massive food recalls, from ground beef to spinach to peanut butter, suggest that it is not. Or at least few food companies are achieving the required level of visibility and control.

Certainly the need is there. The Centers for Disease Control and Prevention estimate that one million people are sickened by salmonella found in food products each year. And public awareness of food safety is increasing, prompted by media coverage of product recalls due to food contamination.

While current US Food and Drug Administration (FDA) requirements for traceability are “one up, one back,” The Washington Post reports that state reporting requirements for foodborne illnesses vary significantly, leading to under-reporting of outbreaks in less regulated states. But these unreported cases often spill over into other states. Clearly, the potential exposure for food and beverage companies is enormous. They must be proactive in protecting their customers, their business and their brand.

The problem is that today’s food chains are much more complex than ever before. Food items and ingredients are sourced globally, with many more parties handling them through this long chain of custody. Many blind spots exist in this process, and loss of visibility means loss of control. Establishing true farm-to-fork visibility is, therefore, more difficult, yet more important than ever before.

But what does Farm-to-Fork visibility really look like? How can food and beverage companies use existing technology to remove the supply chain blind spots and protect their products across these complex supply networks? This paper will trace a sample product, tomatoes, as they travel from farm to fork, and back again, to show how today’s technology can be applied to this challenging problem.

## Whisked from the field

As juicy, ripe tomatoes hang from vines anywhere around the globe, workers pluck them and place them into baskets, and the baskets onto trucks for transport to market. (Or this may be a fully Automated, machine-based process on larger farms.) What’s changed in this age-old process is that the workers can now use mobile devices, such as smart phones or iPads, to record the date, farm, field, quantity, quality rating and other pertinent data about this particular batch of tomatoes right in the field. The data is associated with the batch using labels or tags.

Capturing this detailed field-level data electronically allows it to become immediately visible over a secure internet cloud to all supply chain participants. Additional details are added at each touch point along the supply chain, so chain of custody, visibility and control are maintained throughout the process, removing typical blind spots.



There are several advantages to a cloud-based approach to food tracking starting in the field. First, the information is immediately available for all authorized network partners, enabling them to see what is in the pipeline and plan accordingly. Second, it deters theft, or at least allows any theft to be traced to the exact point in the process where it occurred so corrective action can be taken. Third, and most important, if contamination is discovered anywhere down the road, being able to trace the problem to its source and isolate affected batches greatly reduces the size and cost of any associated recall.

## In the heart of production

Once our batch of tomatoes reaches the processing plant, it may be used in many different ways. After being cleaned and inspected for quality, the tomatoes may be segregated for sale in the produce section of supermarkets; diced or stewed for canning, often with other ingredients added; crushed for paste or sauce; or processed for use in other food products. All you have to do is look at all of the different varieties of canned tomatoes on a supermarket shelf to begin to realize the many processing options.

In this diversity of processing options we begin to see the complications for traceability. While tracking the tomatoes sold whole at the supermarket is quite straightforward, tracing the tomatoes processed through many different recipe combinations is much more difficult. Not only do you need to track which batches went into which recipes in each production run, you likewise have to track all the other ingredients that went into each recipe. Often these other ingredients may be from different parts of the world: garlic from Chile, peppers from Mexico, spices from Asia, and so on.

And the complexity doesn't stop there. Tomatoes processed at one plant may be shipped to another facility for further processing into other end products. Rather than the linear chain implied by the "one up, one back" FDA regulations, these complex interminglings of ingredients are more like a spider web of interconnections.

There are several layers of complications to traceability baked into the above processing scenarios. First, the ingredients for the various recipes may be

coming from different parts of the world, each with their own processing practices, levels of automation and regulatory requirements. Second, each ingredient and step in the process may involve separate companies with their own practices and automation levels. Third, the handoffs between each entity are often blind spots without detailed product or ingredient data, thus breaking the chain of traceability information.

Here again, a cloud-based approach can overcome these limitations. Virtually all companies throughout the world have access to the internet today. Cloud-based traceability applications can gather all the pertinent data, regardless of the level or types of automation at each site. In this way, information is available from all sources simultaneously, so the broken chain of handoffs is not a limiting factor.





## To market we go

Transportation is frequently a blind spot in supply chains as well. While transportation is the connective tissue that binds the many nodes of complex supply networks together, it often acts as a barrier to information flow and visibility due to lack of adequate technology. Without advance shipment notices (ASNs), for example, companies must re-identify products at receiving. This re-identification is at the highest level: a case of diced tomatoes from XYZ company. It does not include the lineage of all ingredients that is critical to traceability.

