CPTTF (CPMA/PMA Traceability Task Force)

Traceability Best Practices

Fresh Produce Industry (North America)

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Summary of Best Practices

This section lists each of the best practices that are identified in this document and where they can be found. You are strongly encouraged to refer to the document for the rationale supporting each best practice. These best practices are voluntary. Companies are free to use and adapt these best practices in a manner that enhances the flow of information with their supply chain partners.

BEST PRACTICE #1 (Page 16)
Add the lot number to fixed-weight consumer packs containing a supplier ID.

BEST PRACTICE #2 (Page 17)
On the retail / foodservice level, mark cases with human readable data including supplier name, product description and lot number.

BEST PRACTICE #3 (Page 18)
On the distribution center level, encode GTIN and lot number in a UCC.EAN-128 barcode.

BEST PRACTICE #4 (Page 18)
On the distribution center level, use human-readable supplier name, product description, and lot number.

BEST PRACTICE #5 (Page 19)
During the slotting process, scan the supplier case and link to the internal pallet number.

BEST PRACTICE #6 (Page 20)
During receiving on the distribution center level, use supplier pallet tags by encoding the company prefix and serial number in a UCC.EAN-128 barcode.

BEST PRACTICE #7 (Page 20)
On the distribution center level, receive the EDI ASN (Advance Ship Notice).

BEST PRACTICE #8 (Page 20)
On the distribution center level, scan supplier pallet data during the receiving process and match to EDI ASN data.

BEST PRACTICE #9 (Page 22)
On the supplier level, use supplier case coding by encoding GTIN and lot number in a UCC.EAN-128 barcode, as well as human-readable supplier name, product description, and lot number.

BEST PRACTICE #10 (Page 22)
On the supplier level, use supplier pallet tags by encoding company prefix and serial number in a UCC.EAN-128 barcode.

Foreword

In late 2002, the Canadian Produce Marketing Association (CPMA) and the Produce Marketing Association (PMA) met to discuss expanded cooperation and collaboration between the two associations. As a result, the associations' leadership agreed to form a joint task force to address the issue of traceability for fresh produce.

On November 13, 2002, the CPTTF (CPMA/PMA Traceability Task Force) was established. Members include 17 appointed broad-based representatives from the North American produce industry, consisting of grower-shippers, retailers, foodservice operators, wholesalers, distributors, and regional produce associations.

Building upon previous CPMA task force work, the task force objectives are three-fold:

- Identify and document key best practices that facilitate enhanced traceability of fresh produce in the North American produce industry
- Conduct a pilot project in the produce industry to demonstrate the application of these best practices and affirm their validity
- Educate the produce industry on the benefits of enhanced traceability

This document addresses the task force's first objective, i.e., to identify and document key best practices. Traceability best practices are intended for voluntary use in the North American marketplace. These comprise both traceability procedures and relevant technical information on product identification, bar codes and electronic data exchange. By adopting traceability best practices, industry members will enhance their ability to identify and recall implicated product through the supply chain in a timely manner.

Introduction

Traceability represents a significant issue that the produce sector is grappling with now. Without traceability, the scope of a product recall may encompass an entire commodity group, source of supply, or product brand. A negative ripple affect could also cross over to other companies with similar products or geographic regions. The cost of a massive recall, in addition to potential future litigation could be a fatal blow to even the largest of organizations. The first priority must always focus on consumer protection. However, industry members also have a business obligation to minimize financial exposure by having effective traceability systems in place.

Although it is not the intention of this document to address food safety outside the context of traceability, best practices recognize and recommend that a food safety system exist within an operation. Food safety programs such as Hazard Analysis and Critical Control Point (HACCP) and Good Agricultural Practices (GAP), as well as quality improvement programs such as ISO 9000 minimize the potential of food safety events and subsequent product recalls. Despite best efforts at prevention however, there will still be some degree of risk of product contamination or tampering at any point in the supply chain. To minimize potential harmful effects on consumers and the industry as a whole, industry members must give a high priority to any practical solution that addresses this issue.

Industry adoption of traceability best practices will result in the following benefits:

- Minimize the impact of a product recall, by limiting the scope of product implicated and providing traceability tools. The financial impact of recalling an entire commodity or brand versus a specific grouping of product (e.g., a batch or lot) can be enormous.
- By ensuring proper segregation and clear identification of product, companies may demonstrate that their product is not implicated in a given product recall.
- Address concerns of agro-terrorism or tampering of the food supply chain.
- Lend support to legislation and associated regulations covering the fresh produce supply chain.
- Bolster consumer confidence through the industry's ability to promptly identify and recall potentially unsafe product.
- Create a feedback loop to improve product quality, condition, and delivery.
- Improve supply chain efficiencies and trading partner collaboration.

References made to pending legislation and regulations, technical standards and guidelines, and other traceability initiatives globally are for general information only. Detailed information should be obtained directly from source documents.

Certain commodity markets such as the grain industry, genetically modified organisms and direct to consumer sales fall outside the scope of this paper.

I. Traceability Best Practices: An Integrated Approach

The key stakeholders targeted to implement traceability best practices include: grocery retailers and foodservice companies providing goods and services to consumers, suppliers who are mainly composed of grower/shippers, and the transporters of goods. Other corporate entities take an intermediary role in the supply chain. They include marketers, wholesalers, food processors, brokers, distributors, cooperatives, importers, and exporters.

It must be recognized that key stakeholders have a wide variation in technical sophistication and financial resources available for traceability initiatives. As such, recommendations that seek to replace existing systems, or introduce excessive costs will likely be met with resistance and non-compliance.

At the same time, effective traceability will require a certain level of technical capability and investment over time. True benefits can only be achieved through widespread industry adoption. Therefore, best practices must provide a compelling business justification for companies to proceed with adoption.

Guiding principles for traceability best practices are as follows:

- Clarify traceability terms and concepts to ensure mutual understanding between trading partners.
- Provide framework for product and location identification: including data attributes that enable access to a given products life cycle, during all stages of production, storage, delivery, and receipt.
- Record where the product was sent and where it came from (one step forward, one step back) at each point in the supply chain.
- Limit the scope of a recall by predefining groups of product and utilizing other data attributes to facilitate traceability.
- Prioritize implementation steps including necessary standards, procedures, and technology to obtain the greatest value in addressing traceability requirements.
- Ensure technical compatibility with other international traceability initiatives.

Various standards organizations and industry associations have completed a considerable amount of traceability work for perishables globally. Meat, seafood and dairy sectors have traceability initiatives in progress.

This document builds upon the technical foundation of the EAN Fresh Produce Traceability guidelines and PMA's Pallet and Case Coding document. Adoption of common technology standards (e.g. UCC.EAN numbering system) is a prerequisite for international trade, and must form the foundation for any North American traceability implementation.

Traceability Defined

The most internationally recognized definition of traceability defines it as the "ability to trace the history, application, or location of an entity by recorded identifications" (ISO 8402). This is usually done for the purposes of managing agriculture and food production, inventory, logistics, supply, quality, safety, product recalls and withdrawals, and compliance with legislation.

In defining traceability, it is important to distinguish between tracking and tracing. Tracking is the capability to follow the path of a specified unit of a product and/or batch through the supply chain as it moves between organizations towards the final point-of-sale or point-of-service. Tracing is the capability to identify the origin of a particular unit and/or batch of product located within the supply chain by reference to records held upstream.

Product defined as unsafe for consumption by a government agency, falls into either:

- Contamination: bacteria, virus, chemical (pesticide application, etc), TDU (Tainted, Decomposed, or Unwholesome)
- Non-compliance of government regulations

Fresh Produce – State of the Industry

Both retail and foodservice companies have undergone significant consolidation in recent years. The largest companies account for a significant percentage of the industry and have significant technology requirements. The remainder of the industry comprises a few hundred small to medium enterprises (SMEs), many of which have found niches in specialty products, strategic locations, unique services and branding.

The supply side has seen some consolidation, but often through other means such as business partner alliances. There are a few dominant suppliers that are technology enabled and account for roughly 40% of the industry, with the remainder made up of hundreds of grower/shipper entities that may not have access to technology. There is a myriad of other support companies that provide materials, labor, transportation, storage, technology and other services that are also impacted by traceability

A considerable amount of fresh produce is imported and exported, thus any North America initiative must dovetail with other traceability requirements globally.

Proprietary systems and data is the common theme with most companies involved in fresh produce. As such, electronic exchange of business data requires that companies go through a rigorous data synchronization process (products and locations) with each of their trading partners. Compounding this problem is that there are often multiple suppliers for essentially the same product, creating many-to-one mapping relationships.

Several large suppliers, retail, and foodservice companies have well-established e-commerce systems — both electronic data Interchange (EDI) and Dot.com systems integration — whereas SMEs are more inclined to participate in Dot.com services.

Based on a 2001 CPMA survey, less than 30% of suppliers provide bar codes on pallets and cases. Most use proprietary identification numbers and use a variety of data carrier formats (3 of 9, Interleaved 2 of 5, UCC.EAN-128, etc.)

The perishable nature of fresh produce and unique characteristics of the supply chain bring challenges to implementing an effective traceability system. Multiple supply sources, raw materials, environmental conditions (commodity specific requirements for humidity, temperature, and segregation), transportation, reconditioning, repackaging, and delivery processes all add complexity to traceability systems.

Companies vary greatly in their technical capabilities: from phone, fax, and paper-based transactions, through robust e-commerce, bar code, and other internal systems. Their ability to identify implicated product, and perform track and trace activities is directly related to their technical capabilities

The primary goal of this paper is to educate industry members on traceability best practices, to encourage adoption of common standards, and to provide a roadmap for industry implementation.

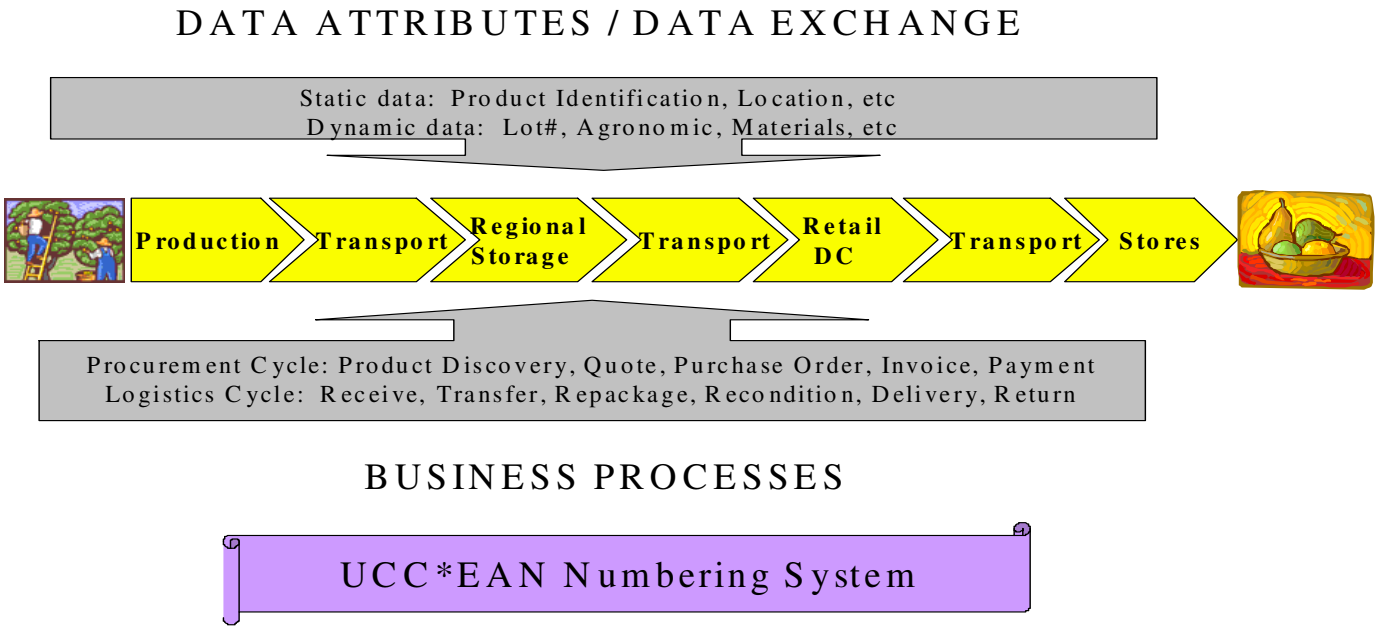
II. Traceability Cornerstones: Data Exchange and Business Processes

This section examines the key components for traceability both internally (within the span of a company's operations) and externally (between one or more trading partners).

