Packing Shed Sanitation

Major area of concern:

It is the last area in the production operation in which a shipper has control of the product

Contamination in the grading, washing and packing procedures are extremely costly

Acknowledgement:

Dr. James Rushing of Clemson University

Dr. Trevor Suslow, Univ. Calif. Davis

Drs. Jeff Breacht, Jerry Bartz U Steven Sargent, Univ. of Florida

TCE/TAMU

GAPs "No Brainier"

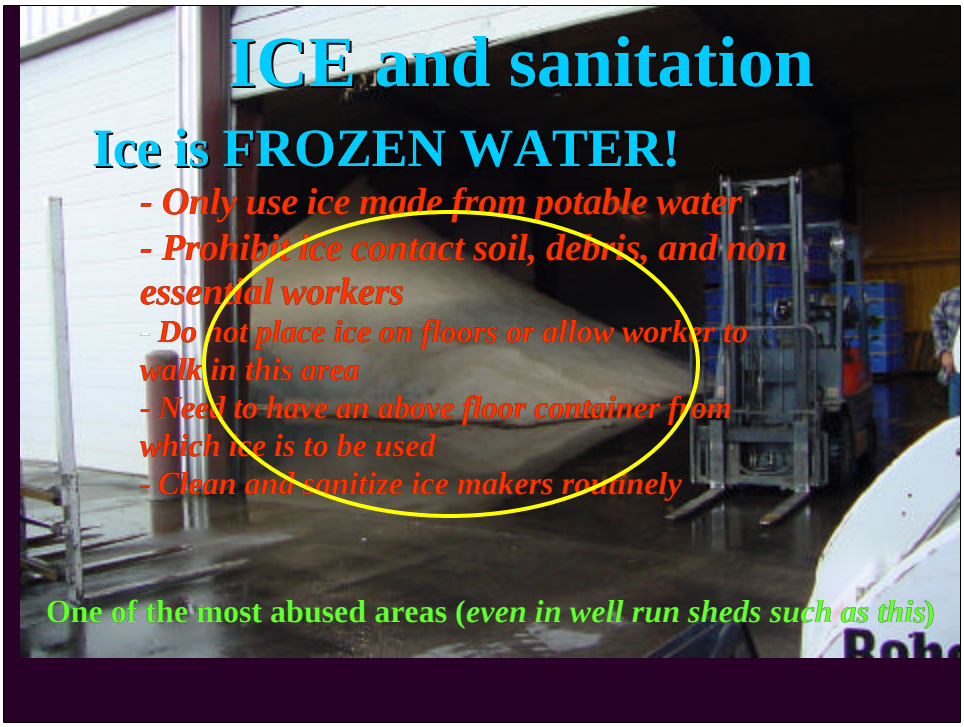
Major Sources of Packing Shed Contamination

- # 1. Water / ice
- # 2. Workers
- # 3. Animals, Fowl & Insects

WATER & ICE

(Reduce the risk for contamination!)

- The major guidelines and practices regarding the use of water in the field also are appropriate in the shed.
- Sanitation is the key



Ice is often overlooked as a source or carrier of pathogens

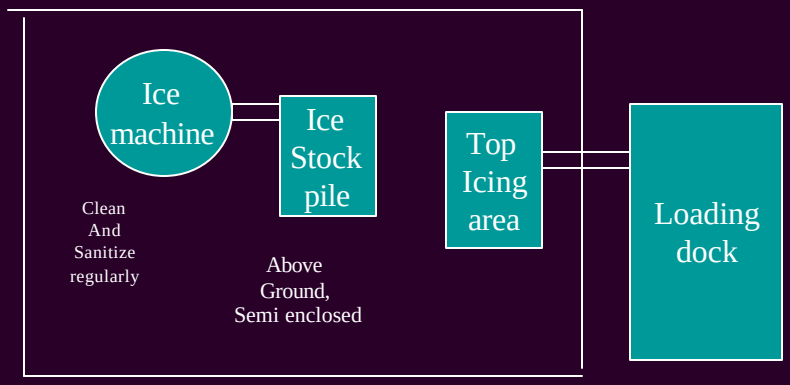
Proper handling and use of ice can reduce potential problems

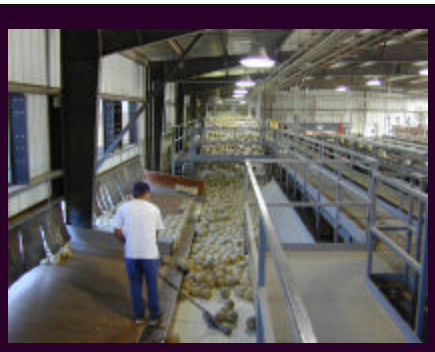
Ice stored on floors without any barriers to reduce contact with workers, animals, birds etc becomes very venerable to contamination.

