

3. Transporters

Transporters – adhering to the Code of Good Practice undertake to do the following:

The trader/transporter must determine the appropriate conditions depending on the type of product, its age, the length of the transport and the transport conditions so that the product arrives at its destination in good quality and with the least possible impact on its shelf life.

3.1 Provide the best possible conditions during transport (including transport related storage)

3.1.1. Refrigerated transport

Shelf-life of perishable products is highly influenced by temperature deviations during transport, handling and storage. Suboptimal cool chain processes and management lead to considerable food losses and waste. Optimum product temperature is one of the most important factors for retaining product quality and condition during the storage, handling and distribution value chain. Products exposed to inappropriately high temperatures get a reduced shelf life due to increased respiration rates and thereby enhancing the ripening process, ageing and loss of turgidity of the perishable product. Inappropriately low temperatures on the other hand causes chilling injuries and therefore shortens shelf-life and increases losses and waste in all the following stages including at consumer level.

Perishable products should be kept at an appropriate temperature at all times from harvest to retail and consumer. The resources invested into cooling products to the appropriate temperature is quickly lost if these products are kept at inappropriately high or low temperatures later in the value chain. Frequent changes in temperature as well as shipping and/or storing fresh fruit and vegetables with different optimum product temperature in the same shipping container or cold storage also reduces shelf life. Having good communication and collaborations along the value chain should therefore include discussions on how to establish and maintain an uninterrupted cool chain.

There is thus much to gain in terms of reduced loss and waste and improved quality by keeping products in appropriate climate conditions throughout the value chain. Keeping very sensitive (highly perishable products) at their ambient temperature during transportation greater are the gains from an unbroken cool chain. For example, lettuce has an estimated shelf life of up to 12 days at zero degrees Celsius but only 2 days at 20 degrees; leek and cauliflower may be stored over e.g. 20 days at zero degrees but only 2 days at 20 degrees. This only refers to products that are not chilling sensitive (see annex II).

Subtropical and tropical products quickly develop chilling injuries when kept at temperatures below ambient/ inappropriately low, though non-freezing, temperatures. Therefore, attention must be paid to appropriate storage and transport temperatures to ensure that chilling sensitive products are not subjected to temperatures below those that may cause chilling injury (see annex II).

If possible, products should be transported in with regulated temperatures vehicles and/or containers. The produce should be brought to the recommended temperature as quickly as possible and uniform temperature should be maintained through distribution. Small deviations may be tolerated by some of the less perishable products, but typically temperatures should be maintained within small deviations of the targeted temperature to avoid loss of quality.

In closed vehicles or containers, products emitting ethylene should not be transported for long distances together with ethylene sensitive products.

3.1.2. Non-refrigerated transport

If products are transported in open vehicles, loading should take place in the shade, and an area that is free from excessive dust. During transportation products should be completely and adequately covered for example with a tarpaulin or any other suitable material to protect it against direct sunlight the elements, dirt and minimize temperature variations. Tarpaulins must be clean and undamaged with sufficient measures in place so as to ensure that they are adequately secured. Thermal insulation tarpaulin may provide some protection against heat.

Proper ventilation should be provided with care to avoid dehydration of the produce.

Stops and reloading should be kept at a minimum. Care must be taken during loading and unloading to avoid temperature abuse and physical injuries.

3.2. Plan transports for optimal conditions

The longer the transportation period, the more important it is to provide optimal ~~transport~~ climatic conditions for the transported perishable products and its packing material in the vehicle.

If products will be unloaded at more than one point, products should be loaded on to the vehicle/ container in reverse unloading order, to avoid unnecessary loading and reloading. In cold climates, measures should be taken to avoid products from getting freezing damage.

In vehicles and/or containers with regulated temperatures, careful planning is required/ must be executed/ to ensure that products that have similar temperature requirements are stored in the same compartment/ container.

Careful planning should also avoid putting products emitting ethylene in the same space as products that are sensitive to ethylene (see annex ?).

3.2.a Vehicles packaging and unitizing

Vehicles should have a good suspension system to avoid excessive shocks of the cargo (including good tyres, tyre air, springs, shock absorbers).

Proper temperature management demands proper air circulation through airflow management, proper packaging and unitization and cargo space management.

The load must be stowed in such a way that it cannot move or fall over during transport.

Proper packaging and unitization is necessary to avoid physical injuries due to compression and vibration of the cargo. Packaging material should be suitable and fit for the transport and its conditions. Usage of low quality packing material (e.g. boxes) might lead, especially when transport takes place under humid transport conditions, to collapsing of boxes and damage of the products in the packaging material

3.2.b Cleaning

Vehicles should be kept clean to ensure proper air circulation around the load, to reduce produce contamination by plant pathogen and food borne pathogens and chemical contamination.