While many companies have internal traceability systems that are effective within the span of their operations, there is considerable room for improvement when a food safety event spans across the supply chain. Most data shared between trading partners via e-commerce or through pallet and case marking is currently in a proprietary format, virtually unusable for traceability purposes.

Industry consensus on data attributes, data exchange, and business processes is a prerequisite for an industry-wide solution. It is imperative that companies work towards a common set of standards and guidelines, rather than building disjointed and incompatible systems.

The following diagram provides a high level overview of the fresh produce supply chain. Data identifiers, data exchange, and business processes follow the physical product as it makes its way through the supply chain from field to consumer.



Data Attributes

Traceability systems are concerned with both static data that remain unchanged through the product life cycle (i.e. a product description), and dynamic data that change event by event (e.g. lot number).

Static Data (Product Identification)

Consumer level (retail point of sale [POS])

- Generic 'loose' random weight; identified by Produce Electronic Identification Board (PEIB) price look up codes (PLUs)
- Generic prepackaged fixed weight/count; identified by PEIB universal product code (UPC) item codes
- Prepackaged fixed weight/count; identified by supplier UPC item codes

Trade level (unit of sell)

- Company prefix and product attributes at the case level global trade item number (GTIN)

Dynamic Data

Raw Materials

- Seed source, water source (irrigation, production process, ice), chemical application, fertilizer, etc
- Packaging material (consumer packs, cartons, liners, reusable plastic containers [RPCs], etc)
- Production and post-harvest material (waxing, stickers, etc)

Logistics

- Application Identifiers (AIs): serial shipping container code (SSCC – also known as pallet license plate), lot number, packaging date, use by date, production number, country of origin, etc.
- Global location number (GLN): identifying production/storage facilities, distribution centers (D/Cs), retail stores, restaurants, transportation, etc.
- Internal location numbers: grower, orchard/grove, ranch/block, vessel hatch/deck, pallet sequence on trucks, cold storage floor grids, staging locations, seal numbers, etc. (may provide additional details on a given GLN)
- Transport numbers, used to identify vessel, aircraft, truck and other carrier references

- Transaction numbers: purchase order, work order, repack, recondition, bill of lading, inspection, receiving, shipping, invoice, credit, etc.

Data Exchange and Business Processes

As an efficient means of transmitting relevant data for traceability, the use of e-commerce is critical. Quotes, purchase orders, advance ship notices, inventory replenishment requests, invoices, and payments can be automatically updated without duplication of effort.

Data Alignment and Synchronization

Before this computer-to-computer data exchange can take place, companies must go through an initial procedure to map and synchronize product and location data.

Product data uniquely identify company products and their associated attributes. Location data uniquely identify corporations (their hierarchies and location addresses). EAN member organizations (including Uniform Code Council [UCC] and Electronic Commerce Council of Canada [ECCC] in North America) administer company prefixes and numbering standards to ensure that a given product (via GTIN) or location (via GLN) is globally unique.

Currently, trading partners must go through a manually intensive and error prone mapping and synchronization exercise as a prerequisite to conducting e-commerce transactions. Incompatible codes severely restrict the industry in moving forward with various technology initiatives and hampers an effective traceability process

For a given commodity (e.g., apples), purchases can be made from multiple suppliers depending on quality, price and delivery factors. Further, a given retail stock-keeping unit (SKU) (e.g. large Fuji apple, 5/6lb bag) may have several associated supplier GTINs (e.g. different origins, sizes, grades, and brands). In other words, a given retail SKU can be sourced from multiple suppliers, and each supplier in turn may have multiple GTINs.

Retailers and suppliers have proprietary systems specifically designed to accommodate fresh produce. Internal product master files are unique to their company, and do not conform to recently developed PMA produce attribute guidelines. Retailers range from 500 to 3,000 products (or SKUs) while suppliers range from under 100 to 20,000 products (or GTINs). Product listings are volatile, with many new product introductions each season. Industry-wide, there is a 20% product substitution rate, where product shipped is slightly different than originally ordered.

E-commerce initiatives to date have relied on the supplier performing the product synchronization work. That is, suppliers map each retailer's set of SKUs and synchronize with their internal set of GTINs. With this scenario, suppliers can best

determine the set of their products that match to the retailer SKU for substitution purposes.

In future, it is expected that both UCCNet and ECCNet will support supplier GTINs for fresh produce. In this event, retailers and foodservice companies will need to perform the mapping and/or synchronization work. Alternatively, Dot.Com catalogue services may be utilized. PMA is taking an active role to oversee the industry's requirements for improved product synchronization (see Appendix I - PMA IPD).

Information Flow through the Supply Chain

Industry consensus on what information is to be shared, when it should be shared, and how it should be shared is crucial to an effective traceability system. The main concept is that enough information needs to be shared between trading partners to identify and track product as it moves through the supply chain, and to trace product to its point of origin.

The key is to determine the optimal balance of data exchange that will meet the requirements of all trading partners and government regulations.

Internal Traceability

Internal traceability refers to confidential or proprietary data and processes that companies use within their span of operations to track product.

Many companies have made significant investments with their internal systems to achieve competitive advantage and meet market demands. For example, supplier systems may comprise crop management, forecasting, sales, quality control, manufacturing, logistics, and accounting. Retailer systems may comprise demand forecasting, procurement, quality control, logistics, inventory, and POS systems, etc. These same systems should provide an excellent audit trail of product movement, and they should be tapped for traceability purposes.

At the same time, it is important to determine data that should not be shared between trading partners. In fact, excessive sharing of information may be counterproductive with data duplication, increased administration and technology costs, and possible infringements on proprietary information. For example, sharing data on chemical application, packaging material, crew information, etc. serves no purpose, when the company that owns the data can reference the data internally when required.

Depending on where companies lie in the supply chain, as a prerequisite for internal traceability they must have systems in place to identify the product (pallet, case, and item), record the production process (packing and repackaging), and record product movement (receive, transfer, and delivery).

External Traceability

External traceability refers to the data exchange and business processes that take place between trading partners.

The greatest challenge facing our industry is the current implementation of proprietary systems for data synchronization, product identification, and pallet and case marking. As a result companies must build traceability systems unique to each of their trading partners, or they become reliant on a piecemeal approach, grasping at any information that might assist them during a food safety event.

There is considerable opportunity to improve industry-wide traceability through industry consensus on data attributes, data exchange, and business processes. Applied appropriately, UCC.EAN standards, PMA Pallet and Case Coding best practices, PMA Industry Product Database (IPD), and other technology enablers will significantly contribute to traceability efforts. Companies can then work towards a common approach to traceability, knowing that they won't have to reinvent the wheel with each of their trading partners.

As a prerequisite for external traceability, companies must have systems in place that adhere to industry standards for data attributes, data exchange and business processes (as outlined in the remainder of this paper).

III. Traceability Considerations at Each Segment of the Supply Chain

Each segment of the supply chain has different requirements, expectations, and technical, human, and financial resources available. A key consideration is to determine the optimal set of data that each segment of the supply chain requires for traceability. Over time, data requirements will remain relatively unchanged, whereas technology will evolve and provide new opportunities to enhance future traceability initiatives.

This section explores data requirements and the possible application of technology at each segment of the supply chain

Consumer Level

The reality is that when the consumer detects product contamination, it may be days or weeks after the purchase date. Packaging (shrink wrap, bags, etc) and identification numbers (PLUs, UPCs, and reduced space symbology [RSS]) will most likely have been discarded at time of consumption.

Given the time elapsed, the scope of product implicated may well have cycled its way through the supply chain. As well, cross-contamination may have taken place at any point in the supply chain or during consumer handling. The consumer must be responsible for the role they play in ensuring the safety of food. When a food safety event occurs they must take the immediate step of notifying the health care system.

Unless multiple outbreaks occur, it is very difficult to achieve traceability based on a specific consumer item. Nevertheless, recall and traceability activities must kick into gear to ensure that remaining product is isolated and removed from all stages of the supply chain, and more importantly to ensure that the source of the problem is identified and corrected.

The challenge with using consumer level codes for traceability is that they were originally developed to facilitate pricing at retail point of sale. Over the last few years considerable discussion has taken place on the merits of extending consumer level codes. For example, GTIN (supplier ID, item ID / PLU) and lot number are considered to be the minimum data requirements for traceability. The following outlines consumer level codes and current assessment for traceability purposes.

Consumer Packs

- PEIB UPC item: generic company prefix does not allow for supplier identification. Where feasible add a lot number (limited application to traceability due to lack of company prefix).

- Supplier UPC item: contains supplier ID and item ID. Where feasible add a lot number. (Combination of GTIN and lot number provides excellent application to traceability.) Applicable for loose or bulk items.
- PEIB PLU: summary level product description (PLU), no supplier identification, and no space available for lot number (limited application to traceability).
- RSS: contains supplier ID and PLU number (UCC produce application guideline). Addition of lot number is problematic due to curvature of product, size of bar code, etc. (limited application to traceability).

For consumer packs, the addition of lot number (with a GLN prefix) would enhance traceability. However, for loose produce, the addition of GTIN and lot number would be infeasible due to logistical issues, technical limitations, and significant supply chain costs.

> Best Practice #1: Add the lot number to fixed-weight consumer packs containing a supplier ID.

Retail Store / Foodservice Outlet Level

The first step is for the consumer to identify the retail store and specific display unit, then the specific commodity, brand, or packaging of the product. Hopefully, the consumer level packaging or other identification numbers can be identified at this point.

Even with positive identification, however, the level of information available would still implicate a very wide scope of product (an entire brand or product line). Often, there are several suppliers involved during the same time period in replenishing a given commodity, adding increased complexity.

Identification at the case level on the other hand would limit the scope of product implicated and provide the required information for traceability. Unfortunately, once product is emptied to retail store displays, cardboard cases are crushed and recycled, and RPCs are returned shortly after use. Retail displays containing cardboard cases or product held in the back room may not accurately reflect the product (or lot number) actually sold to consumers.