Often is the placed on produced just prior to loading on trucks for transporting to markets.

This can serve as a incubation chamber if ice has come in contact with microbes, resulting in the spread of these organisms as the ice melts

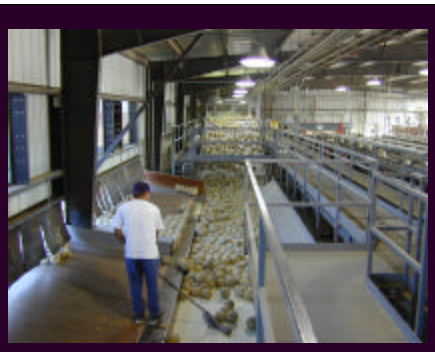
Icing area should be enclosed





A well designed and managed facility and operation can Greatly minimize microbial risks.

- **Product pre-cleaning are location**
- **Easily accessible**
- **Minimal clutter**
- **Smooth surfaces**
- **Pressure washing capability**
- **Floor drains**



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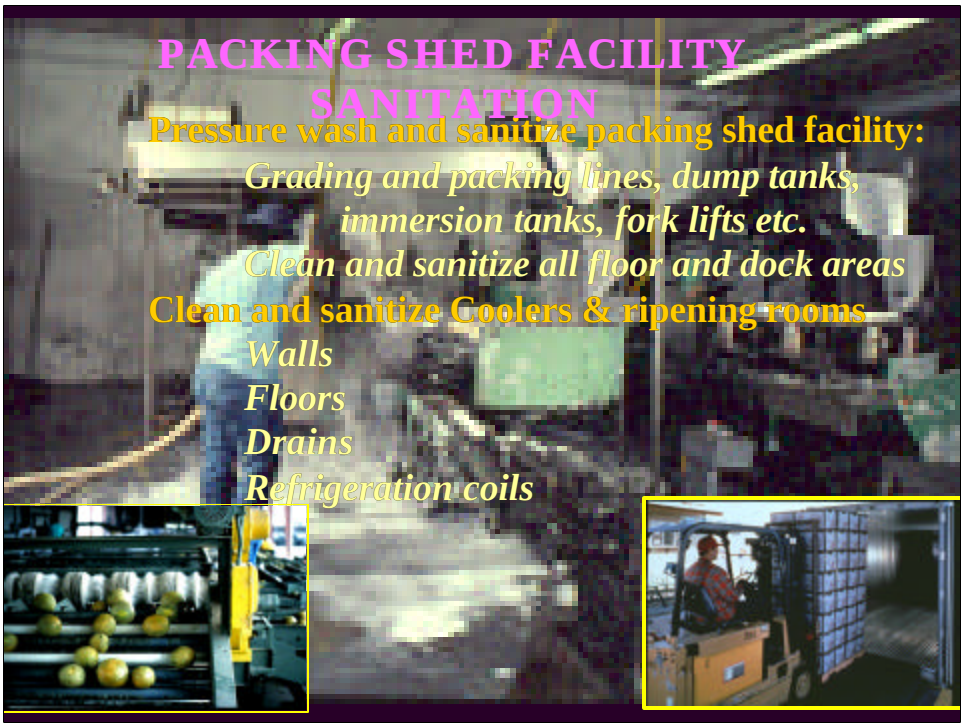
Whenever possible, leave potential problems in the field. Pre grading and cleaning will help.

Use of dump tanks to clean and convey produce is a common practice. This water needs to be clean and sanitizer levels maintained. Debris ties up chlorine and reduces its effectiveness.



Packing house sanitation is even more important than field sanitation because this is the final process stage for produce.

Good field GAPs and implementation can be rendered useless if GAPs or GMPs are not followed.

Biofilms

- *Sticky to slimy accumulations of fungi and bacteria that accumulate on wet surfaces*
- *Chlorine doesn't penetrate biofilms, but will prevent their formation*
- *Change water daily and maintain constant sanitizer levels in dump tanks and spray washers*

Accumulated Organic Matter

- **Contact of plant material with surfaces:**
  - *leaves waxes and plant sap accumulations*
  - *plant residues + moisture + microbes + warm temperatures =* ***biofilms***
- **Partially decayed plant material:**
  - *sticks to surfaces*
  - *is loaded with microbes*
  - *chlorine won't work until deposit is dispersed*

Sanitation in the Packinghouse

- Water is widely used in packing sheds
- Microbes survive and grow on wet surfaces
- Sanitize facilities & equipment regularly
  - Daily: packing line equipment (*particularly areas that remain wet, floors, drains*) breakrooms/bathrooms
  - Monthly or between loads: cold room floors, walls, ceilings, cooling units, doors, and curtains

Floor Drains

-Serve no purpose if they are clogged
-Inspect and clean frequently

Sanitation in the Packinghouse

- *Discard fruits and vegetables that fall on the floor*
- *No animals in packinghouse (domestic or otherwise)*
- *Prepare cartons only as needed*

Sanitation in the Packinghouse

- *Remove fruit and vegetable culls and debris promptly*
- *Provide restrooms and hand-washing stations*
- *Maintain sanitation records*

Hmm – Tastes Good!

