

Quality Improvement Workshop:

Shrimp Storage



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Topics

- Fundamentals of Shelf Life and Storage
- Short-Term Ice (Chilled) Storage
- Long-Term Cold Storage

Shrimp Biology

- Deep tissue considered free of bacteria.
Enzymes are present in muscle.
- Skin, slime, and alimentary canal contain numerous bacteria.
- Hands, equipment, birds are full of bacteria.
 - Seagulls: known carriers of Salmonella
- Metabolic activity vs. temperature

Fundamentals of Shelf-Life and Storage

- Ultimate Goal of Seafood Storage:

Get the most **QUALITY**

for the longest **TIME**

Keyword: QUALITY

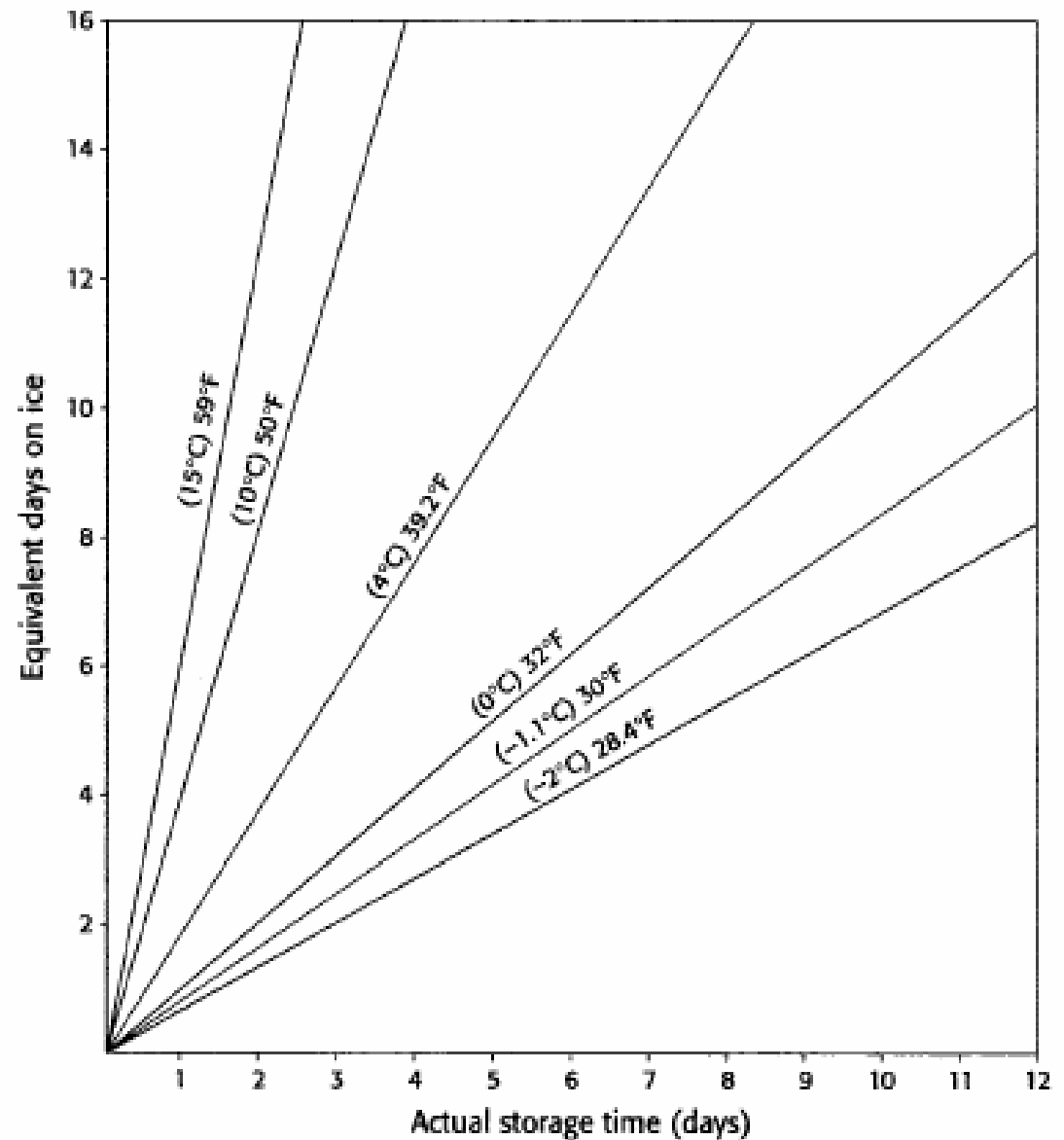
- Quality of end-product is first determined by its initial quality, then by the conditions it's subjected to during further processing.
 - 'Garbage in, Garbage out'
 - Best Management Practices (BMP)

“Product near the end of shelf life must be eliminated. Only the highest quality raw material should go to the freezer.”

