General Fruit Handling for Importers and Wholesalers
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Try this quick quiz to test your fresh fruit handling knowledge before you start the training program. As you move through each course, you’ll take short quizzes to test your knowledge, followed by a final assessment to see how much you’ve learned.

1. **What is the cold chain?**
   - The sequence of people and companies that handle fruit and keep it at the proper temperatures while it travels from producer to consumer.
   - The temperature at which fruit should be stored.
   - The gate that separates the cold storage area from the main loading dock.

2. **Why is it important to handle produce boxes and cartons carefully?**
   - So undamaged boxes can be reused.
   - To ensure the best quality fruit gets to retailers and customers.
   - So someone doesn’t get hurt.

3. **What is the first priority when receiving a fruit shipment into the warehouse?**
   - Unloading the truck.
   - Checking the load and the quality of the fruit in the shipment.
   - Talking to the driver to maintain goodwill.
   - Moving the shipment into the cold storage as soon as possible.

4. **How would you handle a shipment from a mixed produce load?**
   - Combine boxes that best fit together, by size, on separate pallets.
   - Separate items by temperature sensitivity.
   - Wrap the most perishable items in thermal blankets.
   - Separate items in the different units or partitions of the truck.

5. **How do boxes typically get damaged in the warehouse?**
   - By people dropping them.
   - By falling over because they are stacked too high.
   - By getting crushed by other heavy loads.
   - All of the above.
Overview

In this course, we will focus on the single most important thing you can do when unloading shipments and handling fruit: keep the fruit cold.

Scenario

It's a hot Wednesday morning – another sweltering day and it's just started to rain. Jorge, the assistant warehouse supervisor, is hurrying across the loading dock on his way to a meeting. Two trucks are open and two forklifts are zooming in and out of the receiving area of the cold storage, racing to see who can unload the most product. Another truck is backing up for unloading.

When Jorge started nearly a year ago, trucks sometimes sat for an hour or more before they unloaded fruit shipments onto the loading dock. Once quality control had finished their initial inspection, the pallets were moved into cold storage – but sometimes damaged fruit went unnoticed or fruit didn’t get placed into cold storage quickly enough, and when this happened, there would be complaints from buyers about the quality of the fruit. Jorge’s boss was also frustrated that because of improper temperature control as much as 20% of the fruit was discarded by their retail customers. Jorge tried to address this issue in two ways:

First, Jorge worked with his truckers to schedule loads so they didn’t all arrive at the same time. On a typical day, with only two employees to drive the forklifts and unload the trucks – and more trucks often arriving at the same time – there were problems.

Jorge realized that the length of time that fruit sat on the warm loading dock was causing the fruit to spoil. Sometimes visible damage to fresh fruit is delayed due to poor unloading or shipping conditions and poor handling practices. For example, all chilling injuries and temperature problems have a three to seven day delay before fruit might begin to show signs of damage.

Decision Points

- How can Jorge move the fruit from the refrigerated trucks promptly so fruit doesn’t sit on loading docks for too long?
- Should the delivery trucks turn off their refrigeration units? Or, should the trucks keep running during unloading?
- How should Jorge and his team test that his new way of unloading fruit is actually cutting down on waste?

Key Background Information: Video Overview

Let’s learn more about the importance of keeping your fruit shipments cold.

Always remember that fruit is food, and the produce in your warehouse storeroom will be eaten by your family and many others. The procedures you follow will ensure
that every fruit shipment is handled appropriately – and that every family gets only the best quality fruit from your local grocery store.

To provide them with the best quality produce, remember to always mind the cold chain.

The cold chain is the chain of events that happen as the fruit travels from the grower to the end user. Every person at every company who handles and stores the fruit during its journey must keep it at its optimal temperatures to maintain its quality. Always remember that fruit needs to stay within the optimal temperature range at every point in the chain.

Quality and food safety are paramount to the freshness of the fruit.

The optimal storage temperature for apples, pears, and strawberries is 0 to 1 degrees Celsius. If this temperature is not maintained throughout the cold chain, it might not be noticed immediately, but further down the chain, produce quality could suffer and shelf life will decrease. If the importer or wholesaler allows fruit to get too cold or warm, it will affect the quality down the chain, and when it arrives at the retailer or into the hands of the consumer, the fruit may be overripe or spoil quickly.

When you work in the produce business, the single most important job you have is doing your part to maintain the cold chain. Whether that optimum temperature is warm or cold, the cold chain for each particular fruit must be maintained. During the long journey from the grower to the shipper to the importer, to the wholesaler, to the retailer and finally to the consumer, there are plenty of places in the chain where problems can occur.

Every potential break in the cold chain reduces the useful life of fruit and its value, so your part in maintaining the chain is critical. Maintaining the cold chain is also required by industry standards and by law in some countries.

Now, let’s learn more about supporting the cold chain, including operational details for your work on the loading dock.

When working with refrigerated trucks, remember that trucks must turn off their refrigeration units once they open their cargo doors and shipment unloading begins. This means that the cargo doors should not be opened until your team is ready to unload. If you are not ready to unload, keep cargo doors closed so that the refrigeration unit will remain on and fruit quality can be protected.

As soon as the cargo doors open, and the truck’s refrigeration unit is turned off, you’ve got limited time to unload. Always be ready to unload shipments as quickly as possible.

Remember that you should not open multiple trucks at the same time to do your quality control or load inspection. While opening multiple trucks might make it easier for the Quality Control staff, this breaks the cold chain and the fruit quality in the other trucks will be harmed as they wait to be unloaded.
Now let’s talk about the cold chain and your loading docks.

If you work in a newer facility, your receiving docks are probably kept cold. Some older facilities in colder climates, like in Sweden or Russia and some northern cities in the US, keep their docks warm during the winter months to prevent freezing.

Consider this scenario: You want to maintain the cold chain, so your primary concern is making sure that fruit stays refrigerated at all times. Fruit temperature around the outside and corner boxes on a pallet warm up first, as soon as the cartons are exposed to warm air. To keep the cold chain, fruit cannot sit on an unrefrigerated loading dock. More than one hour with no refrigeration could result in serious loss of quality, and fewer than 30 minutes is recommended.

You and your team need to learn how to time your unloading. Try this: Get a large timer unit to hang on the wall. When a new shipment arrives, start the timer and record how long it takes to unload each truck. Your main goal is to be efficient while maintaining safety and minimizing potential damage throughout the loading and unloading process in your warehouse.

It’s important to keep trucks and shipments cool. Truckers often turn off the refrigeration units on their trucks as soon as they arrive to save fuel, even though the trucks sometimes sit idle before you can start unloading.

Remember to make sure that a truck’s refrigeration unit stays on while they wait as your team unloads incoming shipments.

By keeping refrigeration units on until unloading begins, the shipper will have fewer loads rejected. You can explain that the small extra fuel cost of keeping his truck running is justified today by fewer quality problems tomorrow.

Activity: Try It for Yourself

You’re the warehouse manager at a small trading company in Pakistan. Your loading dock isn’t part of your cold storage area, and typical summer daytime temperatures are 32 degrees Celsius (at 16:00h). What can you do to ensure that you don’t break the cold chain when shipments arrive?
Which of these options are the best?
• Make sure trucks are unloaded promptly.
• Don’t accept deliveries between noon and 18:00h.
• Call a few reliable, casual laborers to help when too
  many trucks arrive at once.
• Install a fan on the loading dock.
• Send your workers home at 15:00h.
• Offer cool drinks to the truck drivers while they wait
  for their trucks to be unloaded.

Here are some of our suggestions. What other suggestions do you have?

Quick, easy, inexpensive solutions could include:
• Schedule your workers to come in very early and
  have trucks arrive between 16:00h and 19:00h.
• Avoid scheduling any fruit deliveries in the peak heat
  of the afternoon.
• Use small carts so that the handlers don’t drop the
  fruit cartons.
• Use tape or paint to make a line on the wall at the
  maximum height cartons can be stacked – if the line
  isn’t visible then the boxes are stacked too high.

What would you do? When too many produce shipments
arrive at once, how do you prevent them from sitting in
the heat?

**Review: Show What You Know**

Now let’s check what you have learned so far in this
course with a quiz.