One potential solution is to scan case level bar codes and record data as product flows through each retail store and foodservice outlet. However, this would require a significant investment in technology to outfit retail stores / foodservice outlets with scanners and supporting systems. All cases received would have to meet specifications; otherwise, manual recording of data would be required. Considerable training and discipline would need to be in place to scan full or empty cases in the back room, or when product is moved to retail display.

For a complete solution, all retail stores / foodservice outlets would require the necessary bar code scanning technology and related systems. Given the investment

required in technology and human resources, case level scanning is not a practical option (at retail store / foodservice outlet level) in the foreseeable future.

As such, current traceability practices are reliant on following the paper trail. Delivery receipts (from distribution centers or direct store delivery) are examined to provide information on products received during the timeframe in question. Further investigation of distribution center record keeping systems is reviewed for more specific details. Delivery records typically contain a summary description of the product, the number of cases/pallets, the date/time of delivery, shipping and receiving locations. Unfortunately current practices will result in a considerable amount of investigation work, subsequent time delays, and a potentially large scope of product implicated.

Standard operating procedures for most companies require that product implicated in a recall be clearly identified and isolated in a selected area. An additional tracking process is required to handle the final disposition, such as recording the product identification and problem description, recording the return to distribution center (or supplier), product disposal, or possible release for re-sale.

Human-readable information at the case level would have some value where product implicated could be referenced to inventory in the back room and associated record keeping.

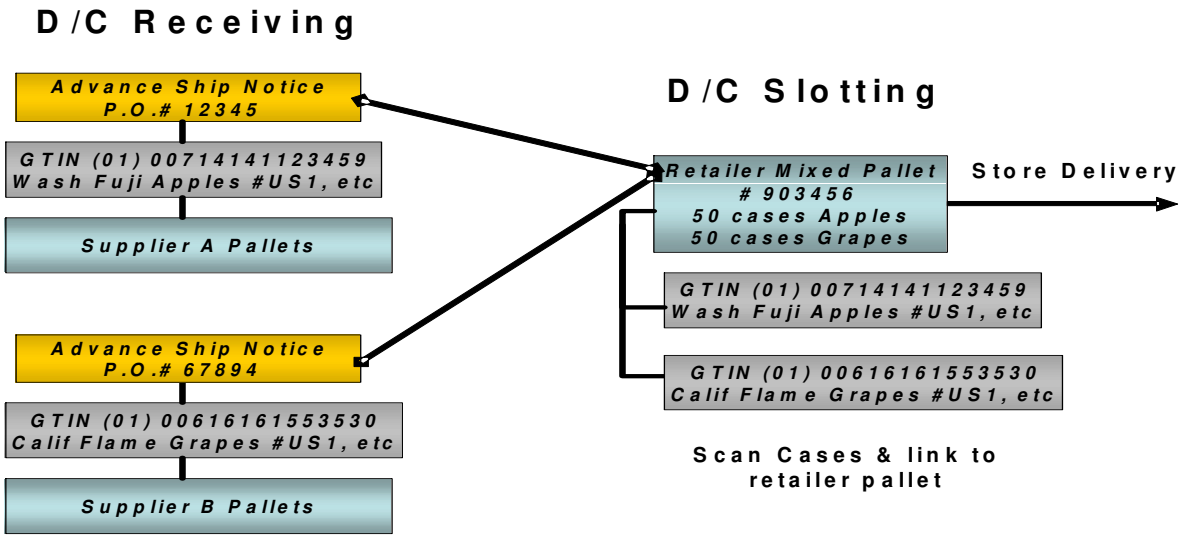
Best Practice #2: Suppliers mark cases with human readable data including supplier name, product description and lot number.

Retail / Foodservice Distribution Center Level

At present, distribution centers vary considerably in their logistics capabilities. A few leading companies have advanced systems to receive full truckloads from suppliers and then slot product for subsequent store level delivery. The slotting process involves breaking full pallets down, rebuilding mixed pallets (comprising multiple products and/or multiple suppliers) and staging product on the warehouse floor. During this process, internally generated pallet tags are created, applied to physical pallets, and then linked back to the original purchase order number. Unfortunately, at this time, supplier pallet and case level information is currently not scanned or recorded, breaking the linkages required for traceability.

There is a significant opportunity for distribution centers to achieve enhanced traceability through capturing supplier case level data during the slotting process for outbound delivery, and by capturing supplier pallet level data during the receiving process.

Outbound Process: Linking Cases to Pallets



By capturing case level data (suppliers, products, and lot numbers) during the slotting process, distribution centers will gain a clear audit trail of exactly what product was delivered or still available in inventory. In the event that a given case of product has been implicated, an effective recall can take place across D/Cs, retail stores and/or foodservice outlets. Suppliers can be easily identified and provided with meaningful information on their products to initiate traceability within their span of operations.

As a prerequisite for data capture, suppliers must adopt industry standards for case coding. Mandatory data include the supplier defined GTIN and lot number with cases marked in both human-readable and bar code format. GTINs must go through a synchronization process to ensure data are properly aligned between trading partners. For example, scanning a case to capture the GTIN only provides a number. This number needs to link to synchronized data to reveal the supplier and product description (see Section II Traceability Cornerstones).

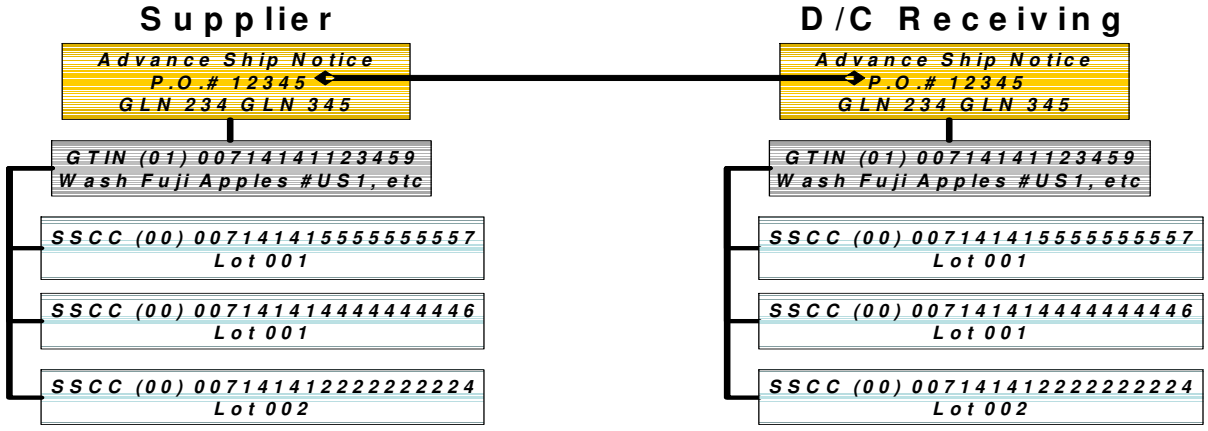
Distribution centers have the option to scan cases manually, or through automated slotting systems where cases are scanned as they move through conveyer belts. With either option, case level data must be scanned and then linked to the retailers' internal pallet tag.

Best Practice #3: Encode GTIN and lot number in a UCC.EAN-128 barcode.

Best Practice #4: Use human-readable supplier name, product description, and lot number.

Best Practice #5: During the slotting process, scan the supplier case and link to the internal pallet number.

Receiving Process: Linking Pallets to the Supplier



It would be beneficial to record supplier pallet tag data during the D/C receiving process. Identifying supplier pallets would greatly reduce the scope of product implicated. Suppliers with pallet tracking systems can review the entire life cycle of a pallet including trace back to source, including linkages to all other relevant information (deliveries to other D/Cs, associated products, materials, etc.)

At present, supplier pallet tags account for less than 40% of total industry volume with the vast majority being in proprietary formats. Until there is a critical mass of supplier pallet tags in terms of overall volume and adherence to industry standards, it is unlikely that retail / foodservice would utilize supplier pallet tags through their entire span of operations.

A complimentary method to record supplier pallet data is through an EDI advance ship notice (ASN). This transaction is similar to the transportation bill of lading and the "Passing" document that is often faxed or e-mailed to the retail / foodservice as notification that the truck has departed from the supplier location.

- The ASN details the purchase order number, pallets (SSCC), cases (GTIN and lot number) quantities, locations, shipping dates, transportation, product temperature, etc.
- Receiving ASNs in advance of actual arrival improves logistics planning.
- ASN data can be matched to outbound (store level) deliveries to determine product shrink.
- ASN data can be utilized for subsequent traceability or operational queries.

During the D/C receiving process, if product is rejected due to quality, wrong product, etc, the associated ASN data should be flagged as “Rejected”. Record-keeping should indicate the final disposition of product to ensure a complete audit trail is maintained.

Once the industry has reached a critical mass of supplier pallet tags (in conformance with industry standards), then other value added functions can take place. For example, once the truck has arrived at the distribution center, supplier pallet tags may be scanned and then matched to EDI ASN data to verify inventory receipt.

> Best Practice #6: Use supplier pallet tags by encoding the company prefix and serial number in a UCC.EAN-128 barcode.
>
> Best Practice #7: Receive the EDI ASN.
>
> Best Practice #8: Scan supplier pallet data during the receiving process and match to EDI ASN data.

Note: Best practices outlined in this section are also required for future initiatives including enhanced category management, tracking shrink through the supply chain, continuous replenishment, and enhancements to e-commerce systems. There is also an economy of scale by investing in technology and systems at distribution centers vs. store level.

Supplier Level

Supplier organizations referred to in this paper comprise growers, grower/shippers, and distributors marketing direct to retail / foodservice. A common business structure is for shippers and distributors to sell product on behalf of growers, establishing a fiduciary responsibility to ensure that growers receive the proper price for their product. The Perishable Agricultural Commodity Act (PACA) focuses on this area, setting out record keeping requirements to ensure product is properly segregated from receipt to final sale. As such, leading suppliers have robust logistics systems that support traceability requirements within their span of operations. Product quality, condition, and handling problems can be quickly traced to the source of the problem.

From a supplier perspective, the product life cycle comprises harvesting, packing (in the field or pack house), receiving from field or other source to the pack house, and shipping to a customer. If product fails at customer receipt it may be returned, reconditioned, and if quality/condition specifications are met, the product may be sold and delivered to a different customer. Along the path, product may be repackaged to different pack formats. One inherent factor that has a positive impact on traceability is that the majority of produce is sold in small containers (corrugated cardboard and RPCs), segregated by product characteristics (such as origin, commodity, variety, size/count, inner pack, outer pack, grade, etc.) and largely restricted to a single grower per container.

These supplier systems have the capability to trace product upstream to the place and time of processing, including relevant data on product source (geographic location), raw materials and suppliers, identity of packing facility and date of packing, etc. Further, these systems have the capability to track product downstream to specific delivery locations.

In a food safety event, suppliers are completely dependent on the quality of information received from their retail and foodservice trading partners. Yet today, major deficiencies occur due to limited data exchange with trading partners. Few suppliers (if any) transmit ASN data to retailers, instead relying on fax transmission or the paper Bill of Lading document provided to trucking companies. Few suppliers mark pallets and cases using barcodes, and those that do are in proprietary formats.

