



Best Practices for Supermarket Food Safety

How to address the modern retail complexities without compromising food safety and quality



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Seemingly overnight, retailers were faced with an influx of click-and-collect orders and home deliveries.

Ensuring food safety is an ever-present concern for grocers; in 2020, this imperative has become more critical than ever. Rapidly emerging e-fulfillment models, evolving consumer preferences and global market trends have combined to create unprecedented complexities. COVID-19 pushed many grocery shoppers online for the first time, rapidly accelerating e-commerce adoption — while likely reshaping consumer buying habits in some lasting ways.

This spike in demand introduced unexpected fulfillment challenges. Seemingly overnight, retailers were faced with an influx of click-and-collect orders and home deliveries. The sheer volume of orders presented a difficult challenge for many retailers, which placed pressures on newer e-fulfillment infrastructures.

Ensuring fast, safe delivery of food to their customers requires not only that grocers have the ability to maintain proper

temperature ranges at every stage (storage, picking, staging and delivery), but also mandates following proper sanitation and hygiene protocol for in-store customers and employees alike. In addition, grocers began playing an even larger foodservice role by providing ready-to-eat, home meal replacements while still supporting deli- and freshly prepared offerings.

These new challenges only highlight pre-existing food supply chain concerns and underscore the importance of maintaining food safety at every point of its journey to consumers. From harvest to production, shipping and cold storage, order fulfillment and delivery, food preparation and handling, grocery retailers must adhere to food safety best practices across a wide range of disciplines.

Emerson is committed to helping food retailers and stakeholders address these challenges at nearly every step of the food supply chain.

FOOD RETAIL MARKET AND CONSUMER TRENDS (2020)

Food safety impacts in America



1 in 6 Americans contract foodborne illnesses each year; 3,000 die.¹

The costs of foodborne illness outbreaks



A retailer could incur costs between **\$4,000** and **\$2.5 million** for a single outbreak.²

Acceleration of e-commerce food retail growth



More than 50% of shoppers purchase groceries online; **20%** made their first online grocery purchase because of COVID-19.³



Consumers ordering food online nearly quadrupled from **11% to 41%** between March 1 and March 22.⁴



Click-and-collect accounted for **77%** of food/beverage online purchases during lockdowns.⁵



Home delivery and in-store pickup grocery sales **increased 37%** in April.⁶



67% of click-and-collect customers plan to continue using the service post-pandemic.⁷

Consumers demand fresh product



Groceries/supermarkets command **64%** of all fresh sales.⁸



Sales of fresh vegetables were **24%** above 2019 levels for the week ending May 3.⁹



62% say they sometimes consider purchasing grocery deli-prepared food.¹⁰



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Understanding food safety risk factors

Ensuring food safety within the supply chain is a cumulative process involving multiple stakeholders. On food's journey to a supermarket, shipments can proceed through up to 30 individual steps and have multiple changes of ownership, custody and control. Once in a grocery store, this chain of custody now includes the complexities of click-and-collect fulfillment — from picking processes and staging through customer pick-up. To ensure food safety and quality, an unbroken chain of temperature certainty and safe handling practices is required.

Multiple factors can either decrease perishable food's shelf life or increase its risk of becoming unsafe and a potential cause of foodborne illness. Common factors that impact the supermarket food supply chain include:

Handling practices

Safe handling practices during harvest, processing, transportation, cold storage and food preparation must guard against:

- The spread of bacterial pathogens that can cause food poisoning, such as E. coli and listeria
- Cross-contamination
- Poor employee hygiene
- Unsafe or unsanitary processing or food preparation methods

Proper temperatures

Produce and perishable commodities must be kept within optimal temperatures to prevent the growth of bacteria,

maximize freshness and shelf life, and avoid food waste and shrink:

- General produce — 32 to 39 °F (0 to 3.8 °C) — includes leafy greens, apples, broccoli, carrots, cauliflower, mushrooms, green onions, berries and corn
- Tomatoes, yellow onions and potatoes — 42 to 54 °F (5.5 to 12.2 °C)
- Meat (beef, pork, poultry and seafood) — 28 to 39 °F (-2.2 to 3.8 °C)
- Dairy — 32 to 39 °F (0 to 3.8 °C)
- General frozen foods — -10 to 15 °F (-23.3 to -9.4 °C)