GMPs dictate that workers should never be allowed to eat, smoke, or drink while working on a grading belt.

Open access always offers the potential for contamination by rodents, birds, pets etc.

Workers are by far a much bigger problem. They are the last people to touch produce prior to shipment.

Train shed worker as well on the importance and procedures needed to insure safety.

Personnel hygiene is always an issue and should be constantly stressed among workers

Problems of note In this situation:

- workers have placed their shoes on a conveyor.
- Packing line are being used as a break room
- Sanitation is some what lacing, (see the stacking devise circled in yellow)

BREAK ROOMS ARE NEEDED

- Grading and packing is a boring job
  - Break rooms should be a clean and pleasant
  - Place to recoup energy
  - Should contain table and chairs
  - Rest room facilities
  - Lockers

Although shed workers are a major source of contaminations, visitors can also cause potential problems with contamination.

Visitors are becoming an even more important issue in light of the bio-terrorism concerns now surfacing in this country.

Do not allow anyone other than employees to wander around the sheds unaccompanied.

FACITITIES & Equipment Cleaning Procedures

- Empty and sweep cold rooms
- Pre-rinse equipment or walls
- Visually inspect surfaces
- Apply appropriate cleanser
  - *Scrub from top, downward*
- Do not allow cleanser to dry on surfaces
  - *Rinse from top, downward*

FACILITIES & Equipment Cleaning Procedures Con't

- **Visually re-inspect surfaces**
- **Apply a high level sanitizer (800 ppm quaternary ammonia)**
  - *Let stand for 20 minutes*
  - *Rinse with potable water*
- **Apply regular level sanitizer (200 ppm quat)**
  - *Rinse with potable water*

Final Steps

- *Clean and put away supplies*
- *Document cleaning practices*
- *Periodic QA inspection/swabs*
- *Training*

Pest Control
Another area of need

Brad Easterling, IPMA / TCE

Standard Operating Procedures

Pests should be excluded from the packing shed, including rodents, birds, and insects. A pest control program should be documented, including inspection schedules and reporting procedures. The packing shed should be closed to the outdoors as much as possible with tightly sealed doors and windows, fine mesh screens and cracks and holes should be repaired promptly, including leaks in the roof.

SOP's cont.

All SOP's, policies, and schedules should be documented and kept where employees have access to them. All documentation must have a place for verification by a supervisor including an area for pest control. All records should be kept on file for a minimum of 2 years.

Pests Include:

- Rodents
- Birds
- Snakes
- Insects
- Pets

Prevention of Pests in Store Rooms

Land immediately adjacent to store rooms and packing sheds should have a buffer of bare soil around them to discourage high populations of rodents, birds, insects, reptiles, and amphibians from living next to the store rooms.

Prevention cont.

Loading docks should be kept clean and dry as to minimize the potential for pest infestation. If possible, loading docks should also have tight fitting doors that can be closed when not in use.

Prevention cont.

Care should be taken to prevent birds and other pests from contaminating packing equipment, surface areas, packing areas and storage areas.

Prevention cont.

Empty containers and unformed containers should be stored off of the floor and bare soil surfaces. This keeps insects, rodents and other pests from using the containers as shelter, nesting materials, and nesting sites.

Prevention cont.

A space of at least 18 inches should be kept between pallets, storage containers, equipment, and the wall. This allows room to check for rodent tracks and droppings and to clean the store rooms.

Prevention cont.

Maintaining sanitary conditions outside of the shed is important because it deters rodents from entering the building and limits the risk of contamination from being brought in from outside the building. This includes keeping trash, debris, weeds, and standing water from accumulating on the grounds outside of the shed.

Prevention cont.

In order to minimize the attraction of pests to the packing shed or store room; cull piles should not be left in the shed or on the grounds outside of the shed.

All garbage, whether in a trash can or dumpster should be kept with a lid on it to prevent insect and rodent problems.

Bird Control

Birds are an important consideration in the sanitation of packing sheds and store rooms because of their ability to carry bacteria over a large area. Effective bird control is difficult due to their flying and abilities to get into small holes. Several methods of bird control are available, but none are 100%.

Bird Control cont.