To address industry-wide traceability, suppliers need to invest in e-commerce to electronically exchange ASN data (among other transactions), and in bar code technology to mark pallets and cases. By doing so, trading partners downstream will have an improved ability to provide specific information on pallets and cases to limit the scope of a product recall. The investment is also required to take advantage of future technology initiatives in the industry.

With that being said, there are other significant hurdles to overcome. Pallet and case bar codes contain dynamic data (such as serial numbers and lot numbers) that are often unknown until the actual packing process is taking place. While it may be possible to preprint case barcodes with static data (such as GTINs), and then apply a second bar code containing the lot number during the packing process, this would likely cause problems with scanning processes downstream (such as a single case requiring two scans: one for GTIN and one for lot number).

To resolve the issue of printing dynamic data, produce packed in the field may require crews to be outfitted with portable thermal label printers. For produce packed in a warehouse operation, changes to ink jet printer technology may be required, or new investments in packing line label printers. Considerable training and discipline would need to be in place to ensure that bar codes meet specifications (verifying for data and quality).

In a food safety event, suppliers implicated must be provided with relevant information to initiate traceability including supplier case codes and/or supplier pallet tags.

Standard operating procedures for implicated product (returned, defective, or suspect) require clear identification and physical segregation. For example, recalled product should be labeled “Hold – Recalled Product”, isolated in a designated area, and inventory status changed to “Hold” to prevent shipping to a new customer. An audit trail is maintained of final disposition (product disposal, re-conditioning, or possible release for re-sale).

In the event product is rejected at the retail D/C, the supplier is notified and a decision made whether to return the product to the supplier’s cold storage or to re-sell the

product to a different customer. In either scenario, relevant claim information is recorded such as product identification, problem description, etc. An audit trail records product returns, product disposal, or a new purchase order cycle for the new customer is initiated).

Best Practice #9: Use supplier case coding by encoding GTIN and lot number in a UCC.EAN-128 barcode, as well as human-readable supplier name, product description, and lot number.

Best Practice #10: Use supplier pallet tags by encoding company prefix and serial number in a UCC.EAN-128 barcode.

IV. Effective Traceability: A Data-driven Approach

The impact of a food safety event can be enormous on companies charged with task of identifying and recalling product. Failure to establish product scope and traceability systems could have devastating affects to the produce sector as a whole, an entire commodity or growing region, or group of suppliers.

The degree of impact is largely dependent on how the supplier defines a set of product during the production process, and the availability of associated data that can be used for traceability purposes through the supply chain.

Data Attributes

The following tables recommend data that should be should be exchanged with trading partners through e-commerce, as well as data marked on pallets and cases (bar codes and/or human readable), and data that should be maintained on internal computer systems.

Core data recommended for exchange is marked by (X). Optional data marked by (O) may be exchanged depending on the degree of information transparency desired with trading partners. All data should be stored for a minimum of 24 months by all trading partners.

Supplier (Internal)

This table is intended for use by supplier companies to implement traceability within their internal systems, including both human-readable and barcode data marked on pallets and cases.

Data	**AI**	**Pallet UCC.EAN-128**	**Case (Human Readable)**	**Internal Database**
Raw Materials		-	-	X
Internal Locations		-	-	X
Transportation		-	-	X
Transactions		-	-	X
GLN Packhouse/Storage		O	O	X
GTIN	01	O	X	X
Lot Number	10	O	X	X
Pack Date	11	O	O	X
Country of Origin	422	O	O	O
Supplier SSCC	00	X	-	X

Supplier ⇔ Retail / Foodservice

This table is intended for use by both suppliers and retail / foodservice companies when implementing traceability between their companies. Data includes EDI transactions as well as human-readable and barcode data marked on pallets and cases.

Data	AI	Pallet UCC.EAN-128	Case UCC.EAN-128	EDI PO	EDI A
Purchase Order#		O	O	X	X
GLN Purchase From	412	O	-	X	X
GLN Packhouse/Storage		O	O	O	O
GLN Distribution Center		O	-	X	X
Retail SKU		-	O	O	O
Consumer codes (PEIB, etc)		-	-	O	O
GTIN	01	O	X	O	X
Lot#	10	O	X	-	X
Pack Date	11	O	O	-	O
Country of Origin	422	O	O	-	O
Supplier SSCC	00	X	-	-	X

Retail / Foodservice (Internal)

This table is intended for use by retail / foodservice companies to implement traceability within their internal systems, including both human-readable and barcode data marked on pallets and cases.

Data	AI	Pallet UCC.EAN-128	Case UCC.EAN-128	Internal Database
Internal Locations		-	-	X
Transportation		-	-	X
Transactions		-	-	X
GLN Purchase From	412	O	-	X
GLN Packhouse/ Storage		O	O	O
GLN D/C		O	-	X
GLN Store Delivery		O	-	X
Retail SKU		-	O	X
Consumer codes (PEIB, etc)		-	-	X
GTIN	01	O	X	X
Lot#	10	O	X	X
Pack Date	11	O	O	O
Country of Origin	422	O	O	O
Supplier SSCC	00	X	-	X
Retailer Pallet tag	00	O	-	O

Note: The Country of Origin AI 422 is recommended for product that is imported to or exported from the United States.

Defining Product Scope

The use of lot numbers for inventory management is widespread through the produce industry, and is ideal for traceability application. Suppliers define their own unique lot numbers based on varying operational requirements.

If the produce is field packed (e.g. grapes, lettuce, celery, etc), the lot number definition usually includes product origin attributes. For other commodities (e.g. tomatoes, citrus, potatoes, apples, etc), produce harvested from multiple growers may be received at a pack house, then graded and sorted as input to final packaging. In this case, the lot number definition usually includes attributes relevant to the pack house operation. In summary, the lot number definition includes one or both of product origin and pack house attributes:

- Product origin: grower, variety, ranch, field/block, or orchard/grove
- Pack house: grower#, pack-house#, production run #, pack date, crop season, commodity/accounting group, etc

The granularity of the lot definition is a key consideration to establish product scope. For example, a lot number defined only by grower number will likely represent a wide set of product (potentially a large growing area over a lengthy period of time). Conversely, a lot number defined by grower, variety, ranch, field, and pack date defines a narrow product set, one that would limit the scope of product implicated during a traceability exercise. In establishing the lot number, companies need to determine their own comfort level. If the product scope is too large, the impact of a product recall could be devastating financially. If too small, then greater administration and logistics complexity may be the result.

Another consideration in defining the lot number is determining the linkage requirements to other internal data such as raw materials, locations, transportation, etc. lot numbers defining a narrow set of product will in turn link to a narrow set of internal data.

To ensure uniqueness globally, the lot number definition should include a GLN prefix (pack house, storage location, etc). Another component of a lot number many include a serial number to link other attributes (e.g. 12345 links to grower, pack house, pack date, etc). Or, the lot number may be an alphanumeric value, where the position and content of data provide further definition (e.g. C1234X equates to C for Celery, 1234 is a production run, and X is an evening production shift). The total length of the lot number should not exceed 20 digits or alphanumeric characters.

In addition to lot number, other product identification attributes such as the GTIN play a significant role in establishing product scope and assisting in traceability exercises.

Determining the granularity level of a GTIN at the Case level will result in a wide or narrow scope of product implicated. (See appendix - PMA Product Attribute Guidelines)

As product flows through the supply chain, logistics data attributes including pallet identifiers (SSCC), and other internal data such as purchase order or invoice data become important tools for traceability. Product defined by a single lot number may have gone through many different paths to reach the consumer. Therefore, it's important to identify the various storage locations, transportation and other services that may have been a contributor to a food safety event.

Product Transformation

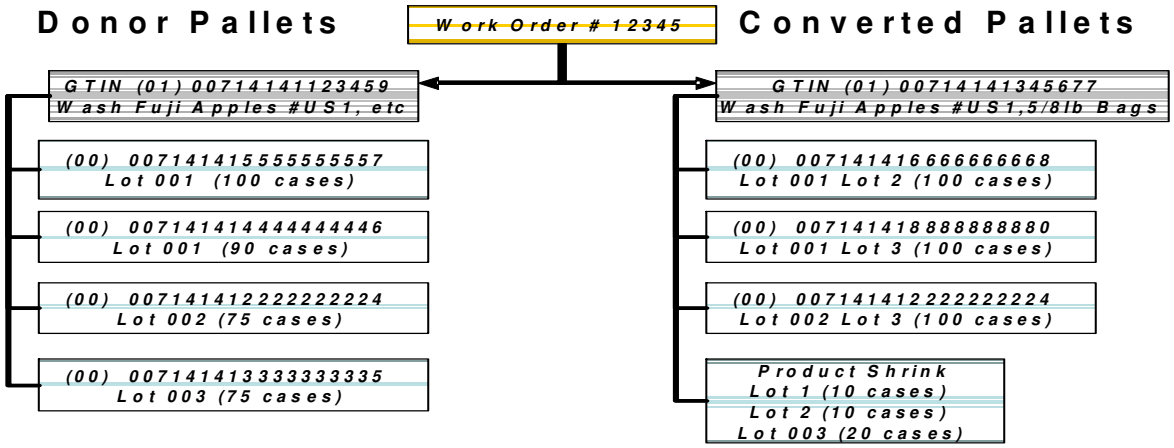
Unlike manufactured goods, fresh produce may go through multiple transformation stages during its life cycle. Harvested product may be held in temporary containers (such as bins or master cartons), then packed into corrugated cardboard (or other case format), and then repacked again to accommodate new consumer pack formats. Product may also be reconditioned due to condition or quality problems — a process that may also involve repacking.

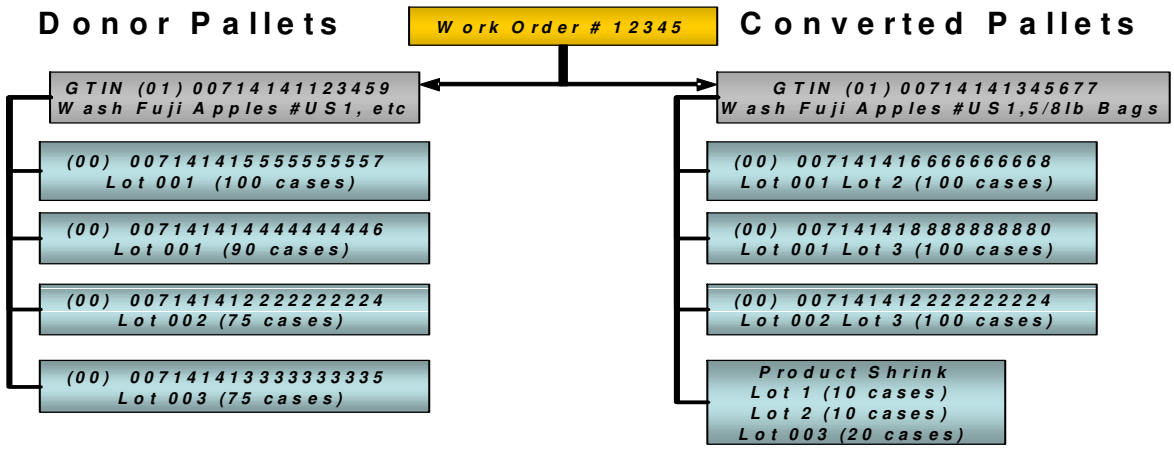
The transformation process often involves tracking both source and finished product at all three levels of hierarchy: pallet, case, and item levels. Raw materials and product shrink all need to be accounted for through all conversion stages.