**What is the cold chain?**
• The sequence of people and companies that handle
  fruit and keep it at the proper temperatures while it travels from producer to consumer.

• The temperature at which fruit should be stored.
• The gate that separates the cold storage area from
  the main loading dock.

**What is the optimal amount of time to leave fruit sitting on the dock before moving it to cold storage?**
• 30 minutes.
• 15 minutes.
• 1 hour.

**What is the consequence of fruit warming up (i.e., breaking the cold chain)?**
• Fruit is worth less and has a shorter life.
• Fruit starts to ripen.
• Fruit starts to deteriorate.
• All of the above.

**New Ways of Doing Things**

After working through this course, what are the things
that you might do differently in your own job to keep the
cold chain?

Think of three new things that you can do today.

There is one main takeaway from this course: Keep
produce cold by being quick when unloading.

Here’s what Jorge did:
• Every time a new worker started, Jorge assigned
  him to work with Manuel on the first day. Manuel is an
  expert on the loading/receiving docks, and he’ll be
  sure that the new employee learns how to handle things carefully, doesn’t stack boxes too high, and
  that cartons aren’t left outside the refrigerated areas.
A new clock on the wall lets the crew know how long a truck has been sitting on the loading dock. The goal is to unload 90% of trucks with 30 minutes and every truck within 45 minutes.

As a reward, the employee who unloads most carefully gets first pick of the fruit that won’t be sent to retailers at the end of the day.

With a new area set up inside the cold storage, all shipment pallets are moved there without delay.

Jorge has set up an area for incoming and outgoing shipments inside the cold storage so all shipments are kept cool. Today, his team moves all produce pallets directly from the truck into cold storage. Once inside the cold storage area, they break down mixed pallets or pallets that are too high to fit in the warehouse storage racks. They check the shipment against the bill of lading and Quality Control workers sample the fruit for specifications and quality. With less time and labor spent handling the fruit due to quality issues, there are fewer complaints about quality from retailers.

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Overview

In this course, we will focus on a most important task in your warehouse facility: how to handle fruit boxes carefully.

Scenario

Jorge notices that some of the newer employees are handling cartons carelessly. Once, they were joking around and a carton was handled quite roughly as it was tossed to a worker on top of the stack. He missed catching that carton, and it not only fell to the ground, but others from the top of the stack toppled, too.

Another group of workers was working quickly, but in their rush, they stacked cartons eight high. The last time Jorge noticed that cartons were stacked that high, the cartons on the bottom sagged and bulged, damaging the product inside.

Decision Points

• When you don’t have space to store everything, what should you do?
• How can you best handle and stack boxes of produce?

Key Background Information: Video Overview

Let’s learn more about the importance of handling produce boxes carefully.

Whenever you are handling boxes of fruit – whether you are breaking down pallets or moving cases for inspection – always handle each box with care. Fruit is tender and can be damaged. Pears, for example, can bruise very easily, and dropping a box can bruise the fruit. Bruises might not appear for up to a week or more, and by then, the fruit may already be on display at a retailer. The fruit that was damaged by poor handling procedures at your warehouse will result in a loss of sales for the retailer. Safe and careful handling should always be the priority!

Another way to keep fruit at its best quality is to avoid stacking boxes too high. If boxes are stacked too high, the contents of the bottom-most box may be bruised or damaged. Do not add boxes on top of pallets received from your supplier.

If boxes need to be restacked, the recommended maximum heights for stacking produce are seven to eight boxes high for apples, seven boxes high for pears, and three boxes high for strawberries. The maximum height depends on the type of pack on the pallet. A good rule is to use the maximum height of the pallet you receive from the supplier.
Handling Fruit Boxes

Remember that fruit is perishable and delicate and must always be handled and stored carefully to maintain its optimal quality and avoid damage. Your team should work hard to maintain best practices so you can provide customers with the quality product they expect.

Activity: Try It for Yourself

Consider this warehouse situation:
The warehouse manager has hired a new employee, Tom, to help with the unloading. As warehouse supervisor, you've been asked to keep an eye on him. As he hurries stacking boxes, Tom is not being careful and drops one box on top of another. The carton corners bend each time this happens.

How long do you wait before taking action? The other workers will quickly see that Tom is being allowed to continue unchecked. They may view Tom's actions as acceptable and become more careless themselves – after all, why should they work hard when Tom is getting away with being careless on the job?

What should you do?
• Take over and move the final boxes of fruit yourself.
• Work with Tom to show him the proper way of stacking the boxes and the importance of doing it properly.
• Wait until the end of the day to take Tom aside and tell him not to drop boxes. (Remember that cartons can be worth as much as $25 each depending on the fruit).
• Embarrass Tom in front of the whole crew by yelling at him.
• Tell Tom that he's going to have the cost of damaged fruit subtracted from his pay.
• Ignore Tom and keeping doing your job well and carefully.
• Tell the manager so that you don’t get blamed for the damage.

When it came time for a break, Tom just walked away and lit a cigarette, leaving half a dozen boxes sitting on the open truck in the mid-afternoon heat.

Tom's bad behavior reflects poorly on your whole team, but you don’t know how the boss wants to handle things.
Handling Fruit Boxes

What should you do next?
• Move the boxes of fruit off the loading dock yourself and take a later break.
• Call out to the team: “Hey, we’ve got to finish getting this fruit out of the heat. Come on guys, we’ve got to move the last few boxes before we take our break!” Then pick up one box yourself and gesture to the others to help you.
• Ignore the boxes in the heat and go take your break, too.
• Complain to the boss that Tom is leaving fruit in the heat.

Review: Show What You Know

Now let’s check what you have learned so far in this course with a quiz.

What is the maximum height for stacking fruit cartons?
• Five is the maximum.
• It depends on the fruit – three for strawberries or as much as six for apples.
• Eight is the maximum.

Why is it important to handle produce boxes and cartons carefully?
• So undamaged boxes can be reused.
• To ensure the best quality fruit gets to retailers and customers.
• So someone doesn’t get hurt.

What should you do if you drop a box of fruit?
• If it was dropped from less than one foot, just continue unloading.
• If it was dropped from one to three feet, you should set the carton aside for inspection.
• If it was dropped from more than three feet, then the carton should be set aside for sampling or discarding or marked for the retailer as damaged.

New Ways of Doing Things

After working through this course, what are the things that you might do differently in your own job to handle fruit more carefully?

The main takeaway from this course is this: Be gentle – handle boxes carefully so produce remains in good condition.

Here’s what Jorge did:
• Every time a new worker started, Jorge assigned him to work with Tom on the first day. Tom has now been fully trained on the loading/receiving dock procedures, and he’ll teach the new employee how to handle things carefully, make sure that cartons aren’t left outside the refrigerated areas, and not stack boxes too high.
• A new clock on the wall lets the crew know how long a truck has been sitting on the loading dock. The goal is to unload 90% of trucks within 30 minutes and every truck within 45 minutes.
• With a new area set up inside the cold storage, all pallets are moved there without delay.

Learn optimum height for stacking boxes.

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Overview

In this course, we will introduce best practices for inspecting shipments of fresh produce.

Scenario

Sergio’s morning wasn’t going well when he walked into his job at the wholesaler’s facility. He’d overslept and missed his bus and now there were five large trucks already pulling up to the loading dock. Sergio knew what that meant – his day was about to get a lot worse. The loading dock was overcrowded, and with too many people working too fast to unload those trucks, costly mistakes could be made. As Quality Control (QC) technician, it was Sergio’s job to sort out the chaos and minimize the damage.

Right away Sergio discovers that all five trucks are filled with apples and two of them weren’t even due in for several days. With so many shipments arriving at the same time, Sergio has a lot to be worried about. Is there room in storage for them all? Will they have the same quality problems as the last load from this shipper? Will they be good for long-term storage or will they need to be repacked? He’ll have to sort all of that out later, because right now, his number one priority is making sure five truckloads of apples stay cold and get handled quickly to maintain their quality.

Today, Sergio is also training a new Quality Control staff member, Alex. Alex pretty much knows his way around QC, but he’s never tested fruit before. He and Sergio work together that morning making sure that there’s plenty of storage space available and staff on hand to deal with the shipments. When that’s covered, Sergio starts training Alex on the importance of proper testing procedures and keeping the fruit cold.