3.3 Ensure proper training of staff

Transportation staff need to be knowledgeable on the storage, handling and distribution of perishable products as well as the impact of careless/ poor handling on quality, shelf life, losses and waste and which results in reduced profitability. Transporters are encouraged to provide training for truck drivers, dock workers as well as workers at other re/unloading points to ensure that handling and transportation of fresh fruit and vegetables are done carefully thereby providing the best conditions for products during transport. In this regard transporters are encouraged train giving them basic knowledge on the different temperature requirements which should include the importance of ethylene producing and ethylene sensitive products. It is recommended that detailed information on products including quick referencing literature such as individual product optimum temperature charts and container product mixture charts for storage and transportation purposes be available for the staff.

3.4 Monitor temperatures during transport

Keeping track of the temperature in the vehicle during the entire duration of the transport will raise awareness of the importance of proper temperature

management. Therefore, transporters are reminded to use the temperature chart on shipping containers and/ or ground transportation vehicles. These charts are very useful in recording the transportation temperature history and help identify the possible route course/ when and where the temperature chain was broken or failed/ if product quality at the destination point is not of an appropriate standard.

3.5. [Responsibility of damages has to be clarified](#)

Products may be damaged during loading, unloading and transportation. Therefore the responsibility of each party or service provider at each point and stage must be clear. Such clarity leads to improvement in handling transportation and storage which improves or maintains quality, reduces damage and economic losses decrease.

4. Retailers

Retailers and retailer chains adhering to the Code of Good Practice undertake to do the following:

4.1 Ensure proper training of staff

Retail staff need to know fresh produce storage and handling practices and to understand its impact of poor handling on quality, shelf life and waste, consumer purchases and eventually the retailer's profitability. They also need to know the urgency of selling products within their shelf-life limits. Therefore, staff should be trained in fresh fruit and vegetables best practices enabling them to a good knowledge of the consequences of inappropriate handling and storing the products including their continued employment.

Handling guides per product, with guidance on appropriate temperatures, ethylene sensitivity, mixture charts and common problems may be a useful tool for this. The guides should highlight quality affecting key parameters and appropriate practices.

4.2 Ensure ordered volumes meet demand

The best retailer practice is to adjust your produce volumes ordered to meet demand. In this way products will not be required to be kept in storage or on display longer than necessary, thereby retaining their quality/marketability and reducing food loss and waste. A "first in first out" approach to stocking/storage also significantly contributes to minimizing food loss and waste and economic losses.

Demand for products vary due to the weather, i.e. seasons, holidays and celebrations. Some high-demand periods are easily predictable, whereas others are less. To ensure a steady flow of the appropriate products based on consumer demands the retailer shop needs good market knowledge and a marketing/ sales and supply plan is essential. Procurement staff are required to speculate less and employ demand planning strategies and tools, to minimize as much uncertainty as possible.

Plan carefully in order to avoid oversupply. Planning involves more than estimates of only sales volume of the various products but also types, varieties, sizes, quality categories and colour categories and also the stage of ripeness. Promotion campaigns promoting the sale of one product may also influence the sales volumes of other, similar products. Therefore, good communication with the supplier or distribution centre should help coordinate supplies to meet market demand.

4.3 Define clear specifications

Retailers' specifications, including quality requirements, should be clearly defined in advance and in dialogue and/ or purchase agreements with producers, in order to avoid causing unnecessary loss/ waste (alt. such a way that unnecessary waste is avoided).

Retailers' specifications on quality should, as far as possible, be identical to the international trade standards developed for trading fresh fruits and vegetables. Additional quality requirements, added to the requirements in the trade standards, should be kept at a minimum in order to reduce transaction costs, losses and waste. An increased sale of Category II products will reduce losses at primary production.

Trading parties should be mindful of specifications that might require grading, sorting or trimming of produce that might lead to avoidable food waste (examples: trimming to the same size or length to fit into a specific package, refusing specific sizes or varieties as not being part of the goods accounting. Trading parties should also take note that some products such as tropical root crops (for ex. yams and ginger) must be trimmed during harvest. This knowledge is very important to avoid food wastage.