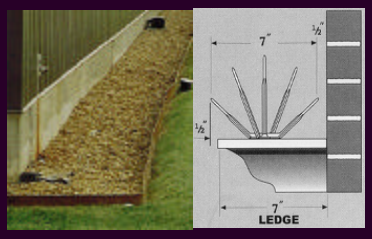
Reflective tape
Inflatable ball with eyes
Audible sounds
Windmills
Scarecrows
Owls
Rubber snakes

Rodent Control

- *Exclusion*
- *Sanitation*
- *Live traps*
- *Mouse/Rat traps*
- *Bait stations*

Rodent Control cont.

Rodent Control cont.



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Temperature management

- Low temperatures supplement good sanitation practices
- Avoid delays that postpone cooling
- Consider:
  - *Time from harvest to packinghouse*
  - *Time from arrival to cooling of produce*
  - *Speed of cooling & final temperature*

Temperature management

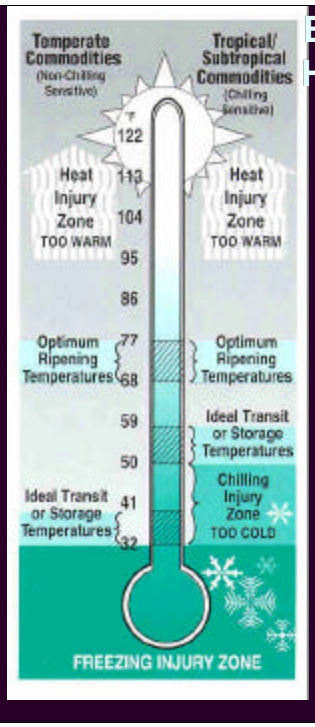
- ***Cooling method***
  - forced-air, hydrocooling, vacuum cooling, package & top icing
  - 7/8 cool (7/8 of field heat removed before storage or transport)
- ***Proper hydrocooler management***
  - water sanitized continuously
  - incomplete cooling = wet, warm produce = Potential for pathogen buildup

Temperature management

- **Storage and transport temperatures**
  - *Optimum temperatures for fruits and vegetables range from 32°F/0°C to 59°F/15°C*
  - *Most human pathogens grow slowly or not at all below 45°F/7°C*
  - *Listeria monocytogenes is a special concern in refrigerated environments*
- **Maintain records of temperature management**

Examples of Storage & Transit Conditions for Vegetables

Vegetable	Recommended	
	Temp.	% R Hy
Cole Crops	32	90-95
Curcurbits	50-55	85-90
Leafy Greens	32	90-95
Tomato (ripe)	45-55	85-90
(Mature green)	55-60	85-90
Pepper	45-50	85-90



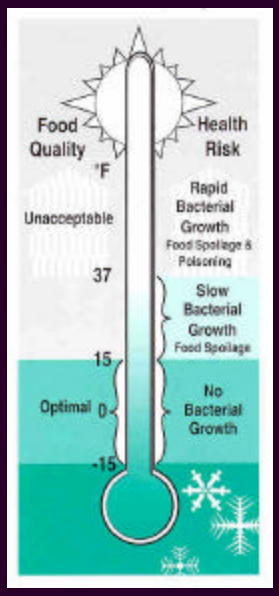
Effects of Temperature on Horticultural Commodities

All products are harmed by exposure to excessively high and low temperatures. Temperate commodities should ideally be transported/stored at 32°F to 38°F (0°C-3°C). Tropical and subtropical products must be transported at higher temperatures to avoid chilling injury.

Courtesy of Patrick Brecht and American President Lines

PRESENTER: Read this slide text to audience.

Temperature Affects Food Quality and Health Risks



Low temperatures preserve the quality of food (its aroma, flavor, texture and appearance), and protect it from spoilage. Chill cargo should be at its lowest safe temperature and frozen cargo must be 15°F (-9°C) or lower at the time of loading.

Courtesy of Patrick Brecht and American President Lines

PRESENTER: Read this slide text to audience.


Load from an Enclosed, Pre-cooled Dock
Enhances produce quality by maintaining optimum product temperature and reducing the potential for contamination


Packing Shed Hazards
• Water sanitation
• Equipment sanitation
• Animal exclusion
• Employee sanitation practices
Packing and storage facilities should always be maintained in a clean condition.


Shipping and Transportation
Basic Sanitation Issues

SHIPPING AND TRANSPORTATION
(vulnerable contamination areas)

- LOADING
- UNLOADING
  - *Fork lifts*
  - *Pallets / totes*
  - *Loading docks*
  - *Truck vans*

Pointless to produce a clean safe product and place it In a dirty or contaminated van !!