Decision Points

• In what order should Sergio open the trucks to best keep the fruit cold?
• Should he open all trucks at once for testing? Or open just one truck, test it, and wait until that truck is unloaded before testing the second truck?
• Which inspections must happen before the truck is unloaded?

Key Background Information: Video Overview

Let’s learn more about inspecting shipments.

First, it’s very important to keep trucks closed and cold until you’re ready to check and unload the shipments.
You don’t want to break the cold chain!

Consider this scenario: There are five trucks and you want to sample the shipments in all of them. Five trucks can’t be opened at the same time and still be unloaded quickly to keep the apples cold enough to maintain the cold chain at an unrefrigerated receiving dock.

What should you do? The first thing you need to remember is to always keep it cold. Optimal cold chain temperature for apple shipments is 0 to 2 degrees Celsius. If five trucks are waiting to be unloaded, the fruit will warm up and the cold chain is broken.

You must work quickly so that fruit does not sit out in warm temperatures. The Quality Control Technician must be ready when a truck is first opened up at the loading dock to do the preliminary inspection immediately. Once that’s completed, truck can be unloaded quickly into the receiving area inside the cold storage.

Remember that you are part of a chain keeping the fruit cold. After half an hour at temperatures as low as 10 degrees Celsius, the pulp temperature of strawberries starts to warm up and within an hour, internal fruit temperature rises to levels at which the berries begin to spoil, especially for the fruit on the outer edges of the pallet where temperatures are warmest. If your loading dock is warmer than 10 degrees Celsius, the fruit will heat up even faster and begin to spoil sooner. Never leave fruit pallets sitting on a warm loading dock or in a truck with its refrigeration turned off and its cargo doors open for more than 15 to 20 minutes.

Always keep trucks closed with refrigeration units on until you’re ready to unload them. You already know that you should avoid opening two or more trucks at the same time to do quality control and load inspections. This might make it easier for the Quality Control staff, but the fruit quality in the other trucks will be harmed as they wait for unloading. For most companies only ONE truck should be open at once. At MOST, there should never be more than TWO trucks open, and then only if there are more than enough forklifts and workers available to unload quickly.

Now, let’s learn more about checking the temperature recorders to make sure fruit shipments have been kept cold.

The first step is to check whether the temperature recorders are in the boxes or with the shipment. If they are with the shipment, you can easily look at the temperature history and confirm unexpected or unusual temperature changes. This will give you a more accurate picture of whether the fruit has been kept cold enough to maintain its quality.

The optimal shipping temperature for most fresh fruits is 0 to 2 degrees Celsius but temperatures will fluctuate during shipment as the refrigeration units cycle on and off during the journey.
If the temperature recorder shows unusually high temperature spikes or that the refrigeration unit cycled off for a longer period of time, then the fruit may be affected and you should check the shipment for damage like spoilage or mushiness.

If the temperature shows lower than expected temperatures, check carefully for potential freezing damage.

The quickest and easiest way to test the truck temperature is to take a thermometer reading inside the truck. To make sure of reliability, you should also use a digital pulp thermometer to check the internal temperature of a few pieces of fruit in the shipment. You want to make sure that fruit temperature is 0 to 2 degrees Celsius and that the truck temperature is -2 to +3 degrees Celsius. This will be the most reliable temperature measurement, especially if you received fruit shipped in a refrigerated container or fruit that was shipped by airplane.

When the truck is first opened, the forklift operator will need to remove a couple of pallets so you can access fruit near the back of the load for your initial readings on the shipment. Before you unload and move the pallets to the cold receiving area, you must make some quick checks.

First, note that fruit sizes are marked on the box. You need to verify that the box actually contains the specified number of fruits per the label.

A quick temperature check on the truck contents will help you determine if the fruit has been allowed to warm up during shipping.

You can also take a few fruit samples from a box or two for pressure testing.

For another key part of Quality Control, you need to open a number of boxes to check the fruit for decay and other damage. The US Government standards allow for up to 2% of fruit to be damaged – that’s only one or two pears in a box.

Activity: Try It for Yourself

Are there thermometers throughout your warehouse? Are these thermometers calibrated and checked at least four times each year? Check the temperature in different parts of the warehouse to find the hottest place. Do you ever leave fruit in places that are over 12.7 degrees Celsius for longer than ten minutes?

Put one pear in a refrigerated area and another pear in the hottest place in your warehouse. After a few days, compare how the two pears handled different temperatures by checking them with a penetrometer – the instrument you use to test a fruit’s ripeness.
Always measure the pressure of the fruit you’re sampling to gauge how ripe it is.

To learn if a piece of fruit is bruised, cut into your test fruit (the piece you used for the pressure test and temperature probe) to check for the internal breakdown or bruising in the fruit.

What do you notice when you cut into the fruit’s flesh? What is the condition? Is it damaged? Bruised? Breaking down? Would you want to eat this fruit?

To test the ripeness of pears and apples, you use a penetrometer. A penetrometer tests the hardness of the fruit.

- Make sure you have the correct tip. There are different tips for apples (10mm tip) and pears (8mm tip). Using the wrong tip can give you improper readings.
- Peel an undamaged portion of the fruit.
- Place the fruit on a flat surface – don’t hold it in your hand.
- Press the reset button on the side to reset the penetrometer.
- Press the penetrometer to the peeled area and push until the penetrometer punches to the designated line on the tip.
- Read the pressure from the gauge.

Optimal pressure for unripe pears and ripe apples is different for all varieties. Ideal eating pressures are a guide for how fruit should be received. Pears will ripen about .45 kgs per day at room temperature. Apples will typically lose .45 kgs of pressure while in transit. Every market has its own preference for each type of fruit. Be sure to work closely with your shipper to determine the optimal pressure requirements for each fruit variety. Also be sure to check fruit in different parts of the shipment. Ideally the whole load will have similar pressure and ripeness and can be handled together. Alert the warehouse manager if there is a wide variation in pressure – this could mean that some of the fruit is riper or softer and may be damaged or spoiled. As an importer or wholesaler, your main goal is to keep the cold chain intact.

Ask the Quality Control (QC) staff in your warehouse to show you how to conduct an inspection.

- How do they check the quality of fruit?
- How much sampling do they do when a truck arrives?
- What can you do differently when inspecting shipments?

**Review: Show What You Know**

Now let’s check what you have learned so far in this course with a quiz.

**If several trucks arrive at once, you should:**
- Immediately open all of them to count the boxes.
- Open one truck, do QC, and then unload that first truck before you open the next truck.
- Open all trucks, do QC on all of them, and then let the warehouse staff worry about trying to unload the trucks at once without the fruit getting too warm.

**If the temperature recorders show that several days have passed with temperatures above 12.7 degrees Celsius you should NOT:**
- Do extra testing to see how much this caused the fruit to ripen or soften.
- Report the whole load to your boss as a potential problem.
- Ignore it, since the fruit spent less than two weeks at a high temperature – it won’t be damaged or unsafe.

**When testing a load of fruit:**
- Eat one fruit from one box and if it tastes fine, that’s enough of a check.
- Pull several boxes from the load, open each box, and visually inspect the top layer.
- Pull several boxes from the load and from each box. Then pull out several fruits in the top, middle, bottom, and side of the box to inspect.
New Ways of Doing Things

After working through this course, what are the things that you might do differently in your own job to check the quality and temperature of incoming shipments, and put them into the right place in cold storage area all while keeping the cold chain?

Name three new things you can do in your job today.

There are three takeaways from this course:
• Conduct an efficient and effective Quality Control check on the loading dock.
• Test temperature and fruit quality.
• Keep it cold!

Here’s what Sergio and Alex did:
• No matter how many trucks delivered produce at their wholesaler’s warehouse, they made sure they could receive the deliveries with enough storage space and staff.
• Once cleared for delivery, they only opened and inspected one truck shipment at a time, making sure to never break the cold chain.
• Trained the entire wholesaler’s team to become experts at checking fruit quality and ripeness.

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Overview

In this course, we will learn about tracking fruit and keeping your produce shipments cold.