4.4 Contract appropriate maturity requirements

Perishable produce needs to have reached an appropriate stage or degree of development to have sufficient shelf life and good eating quality. It is of utmost importance that trading parties understand and have the same interpretation of the terms "maturity" (in fruits) and "sufficiently developed" (in vegetables and root crops) for each individual produce, i.e the produce must attain an appropriate degree of development to withstand transportation and handling, have good shelf-life, ensure proper completion of the ripening process, eating/ utility quality and having normal taste which will ensure the proper completion of the ripening process.

Consumers may be very eager to buy products when these first appear on the market at the beginning of the season. They may also be willing to pay a premium price for these first products. Retailers may be tempted to sell products as early in their season as possible to reap economic benefits. However, if these early season products are marketed before they have reached the appropriate maturity, they may not be able to ripen properly and will remain hard and tasteless never attaining the desired utility needs and deteriorate quickly. This may result in the throwing these products away and avoid buying such products again, either in the near future or permanently – even when better qualities are available. This will have a

negative impact on price and demand of such products for an extended period of time, as well as the reputation of the supplier/producer.

It is important that the retailer knows that the different varieties from the same region or country, of many fruits, for example apples and pears, mature and ripen at different times. As such they should be also marketed at different times. Each variety should be placed on the market at the correct time to avoid low eating quality and eventually the products being wasted. One of the best ways to avoid this is to have good communication with producers, and seek and respect their advice.

4.5 Control the ordered products at arrival

Buyer and seller should have a common agreement on criteria and method for controls and claims.

Return of products from retailers because they fail to meet the requirements of a quality standard or the requirements agreed to by buyer and seller is a major cause of food loss and waste. However, areas considered high risk and likely to cause problems should be defined in contracts in advance or otherwise by a common agreement between buyer and seller.

It is very difficult when buyers and sellers do not agree on whether products are in conformity with agreed quality standards. The precondition for the acceptance of a complaint is a prompt incoming inspection and a prompt feed back to the seller /supplier. However, when a poor quality complaint is supported by transparent sampling, respect of legal tolerances, photos and additional supporting evidence, including inspection reports common agreement is facilitated.

In cases of dirty or overripe products – non-conformity is easily established; photographs usually suffice to communicate the extent of non-conformity to the seller. However, in less obvious cases, a more thorough quality inspection of the product is required. Additionally, buyer and seller should have an agreement on control and claim methods and how claims are communicated and documentation processes.

The quality inspections should be carried out directly after arrival of the produce in order to clearly reflect the condition at arrival. The results (non-conformities) should be communicated to the seller as quickly as possible in order to avoid the impression that the defects might have developed due to unfavourable conditions at the buyer's premises. The results of the quality inspection are therefore only a valid judgement of the quality of delivered products if made in connection with the arrival of these products at the buyer's premises. Depending on how sensitive products are and how they are kept and handled after arriving at the buyer's premises, they may quickly deteriorate in quality.

If possible, the reasons for non-conformities must be identified. This communication will assist those involved to take necessary measures to avoid this problem in the future. If, for example, products show symptoms of chilling injury and there has been a known deviation from the optimum temperature during transport, this deviation is important information for those involved.

The buyer, in agreement with the seller, should always try to find ways to avoid returning the product. Possible remedies are: accepting the legal tolerances, downgrading the produce, correct the labelling.

4.6 Handle products carefully

Bruising damages products, reduces quality and can lead to rot resulting in products being wasted. Products may be bruised not only when being transferred from boxes into display areas but also by consumers who handle and squeeze them.

Products that are packed individually on trays in the packages (boxes) will be less bruised if displayed for sale in these boxes.

Products should be handled as carefully as possible placing in special retailer displays. As such, retail staff should be well trained and fully understand the consequences of improper handling of products. Any wasted produce reduces the profit of the retailer, has an impact on sustainability and disregards all efforts of producers and other partners along the chain.

Retailers should consider taking measures that limit the damage of products caused by careless consumers, such as limiting the volume displayed at any given time and thereby the number of times each product is scrutinized by a consumer until finally chosen. Other measures are providing point of sale information and warnings. For products that are easily bruised such as peaches, apricots, ripe pears and ripe avocados, sale in pre-packages can noticeably reduce waste.

4.7 Store products appropriately

Temperature is a vital factor in retaining product quality during distribution. It increases shelf life by affecting respiration rate and thereby reduce the ageing of the fruit and vegetables. Shelf life is highly influenced by deviations in temperature during transport and storage. As a result, inadequate cool-chain processes and management cause a considerable share of food losses and waste.

If stored prior to display, products should be stored appropriately, taking into account their specificities and the facilities available.