Keyword: TIME

- How long can I hold it and maintain that initial quality?
- **Shelf Life:** The time from when the product is taken from the water until it's no longer fit to eat.
 - 'Know your shelf life!'
 - Offers more control of product
 - Temperature and handling practices (BMP) are most important factors

Equivalent days on ice at selected storage temperatures compared to actual storage times.

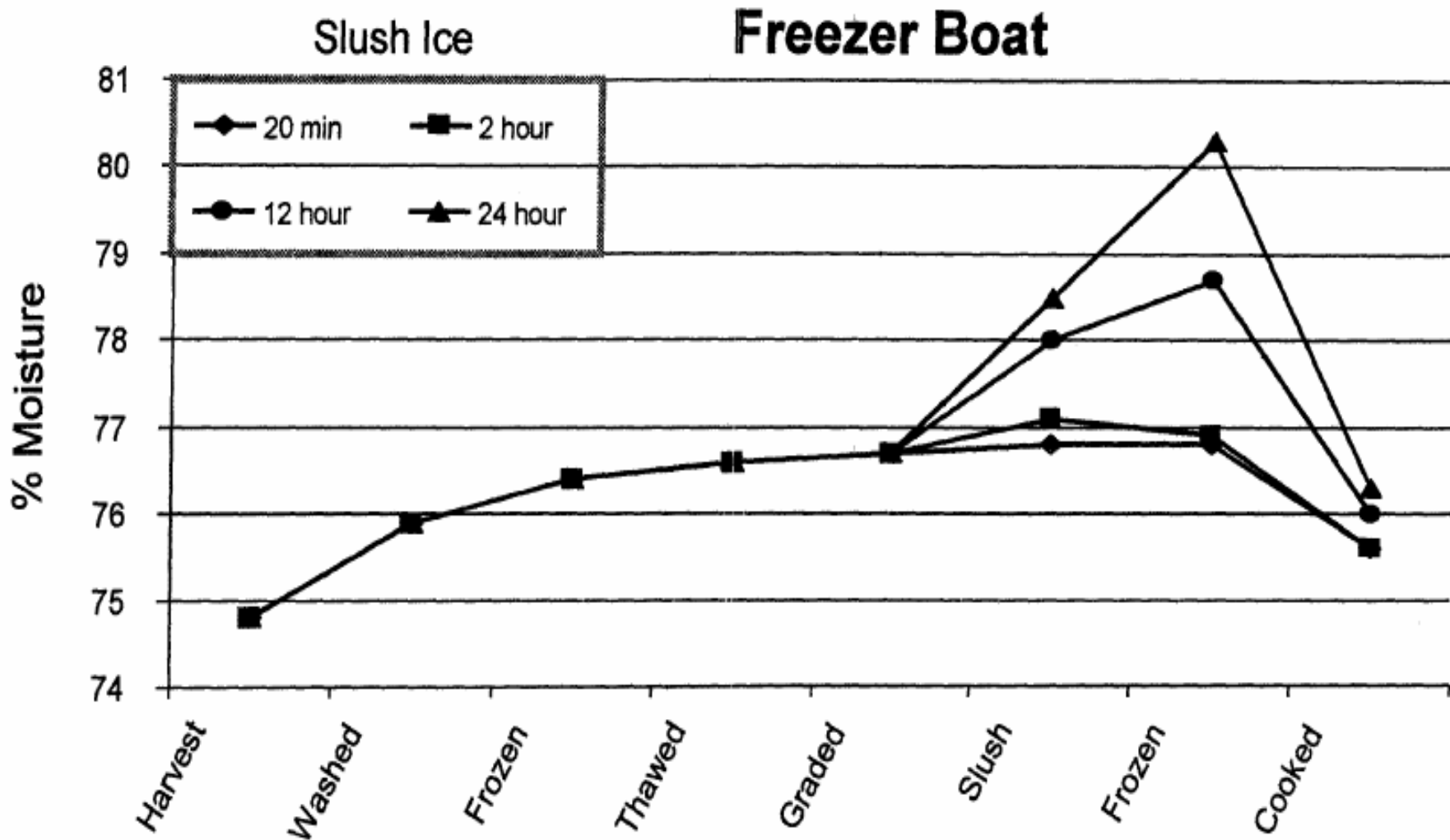


Short-Term Chilled Storage

Slush Storage: Bringing truth to the myth

- The Good:
 - Very cold
 - Maximum surface area coverage
 - Excellent appearance (University of Miami; 1952)
- The Bad and The Ugly:
 - Water uptake and subsequent loss (University of Florida) *with extended storage periods.*