Scenario

Tuesdays are usually slow at the warehouse, but not this Tuesday. Jorge is ready for his break, but there’s no sign that the floor is slowing down anytime soon. He’s the assistant warehouse manager, and he’s responsible for keeping the cold rooms in order. Jorge knows that the two back cold rooms are now totally full from a shipment last night and his crew has just finished unloading several pallets of strawberries. That means that Sergio, the Quality Control manager, has probably already done a quick inspection.

With the shipment now in the receiving area, Jorge needs to find room in the already crowded cold storage. With two more trucks from their best supplier pulling up to the loading dock, he knows that he needs to move this shipment of strawberries out of the receiving area and into the cold storage right away to make room for the incoming shipments.

Jorge’s break will have to wait for now – he knows that it’s more important that he doesn’t break the cold chain.

Decision Point

• What are the inspection points or priorities when the fruit is in the receiving area – before moving the shipment into the cold room?

Key Background Information: Video Overview

Let’s learn more about the importance of tracking and keeping fruit cold.

After completing detailed quality checks, you will be able to determine whether the fruit needs to be moved immediately or whether it can be stored for some period of time before sending it on to your customers.

Based on these inspections, you will also be able to determine whether the fruit should be sold to other wholesalers, or to retailers, depending on its quality. Other wholesalers may take poor quality fruit off your hands at a discount.

Always remember that your first priority is maintaining optimal fruit conditions. Quality Control and labeling are important, but the priority is keeping the fruit cold, so your facility may need to adjust where these processes occur. Can Quality Control and labeling happen in the cool room? How can your team keep the fruit cold enough to maintain its quality and still accomplish other important processes?
Now, let’s learn about labeling fruit cartons and pallets.

All fruit pallets are identified upon arrival with a barcode or hand-written label. Tracking this information is essential so that you’ll always be able to tell the date and time a box of fruit arrived.

You may also want to mark notes on boxes or pallets, so that all your produce handlers can easily tell if the fruit is softer than expected or if there are other special handling issues.

Activity: Try It for Yourself

Keep record of all incoming and outgoing shipments. Your log may be a book with handwritten entries, it may be a spreadsheet that you use, or it may be a fully automated inventory system.

You need to know how old your product on hand is to manage it effectively. If you have inventory on hand for two to three weeks or more, you’ll need to check your inventory every week to make sure you know its quality. You need to check all fruit every week to be sure that its quality is what you expect and to know if it needs to be shipped out early.

Review: Show What You Know

Now let’s check what you have learned so far in this course with a quiz.

To really know the quality or ripeness of produce on a truckload, you should:

- Just test a box from the back – the shipper never puts the best fruit at the back of the load.
- Test from several points in the load in case quality varies throughout the shipment.
- Don’t bother to test. Your supplier is trustworthy and has already tested the fruit quality for you.

When fruit pallets arrive in the receiving area:

- Label the entire pallet.
- Label the individual cartons.
- Label individual fruits.
- Don’t bother labeling – just group fruit and then remember the time and date the shipments arrived.

On the pallet label note important facts like:

- The date the pallet arrived.
- The weather conditions on arrival.
- Special comments about ripeness and handling.
- All of the above.
New Ways of Doing Things

After working through this course, what are the things that you might do differently in your own job to check the quality of incoming shipments?

There are two takeaways from this course:

• Check quality/labelling pallets of incoming shipments.
• Keep the shipment cold.

Here’s what Jorge’s team did:

• Learned how to do inspections quickly without breaking the cold chain or compromising the quality of each shipment.
• Reorganized the cold storage so that each type of fruit would be placed in the best cold zone for its optimal temperature.

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Overview

In this course, we will explore some simple things you can do to keep fruit at its best quality.

Scenario

In Jorge’s warehouse, an incoming shipment of fruit has just been labeled and logged. Now it has to be moved into the storage room. Steve is a new forklift operator and Jorge needs to take a few minutes to teach him some basics to make sure he handles the fruit pallets correctly.

Decision Point

- What does Steve need to learn about fruit handling and optimal temperature?

Key Background Information: Video Overview

Let’s learn more about the importance of keeping fruit cold.

In order to maintain quality, you must always keep fruit at its optimal temperature.

Different types of fruit have different temperature requirements. Ideally, your warehouse will have multiple cold rooms or zones. More commonly, your cold room will be set to a compromise temperature to accommodate different requirements for a variety of produce types.

Ideal temperatures for storage include these recommendations:

- For apples, maintain 0 to 3 degree Celsius. Remember that apples soften five times faster at 4 degrees Celsius than at 0 degrees Celsius.
- For pears, maintain 1 to 2 degrees Celsius with 90 to 95% relative humidity.
- For grapes, maintain -1 to 0 degrees Celsius.
- For strawberries, maintain 1 degree Celsius. For mangoes and melons, maintain 7 to 10 degrees Celsius.

Keep temperature-sensitive fruit like apples and pears far back in the storage. Storing these fruits near the entrance and receiving areas may be convenient, but because these areas are susceptible to the most temperature fluctuations using these areas for storage will not keep fruit cold enough to maintain their best quality.
Remember that you always want to preserve fruit quality. Within your facility’s cold room, you need to observe some basic rules to ensure that fruit quality is maintained.

- Keep the cold room clean. Remove or clean up spills and rotten fruit as soon as possible.
- Avoid placing cartons and pallets directly against the walls. Maintain good airflow around all cartons for best quality.
- Always place stacked boxes on pallets. Do not stack any boxes directly on the floor where cartons can get wet and damaged.
- Avoid stacking the boxes too high. If boxes are stacked too high, the bottom carton in the stack can get crushed.

**Activity: Try It for Yourself**

Draw a map of one of your facility’s cold storage rooms, showing where different types of fruits are typically placed.

- Can you identify where the fan is located? This will be the coldest part of the room.

Take a thermometer to that cold room and measure the temperature at different parts of the room and on different racks.

- Is there a “hot spot” where temperatures are warmer than the rest of the zone?
- Is the southern side of the cold room warmer because it gets more sun?
- Is there a cold spot where things tend to freeze?

Look at this picture of a storeroom filled with produce boxes and pallets.

- What do you notice about the room that might be problematic for the stored produce?

- How are the boxes stacked? Too high? Too low?
- Are the pallets placed side by side, jammed up against wall? Or, is there enough room for proper air circulation?
- Are the pallets stacked too close to the refrigeration unit?
- Given this storage room set up, will it be easy or difficult to follow the FIFO rule?
Now, let’s look at the profiles of two fruit wholesalers in a port city in Brazil.

<table>
<thead>
<tr>
<th>Joe’s Family Importers</th>
<th>Mundo Novo</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Building Age</strong></td>
<td>45 years</td>
</tr>
<tr>
<td><strong>Loading Dock</strong></td>
<td>Unrefrigerated, single loading dock used half days for shipping and half days for receiving</td>
</tr>
<tr>
<td></td>
<td>Open unloading area with roof</td>
</tr>
<tr>
<td><strong>Quality Control</strong></td>
<td>One technician</td>
</tr>
<tr>
<td><strong>Department</strong></td>
<td>Three technicians plus a manager; state-of-the-art devices</td>
</tr>
<tr>
<td><strong>Pallet Tracking</strong></td>
<td>Hand label incoming pallets, computer program prints labels, manual log</td>
</tr>
<tr>
<td><strong>System</strong></td>
<td>Bar coded labels; label printer at the loading bays</td>
</tr>
<tr>
<td><strong>Temperature Tracking</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Receiving Area</strong></td>
<td>Outdoor - under roof, with fan</td>
</tr>
<tr>
<td><strong>Cold Storage</strong></td>
<td>Two cold zones</td>
</tr>
<tr>
<td><strong>Repacking</strong></td>
<td>In house</td>
</tr>
</tbody>
</table>

Both of these companies deliver quality fruit to their loyal customers.

You’ll notice the two different facilities have the same challenges with keeping the fruit cold. Larger or newer facilities don’t guarantee fruit quality or solve all your temperature problems.

When you become familiar with different conditions in your warehouse – and in other similar situations – you’ll easily learn more about handling fruit to maintain quality.

### Review: Show What You Know

Now let’s check what you have learned so far in this course with a quiz.

**What is the first priority when receiving a fruit shipment into the warehouse?**
- Unloading the truck.
- Checking the load and the quality of the fruit in the shipment.
- Taking morning break at 10:00h.
- Talking to the driver to maintain goodwill.
- Moving the shipment into the cold storage as soon as possible.