Refrigerated and frozen food transportation is also a potential problem spot. Changes in temperature within a trailer or container during transport can adversely affect food quality and safety. But without proper sensing and monitoring technology, which is readily available today but not always used, there is no way of knowing whether temperatures during transport were maintained within acceptable ranges.

The use of third-party co-packers, carriers and logistics service providers adds to the complexity of these information handoffs. It only takes one interruption in the information flow to break the chain of visibility. But, with a cloud approach and enabling technologies such as collaboration portals and on-demand inventory management, these barriers to information flow can be overcome.

## When something goes wrong

Regardless of how careful and exacting your food chain processes are, things go wrong. The tomato field might have been tainted by runoff from a neighboring field. Overseas ingredients may have been contaminated in shipment. A faulty thermostat in a processing plant may not have raised the temperature high enough to kill bacteria. You know the drill.

Unfortunately, many times these problems are not discovered until the merchandise is in the hands of retailers or consumers. Rather than going into panic mode and pulling everything from store shelves and distribution centers, companies with farm to fork traceability can quickly locate everywhere the tainted batch has been used. Then only those end products containing ingredients from the affected batch need to be pulled from shelves, locked from sale on POS systems, and recalled.

This fast, laser-sharp recall capability can save millions of dollars by limiting the recall to only the affected products. Mass recalls of products should become a thing of the past once all food and beverage companies adopt these visibility solutions. These solutions also better protect the public because time is not wasted trying to figure out manually which products are impacted. Therefore, tainted products are pulled faster and the public is notified sooner.

## The odyssey ends, but not the story

We'll leave our fictitious tomato odyssey here, but will discuss some of its implications before we close. No doubt you recognize this as a scenario that happens every day in the food industry. But the results vary greatly based on the processes and technologies used.

Perhaps you noticed that the detailed information about the tomatoes followed them from the field all the way to the store shelf, regardless of whether the tomatoes were whole, diced, became sauces or were mixed into recipes. The details of every process that "touched" the tomatoes and other ingredients were recorded for FDA compliant traceability and for potential recall purposes. Because of this, the processing company could quickly determine which, if any, of their tomatoes were affected by a recall - saving millions of dollars and protecting their customers and brand.

Of course, this was a simple example. With global sourcing of many ingredients, with many more suppliers and touch points in the process, and with new legislation like country of origin labeling, the need for visibility to inventory and its associated data trail becomes much more complex. And the risks and rewards grow much higher.

The kind of farm to fork traceability and visibility required to meet these challenges doesn't exist in typical Warehouse management systems (WMS).

That's because visibility and traceability a coordinated data stream from all the touch points in the food supply chain. This can only exist in collaborative cloud networks that capture all this data from the many sources, translate it into common formats, and integrate it into appropriate applications for processing. The disparate systems, protocols, data formats and coding structures across the supply chain make this difficult. But translation capabilities and standards efforts such as the Produce Traceability Initiative (PTI - [producetraceability.org](http://producetraceability.org)) are simplifying the process. Blue Yonder is working with food customers and PTI to deliver this uncompromising level of visibility and traceability.

To enable this, configurable workflows can be set up to direct how each product is processed from the field through distribution. This includes what processes are performed in which order, and what data is captured. These workflows also specify how workers should react when exceptions occur.

So in our example, the configurable workflow directed that the inbound tomatoes were to be inspected, rated for quality, routed based on quality or damage, cleaned, cooled and packaged. On the outbound side, the workflow might have directed them to be further inspected, sterilized, chilled, specially packaged based on customer specifications, and shipped by various means, with ASNs sent electronically to the receiving sites.

Once the tomatoes reach the grocery store, task management technology can direct workers to receive the produce based on the ASN, inspect it,



and either store it or stock it directly on shelves. Other protocols could include product rotation routines and promotional set-up, display and pricing.

To ensure the right number of associates with the right skills are available when needed to perform all the processes and tasks throughout processing, from the field all the way to the store shelf, enterprise workforce planning and scheduling technology can be used. Enterprise workforce management systems monitor work progress to ensure critical steps are completed on time. They also track performance and incentives, which are key to maximizing efficiency.

Technology allowed the tomatoes in our story to have an efficient, visible and traceable path from farm to fork. As supply chains and regulations become more complex, and processing becomes more intricate, the value of supply chain technology only increases. A system that can direct and track every touch point along the way will provide the greatest agility, efficiency and control, helping you to meet your goals while being a trusted, low-risk partner to your customers.