Online order fulfillment presents new challenges for maintaining optimal temperature control. Chilled perishables and frozen goods must be kept within optimal temperature ranges, which can impact:

- In-store picking processes
- Order staging prior to customer pickup
- Walk-in cooler performance due to demand fluctuations and employee foot traffic

Cook-and-hold procedures must maintain food at optimal holding temperatures. Per the U.S. National Restaurant Association's (NRA's) ServSafe® guidelines, this requires frequent checking and documentation of internal food temperatures to ensure food quality and safety.

- Food left out at room temperatures for more than four hours is no longer safe.
- Hot holding tables must be above 140 °F (60 °C); cold storage must be below 40 °F (4 °C).

Environmental considerations

With respect to perishable produce, additional environmental considerations must be monitored and managed throughout food's journey, including:

- Optimizing humidity conditions
- Accelerating or delaying ripening with atmospheric agents such as ethylene and CO₂
- Limiting excessive vibration of the shipping container
- Preventing unauthorized access or exposure to light
- Avoiding shipping delays and tracking the location of each load in real time

Ensuring food safety throughout its journey

Providing consistently safe and high-quality food in the supermarket is a responsibility shared by each stakeholder in a grocer's supply chain. From farm to fork, grocers depend on their cold chain suppliers to collect, share and report on the handling and shipping practices that contribute to food safety.

Harvest and processing

The potential decay of perishable produce starts the moment it is picked, so time of day is the first food quality consideration. For example, strawberries picked during the afternoon can respire and radiate heat, both of which can adversely impact shelf life, quality and safety. The decay process can be stunted by controlling temperatures and the ambient environment in a variety of ways:

- Flash cooling/freezing
- Temporary staging in a storage cooler prior to shipping
- Pre-cooled containers, which help remove excess field heat

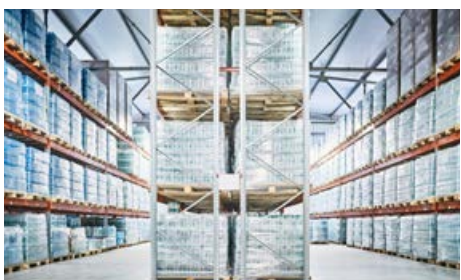
Atmospheres may be modified with ripening agents, and processors often measure the levels of ethylene, a natural gas that can accelerate ripening.

Emerson cold chain solutions — Emerson provides temperature-probing devices that can be used to measure internal “pulp” temperatures prior to and during the staging and loading processes. Our real-time temperature monitoring and tracking devices can be activated inside the shipping container to immediately begin monitoring location, temperatures and other environmental conditions of in-transit perishable shipments.

Transportation

The transportation of food's journey can last from days to weeks — by truck, sea and/or air — and grocers rely on their shippers to provide an unbroken chain of temperature certainty. Loading best practices promote airflow and shipments to be “load locked” in order to limit excess vibration. Shipping and transport containers must be able to maintain temperatures and provide visibility into container conditions. Mixed-load cargos may have different refrigerated temperature zones within the same shipment.

Emerson cold chain solutions — Emerson's field-tested, proven compression technology can withstand the rigors of the road while helping operators to ensure that their transport refrigeration systems preserve product at specified temperature ranges. Temperature monitoring, logging and tracking devices — combined with our cloud-based software portal — can provide real-time temperature and location conditions of product in-transit. The software enables live remote monitoring and issues alerts to stakeholders based on user-defined parameters, such as: temperature excursions; changes to shipping atmosphere; vibration; security breaches; and shipping delays.



Cold storage distribution center

Handlers must inspect product temperatures and conditions on receipt at the cold storage facility. This includes checking pulp temperatures with probing devices and reviewing trip data from logging and tracking devices. Relying on only the ambient air temperature of the shipping container is not an accurate measure, as some carriers may turn off the refrigeration during shipping to preserve fuel.