**As the pallets are unloaded from the truck/trailer and into the receiving area, each pallet is:**
- Marked/scanned.
- Added to shipping log.
- Unpacked.
- Moved directly back into cold storage rooms.
- All of the above.

**The best place to store fruits like apples and pears is:**
- In the middle of the storage room so you won’t forget to place fruits on display.
- In the front of the storage room, near the door.
- In the back of the storage room to avoid temperature fluctuation.

### New Ways of Doing Things

After working through this course, what are the things that you might do differently in your own job to check the quality of incoming shipments, making sure that you get them into the right place in your cold storage area without breaking the cold chain?

There are two takeaways from this course:
- Use proper storage placement for all shipments.
- Keep the shipment cold.

Here’s what the team did:
- Reorganized the cold storage so that each type of fruit would be placed in the best cold zone for its optimal temperature.
• Kept the cold storage room clean and always stacked cartons and boxes on pallets rather than directly on the storeroom floor.

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Overview

In this course, we will explore issues related to shipping produce to other wholesalers and retailers.

Scenario

It’s early Friday morning, a very busy day at the warehouse, with plenty of orders coming in. Of course everyone wants their orders filled immediately, as customers and retailers need to stock up for the busy weekend ahead. Jorge checks at the receiving area for orders that need to be filled. He knows that with all the shipments of grapes that have come in over the past few days, they’ll be moving many cartons out of the facility today. He’s got more to think about than grapes, though – his order pick list includes other fruits as well.

With his pick list in hand, he hops on the forklift. Heading to the back of the cold storage, he consults his log to find the oldest cartons and pallets of fruit in stock, so he can get those out first.

Jorge likes the changes that he has implemented. Now the team is putting together orders and mixed pallets inside the cold storage. It’s easier for him to pull all the stock needed and group it there instead of taking it all the way out to the loading dock as he did before. Pulling on the jacket he wears while working back in the cold rooms, Jorge starts assembling the orders.

Now that Jorge has identified and located all the pallets and cartons to be shipped for all of his various orders, he’s ready to start assembling the shipments in the staging area.

Decision Points

• What cartons/pallets should be shipped out to fill the orders?
• How should orders be prepared and trucks loaded to ensure that the best quality fruit arrives safely at the retailer’s facility?

Key Background Information: Video Overview

Now, let’s learn more about best practices for shipping fruit.

Shipments which have been stored in your warehouse for the longest period of time are normally the first to be used to fill orders. It is important to label fruit as it arrives so you’ll know exactly how long it has been in the facility.

Pallets that have been in storage the longest are considered the First In and should be selected over the
newest, most recently added produce – even if the more recently received pallets are in the way.

Fruit is perishable and it is essential that the oldest stock moves out first – also known as **First Out** – as the newer stock has a longer storage life.

Barring these exceptions, when you have two boxes or pallets of fruit, the older fruit will almost always be the ripest and softest. If you have new inventory that is soft or over-ripe, then you may decide to ship the riper fruit first. Weekly inspections of stored or warehoused fruit would be a good best handling practice for your warehouse team.

Let’s learn how to use an important tool, the penetrometer, for checking fruit quality.

The FIFO rule – First In, First Out – is one of the most important rules you need to follow to do your best job preserving fruit quality.

But, when should you bend the FIFO rule? When does fruit ripeness trump FIFO?

Exceptions of course arise when more recently received fruit is riper than you expected or what you already have on hand.

Make exceptions to the FIFO rule when more recently received fruit is riper than you expected or riper than what you already have in stock. If incoming shipments have suffered a break in the cold chain en route, that fruit might have begun to ripen or soften ahead of schedule. You might choose to make an exception to the FIFO rule in this case, too.

The penetrometer is used to check the pressure of the fruit. The pressure tips on a penetrometer are different for apples and pears. Pears use the 8mm tip and apples use the 10mm tip. Remember to always skin a small section of the fruit before testing. Place the skinned fruit on a flat, even, solid surface, like a table. Stand over the table, press the penetrometer into the fruit, and use steady pressure from your shoulder. Press straight down into the fruit evenly and rapidly. You should be able to get a good reading after only 1 or 2 seconds.
The staging area is where orders are usually compiled in most stores, and is often located just inside the entrance to the cold storage area. It’s a useful space whether you have orders for just one fruit or a mixed order. When there are several products for each order, pallets of mixed products can be assembled while fruit and produce remains cold. When the order is ready, it can then stay cold until the trucks arrive.

If, however, your staging area is not cold, only assemble one order at a time. Assembling multiple orders at once means that all of the fruit sits in a warm area and will start to soften or ripen before it should. Always assemble orders in an area that is cold, or at least air conditioned.

When your order is packed and ready to go out, move the assembled shipments onto the shipping dock only when the truck has arrived and is ready to be loaded.

If you’re working on an un-refrigerated shipping dock, it is important to assemble and load orders so that the fruit stays in cold storage as long as possible.

Here are some tips for keeping fruit cold while loading an order:
- Use a picker to mark the stock for an order, but not move it out of cold storage.
- Set up a temporary staging area in the back area of your cold storage, in a space where the racks are empty.
- Start a timer and work to assemble the order in a target time, say 15 minutes.
- Stay focused on efficiency but always be safe.
- Check your progress to see what you have accomplished.

Your goal is to get the orders filled, ready to go, and loaded in the shortest possible time while keeping produce cold.

In general, if the fruit has been kept cold, it shouldn’t need another inspection before it is shipped. However, there may be times when another inspection is needed before shipping, like when the fruit you’re shipping out may be of marginal quality, when you’ve repacked fruit for a shipment, or when shipping older fruit.

Depending on the time of year, you may need to repack some fruits or boxes. Whether you sort or repack at your location or contract this service out, you need to make sure it’s done in a cold area to keep the cold chain and maintain fruit quality.

Now, let’s focus on loading trucks carefully. When you’re loading a truck with your shipments, follow the same guidelines about careful handling as you did when you unloaded:
- Avoid dropping the cartons.
- Avoid stacking boxes too high.
- Avoid placing produce boxes and pallets against the side walls of the truck where heat can seep through and affect the pallet.
- Use a center line loading pattern. Align the pallets in the center away from the walls. This provides better air circulation and ensures a more even temperature distribution for the pallets. The temperature of produce is at greater risk when the load is placed against the wall of the trailer and especially if it is against a wall that has been damaged.
Remember that different types of produce and fruit like different temperatures. In fact, a temperature that is optimal for some fruits can actually cause damage to other fruits.

**Activity: Try It for Yourself**

A truck driver has called ahead to say he’ll be at your warehouse in 10 minutes.

Should you start moving the fruit out onto the shipping dock so he can load quickly (for quick turn around)?

The temperature of the loading dock is higher than 23.8 degrees Celsius.

What would YOU do?

Take an empty fruit box and put a thermometer inside it. Put the box onto the loading dock and check the temperature every 15 minutes. You’ll see that cardboard is not a very good insulator – that box will heat up faster than you think!

- How long does it take for the interior of the box to warm up 5 degrees Celsius from the starting temperature in the box?
- How long does it take for the box to warm up to match the temperature outside the box?

Now, imagine that you are helping a new employee load the delivery truck. As he drives the pallets onboard, you notice he is packing them tightly into the front corner and along the walls.

What placement will keep the produce in cold temperatures during the trip to your end customer?

**Note:** Newer trucks typically have a trailer with more than one temperature zone. Be aware of these different zones in the trucks you are loading, and mindful of optimal temperatures for the different types of produce your facility handles.

**Review: Show What You Know**

Now let’s check what you have learned so far in this course with a quiz.

What could happen to the fruit if you keep it in the staging area?

- It could take longer to load the truck.
- Fruit cartons could get in the way of other orders being assembled.
- Fruit will stay cool.

There are four pallets of fruit in the cold room. When choosing which one to ship you should:

- Always pick the oldest pallet to ship – the one that arrived first.
- Always pick the newest pallet.
- Ship the pallet closest to the door.
- Ship the pallet containing the least ripe fruit.

How would you handle a shipment from a mixed produce load?