Pallet/Case Transformation

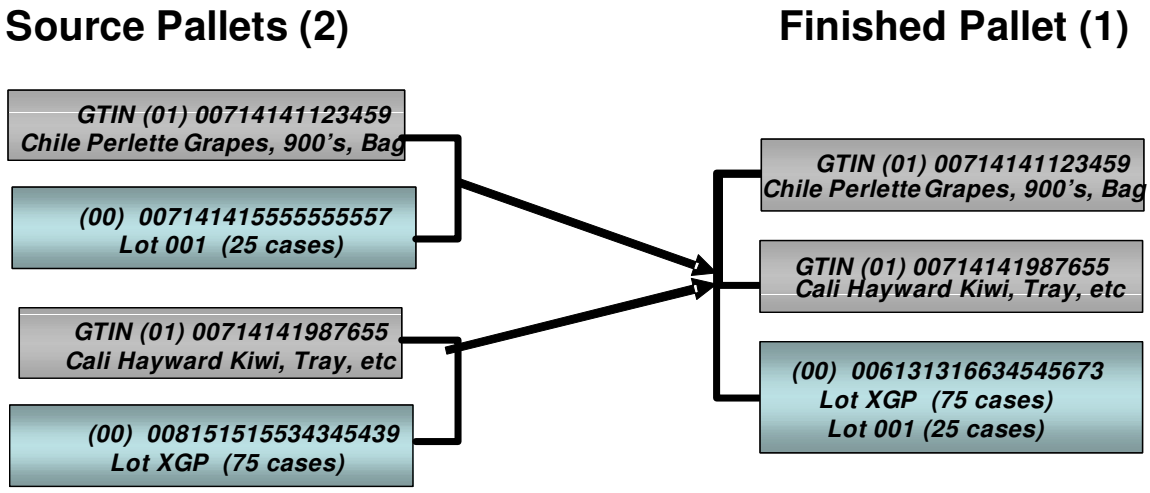
For traceability purposes, a link must be maintained between source and finished product. For example, four pallets of bulk apples are converted into bagged apples. The process may result in less than four pallets due to product shrink, or more than four pallets due to the finished product format (leftover partial pallets may be input into another transformation process). Finished product is often assigned new pallet, case, and item level codes, potentially breaking the chain for traceability.

To ensure a traceability link is maintained between source and finished product the most common technique is to use another reference number such as a work order number or repack number. This number acts as a database key to link source and finished pallets together as per the following diagram.



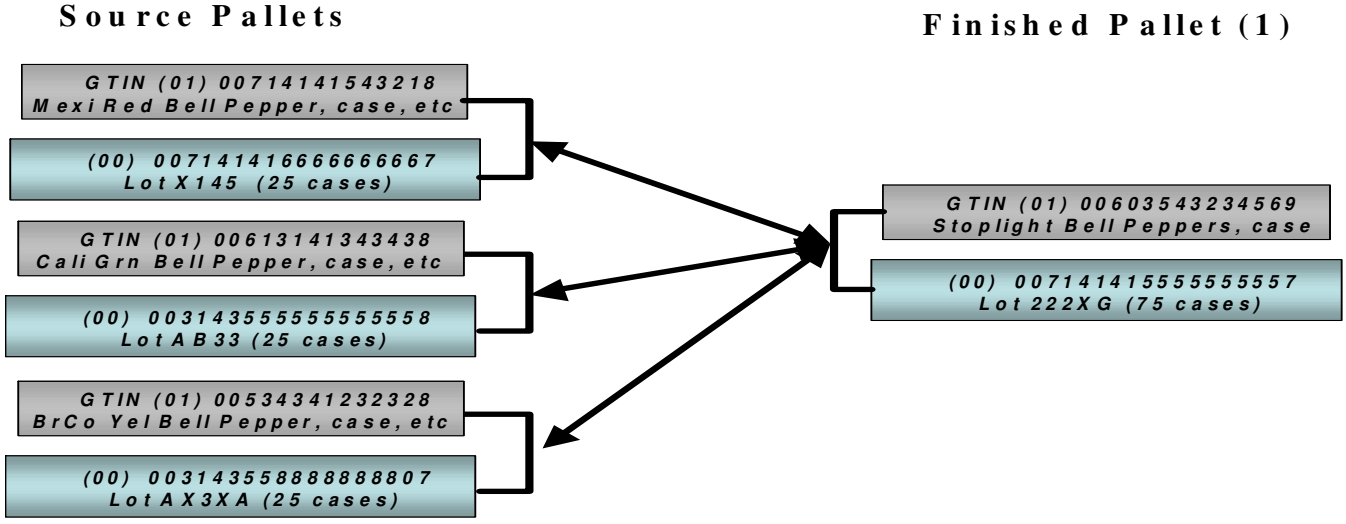


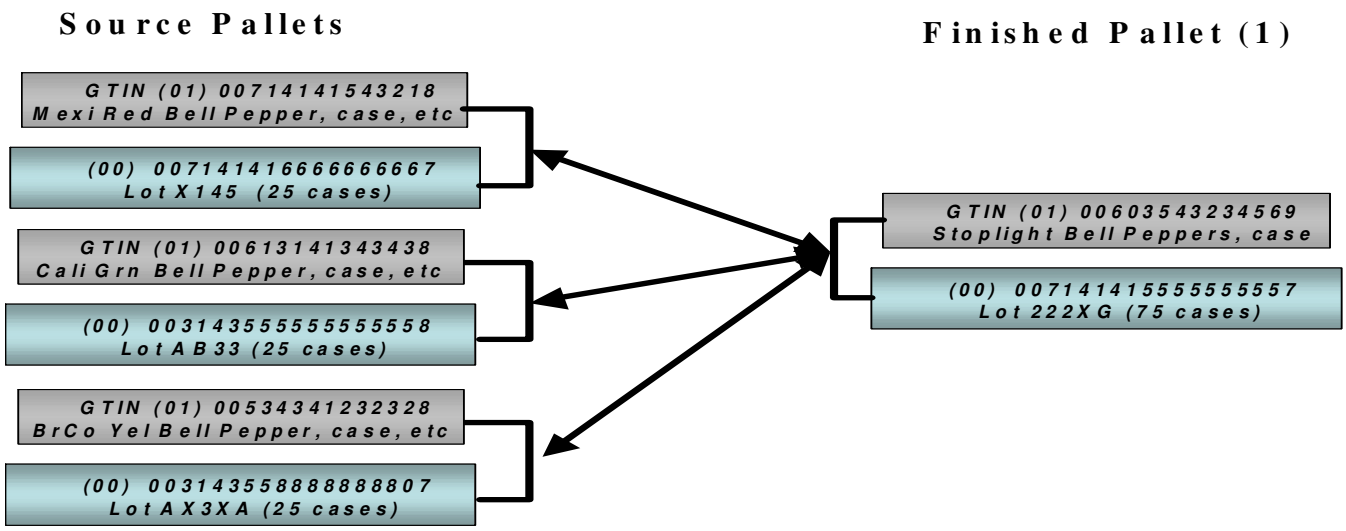
For other business processes such as building mixed pallets (multiple commodities), reconditioning product, and warehouse receiving, a direct link between the source and finished pallets creating a parent-child relationship should be created. In this event, the intermediate work order reference number would not be required as per the following diagram.



Item Transformation

The transformation process may also occur at the item level where heterogeneous source product is repackaged into new consumer items. An intermediate reference such as work order number, or a direct link via the parent-child relationship provides the necessary linkage. In this example, three source pallets each with unique GTINs, and SSCC numbers are combined into one finished pallet resulting in one GTIN and SSCC as per the following diagram. Due to the new consumer pack, a new lot number is created as part of the production process, as follows.

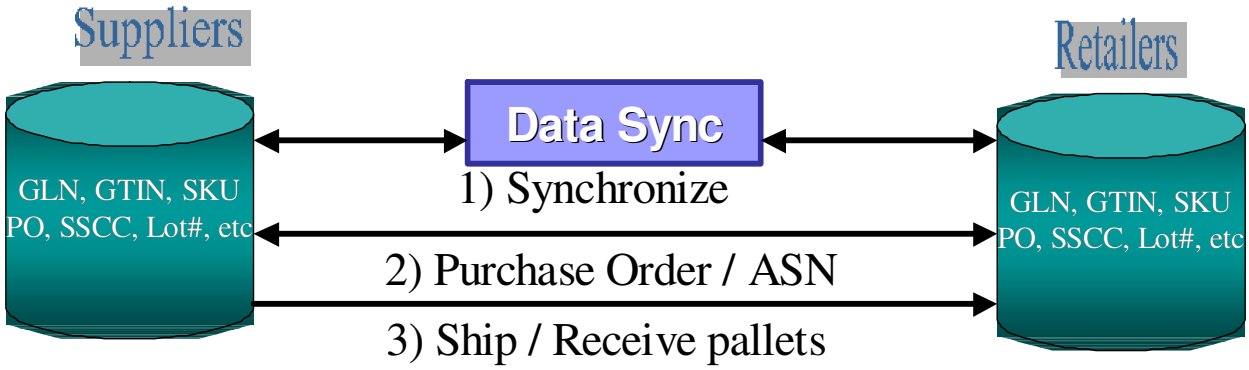



Source Pallets
Finished Pallet (1)
GTIN (01) 00714141543218
MexiRed Bell Pepper, case, etc
(00) 007141416666666667
Lot X145 (25 cases)
GTIN (01) 00613141343438
CaliGrn Bell Pepper, case, etc
(00) 003143555555555558
Lot AB33 (25 cases)
GTIN (01) 00534341232328
BrCo YelBell Pepper, case, etc
(00) 003143558888888807
Lot AX3XA (25 cases)
GTIN (01) 00603543234569
Stoplight Bell Peppers, case
(00) 007141415555555557
Lot 222XG (75 cases)

V. Traceability Best Practices – Integrated Models for the Future

Clearly, the industry must work towards common standards and best practices to collectively improve traceability efficiency. The logical approach is to first ensure that the key building blocks are in place, and then incrementally add new technology enablers over time.

Model 1: One Up / One Down



The "one-up / one-down" model describes current best practices — a near-term goal that companies should be working towards. The main benefit is that companies need only be concerned with exchanging data with their immediate trading partners (upstream and downstream in the supply chain).