REQUIRED OF VANS PRIOR TO LOADING

- Determine prior load
- Pre-cleaned
- Sanitized
  - *If needed, provide equipment for cleaning and sanitizing*

LOAD PRODUCE ONLY IN CLEAN PRECOOLED VANS

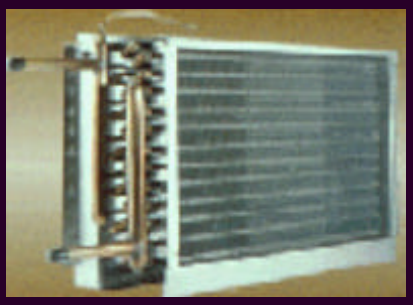
- THE PRODUCE IS YOURS, YOUR WILL BE RESPONSIBLE FOR IT.
- INSIST ON PRE COOLED WASHED VANS PRIOR TO LOADING
- MAY BE MONEY WELL SPENT TO INSTALL A POWER WASH STATION.
- CHECK PRIOR LOAD HAULED.

Transportation & distribution (cleanliness & Sanitation)

Pre-clean & pre-rinse Inside & out)
Use adequate contact time
Proper cleaner selection

- *Aluminum panels & floors*
- *Utilize moderately alkaline + corrosion inhibitors*
- *Wood panels, utilize polyphosphates+ surfactants*

Dry Cleaning of Evaporator Coils and Fins



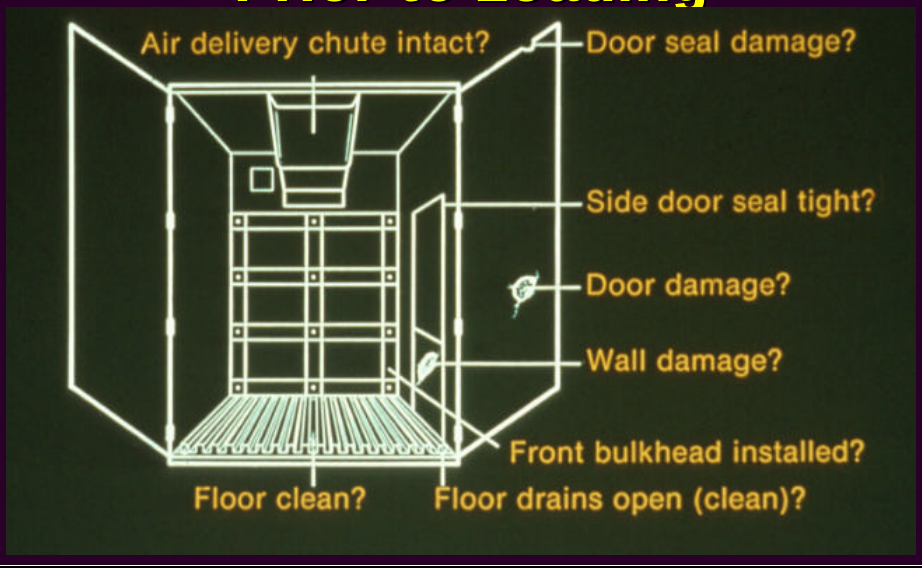
*Vacuum

*Gaseous oxidizers

Transportation & Distribution Sanitation & Cleanliness

- Adequate mechanical disinfecting
  - *Cleaning Equipment utilize*
    - 6-8 gpm @ 650-850 psi & 130-150° F
  - *Clean water rinse utilize*
    - 60-80 psi & 130-150° F

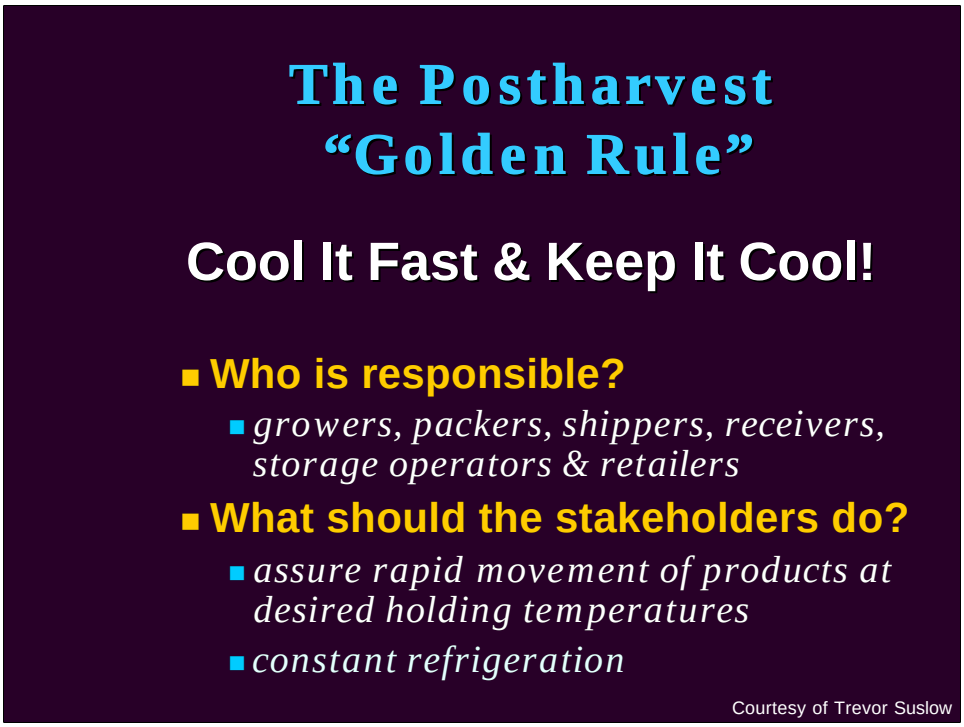
Truck Features to Check Prior to Loading