The appropriate temperature must be kept all the time from harvest to retail. Products must be stored at their appropriate, product-specific temperature to retain the visible quality, keeping quality and the nutritional quality, and to reduce food loss and waste. Therefore if products are kept at higher temperatures than optimum, at any time along the chain, the cost of all activities at every previous stage including production, harvest and post-harvest is quickly lost and/ or wasted.

The higher the temperature and the more sensitive the products are, the greater are the gains from an unbroken cool chain. For example, lettuce has an estimated shelf life of up to 12 days at zero degrees Celsius but only 2 days at 20 degrees; leek and cauliflower may be stored over 20 days at zero degrees but only 2 days at 20 degrees. This, however, only refers to products that are not sensitive to chilling (see annex II).

Frequent change in temperature also reduce produce shelf life. Taking products from cool storage and back should therefore be avoided. Collaboration and discussions along the value chain should be conducted to establish an unbroken cool chain,

Subtropical and tropical products develop chilling injuries when kept at low, temperatures. Attention should therefore be paid to ensuring that chilling-sensitive products are not subjected to temperatures below those that may cause chilling injury. (See Annex II). When possible, there should be different temperature zones in the storage facilities to accommodate the different temperature requirements of products.

In addition to temperature, you should take into consideration any other aspects presentation of the produce that are important to retain the visible quality, the keeping quality, the nutritional quality and that would reduce waste, such as humidity and ethylene. Relative humidity can be controlled by the temperature of the storing facility: setting the dew point and/or controlling the moisture in the air of the facility (e.g., mists, spraying water and/or leaving water tins inside the storage facility are practical alternatives. Products producing ethylene (climacteric fruits, see annex ?) and products that are sensitive to ethylene (see annex ?) should be stored separately.

4.8 Display products appropriately

Products should be displayed appropriately, taking into consideration their specificities and the facilities available. In addition to temperature, take into consideration any other aspects of the presentation of the produce that are important to retain the visible quality, the keeping quality, the nutritional quality and that would reduce waste.

Temperature is a vital factor to retain the visible quality, the keeping quality, the nutritional quality and to prevent food waste and therefore on the profitability. The appropriate temperature should therefore be kept all the way to the point of display.

Frequent change in temperature at retail points also reduces produce shelf life. A good dialogue along the distribution chain shall therefore include discussions on how to establish an unbroken cold chain, product placement in retail outlet (near doors, other frozen type foods – cheese, butter, frozen meat and fish), retail method (pallet bins, smaller retail containers of only one fruit variety or mixture of different fruits),

To avoid shortening shelf-life the quantity on display should be adjusted to possible sales in order to limit the volume of products displayed at unfavourable temperatures. This is particularly important in open air markets.

When products are offered for sale in the open, measures should be taken to protect them from ~~unfavourable weather conditions~~ direct sunshine, wind, dust and dirt. Products that easily loose water, such as leafy vegetables, may be sprayed with clean water. Small retailers with no cooling facilities may prolong shelf life by covering their fresh produce overnight with wet cloth or tissue or any other suitable material.

Products should be presented in such a way as to:

- minimize a negative impact of fruit with a clear ripening stage (climacteric fruit,¹ such as bananas) on other produce
- maintain adequate humidity.

4.9 Avoid campaigns encouraging consumers to oversupply

Promotional campaigns such as “Buy one get one free” and other enticements to large volume purchases encourage consumers to buy more products than they, or their household, may be able to consume. Such purchases often result in food waste. Although there may be good intentions behind many promotion campaigns – such as increasing consumption of produce for health reasons or providing economic help to domestic producers to sell an unexpected overproduction due to favourable weather conditions – it may however, from a waste perspective, be better to decrease the price instead.

It is important to consider the side effects of promotional campaigns. For instance, when consumers are encouraged to buy more of a targeted product, they may likely buy less of other similar products, i.e. a campaign to promote pears may lead to decreased sales of apples, thus leading to

¹ A climacteric fruit is a fruit with a clear continuing ripening stage when many characteristics of the fruit change, for example fruit texture which becomes softer, content of sugar and aroma substances, increased respiration rate and production of ethylene. Non-climacteric fruit lack this stage. A list of climacteric and non-climacteric fruit is found in annex I.

possible waste of apples. Therefore, in the long run, a stable volume and price decreases losses and waste.