This model applies both to direct EDI trading partner relationships, as well as EDI via third-party Dot.com systems. The general process flow is as follows:

1. Product and location data are synchronized between trading partners.

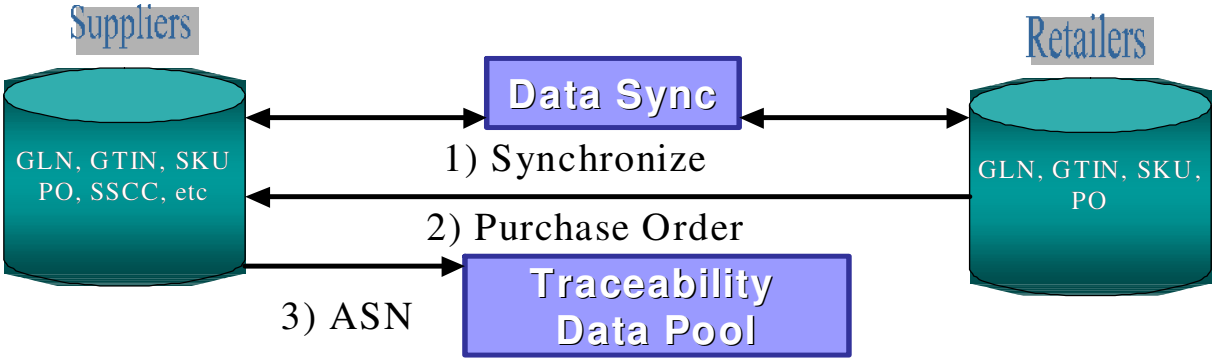
2. A purchase order is placed by retail / foodservice. The supplier transmits an ASN at point of shipping. Distribution centers store ASN data including products, locations, pallet numbers, and lot numbers.

3. Distribution centers receive physical pallets (through scanning the SSCC) and match to ASN data.

In the event product is rejected, the purchase order (and other relevant records such as ASN data) must be updated to reflect the rejection details. The supplier returns the product to inventory or resells to an alternate customer (keeping an audit trail of relevant records to ensure the continuity of the traceability system).

Information necessary to track and trace product would be held internally on each trading partners internal systems. Data on product identification, locations, product movement, etc would only be applicable to the product that flows between specific trading partners.

Model 2: Traceability Data Pool



The Traceability Data Pool (TDP) model describes a central repository of traceability data maintained for the fresh produce industry. The TDP builds upon the product identification data stored within the IPD (or other catalogue service).

In the event of a food safety event initiated at retail store level, the retailer could quickly search the TDP via an internet browser. Search criteria would include SSCC number and lot number (if the supplier pallet tag is available), or the case level human-readable information. The TDP search would return the supplier contact info along with the retailer's purchase order number and related SKU numbers. In turn, this data could be used to search their internal database for other store level deliveries. The supplier would also be contacted and provided with relevant traceability information to initiate internal traceability procedures.

Alternatively, if SSCC or case level information is unavailable, retailers could then perform a search of the TPD using their own reference information, such as SKU, GLN, purchase order number. This query would provide the retailer with relevant supplier data on deliveries made to their distribution centers, (including supplier contact info SSCC, GTIN, etc. which in turn would be provided to the supplier to perform their own track and trace).

The major benefit of this approach is that the retailer would not be faced with any internal systems changes. Suppliers would need to transmit an ASN to the TPD for each delivery made to distribution centers (or submit an extract of ASN data on a periodic basis). All data necessary to track and trace product through the supply chain would be available in a central repository (product identification, locations, product movement, etc).

Suppliers' concern about confidential information would be addressed, since only external (not internal) data would be transmitted to the TPD, and that data would be in numeric form only (e.g. GLN, GTIN, SSCC, lot and other numbers, but not including associated descriptions). Access to the TPD would be restricted to users with approved access privileges. The only character data maintained on the TPD would be emergency

contact information (name, telephone, e-mail) for each link in the supply chain in order to provide timely information in the event of a food safety crisis.

Appendix I: Relevant Technology, Standards, and Guidelines

UCC.EAN Bar Codes

A bar code is a precise arrangement of parallel lines (bars) and spaces that vary in width to represent data. Bar codes comprise both data structure (e.g. SSCC, GTIN, item UPC, PLU, etc) and data carriers (e.g. UCC.EAN-128, Interleaved 2 of 5, 3 of 9, etc). It is recommended that UCC.EAN-128 be used for pallet and case bar codes.

To obtain a supplier ID in the United States, contact the Uniform Code Council at +1 (937) 435-3870 or www.uc-council.org. In Canada, contact the Electronic Commerce Council of Canada at +1 (416)-510-8039 or www.eccc.org.

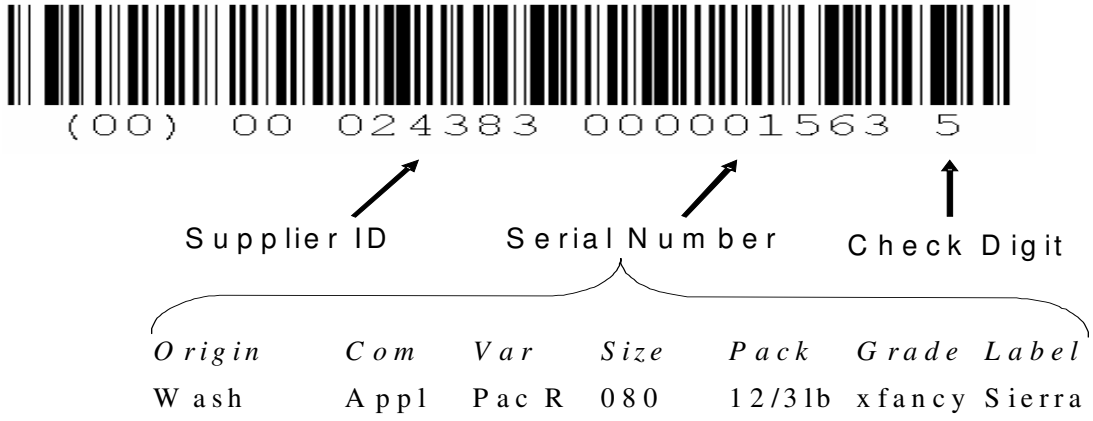
The following chart provides a rough timeline for industry implementation of bar code and possibly radio frequency identification (RFID) technology. (See PMA Pallet and Case Coding document for more information).

	0 – 2 Years	2 – 5 Years	5 – 10 Years
PALLET LEVEL	**UCC.EAN-128** **SSCC**	**UCC.EAN-128 / RFID** **SSCC**	**UCC.EAN-128 / RFID** **SSCC**
CASE LEVEL	**Interleaved 2 of 5** **GTIN + 2nd bar code for LOT** *** Supplier, Product Description & Lot**	**UCC.EAN-128 / RFID** **GTIN & LOT** *** Supplier, Product Description & Lot**	**UCC.EAN-128 / RFID** **GTIN & LOT** *** Supplier, Product Description & Lot**

* Human Readable Information

Note: The Interleaved 2 of 5 bar code is currently utilized to print on corrugated cardboard, either pre-printed or sprayed on during the packing line process. At this time, the Interleaved 2 of 5 is not recommended for use since it can only support 14 digits — not enough space for both the GTIN and lot number. Creating two separate bar codes (one for GTIN and one for lot number) would likely not be acceptable as two scans would be required to record bar code data. The UCC has a pilot project underway to modify the current Interleaved 2 of 5 guideline allowing AIs in addition to the GTIN. Depending on the results, the Traceability Best Practices document may include the Interleaved 2 of 5 at a future date.

Pallet SSCC (in UCC.EAN-128 format)



Supplier ID (or Company prefix)

Assigned by EAN member organizations (including ECCC and UCC in North America)

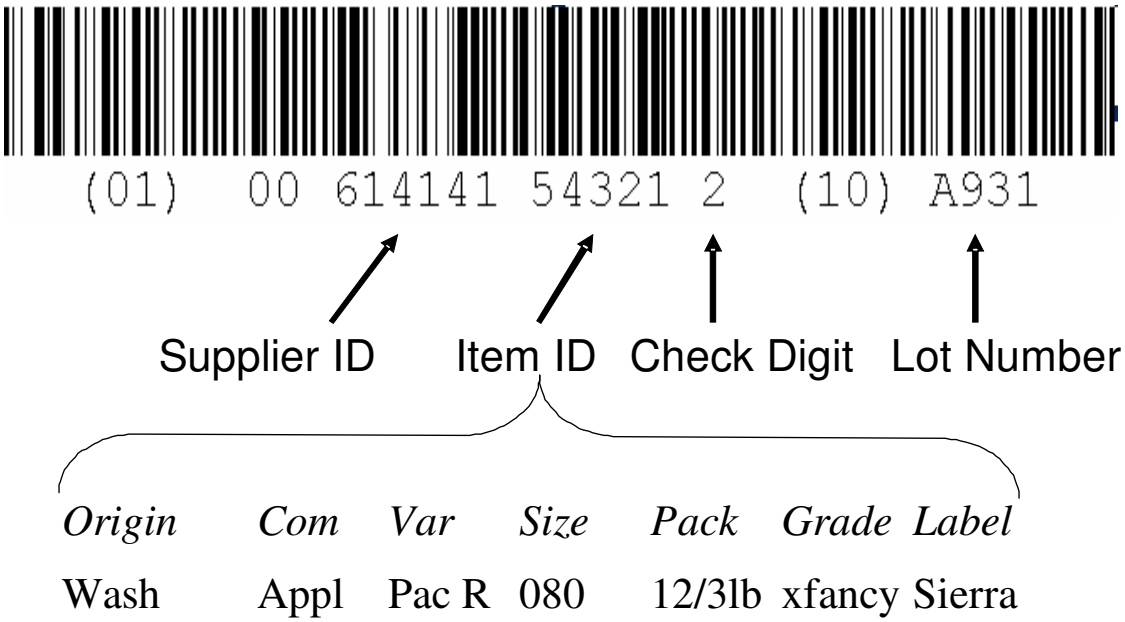
Serial Number

In the fresh produce industry, the supplier assigns a unique serial number. The serial number links to the supplier's produce description attributes. The combination of supplier ID and serial number uniquely identifies the pallet globally.

Check Digit

A single digit mathematically calculated using all preceding digits that is read by the scanner to facilitate scanning and tracking through the supply chain.

Case GTIN & Lot (in UCC.EAN-128 format)



Supplier ID (or Company prefix)

Assigned by EAN member organizations (e.g. ECCC and UCC in North America).

Item ID

In the fresh produce industry, the supplier maintains the item ID. The item ID in turn links to the supplier's produce description attributes. One exception is retail branded products; in this case the retailer assigns the item ID.

Check Digit

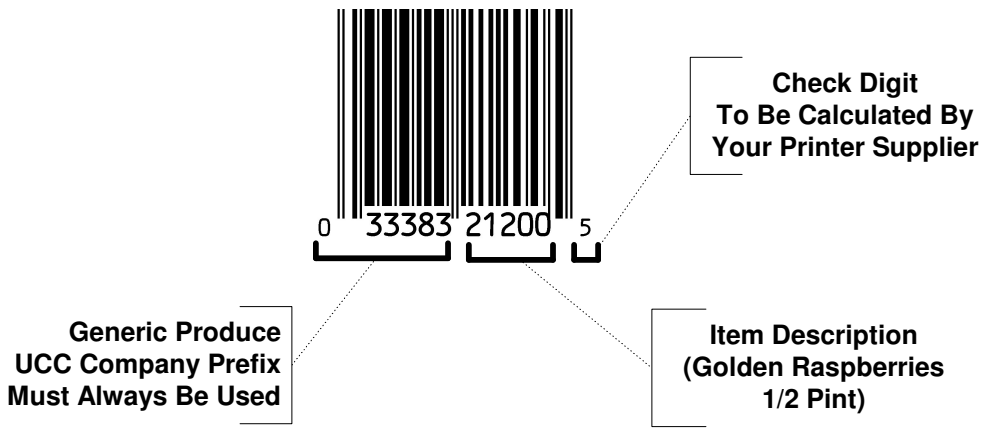
A single digit mathematically calculated using all preceding digits that is read by the scanner to facilitate scanning and tracking through the supply chain.