After inspection, handlers promptly transfer perishable cargo into a designated cold storage temperature zone. The entire process must adhere to each facility's established quality assurance practices, such as:

- Hazardous Analysis and Critical Control Points (HACCP) plans
- Hazard Analysis and Risk-based Preventative Controls (HARPC) plans

Local health inspectors may request to review a facility's HACCP plan and related documentation to verify that a facility is following its own protocols.

Emerson cold chain solutions — Emerson's logging and tracking devices give end users the ability to maintain live, remote visibility for monitoring the temperature and location of their in-transit shipping containers. In cold storage facilities, our compression and refrigeration technologies help operators to establish and maintain proper temperatures in various cold storage zones. Robust facility monitoring solutions help operators to remotely oversee conditions, ensure proper temperatures, and automatically record temperatures for use in HACCP reporting.

Grocery stores

From the moment perishable shipments are unloaded in supermarkets, operators take ownership of food quality and safety. This starts with inspection — checking pulp temperatures and trip data logs — and continues with the prompt transfer of perishables into designated cold storage coolers or freezers. Once in cold storage, control platforms help retailers monitor perishable temperatures and optimize food quality.

The emergence of e-fulfillment business models introduces new food safety and quality concerns. Dedicated click-and-collect refrigerated storage and staging coolers must have sufficient capacity to handle the fluctuations in order volumes and associated demands, such as air filtration to handle frequent opening/closing of walk-in doors and refrigeration architectures that can adapt to varying load requirements. Order-picking processes, customer pick-ups and deliveries must be optimized to ensure safe handling and proper temperatures.

In addition, supermarket food preparation introduces hot-side complexities as consumers look to grocers for home meal replacements. The increasing consumer demands for grab-and-go options include both freshly prepared and



ready-to-eat/reheat meals. To ensure safety and meet local health inspection requirements, staff must be trained in safe cooking best practices, such as those provided by the NRA's ServSafe certification course. Cook-and-hold procedures should also follow established HACCP/HARPC plans, with a focus on the prevention of bacterial growth and maximizing food quality/safety.

Preparation of both hot and cold food requires a familiarity with specific tools and equipment to ensure safety compliance, such as:

- Hot holding tables for prepared food
- Probing devices for checking internal temperatures
- Pocket-held thermometers
- Thermocouple probes to capture a variety of temperatures (air, surface and internal)
- Thermometers for hot- and cold-side refrigeration and holding cabinets

Emerson cold chain solutions — Emerson continues to build on its legacy of compression and refrigeration technologies to meet the requirements of modern supermarkets. This includes condensing units with variable-capacity modulation to precisely match refrigeration load requirements and flexible distributed architectures that can augment existing refrigeration systems.

We offer a suite of temperature-probing devices to help grocers automate the recording of prepared food temperatures and address food safety and process compliance concerns:

- Verify safety and ensure consistent temperature compliance during food preparation.
- Limit the potential for manual recording inaccuracies.
- Ensure food safety process compliance across the enterprise.

Our powerful facility management, monitoring and control platforms address both existing and emerging food retail complexities. These tools provide near real-time access to critical information to help retailers track, triage and respond to issues pertaining to food quality and safety compliance — in individual stores and across their multi-site networks. In addition, these control platforms utilize alarms, notifications and remote access to enable end users to have continuous building and refrigeration monitoring at any retail location.

EMERSON COLD CHAIN SOLUTIONS



Connectivity drives cold chain visibility

At a time when grocery retailers are being held to increasingly higher food safety and quality standards, store operators, consumers and health inspectors are demanding greater transparency in the food supply chain and improved visibility of food's journey from farm to fork. To consistently deliver the safe, high-quality food offerings that their customers expect, operators must adhere to established best practices and employ the proper tools and technologies. It also requires an understanding

of everything that contributes to food quality and safety throughout the food supply chain.

With today's connected internet of things (IoT) monitoring and tracking infrastructures, operators now have the potential for visibility into each step of food's journey — and even the possibility for comprehensive cold chain traceability. Emerson provides the refrigeration technology and IoT-enabled infrastructures to help stakeholders at each point monitor, control and track a variety of conditions necessary for preserving food safety and quality.