

The Reefer Is Not a Precooler

Why loading warm produce is the most expensive cold-chain mistake. Precooling methods, heat load, and how to estimate cool-down time before the trailer leaves the dock — from USDA AH-66 and HB 669.

ProspectSentinel

~12 min read

USDA AH-66 + HB 669

For shippers & reefer desks

Precool Estimator

Transit Guide

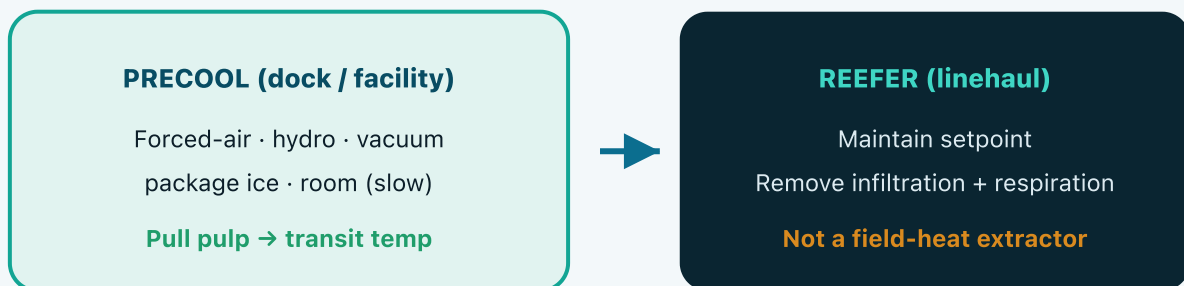
Cold Chain Index

Executive brief

Handbook 669 is blunt: to maintain appearance, prevent decay, and extend market life, **lower temperature and remove field heat as soon after harvest as practical**. Cooling completed before shipment is **precooling**. The ideal is that carriers accept only properly precooled product. When that fails, the trailer's refrigeration system must carry the extra heat load — and most units are sized to hold, not to pull a hot load down on the highway.

AH-66's precooling chapters reinforce the same physics: methods differ (forced-air, hydrocooling, vacuum, package ice, room cooling), but the job is identical — get pulp temperature into the storage/transit band before the product is sealed behind trailer doors.

Field heat must leave before the trailer owns the product



HB 669: any cooling completed before shipment is precooling. Ideal: carrier accepts only properly precooled product.

Broker tell: If the shipper cannot state pulp temp at loading, you do not have a reefer problem yet — you have an unknown heat inventory.

What “field heat” actually is

Heat in a loaded trailer is not one number. HB 669 inventories the loads a refrigeration unit must fight:

- **Residual heat** in trailer air, lining, and insulation.
- **Conducted exterior heat** through walls/floor/ceiling (and solar gain on surfaces).
- **Infiltration** through cracks, seals, and door openings.
- **Excess commodity heat** above desired transit temperature (the precool failure).
- **Respiration heat** from living produce — higher in commodities like asparagus, sweet corn, and strawberries than in apples, oranges, or potatoes; rate rises with temperature.

Sweet corn is the classic teaching example in HB 669: sucrose depletes rapidly as holding temperature rises (their Figure 1). Every hour warm is not “a little quality loss” — it is a steep curve.

When product is much above transit temperature at loading, HB 669 points operators to estimate the heat load (Appendix I) and **not use the trailer** if the unit is not rated to bear it. That sentence should be on every shipper SOP wall.

Precooling methods (AH-66 lens)

METHOD	BEST FIT (TYPICAL)	NOTES FOR DESKS
Forced-air	Wide range of packaged produce	Workhorse; slower than hydro/vacuum; more moisture loss risk
Hydrocooling	Many vegetables / some fruit	Fast heat transfer; water sanitation is non-negotiable
Vacuum	Leafy crops that release vapor readily	Very fast when commodity is suited
Package ice	Ice-tolerant commodities	Never assume ice is universal — see Groups & top-ice rules
Room cooling	Slow / durable crops only	Often too slow for high-respiration produce

Interactive estimate for planning conversations: [Reefer Precool Time Estimator](#).

Interactive transit setpoints and pre-load checklist: [Produce Shipper Transit Guide](#).

Shipper checklist

- ☐ Define target pulp temp = transit band for the commodity (not “cold enough”).
- ☐ Record pulp temps from multiple pallets/depths before loading.
- ☐ Precool the trailer (or prewarm in winter) so the box is not the heat source.
- ☐ Do not seal a known-hot load because “the unit is good.”
- ☐ Keep airflow paths open — precool success dies if the load blocks return air later.

Broker checklist

- ☐ Put required pulp temp / setpoint on the confirmation.
- ☐ Ask for precool method on high-respiration commodities (berries, corn, leafy).
- ☐ If shipper loads warm, document it before the first check call — claims are timeline wars.

Deep links: [Reefer Precool Time Estimator](#) · [Produce Shipper Transit Guide](#) · [Cold Chain Index](#) · series hub [Cold Chain Field Library](#)

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FAQ

- ▶ Is this official USDA guidance?
- ▶ Can I share these with customers?
- ▶ Where are the interactive tools?

Sources & interactive tools

- [USDA AH-66 — The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks \(2016\)](#).
- [USDA AMS HB 669 — Protecting Perishable Foods During Transport by Truck](#)
- **Federal rules (eCFR):** [7 CFR Part 46 — PACA regulations](#) · [49 CFR Part 370 — Principles and practices for the investigation and voluntary disposition of loss and damage claims](#)
- [Cold Chain Index](#) — 200+ commodity storage/transit matrix + co-load checker
- [Produce Shipper Transit Guide](#) — dock setpoints, mix load, checklist
- [Reefer Precool Time Estimator](#) — half-cooling-time style estimator
- [Perishable Claim Analyzer](#) · [PACA Good Arrival Calculator](#) · [Produce Truck Rate Explorer](#)
- [Freight claim package checklist](#) · [Claim / Carmack deadline calculator](#)

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Primary sources: USDA-ARS Agriculture Handbook 66 (2016); USDA-AMS Handbook 669, *Protecting Perishable Foods During Transport by Truck* (1995, reprinted 2008), including Load Compatibility Groups from USDA Marketing Research Report 1070 (Lipton & Harvey, 1977). Selected federal regulation entry points: [7 CFR Part 46 \(PACA\)](#); [49 CFR Part 370 \(freight claims\)](#).

Full series

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