PRE-COOL VANS PRIOR TO LOADING

- Cool to temperature required by product
  - *Maintains product quality*
  - *Reduces produce "sweating"*
  - *Reduces microbial development*


Cold Chain
Monitoring
Request temperature records
be maintained in transit



The Golden Rule of Postharvest is:

Transportation

- *Link in a Cold Chain From the Grower to the Consumer*
- *Pre-transit Handling of Perishables Dictates Quality and Shelf Life After Transport*

Courtesy of Jeff Brecht

Transportation is a very important food safety link between grower and consumer.

Stowing – No Hot Spots!

- **Block stowing (bottom-air)**
  - air flows through vent holes in boxes
- **Airflow stowing patterns (top-air)**
  - air flows down the entire length of the load in channels between boxes
- **Bracing and filling**
- **Avoid blocking air movement, which causes "short cycling"**

Courtesy of Jeff Brecht

Proper stowing is important for effective cooling during transit.

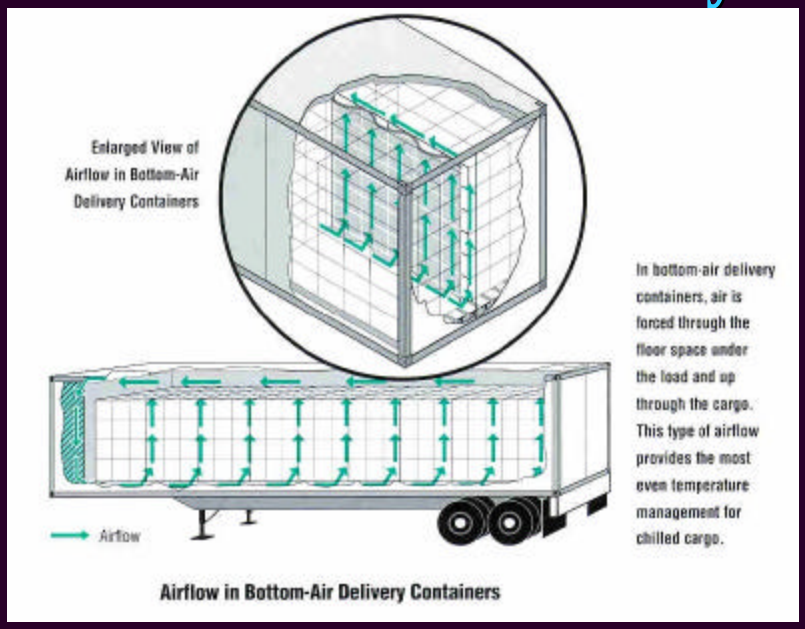
Product Packaging

- To aid temperature management
  - *Appropriate venting for bottom-air or top-air delivery*
- To protect the product
  - *Stacking strength*
  - *Moisture resistance*

Courtesy of Jeff Brecht

Use packaging as part of temperature management.