4.10 Find ways to use or sell damaged or suboptimal products

Even with the most careful planning, storage and handling, some products cannot be sold at retail as originally intended. Therefore retailers should have alternative solutions for selling or disposing of the products to reduce food loss and waste, which include:

- Reduce price and sell as
 - Category II (if applicable)
 - “for home processing” (if applicable)
 - “for immediate consumption”
- Promote interesting recipes or new preparations to increase interest of consumers (at point of sale)
- Process to juices, jams, smoothies, etc.
- Give to charity (e.g. see EU Guidelines)²

4.11 Measure the amount of produce that is wasted and specify the major causes of the waste

(Retail) Companies in the food chain that are aware of the volume of their food loss and waste and that understand the causes of food loss and waste and have the means to measure the waste should have a greater capacity to reduce food losses and waste than companies that do not make this effort. This implies that companies acknowledge there is a problem, measure the losses, identify hotspots and manage the food losses through targeted interventions.

Retail companies that regularly measure food loss and waste can identify more easily the hot spots for this waste (where it happens) and review the results that enables them to start a learning process that serves as an important tool for finding remedial measures that lead to reduced waste.

Such results can be used, not only for future planning but also for the implementation of measures related to handling, temperatures, transport, logistics etc. Apart from the aspect of reducing loss and waste there are strong business incentives to implement this Code of Good Practice because money spent on reducing loss and waste is reported to give up to an estimated 14-fold³ return on the money spent. (For further details, see the UNECE measuring methodology in Annex III.)

² The EU Food Donation Guidelines provide valuable advice:
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:C:2017:361:FULL&from=EN>

Retailers buying directly from producers should also undertake the following:

4.12 **Improve logistics to shorten time from harvest or packing to retail**

As fresh fruit and vegetables have a limited shelf life, the time that elapses from harvest to retail, or for long-term stored products from packing to retail, should be as short as possible. A strict “first-in, first-out” principle should be applied.

4.13 **Ensure unbroken cool chains,**

Products should be kept at an appropriate temperature shall be kept at all times from harvest to retail. The investments (money and effort) put into production, post-harvest handling and cooling products to the appropriate temperature is quickly lost if products are exposed to unfavourable and/or fluctuating temperatures later in the value/ distribution chain. Therefore, a good dialogue by all participants along the distribution chain shall include discussions on how to establish an unbroken cool chain. The cool chain should be established and maintained from harvest to retail stage – which includes instre ?? or point of final sale display.

4.14 **Place orders and/or change orders in timely manner**

Orders should be placed in a timely manner that gives the producers enough time harvest products at the appropriate time of day, cool products to the appropriate temperature, sort/ grade and pack according to specifications given. If orders are placed or changed shortly before time of dispatch producers may have to send products that are not properly cooled. This will reduce the shelf life of the products and increase food loss and waste. It may also lead to sorting and packing having to be done too quickly to allow for careful handling and for quality assurance to be carried out properly. In cases where orders are placed in foreign countries requiring several days or weeks of sea travel last minute orders is often not feasible.

4.15 **Avoid late cancellations**

When orders of perishable products are cancelled at short notice and close to dispatch, it is difficult to find a new buyer for these products and the products are often wasted. This problem is even more severe when the product is packed in specific branded packaging of the retailer and the product cannot be sold to another retailer without costly repackaging and additional risk of damages. (Ulrike – especially if the presentation, packaging and labelling are specifically aimed at the retailer).

In cases of orders placed in foreign countries requiring several days or weeks of sea travel to destination markets, order cancellations may not be feasible, or can result in high rates of food loss in producing countries; particularly if the product is not part of the country's diet.

The frequent cause of late cancellations is often that market demand for a product, at a given time, is lower than when the buyer originally placed the order. In some cases when it is impossible to change the order (product is located at the shipping port, or already loaded on the means of transport), the products may therefore still be wasted upon arrival at the destination market. In these cases, the buyer should consider measures to promote the sale of these products.

The negative impact of a late cancellation will be particularly severe if an order is cancelled for example after a producer has opened a cold store or a Controlled Atmosphere (CA) store and removed the products from the storage room. Once a CA store has been opened, the fruit must be moved into the distribution chain.

Final Note

Ulrike: Shall we put a final note saying that respecting this Code of Good Practice will help to reduce food loss and waste, increase sustainability, increase profit and satisfaction along the marketing chain including consumer?

Further reading

Clément Vigneault; James Thompson; Stefanie Wu; K.P. Catherine Hui; Denyse I. LeBlanc, 2009. Transportation of fresh horticultural produce. Available at: <http://postharvest.ucdavis.edu/datastorefiles/234-1291.pdf>

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Jeffrey K. Brecht; Steven A. Sargent; Patrick E. Brecht; Jorge Saenz; Leonard Rodowick Protecting Perishable Foods During Transport by Truck and Rail , 2019. Available at : <https://journals.flvc.org/edis/article/view/113444/117747>

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