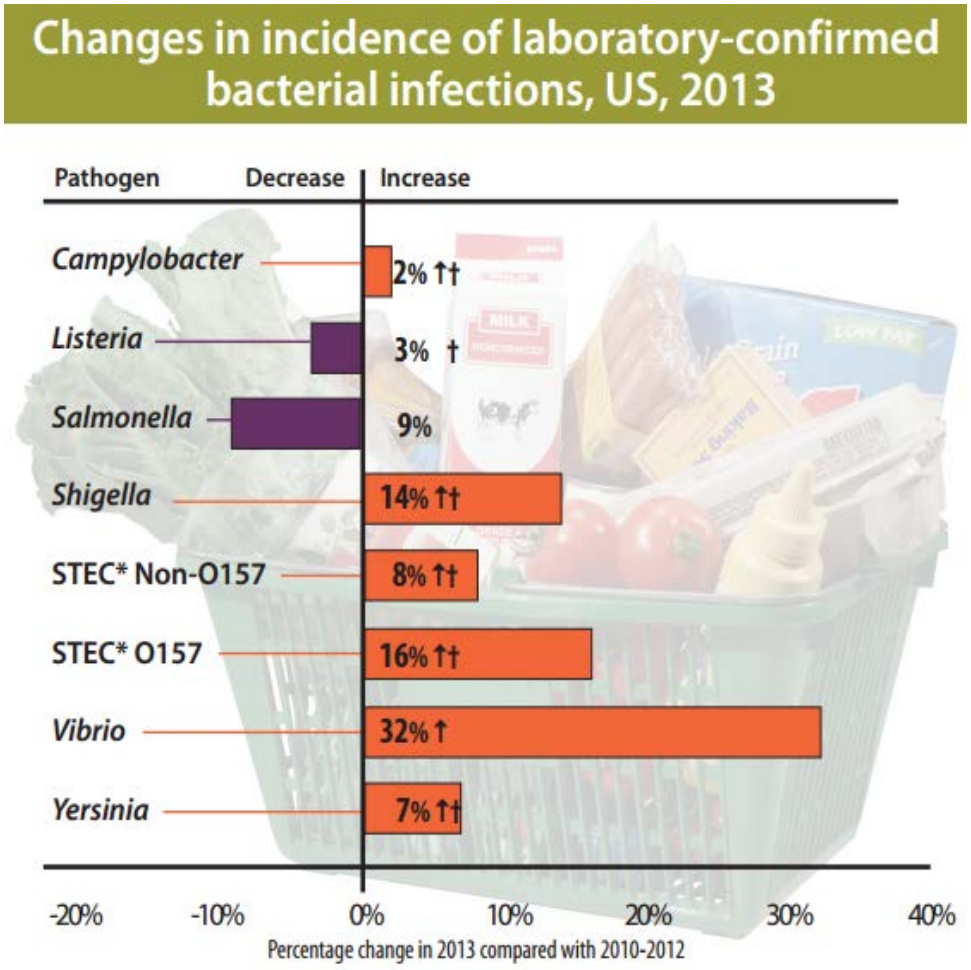
Post Harvest Processing

Post Harvest Processing (PHP) for Oysters

WHY ?

Because consumers prefer to eat them raw !

Limited illnesses occur but they are persistent



Despite an extensive safety record, oyster consumption still requires special food safety attention …