- Combine boxes that best fit together, by size, on separate pallets.
- Separate items by temperature sensitivity.
- Wrap the most perishable items in thermal blankets.
- Separate items in the different units or partitions of the truck.

Suppose a new employee is working with you on his first day. What would you be sure to tell him about how to handle boxes of produce?

- Don’t drop the boxes.
- Stack boxes as high as you can reach.
- Don’t stack boxes more than eight high.
- It’s not dangerous to drop a box from a meter or so high.
New Ways of Doing Things

What are some of the things that you can do differently after taking this course?

We’ve covered a lot of information, but the three most important things you need to do are:
• Keep it cold – maintain the cold chain.
• Be careful – don’t stack boxes too high and don’t drop them.
• Be quick – move fruit quickly through warm areas so that it doesn’t get warm.

If you can change your handling processes to do these three things, you’ve taken a big first step in delivering better quality fruit to your customers.

If you could just do one thing better, it would be to keep the fruit cold at your importer or warehouse location.

You’re part of a chain of people who handle fruit, if you are:
• Unloading shipments from trucks.
• Conducting Quality Control inspections.
• Moving produce to cold storage.
• Monitoring produce orders.
• Assembling orders.
• Loading out.

How are you doing? Your cold chain score
Give yourself points:
3 - If fruit is usually kept at 0 to 1 degree Celsius.
2 - If sometimes fruit is kept cold, sometimes not (delays happen).
1 - If fruit often doesn’t stay cold.
0 - If none of the above are true, you need to review the handling process at this part of your warehouse facility.

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Overview

In this course, we will learn about apples and their unique handling and storage requirements. Specifically, we will explore how to keep apples cold and we will also learn that apples are ethylene generators in storage – and why this is important information!

Scenario

Sunil’s family warehousing business is expanding to handle imported fruit. Sunil’s father built the company from nothing, handling mostly household goods but also handling local produce seasonally. Since he’s been a reliable supplier, many of his customers have asked him if he can start supplying them with imported fruit and vegetables. Retail stores are being modernized and renovated and consumers are looking for more variety of fruit and high quality food, so this seems like a good idea. Sunil is exploring what this will mean for his handling process, since it’s currently common for a dozen trucks to unload on his dock in mid-morning and it sometimes takes his crew all day to get the pallets unloaded and stowed inside.

Apples are one of the fruits that Sunil wants to import. He wants to learn about the special needs of handling apples in his cold storage. He knows there are many different varieties of apples, and he needs to understand more about their similarities and differences.

Decision Points

• What is unique about apples?
• How do they fit with other fruit and produce?
• What cold storage requirements do apples have?

Key Background Information: Video Overview

Let’s learn more about best practices for handling and storing apples.

Some fruits are picked or shipped when they are unripe or partially ripe. Apples do not ripen after they are picked and so are picked at their full ripeness. Apples keep well, but they do not ripen or improve over time. Warming them up does not improve their ripeness as it does with other fruit.

Always keep apples cold. As long as apples are kept cold and never allowed to warm up, they will stay crunchy. Optimal storage conditions for apples are 0 to 2 degrees Celsius and 90 to 95% humidity.

However, when apples are stored at temperatures above 2 degrees Celsius, they give off a gas called ethylene. Ethylene does not harm people, has no odor, and does not degrade the quality of the apples. However, other fruits and vegetables are affected by ethylene if they are stored near apples.
Handling and Storing Apples

Fruits and vegetables that are ethylene sensitive will ripen faster. Keep apples away from kiwifruit, and ethylene sensitive vegetables such as carrots, cucumbers, leafy vegetables, lettuce, and potatoes.

Ethylene is not a problem if the apples are kept cold at 0 to 2 degrees Celsius. Be careful when storing your apples and pears in the same cold rooms – especially if your cold rooms are not kept at 0 to 1 degree Celsius. Ethylene emitted from apples is very small at this low temperature and increases with temperature increases.

How can you know if ethylene is causing damage to produce? Ethylene damage shows up as tough asparagus, yellowing in broccoli and cabbage, bitter flavor in carrots, loss of color in leafy greens, or leaf spots on lettuce.

Don’t store apples near potatoes or onions. Apples will absorb the strong flavor of onions, and potatoes are ethylene sensitive.

Always handle apples gently. Apples that are dropped will bruise and the resulting damage may not show up immediately, but will certainly affect their quality and value down the line. Apples that are dropped can also cause stem damage. Stems of one fruit can easily damage the adjacent fruit.

The more damaged a fruit is, the more ethylene gas it produces. So, if you have soft apples, you’ll want to separate them from everything else or ship to customers immediately.

If boxes need to be restacked, stack apple boxes only seven to eight high in your storeroom or warehouse.

Activity: Try It for Yourself

Take a closer look at the apples in your storage.

Find out how many varieties of apples you handle in your warehouse/cold storage now (this will vary over the year).
• What information (variety? size?) is printed on most apple boxes?

Take a look at a specific box:
• When was the fruit picked and packed?
• How old is the box of apples you're looking at?

Have a closer look at the apples within a box.
• How are they packed – individually wrapped or in trays? Are the apples touching each other? How well they are packed dictates how gently you need to handle them.
• Look at the apples in the top of the box and along the sides. Is there a quality difference? Apples at the edges may get bruised more frequently and will warm up more quickly when the temperature rises.
• Pick up an apple and hold it in your hand. Is it firm? Ideally, apples should be firm and crunchy.
• Do you see any signs of bruising anywhere on the fruit? Bruises devalue apples and bruised fruit may need to be discarded by the time it reaches retailers.
Handling and Storing Apples

Do you see any cuts on the apple? Where there are cuts, the apple’s flesh turns brown and consumers don’t want to buy damaged or discolored fruit.

Does it feel cold? If they’re in cold storage, they should feel cold!

When you are familiar with the quality or and condition of your incoming shipments, you’ll become an expert.

Apples:

- Are ripe when picked.
- Ripen after they are in stores.
- Are soft when they are ripe.

New Ways of Doing Things

If you were helping a new worker get started, what are three things you would show and tell him about handling and storing apples?

After exploring this course, you’ve learned more about handling and storing apples. Here are some of our suggestions for best practices:

- Handle apples gently but move them quickly to minimize time out of cold storage.
- Keep apples at 0 to 2 degrees Celsius to keep them crunchy.
- Don’t stack apple boxes higher than six (preferably five!).

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.

Review: Show What You Know

Now let’s check what you have learned so far in this course with a quiz.

Apples:

- Generate ethylene.
- Absorb ethylene from other fruits.
- Can be safely stored next to onions.

The optimal temperature for storing apples:

- Doesn’t matter as long as it’s not too warm.
- Should be 0 to 1 degree Celsius.
- Ranges from -10 to +10 degrees Celsius.
Overview

In this course, we will learn about your key task in storing pears: keep pears cool.

Scenario

Sunil’s family wholesaling business has facilities that handle locally produced fruits and vegetables that require little cold storage (like potatoes, onions, and melons). Recently, they’ve expanded to include two cold storages to handle new imported fruits.

Currently, Sunil is exploring what these changes will mean for his handling process. It’s currently common for a dozen trucks to unload on his dock in mid-morning, and it sometimes takes his crew all day to get the pallets unloaded and stowed inside.

Many of Sunil’s competitors are handling USA Pears, and Sunil wants to be able to offer these products to his customers.

Decision Point

• Can Sunil start receiving pears with his current loading and storage setup?

Key Background Information: Video Overview

Let’s learn more about the importance of keeping pears cool.

Pears are picked from the tree when they’re mature but unripe. How fast they ripen depends on their temperature. As long as they stay cold, at their optimal storage temperatures of 1 to 2 degrees Celsius with a 90 to 95% relative humidity, they won’t soften and ripen. Once they warm to above 2 degrees Celsius, pears begin their ripening process and within a few days to a couple of weeks can become overripe.

If a pear in storage is allowed to warm up, ripening starts from the core outwards. If the pear is then chilled again to 1 to 2 degrees Celsius, the ripening process slows down. Once ripening starts, it can’t be completely stopped – the process might be slowed down or even “put back to sleep,” but the ripening will still continue. Under these circumstances, importers and wholesalers need to sell those pears much more quickly in order to get them to the consumer at their optimal ripeness.