Water Uptake and Loss



Effects of Slush

- Some bacteria capable of low-temperature growth... 'Cesspool'
- Economic Fraud
- Water will cook out and cause 'shriveled' shrimp
- Fried shrimp will 'pop' causing cooking hazards
- Water loss will cause flavor loss
- Decreased customer satisfaction

Short-Term Storage Techniques

- Storage container made of non-porous, sanitized material
- False bottoms
 - Holds shrimp off of bottom, out of ‘juice’
- Open or ‘crack’ drain plug
 - Facilitates ‘washing action’
 - Bacteria counts are much higher in the bottom ‘juice’ than on shrimp

Short-Term Storage Techniques

- Pre-chill after rinse stage (no more than 15 minutes)
 - Less heat shock to storage ice
 - Less chances of heat pockets
- Layer ice (2 lbs. for each pound of shrimp)
 - Pack ice against sides and bottom to create barrier against heat sources
 - Do not layer shrimp too thick

Short-Term Storage Techniques

- In Summary:
 - Keep as cold as possible; Pre-chill coupled with maximum ice contact
 - Minimize water contact time to avoid uptake and subsequent loss
 - Adequate drainage

Long-Term Storage (AKA Cold Storage)

Advantages:

- Can be of higher quality than chill-stored
- Provides year-round marketing opportunities
- Extends distribution time and distance
- Extends inventory time
- Fishing trips can be more lengthy and profitable
- Can bring better price

Cold Storage Considerations

- Building Size
 - Space available
 - Money available
 - Volume required based on packaging and product
 - Turnover/Access
 - Storage time
 - Aisle spacing
 - Curbs (6-12 inches)

Cold Storage Considerations

- Insulation and Vapor Barrier System
 - Urethane or expanded polystyrene
- Accessories
 - Doors, pressure ports, shelves/racks, lighting, fire protection, alarm, thermometer, door heater, air curtain, flooring, kick plates, roof kits, inside latches.
- Foundations
- Refrigeration

Cold Storage Quality Loss

- Ice crystallization reduces water-holding capacity
- Lipid oxidation causes color changes (fatty fish)
- Enzymatic activity causes soft texture from tissue breakdown
- Lipid hydrolysis affects rate of other reactions
- Dehydration / freezer burn

Cold Storage Techniques

- Recommended Facility Temperatures
 - Work Area: $\leq 50^{\circ}$ F
 - Cold Rooms: 32° F to 40° F
 - Chill Storage: As close to 32° F as possible
 - Freezers:
 - Short-term: 0° F
 - Long-term: -20° F or lower

Cold Storage Techniques

- Long-term storage: Why so cold?
 - Below 15° F: bacteria growth and replication stops
 - At 0° F: enzyme and other chemical reactions slow enough to allow *short-term* storage
 - -20° F and below: cold enough to avoid flavor and nutritional loss over long periods.
 - ‘Critical Zone’: 23°F - 30°F
 - Avoid slow freezing to reduce time spent in this zone
- Eliminate temperature fluctuations

Cold Storage Techniques

Product		Maximum Storage Temperature (°F)		Storage Life (Months)	
		2 months	6 months	0°F	-20°F
Pink Shrimp	Raw in shell	-10	-15	8	12
	Cooked meat	-20	-30	3	6
Sidestripe shrimp	Raw in shell	0	-10	9	14
	Cooked meat	-20	-30	4	8

Cold Storage Techniques

- Recommended Elapsed Time for Hard Freeze
 - Packages greater than 5 pounds should be hard frozen within 24 hours.
 - Packages less than or equal to 5 pounds should be hard frozen within 12 hours.
- Recommended Elapsed Time for Brine Freeze
 - 15 pounds per 100 gallons of brine should freeze within 20 minutes.

Cold Storage Techniques

- Processing and Reprocessing
 - Once thawed, shrimp should not remain in water for more than 30 minutes.
 - Internal temperature should remain below 40°F.
- Packaging
 - Contain
 - Protect
 - Identify

Cold Storage Techniques

■ Summary

- Only the highest quality should go to the freezer
- Do not overload freezer
- Bring product to frozen state as soon as possible
- Minimize temperature fluctuations
- Colder temperatures allow longer storage life

Thank You For Attending!!!

Please take a moment to complete the Program Evaluation. Your input is highly valued and is very important in the development of future programs.

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