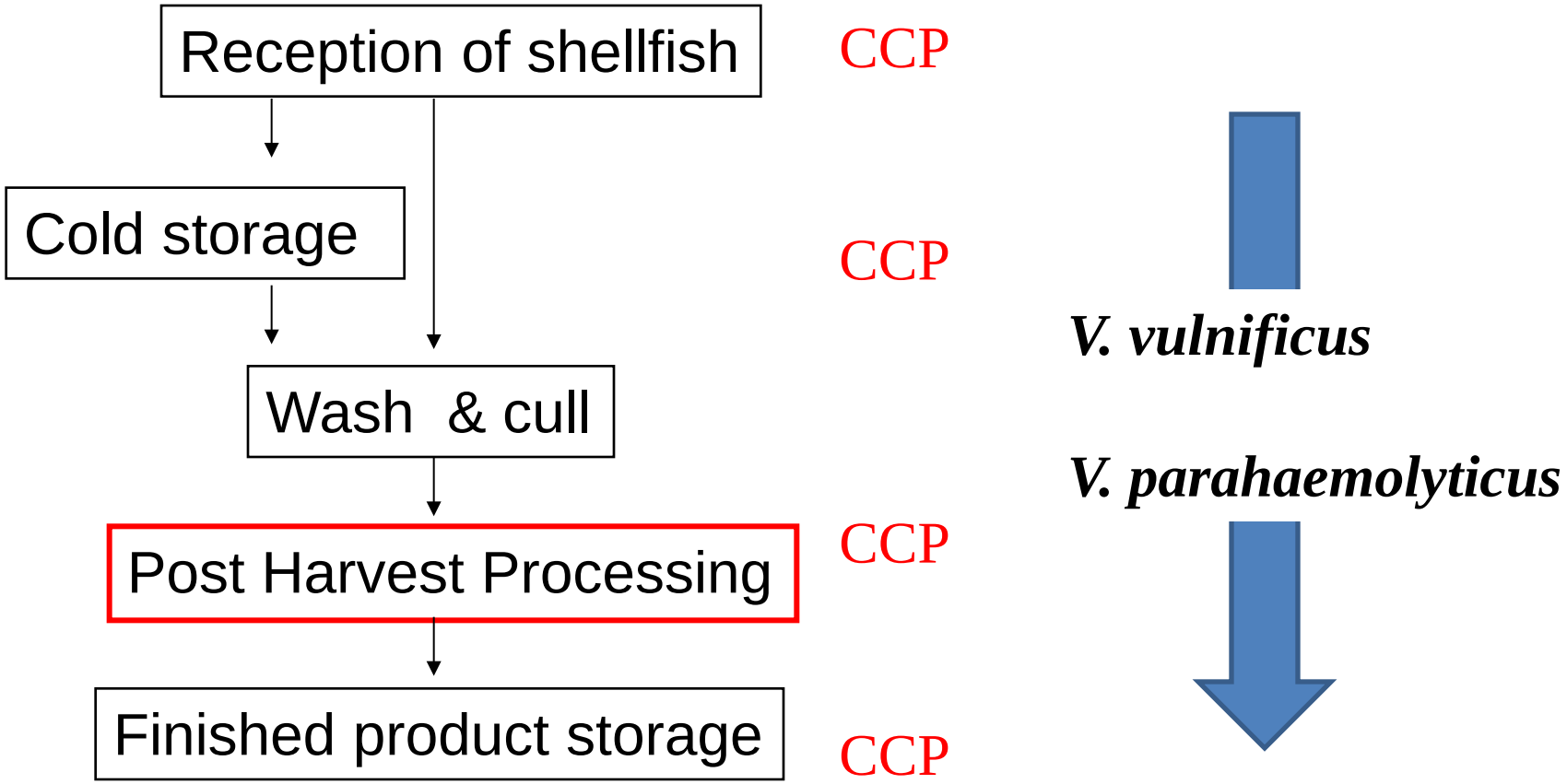
… the real issue is the recipe (raw) and the health of the consumer.

The primary food safety concern is certain naturally occurring bacteria that if present in certain amounts and certain types, it could present potential health problems for certain consumers …

… the primary bacteria of concern are certain types of *Vibrios* .