Green Anjous are a variety of pear that can actually be put back to sleep.

The ripening of this particular variety can be slowed by returning the pear to its optimal storage temperature. Other pear varieties will continue to ripen,
even at optimal storage temperature, so it is important to understand that once the ripening starts it can’t be completely stopped.

Consider this scenario: Your warehouse keeps its incoming shipments of pears on the loading dock for hours. This slow handling might cause pears to ripen too quickly, and will cause spoilage problems at your customer’s facilities. If you don’t make changes, you will be cutting down on the shelf life and storage time for the pears, and might not be able to meet your customer’s preferences. If you ship those pears to retail stores, they may ripen before the stores have time to sell them to their customers, and you may lose business.

Different countries have different preferences where pears are concerned. A longer ripening time makes the flavor richer, sugars become more prominent and the fruit develops a softer texture. In the US, Canada, and Australia, consumers prefer to eat pears that have this richer, softer texture, which occurs around 3lbs or 1.36kg pressure on a penetrometer. In most other countries of the world, however, consumers prefer to eat a slightly crunchy pear, that’s more like an apple in texture with close to 5lbs or 2.26kg pressure on a penetrometer.

When you’re experimenting with pears, you may consider some of the soft pears to be over-ripe and inedible. We encourage you to try them to discover what a riper, sweeter pear tastes like.

For an accurate test of a pear’s ripeness, you will need a device called a penetrometer, which tests the pressure of the pear for its hardness.

Another way to test pears for ripeness is to press gently on the neck of the pear, near the stem. Since pears ripen from the inside out, the body of the pear may seem hard but if the neck yields to gentle finger pressure, the pear may be riper than you could tell just by examining the outside of the fruit. It’s important to check the neck to make sure that you get an accurate reading of the quality of the pear so you can always get the best condition to your customers.

**Activity: Try It for Yourself**

Go to a local store and buy four pears, each with the same general level of pressure. Put one on a hot windowsill in the sun, one in an un-air-conditioned room, one in an air-conditioned room, and one in a refrigerator. After two or three days, go back and see what the pears look like and whether they feel soft.

You may find that some pears can be stored at room temperature for several days without getting softer, while some varieties will still get soft at room temperature and begin quick ripening.

Would you want to eat the pear after it spends a week on a sunny windowsill? Would you eat any of the pears after a week?
Notice that most pears do not change color over time. Only Bartlett pears turn yellow as they ripen. Yellow Bartlett pears could be ripe and need to be shipped out immediately.

Create a storage map or plan of where to put pears in new cold storage zones in your warehouse.

When you are familiar with the quality or and condition of your incoming shipments, you’ll become an expert in handling pears.

Review: Show What You Know

Now let’s check what you have learned so far in this course with a quiz.

The optimal storage temperature for pears is:
• 4 to 6 degrees Celsius.
• 0 to 2 degrees Celsius.
• Room temperature.
• There is no preferred temperature – temperature doesn’t matter.

Pears (all varieties):
• Ripen from the core outwards.
• Ripen and soften with time.
• Are picked when mature.
• All of the above is true about pears.

The best way to test a pear’s ripeness is to:
• Check the neck.
• Use a penetrometer at the exact time a pear is harvested.
• Squeeze the flesh.

New Ways of Doing Things

After working through this course, what are the things that you might do differently in your own job, to keep pears at their best quality?

Consider three new things that you could do differently in your job.

When handling pears, you need to remember two main ideas:
• Be quick and keep fruit cold. Move fruit cartons quickly off the loading dock and into the cold storage room (to keep up the cold chain!).
• Avoid letting boxes of fruit sit at room temperature and warm up.
• Store pears carefully. Open MAP bags once the cold chain has been broken. Keep pears in the coldest part of your cold room, as close to 0 degrees Celsius as possible.

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Overview

In this course, we will learn about pears and their unique handling requirements.

Scenario

Sunil’s family business has a reputation for reliability and quality and he wants to be sure he’s delivering high quality fruit to his customers. His current handling processes can be somewhat rough, and sometimes pallets are stacked two or three high. Sunil tries to find a balance between moving high volumes and getting things done quickly without excessive loss.

Decision Point

• How can Sunil expertly handle a mixed shipment of produce – pears, apples, strawberries, potatoes, onions, and leafy greens?

Key Background Information: Video Overview

Let’s learn more about the importance of handling pears gently.

As you know, pears can be delicate. Pallets may arrive with boxes stacked up to seven high, but if boxes need to be restacked, it is recommended that the boxes should not be stacked more than six high at your warehouse.

If a whole carton is dropped, then all of the fruit in the carton can bruise and will be unsellable, by the time it reaches the consumer. Also, pear stems can mark or scratch other pieces of fruit, and this can happen very easily if cartons are not handled carefully.

The warehouse where you work may handle different varieties of pears. A green pear could be an unripe Bartlett pear or a nearly ripe Anjou pear. The variety of the pear is stamped on the end of each box. Know your pears and avoid potential mishandling and waste.
Activity: Try It for Yourself

Get a few pears to test their handling. Drop a pear onto the ground from waist height. Drop another one from head height.

Do you see any bruises? You would expect to, but bruising may not be visible from the outside, so you should cut into the fruit to see if the flesh has been bruised. Sometimes bruises won’t necessarily develop for a day or two so it’s a good idea to put your dropped fruit on a windowsill and see if they develop bruises the next day.

Review: Show What You Know

Now let’s check what you have learned so far in this course with a quiz.

The unripe pears that your warehouse receives:
- Are fragile and will bruise if dropped.
- Feel quite hard and can take a lot of rough handling.
- Are cushioned in their packaging so it doesn’t matter how they’re handled.

In your warehouse, pears should be stacked:
- Up to eight boxes high.
- Only two boxes high.
- Five boxes high is ideal and six is the maximum.

New Ways of Doing Things

After working through this course, what are the things that you might do differently in your own job, to keep pears at their best quality?

When handling pears, the most important thing to remember is to be gentle!

Always handle pears gently, avoid dropping the fruit, and avoid stacking the boxes so high that the lower cartons are crushed (five to six high is the maximum).

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Overview

In this course, we will learn about pears and their unique storage requirements.

Scenario: Storing Pears

As you know, Sunil’s warehouse now has a cool storage area to handle vegetables and he’s arranged for a newer, second cold storage to handle the extra volume of produce being shipped weekly to his facility.

Currently, vegetables are stacked in the cool storage room. Sunil is planning to store incoming shipments of pears in the cold room with the other vegetables and fruits.

Decision Points

• Should Sunil store pears in his new cold room beside the other fruits and vegetables?
• What would you tell him to do?

Key Background Information: Video Overview

Let’s learn more about best practices for storing pears.

Pears keep optimally at 1 to 2 degrees Celsius with 90 to 95% relative humidity. In a cold storage room with variable cold temperatures, pears should always be placed in the coldest area of the room to maintain optimal quality.

Bartlett pears are sometimes shipped in MAP – or modified atmosphere – storage bags. These storage bags are designed to retain maximum quality as long as the fruit is cold. If the cold chain has been broken, the MAP bags will cause the fruit to ripen and degrade. If this happens, the MAP bags must be cut open and the fruit removed.

If pears are stored next to fruits that generate ethylene during their ripening cycle then the pears will start to ripen more quickly. Pears should always be stored at the opposite side of the cold room from ethylene-generating fruits such as apples, mangoes, or bananas.

Even with a receiving area inside the cold storage, pears keep best in the coldest storage area, optimally at 1 to 2 degrees Celsius. Other fruits will store better and keep their quality in the other temperature zones. You should still expect pears to ripen while in storage so you will need to manage your inventory accordingly.
Activity: Try It for Yourself

Create a storage map or plan of where pears should be placed in cold storage zones in your warehouse. Share this map with members of your staff team so everyone can be informed.

When you are familiar with the quality or and condition of your incoming shipments, you’ll become an expert.

Review: Show What You Know

Now let’s check what you have learned so far in this course with a quiz.

The optimal storage temperature for pears is:
- 4 to 6 degrees Celsius.
- 0 to 2 degrees Celsius.
- Room temperature.
- There is no preferred temperature – temperature doesn’t matter.