Lot Number

One of several AI's (Application Identifiers) that may be applied using UCC.EAN-128.

PEIB UPC: Consumer Pack (Fixed Weight/Count)

Fixed Weight UPC-12



For the produce industry, the PEIB has defined generic UPC item codes (for fixed weight/count pre-packaged produce). Identified by the UCC Company Prefix of 033383, and a 5-digit number that references a product description: such as Region Area (Origin of the produce at a country or state/province level), Variety, Grade, and a combined size/weight/count attribute (see www.pma.com/upconline). The retailer enters the PEIB UPC item code to set up a SKU for the packaged item. Note that this 5-digit item ID is completely separate from the PLU 5-digit coding structure.

E-Commerce

EDI (Electronic Data Interchange) and online services are quickly becoming the prevalent method of conducting business in the fresh produce industry.

The most common set of EDI transactions (or electronic documents) include Price Information, Inventory Replenishment, Purchase Orders, Purchase Order Acknowledgment, Advance Ship Notices, Invoices, and Payment.

EDI may be conducted directly between trading partners, or as part of a Dot.com integration solution. Traditional EDI using value-added networks (VANs) at a cost per transaction is quickly giving way to EDIINT AS2 where transactions flow securely over the Internet at no additional per transaction cost. However, EDI still requires that companies invest in EDI translator software, or contract third-party companies to perform the document translation.

Extended mark-up language (XML) is another set of document standards that promises to add more flexibility, without the heavy investment required for EDI translator software. However, it is unlikely that retail / foodservice companies will migrate to XML any time soon given the large investments in EDI technology.

For more information on e-commerce, see the PMA EDI White Paper (www.pma.com/EDIwhitepaper) and www.uc-council.org or www.eccc.org .

RFID — The Next Generation

This relatively new technology has taken a rapid leap forward with the endorsement of Wal-Mart (the largest grocery retailer in the world) and the U.S. Department of Defense (the largest supply chain in the world). RFID has three main components

1. SmartTag; the physical chip and antenna that is activated by RFID readers
2. EEC (or electronic product code); refers to the data format and content
3. Object Naming Service (ONS); internet-based service that will assist in linking the ePC data to products, locations, etc.

EPCglobal is a new joint venture between EAN International and the Uniform Code Council to develop and manage standards for the EPC (see www.epcglobalus.org). The Verisign company will provide ONS services for EPCGlobal in future.

RFID promises to offer a number of advantages over current bar code technology by eliminating the physical work of scanning bar codes, thereby improving accuracy and efficiency. This in turn will drive improvements to inventory management (receiving, shipping, floor location), demand planning, and continuous replenishment systems. Unlike current bar code systems, RFID does not require “line of sight” and precise scanning distances.

It is expected that companies implementing RFID will target pallet and cases first, using the SmartTag as a unique license plate (serial number). In the longer term, RFID is expected to have widespread application at the item level (once some significant technical hurdles are overcome).

- Costs currently range from $0.15-$0.20 per SmartTag. RFID readers are relatively costly at $1,000 per unit.
- Manufacturers are working towards embedding SmartTags directly into pallet, corrugated cardboard, and RPCs. Other companies are working towards adhesive applications.

There is potential for RFID to have a major impact on the fresh produce supply chain. Accurate tracking of pallets and cases can only have a positive effect on the traceability initiative. For example, D/C slotting systems might utilize RFID to scan and track pallets and cases as they flow through to store level.

At the same time, there are still many questions since this is a developing technology as follows:

- How SmartTags hold up in harsh environments (humidity and low temperatures)
- Longevity and reuse of SmartTags
- RFID reader accuracy when scanning product having a high water content

- Consumer safety (toxicity, etc)
- Logistics requirements to encode SmartTags with data (SSCC, GTIN, lot#, etc)
- The continued need for human-readable information applied to pallet and case

In the event RFID is adopted by the fresh produce industry, all traceability best practices including data attributes, data exchange (synchronization, ASN, etc), pallet and case standards, etc. will still be required to enable RFID. The logical next step is to hold pilot tests to validate the technology for use in the fresh produce industry. (See www.autoidcenter.org .

PMA Product Coding Attributes

The PMA E-Commerce Task Force recommends that the following attributes be utilized for electronic communication between commercial buyers and sellers to create product specificity in a common format. The PMA IPD Attribute committee is actively working to refine the following:

Product Attribute Descriptions

Origin – Primarily defined as Country of origin. Secondary attributes for State/Province, and Growing Region may be used where necessary.

A NIMA standard will be used for Country and State/Province abbreviations. The NIMA standard abbreviations for the states of the United States match those used by the U.S. Postal Service. State abbreviations will not be available for all countries.

Commodity – Name of commodity (or species), such as apple or orange.

PLUcodes.com is the recommended source for the list of commodities. Where a commodity is not listed on this site, industry standard practices should be used.

Variety – Name of Variety (or sub-species), such as Hass, Hayward, Red Delicious.

PLUcodes.com is the recommended source for the list of commodities. Where a commodity is not listed on this site, industry standard practices should be used.

Sub-variety may be used to further define a specific variety (such as the blush or type of point on an apple)

Size – Size of the individual piece of fruit, vegetable, nut etc.

Generally accepted industry sizes should be utilized here. Valid sizes may include the following types:

Descriptive terms: Small, Medium, Large, Jumbo, or Minimum

Specific size: 2 ½" (apples) or Size 12 (Cantaloupe)

Size range: 18 - 20 (peanuts) or 10 – 12 (oz. Russet potato)

Specific size: 40, 48, 60 etc.

Size Unit of Measure may be used as a secondary attribute where size is generally stated as a number and Unit of Measure – such as 2 ½", where 'IN' would be the Unit of Measure code for 'inch.'

Count – Refers to the quantity of individual pieces within the container or outer pack. There is a direct relationship with the Size attribute. (Knowing the Count value yields the Size of fruit based on a given Outer Pack. Alternatively, knowing the Size attribute yields the Count value.) Normally, either Size or Count attribute is used (although using both in an electronic transaction is recommended).

Outer Pack – Shipping Container Type describes the container used to hold either the loose product, or units in a packaged fixed weight/count format.

Standard practice codes should be utilized here. Examples of Outer Packs include the following: Carton, Bin, Retail Display Tray, Flat, Euro Box, RPC, etc.

Gross Weight can be included as sub-attribute to Outer Pack to describe the gross weight (total weight of product and packaging materials) of the Outer Pack.

Gross Weight Unit of Measure (UOM) describes the measure describing the weight. This would include the two-character code for Pound, Ounce, Kilogram, Inch, Quart, or other UOM utilized in standard practices.

Net Weight can be included as sub-attribute to Outer Pack to describe the net weight (gross weight less packaging materials) of the Outer Pack.

Net Weight Unit of Measure describes the measure describing the weight. This would include the two-character code for Pound, Ounce, Kilogram, Inch, Quart, or other UOM utilized in standard practices.

Inner Pack – Several Inner Pack sub-attributes are generally used together to describe the contents within a given Outer Pack. However, when the units are loose within the inner pack, only the Pack Style sub-attribute is used.

An example of the sub-attributes Pack Quantity, Pack Size, Pack Size Unit of Measure and Pack Style would be '8 - 5lb bags.'

Pack Style of the units held within the Outer Pack. In the example above this would be 'bag.' Examples of Pack Styles for loose product would be Tray Pack, 3 Layer, Volume Fill, etc. Examples of Pack Style also include Clamshell, Bunch, Bag, etc.

Pack Quantity refers to the number of units held in a packaged format within the Outer Pack. In the example this would be '8,' describing that there are eight bags.

Pack Size is the size of the units held in the packaged format within the Outer Pack. In the example this would be '5,' describing that the bags are five-pound.

Pack Size Unit of Measure is a two-character code describing the unit of measure for the package format. In the example this would be 'LB,' describing that the bags are measured in pounds.

Grade – Specifies the grade of the commodity. USDA, other country or region grades, or industry standard terminology (ex. US#1, Good Delivery) can be used.

Label/Brand – The supplier-defined Label/Brand may infer product characteristics not addressed in other attributes. This may include buyer specified quality or appearance, or any other characteristics unique to the supplier.

Handling/Storage – Describes treatments of product after harvesting that are necessary components of the selling process. Two sub-attributes are used to define Handling/Storage. Post Harvest may include such things as Ripening. Treatment may include such things as Waxed or Controlled Atmosphere Storage.

Growing Method – Describes growing characteristics whose descriptions are necessary components of the buying/selling process. The valid growing methods defined at this time are:

- Conventional
- Organic
- Genetically Modified
- Hothouse
- Kosher
- Nutriclean
- Residue Free

Consumer Labeling – Describes the physical labeling on each package or individual piece of product. Type of Consumer Labeling includes UPC (includes UPC-E), PLU, RSS, None. Code is an optional sub-attribute would include the actual PLU or UPC code on the product.

PMA IPD (Industry Product Database)

In 2001, the PMA E-Commerce Task Force drafted a concept paper to address the industry's unique issues with synchronizing supplier GTINs and retailer SKUs. A technique was discovered whereby trading partners could map their products (one-time)

to a central repository containing standard produce attributes. Once mapped, any current of future trading partner's products could be retrieved without the need to go through a separate mapping exercise.

In 2002, the ProduceSupply.org association together with the FoodConnex company conducted a successful IPD pilot project, proving the theory of one-time mapping. Subsequently, PMA formed an IPD Steering Group to investigate PMA's role in facilitating IPD implementation for the industry. In October, 2003 a decision was made that PMA would play a stewardship role in future. This role includes establishing product attributes and content, and certifying third-party technology vendors for IPD compliance.

Appendix II: Legislation and Regulations Impacting Traceability

Heightened concern about the safety of the North American food supply has initiated a federal response.

The U.S. Department of Agriculture (USDA) has expanded its operations in terms of inspectors and diagnostics capability. The U.S. Food and Drug Administration (FDA) has strengthened food safety rules and are working towards making it easier for investigators to trace the origins of an outbreak. The Department of Homeland Security now oversees the inspection of products entering the country.

In Canada, the federal government is taking an active role in working with provinces to establish a comprehensive agricultural food safety and traceability program by 2008.

Bioterrorism Act (FDA Prior Notice)

Under the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act), the FDA requires food facilities, both foreign and domestic, to register their facilities. Prior notice must be received electronically by FDA between five days and several hours before arrival (exact timing depends on the mode of transportation). For more information about biosecurity rules, see www.pma.com/FoodSecurity.