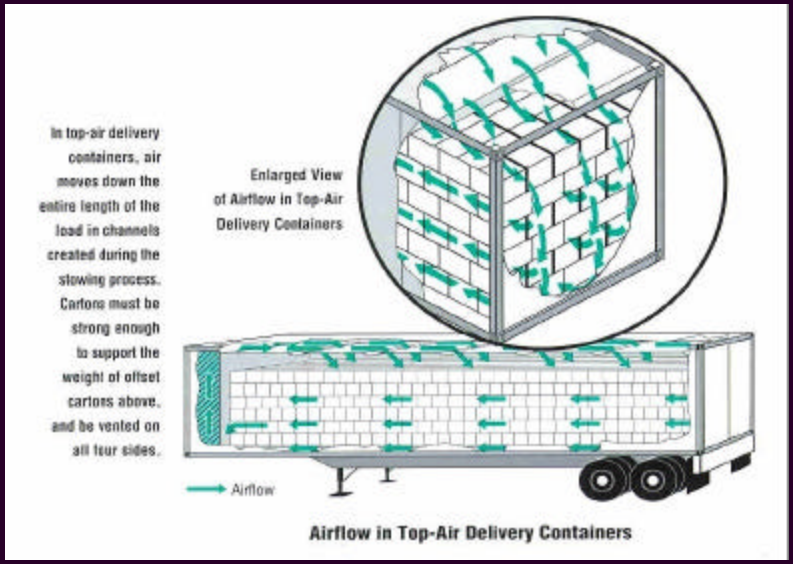
Bottom-air Delivery



Courtesy of Patrick Brecht and American President Lines

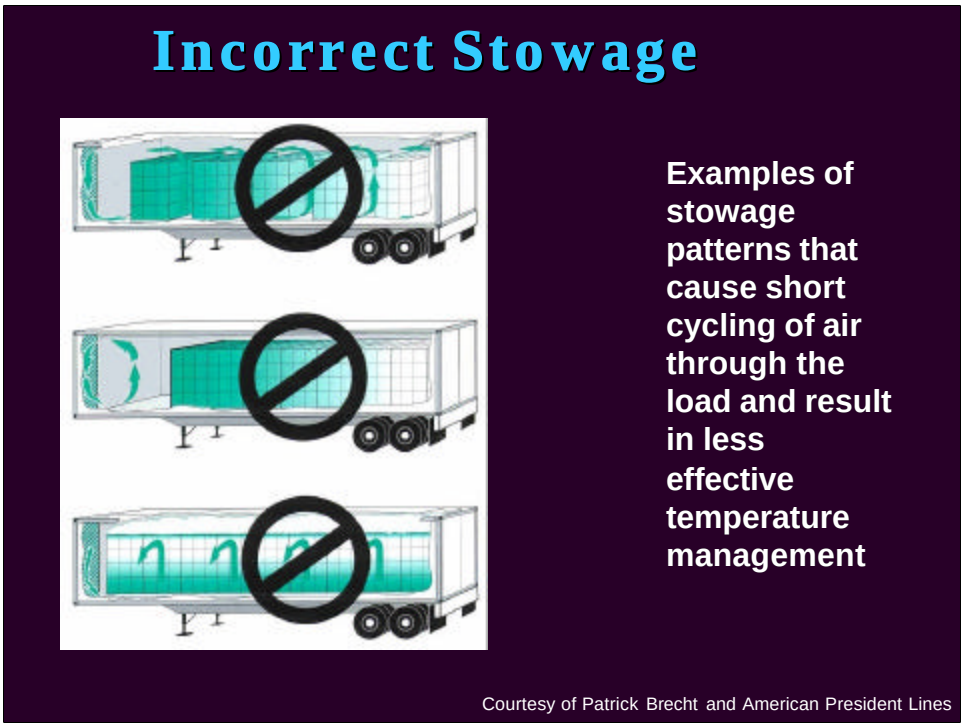
The other kind of air delivery system is “bottom-air delivery”. **PRESENTER: EXPLAIN SLIDE.**

Top-air Delivery



Courtesy of Patrick Brecht and American President Lines

There are two common types of air delivery systems in transport trailers: This slide shows “top-air delivery”. **PRESENTER: EXPLAIN THIS SLIDE**.



These are examples of incorrect stowage.

Recording Thermometers

- *Usually placed to measure discharge air temperature*
- *Provide documentation of refrigeration ('reefer') unit performance*
- *Newer types have probes to record product temperatures, too*
- *Calibrate the temperature sensors!*

Courtesy of Jeff Brecht

Using the recording thermometer is a good idea.

Transportation

- *Link in a Cold Chain From the Grower to the Consumer*
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Courtesy of Jeff Brecht