The best way to test a pear’s ripeness is by:
- Checking the neck.
- Squeezing the fruit to see if it’s soft.
- Checking for obvious bruises on the pear’s flesh.

New Ways of Doing Things

After working through this course, what are the things that you might do differently in your own job, to keep pears at their best quality?

When storing pears, keep in mind these important best practices:
- Store pears carefully.
- Open MAP bags once the cold chain has been broken.
- Keep pears in the coldest part of your cold room, as close to 0 degrees Celsius as possible.

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Overview

In this course, we will learn about strawberries and their unique handling and storage requirements.

Scenario

Sunil’s warehouse has just received a new shipment of mixed produce that includes a pallet of strawberries.

Ideally, Sunil would like to keep the strawberries at 0 to 2 degrees Celsius. But the 0 to 2 degree Celsius cold room is full and there’s only space in the 5 degree Celsius storage room. Sunil considers putting the strawberries in this room rather than wait until the colder room can be rearranged to make space. If the strawberries are near the fan, they might get colder than 5 degrees Celsius. Alex, a member of the staff, mentions to Sunil that the fan will blow direct air over the fruit (and dry it out) and while the temperature will be cooler, it will fluctuate more as the fan goes on and off. Strawberries are expensive produce, so Jorge ponders whether he can keep them in the cold receiving area (which is also about 5 degrees Celsius, but the temperature fluctuates depending upon traffic) for a few hours, while he ships out some of the fruit from the cold room to make space. If necessary, some pears or apples could be moved to the 5 degree Celsius cold room to make sure the delicate strawberries don’t spoil.

Decision Point

• The clock is ticking – fruit has to be kept cold to maintain its quality. What should Sunil do to keep his produce safe?

Key Background Information: Video Overview

Let’s learn more about best practices for handling and storing strawberries.

Temperature is the single most important factor in strawberry storage because strawberries are among the most delicate of all fruits.

Strawberries are picked ripe. They don’t ripen any more after picking and so they must be kept cold at all times.

Strawberries have a high respiration rate compared to other fruits and must be stored at 0 to 2 degrees Celsius to maintain quality. If strawberries warm above 2 degrees Celsius, then they may begin to soften and are at risk for decay or mold.

If strawberries were shipped to you by air freight, they may not have been refrigerated. In that case, you need to immediately place strawberries in 0 to 2 degree Celsius storage and open the cartons promptly for inspection. Don’t delay!
Strawberries are sometimes shipped with a MAP pallet bag enclosing the pallet. Using MAP pallet bags will increase the temperature of the fruit. MAP bags must be removed upon arrival at your importer or wholesaler location.

Strawberry quality will decrease if storage temperature fluctuates. Store delicate berries at 0 to 2 degrees Celsius in your warehouse, away from water or free moisture, and away from doors and cooling units.

Remember that moisture damages strawberries. Keep strawberries away from any moisture, cold, wet storage rooms and zones, and never mist them. Strawberries will break down rapidly if misted yet they also dehydrate quickly, so keep them away from airflow sources.

The good news is that strawberries are not affected by ethylene. It’s fine to store strawberries next to ethylene-producing fruits when storing shipments of mixed produce in the 0 to 2 degree Celsius cold storage room.

You and your warehouse team should understand how important it is to keep delicate, perishable strawberries at their optimal condition and ensure that they are stored and shipped carefully.

Activity: Try It for Yourself

Look at a flat of strawberries from an incoming shipment. Handling them carefully, look at some berries in their flats.

- What color are the berries?
- Are they shiny with fresh green caps (calyx)? Is there any damaged or spoiled fruit?

Look at the flat:

- When was it packed?
- How old is the fruit you are viewing?
- Where did it come from?
- What size or grade is it?

When you learn more about strawberries through observation and inspection, you will be able to provide your customers with quality fruit selections.

Review: Show What You Know

Now let’s check what you have learned so far in this course with a quiz.

Why should you always put strawberries on the top of a mixed pallet?

- They are colorful and make the pallet look bright.
- Strawberries need to be unloaded first.
- If you put other fruits on top, the strawberries will be crushed.
Storing and Handling Strawberries

Moisture:
- Doesn’t affect strawberries.
- Causes strawberries to spoil faster.
- Helps strawberries keep fresh longer.

Where should you place strawberries in a storage room?
- By the door so you can reach them easily and move them quickly.
- Away from the doorway and refrigeration unit to minimize airflow and temperature fluctuation.
- Place strawberries anywhere you have room for them because their cartons are smaller than other produce containers.

New Ways of Doing Things

If you were helping a new co-worker get started, what are three things you would show and tell them about handling and storing strawberries?

Consider some new things you could do in your job.

When handling and storing strawberries, you need to remember three things:
- Handle strawberries very gently while making sure to transfer them quickly to cold storage.
- Keep strawberries cold – always store at 0 to 2 degrees Celsius.
- Strawberries need to be shipped out to retailers within a few days for customers to receive the best quality fruit.

After thinking about how to do things differently in your job, you might want to check out additional resources in the Learn More section of this course.
Now that you’ve completed all your fresh fruit handling courses, take this final assessment to measure just how much you’ve learned.

1. What is the optimal amount of time to leave fruit sitting on the dock before moving it to cold storage?
   - 30 minutes.
   - 15 minutes.
   - One hour.

2. What is the maximum height for re-stacking fruit cartons?
   - Five is the maximum.
   - It depends on the type of fruit — three for strawberries or as many as six for apples.
   - Eight is the maximum.

3. What would you tell a new employee on your shift about how to handle boxes of produce?
   - Don’t drop the boxes.
   - Stack boxes only as high as you can reach.
   - Don’t stack boxes more than eight high.
   - It’s not dangerous to drop a box from a meter or so high.

4. The best place to store fruits like apples and pears is:
   - In the middle of the storage room so you won’t forget to place fruits on display.
   - In the front of the storage room, near the door.
   - In the back of the storage room to avoid temperature fluctuation.

5. To really know the quality or ripeness of produce on a truckload, you should:
   - Just test a box from the back. The shipper never puts the best fruit at the back of the load.
   - Test from several points in the load in case quality varies throughout the shipment.
   - Don’t bother to test the shipment. Your supplier is trustworthy and has already tested the fruit quality for you.

6. What are some potential hazards of breaking the cold chain?
   - Spoiling the fruit in your shipments.
   - Upsetting your retail customers with sub-optimal fruit.
   - Both of the above.

7. What should you do if there are too many trucks at your warehouse waiting to unload shipments? How can you best manage the potential chaos?
   - Accept and unload the shipments in the order they arrive.
   - Inspect the fruit shipments in all trucks before unloading them.
   - Immediately return trucks that arrive early to their suppliers.
   - Expertly and quickly check one shipment, unload, and move on to the next truck.

8. The best staging area for orders is:
   - Located inside a cold storage area.
   - Not necessary - assemble orders on the loading dock.
   - Not necessary — move pallets directly onto the truck.

9. When loading pallets onto the truck or trailer:
   - Place them as close to the front wall as possible.
   - Align pallets along the center line so that they are away from the wall.
   - Put the pallets along the walls so you can easily walk up the center aisle.

10. If the unloading/receiving area is warm, remember that:
    - It’s not a problem. Fruit can sit for up to five hours before storing.
    - Fruit needs to be moved quickly so it spends no more than 10 to 15 minutes in a warm area.
    - Fruit will not be damaged if it sits for up to two hours at room temperature.
Learn More

Eager to learn more? Here are some resources you can use to gather more information.

Check some fruits and their optimal temperatures.

Learn optimum stacking height for boxes.

Explore these sites!

USA Pears web links for importers / wholesalers
California Strawberries
Washington Apple Commission
California Table Grape Commission
Produce Marketing Association
UC Davis Produce Information
USA Pears
California Pears
Maintaining Quality Of Fresh Strawberries, California Strawberry Commission, p. 19-22.
Produce Marketing Association
US Fresh Fruit Basic Training Participants

USA Pears
www.usapears.org

Washington Apple Commission
www.bestapples.com

US Apples Export Council
www.usaapples.com

California Pear Advisory Board
www.calpear.com

California Strawberry Commission
www.calstrawberry.com

California Table Grape Commission
www.freshcaliforniagrapes.com