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CARGO LOSS PREVENTION FRESH CARROTS FROM CHINA – ALLEGED FROZEN

CASE

Recent cargo outturn surveys of fresh carrots laden in reefer containers shipped from China to Thailand showed that part of the cargo was observed with symptoms of freezing / chilling injury.

According to the Carrier's Bill of Lading, the pre-set temperature was Minus 1°C (Plus 30.2°F) and the Air vent setting was 15m³/hr.

OBSERVATIONS

The fresh carrots were noted with frost whilst some were iced up and stuck together. The affected carrots were noted to be stowed at the bottom tiers and front or blower end.

CARROTS FACT DATA

Optimum carrying temperature = 0°C (Plus 32.0°F) and the storage life is typically

- Bunched: 10 to 14 days
- Immature roots: 4 to 6 weeks
- Fresh-cut: 3 to 4 weeks
- Mature roots: 7 to 9 months

Freezing injury will likely occur at temperatures of Minus 1.2°C (Plus 29.5°F) or lower. Frozen carrots generally exhibit an outer ring of water-soaked tissue, viewed in cross section, which will blacken in 2 to 3 days.

REEFER CONTROL

The ocean carrier and the organization that requires the transport services should agree on the desired carrying temperature for the load. The temperature should be clearly specified in both Celsius and Fahrenheit scales in order to reduce confusion between the two.

The pre-set temperature is usually set by the ocean carrier based on the shipper's instructions.

New design of reefer machinery

If a reefer cargo has been properly cooled to the pre-set temperature before loading and is properly loaded in the reefer box that has a relatively new design, the thermostat can be set close to the long-term storage temperature. Newer container designs have supply-air temperature sensors and controllers that automatically control refrigeration based on supply air temperature if they are set at temperatures for chilled cargo. Because these containers can control air temperature within 0.5°C (1°F) or better under most conditions, produce is rarely exposed to temperatures much below the set point temperature. This would likely reduce freezing or chilling injury if the thermostat is calibrated and set at the pre-set temperature.

Old design of reefer machinery

Thermostats for older refrigeration systems with return-air temperature controllers should be set at least 1°C (2°F) above the pre-set temperature to prevent freezing or chilling damage to produce. Systems that have switch-selectable temperature sensing should be set to the supply-air temperature sensing for chilled cargo; by contrast, return-air temperature sensing is used primarily for frozen produce. Both types of containers automatically control temperature on the basis of return air temperature if they are set for a frozen load temperature.

LOSS CONTROL

Fresh carrots stored below 0°C for a prolonged period of time are susceptible to chilling / freezing injury.

REFERENCES

Marine Container Transport of Chilled Perishable Produce – University of California, Agriculture and Natural Resources Publications 21595

Refrigerated Transport – Joseph Sinclair

Carrots post harvest handling and storage – Department of Plant Sciences, University of Saskatchewan, Canada

Trust the above is of assistance.

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For and On Behalf Of

CJA Marine Services (Thailand) Co. Ltd

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