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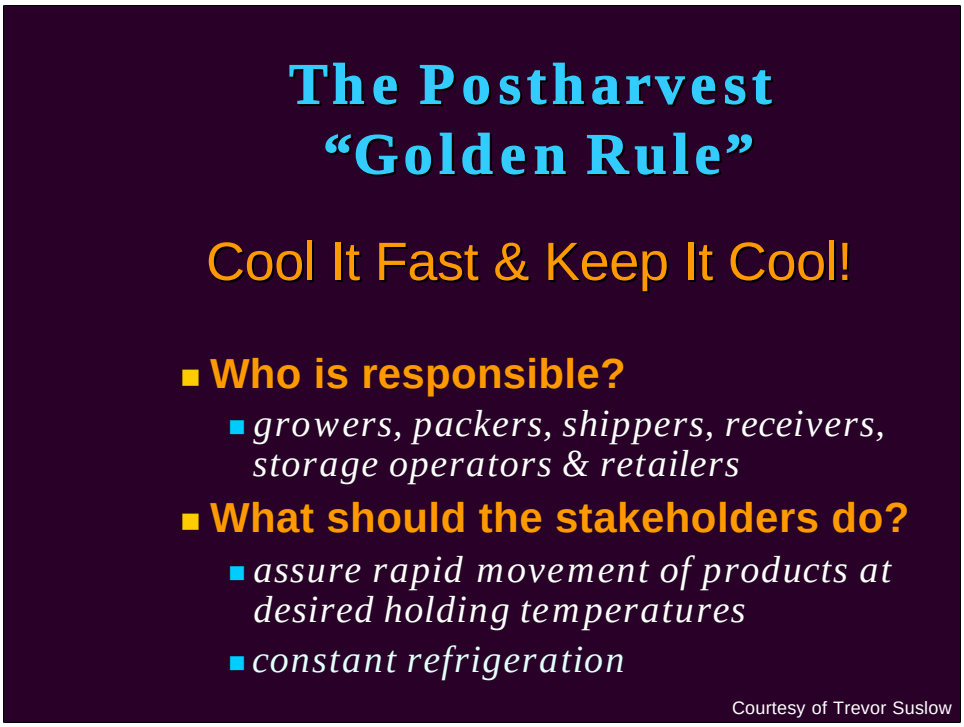


The Golden Rule of Postharvest is:

Desirable Features For Temperature Management

- *High capacity fan*
- *Solid front return-air bulkhead*
- *Deep floor for air circulation*
- *Temperature monitored in discharge from refrigeration unit*
- *Air channels in walls for air circulation and to help isolate load from the environment*

Courtesy of Jeff Brecht

Trailers should have: **PRESENTER: READ THE SLIDE**.

Recommendations

- *Cool products rapidly after harvest and maintain cold chain throughout handling*
- *Set maximum acceptable temperatures for each commodity carried*
- *Use recording thermometers with probes to monitor product temperature*
- *Maintain records of reefer performance and maintenance*

Courtesy of Jeff Brecht

In summary, cool produce, keep it cool and clean during transport and RECORD your efforts.

Recommendations (cont.)

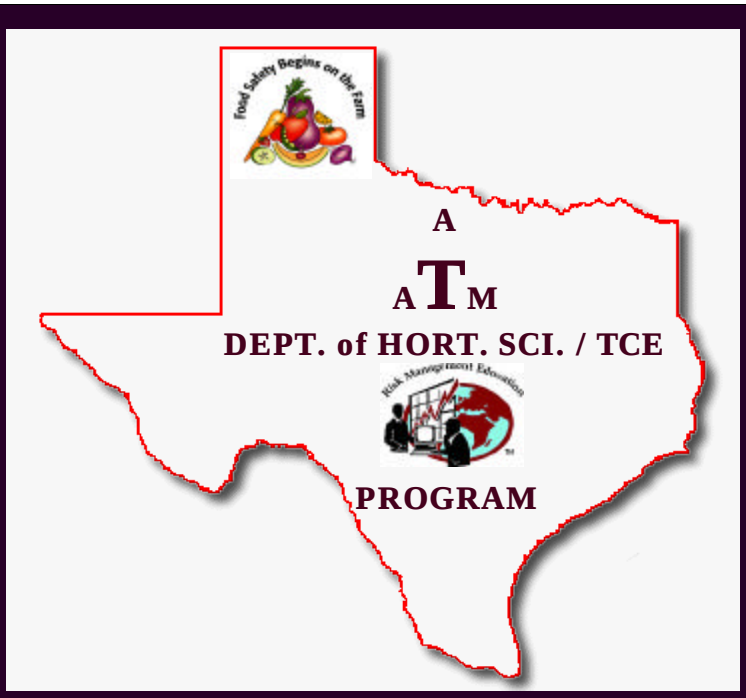
- *Use packaging compatible with the air delivery system, with excellent ventilation and strength*
  - **stow properly**
- *Regularly inspect and sanitize trucks & containers*
- *Maintain records of prior cargoes and equipment cleaning*

Courtesy of Jeff Brecht

Also, stow properly, use correct air delivery system and keep records!

A clean packing house is a safe packing house

- *Clean and disinfect all surfaces*
- *Pressure wash walls form top down*
- *Discard fruits and vegetables that fall on the floor*
- *No animals in packinghouse (domestic or otherwise)*
- *Prepare cartons only as needed*
- *Remove fruit and vegetable culls and debris promptly*
- *Provide restrooms and hand-washing stations*
- *Have an effective pest control program*
- *Maintain sanitation records*


Food Safety Begins on the Farm
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DEPT. of HORT. SCI. / TCE
Risk Management Education
PROGRAM