U.S. Country of Origin Labeling

The 2002 Farm Security and Rural Investment Act (aka Farm Bill) amended the Agricultural Marketing Act requiring USDA to issue guidelines to establish mandatory Country of Origin Labeling (COOL) on specific covered commodities including all fresh and frozen fruits and vegetables. Recently, a two-year delay has been imposed moving the target date for this requirement going into effect, and another bill was introduced in June 2004 to replace it with a voluntary system.

For more information about origin labeling, see www.pma.com/OriginLabeling.

Canadian Government Agri-food Policy Framework

The Canadian government is taking a proactive approach in developing a comprehensive agri-food policy framework. Its intent is to enhance the profitability of the agricultural and agri-food sector, and to ensure the safety and traceability of the food supply. The following section specifically references its interest in traceability initiatives.

Traceability

Section 22.1.7

To facilitate the development and implementation of traceability systems by industry throughout the agri-food continuum by*; inter alia*

22.1.7.1 assisting the agriculture and agri-food sector in the development of data management standards for traceability systems;

22.1.7.2 continuing to support the development of traceability systems at the retail level; and

22.1.7.3 providing funding and technical support for development of traceability and Identify Preservation systems, along the agri-food continuum through to the retail level.

Canadian Traceability Steering Committee

A committee has been formed to examine the development of common standards and enablers to permit the implementation of seamless traceability programs within commodity groups and sections of the supply chain. Established by the Canadian Council of Grocery Distributors and the Electronic Commerce Council of Canada, steering committee members also include the Canadian Federation of Independent Grocers, Fisheries Council of Canada, Food and Consumer Products Manufacturers Council, Canadian Cattle Identification Agency, Baking Association of Canada, Canadian Poultry & Egg Processors Council, Canadian Aquaculture Industry Alliance, Canadian Produce Marketing Association, and government representatives from Agriculture and Agri-Food Canada.

The committee has developed a white paper and conducted a series of consultative sessions with various fresh foods industries across the country. A technical committee has been formed to create a Canadian traceability framework, then to develop specific guidelines and standards for all perishable industry segments.

European Union Food Law Regulations

The following European Food law regulations go into effect January 1, 2005.

Article 3: Other Definitions

15. 'traceability' means the ability to trace and follow a food, feed, food-producing animal or substance, intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing or distribution.

Article 18:

Traceability

1. The traceability of food, feed, food-producing animal or substance, intended to be, or expected to be incorporated into a food or feed, shall be established through all stages of production, processing or distribution.

2. Food and feed business operators shall be able to identify any person from whom they have been supplied with a food, a feed, or a food-producing animal, or any substance expected to be, incorporated into a food or feed.

3. To this end, such operators shall have in place systems and procedures which allow for this information to be made available to the competent authorities on demand.

4. Food and feed operators shall have in place systems and procedures to identify the other businesses to which their products have been supplied. This information shall be made available to the competent authorities on demand.

5. Food or feed which is placed on the market, or likely to be placed on the market in the Community shall be adequately labeled or identified to facilitate its traceability, through relevant documentation or information in accordance with the relevant requirements of more specific provisions.

6. Provisions for the purpose of applying the requirements of this Article in respect of specific sectors may be adopted in accordance with the procedure laid down in Article 58(2).

Glossary

ASN (Advance Ship Notice) is an EDI transaction in which the shipper advises the receiver of a pending shipment. The ship notice/manifest enables the receiver or retailer to identify short shipments before receipt and plan warehouse receiving more efficiently. Also known as the EDI transaction sets 856 or 857.

Application is a group of software programs that provides functionality for the business (examples are General Ledger, Order Entry, Inventory, Quality Control, etc.)

AIs (Application Identifiers) are predefined numbers enclosed by parentheses used in the UCC.EAN-128 bar code symbol to delineate additional information about the item.

Bar Code is the array of bars and spaces representing data. The combination of symbol characters and features required by a particular symbology, including quiet zones, start and stop characters, data characters, check characters, and other auxiliary patterns that together form a complete scannable entity. Also known as the bar code symbol.

Check Digit is a number found at the end of a UPC, GTIN, or SSCC for the purpose of verifying that all of the numbers preceding the last digit are accurate. The check digit is considered to be part of the number and should therefore be stored along with the other preceding digits.

Company Prefix is the number assigned to a company by either an EAN member organization or the UCC.

Consumer Unit is the smallest unit normally intended to be sold to the end retailer. Also known as an item or package (the product inside the carton when the lid has been opened).

Data Elements are pieces of information contained in an EDI document (for example, business address, quantity, sales price). Equivalent to data fields in a computer file.

Data Synchronization refers to data sent from the originator matching data stored at the receiver.

EAN FPT (Fresh Produce Traceability) Guidelines are aimed at providing a common approach to tracking and tracing fresh produce by mean of an internationally accepted numbering and bar coding system: the UCC.EAN system. See www.EAN-int.org/agro-food.

Electronic Commerce is the conduct of business communications and management through electronic methods, such as EDI, fax, Internet, e-mail, and automated collection systems.

EDI (Electronic Data Interchange) is the electronic exchange of structured information between locations over a telecommunications network. It usually refers to business transactions transmitted from one computer application to another computer application. It is a voluntary public standard.

GAP (Good Agricultural Practices) are guidelines established to ensure a clean and safe working environment for all employees while eliminating the potential for contamination of food products. A GAP program addresses site selection, adjacent land use, fertilizer usage, water sourcing and usage, pest control and pesticide monitoring, harvesting practices (including worker hygiene, packaging storage, field sanitation, and product transportation), and cooler operations. Standard operating procedures are developed and incorporated into the GAP program providing guidance with respect to potential points for contamination and preventative or corrective measures to mitigate their effects.

FDA (The U.S. Food and Drug Administration) is a federal agency that has developed voluntary guidelines for good agricultural practices (GAP) for reducing the potential for microbial contamination of produce.

GLN (Global Location Number) is a 13-digit number used to identify a location (similar to the Dunn and Bradstreet number). The GLN consists of two parts: a company prefix and a four-digit location number assigned by the owner of the GLN.

GTIN (Global Trade Item Number) is the umbrella term for several kinds of item numbers and a shorthand term for the UCC.EAN Global Trade Item Number. A GTIN may use the UCC.EAN-8, UCC-12, UCC.EAN-13 or UCC.EAN-14 Data Structure. This data structure comprises a 14-digit number that has four components: (1) an indicator, (2) a manufacturer prefix, (3) a unique number to that manufacturer, and (4) a check digit. The GTIN has gained a lot of traction in the consumer packaged goods (CPG) marketplace and has largely been the accepted standard for the packaged goods side of the business. The recommendation in this paper is to use the GTIN (UCC.EAN-14 Data Structure) at the case level.

HACCP (Hazard Analysis and Critical Control Point) is a food safety program for preventing hazards that could cause foodborne illnesses by applying science-based controls, from raw material to finished products.

- Analyze hazards
- Identify critical control points
- Establish preventive measures with critical limits for each control point
- Establish procedures to monitor the critical control points
- Establish corrective actions to be taken when monitoring shows that a critical limit has not been met

- Establish procedures to verify that the system is working properly
- Establish effective recordkeeping to document the HACCP system

Indicator is the first digit of the GTIN revealing the relationship of the number on the outside of the case to the number on the items inside the case.

IPD (Industry Product Database) is an initiative in the produce sector to help address product identification. It will enable a retailer's SKU# to be mapped to a supplier's product code (i.e. GTIN or other number). This will help facilitate data synchronization between trading partners. See www.pma.com/IPDFactSheet.

ITF (Interleaved 2 of 5) is a bar-code symbology also called I 2/5. It is a 14-digit number often used to encode the GTIN for bar codes that need to be applied directly to corrugated cardboard.

ISO (International Standards Organization) 9000 comprises eight quality management principles that can be used as a framework to guide organizations towards improved performance. They are:

- Customer Focus
- Leadership
- Involvement of people
- Process approach
- System approach to management
- Continual improvement
- Factual approach to decision making
- Mutually beneficial supplier relations

Item ID describes the five digits of the UPC-12, EAN-13 and UCC.EAN-14 numbers that are unique to each product for a specific company prefix. The item ID acts as a database key to an associated product description.

Linear Bar Codes are one-dimensional bar codes that are read left to right or right to left.

Lot Number is one of several AI's that may be applied using UCC.EAN-128.

Maps are the work required to equate one piece of data received from a trading partner to the corresponding piece of data within another trading partner's system. When cross-referencing item numbers, maps must be created and stored for future use. Also known as mappings.

Multi-dimensional Bar Codes are non-linear bar codes that contain much more information than their linear counterparts.

Packaging Type is the first digit of the SSCC number indicating the type of container being used at the pallet level.

POS (Point-of-Sale) is the retail checkout where consumer items with UCC.EAN bar code systems are normally scanned.

Produce Attributes are additional characteristics of an item that assist in identification. In the context of this document, the attributes are defined by the PMA Produce Coding Attributes.

Product Code is a number issued by the supplier to internally distinguish it from other products. Used by itself, the product code has no value to anyone other than the supplier.

Product Traceability describes the qualitative follow-up of products. It essentially relies on correct record-keeping and the thoroughness of information concerning the product. A manufacturer uses it to find the causes of a quality fault either upstream, if the incident could have occurred at his suppliers' premises, or downstream, if the incident could have occurred during shipping, for example.

Product Tracing is the capability to identify the origin of a particular unit and/or batch of product located within the supply chain by reference to records held upstream in the supply chain. Products are traced for purposes such as product recall and investigating complaints. In the context of this document the focus is on tracing produce from retail to grower.

Product Tracking is the capability to follow the path of a specified unit of a product through the supply chain as it moves between organizations. Products are tracked routinely for obsolescence, inventory management, and logistical purposes. In the context of this document, the focus is on tracking produce from the grower to retail point of sale.

RSS (Reduced Space Symbology) refers to a family of bar code symbols that can contain 14 characters of information. One member of the RSS family, the RSS Expanded, can hold up to 74 characters of information (but, because of its size, is also a larger barcode symbol). With the advent of the RSS, there is the potential to code a UPC-like format into a much smaller barcode symbol.

Scanner is an electronic device that reads bar codes and converts them into electrical signals understandable by a computer.

Serial Number links to the suppliers' produce description attributes. The combination of supplier ID and serial number uniquely identifies the pallet globally.

SSCC (Serial Shipping Container Code) is an 18-digit number comprising a 1-digit extension number, a 2-digit number system character, a 5-digit manufacturer ID, a 9-digit serialized code to uniquely identify the shipment, and a 1-digit check code. This number (often represented in a bar code) is known as the “license plate” used on variable content containers, pallets, and shipments. Also known as the serial shipping container code.

Standard Product Identification is the number assigned to an item that abides by certain rules and conditions. The standards used for product identification in this document are governed by the UCC.EAN system.

Supplier ID is assigned by EAN member organizations (including ECCC and UCC in North America). Also known as the company prefix.

Symbology is a defined method of representing numeric or alphabetic digits using bars and spaces that are easily scanned by computer systems.

Trading Partner is a company that exchanges electronic documents as part of a predefined business relationship.

UCC.EAN System comprises those standards endorsed by the EAN Member Organizations (including UCC and ECCC in North America).

XML (eXtensible Markup Language) is a computer language used to exchange data. XML is a form of electronic commerce used similarly to EDI.