Post Harvest Processing (PHP) for Oysters

Processing designed to retain raw product characteristics while reducing certain bacterial loads to acceptable levels



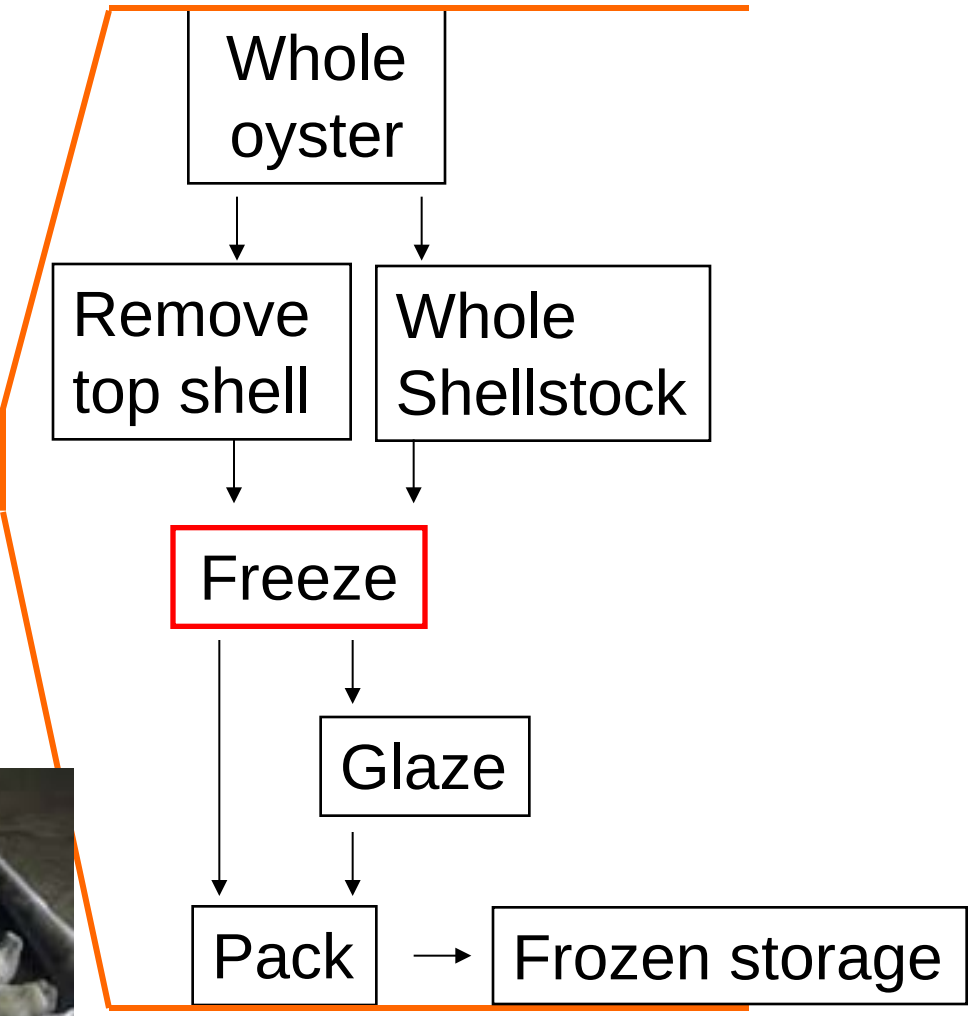
Post Harvest Processing (PHP) for Oysters

Current PHP methods approved and have been used in USA commerce

- Freezing
- Hydrostatic High Pressure
- Low Temperature Pasteurization
- Irradiation
- Others

- Nitrogen
- Carbon Dioxide
- Blast
- Standard Freezer

PHP - FREEZING



PHP - Freezing

Key to effective freezing in terms of bacterial reduction

- Rate of freeze
- Duration for frozen storage

PHP - Freezing

Pros:

- Market acceptance noted & acceptable in restricted markets (CA)
- Low initial cost – facility, equipment ($300,000+)
- Long shelf-life and inventory control
- Product available during harvest closures
- Variable product forms – whole, half-shell, shucked, value-added
- No royalty fees for new processors (?)

Cons:

- Market acceptance limited, not preferred
- Requires high product cost vs. profit margins?
- Delay in returns on investments
- Entry and maintenance costs
- Lack of available validations and periodic verifications

PHP – High Pressure

Whole oyster

Banding

High Pressure

Shuck, grade & wash

Pack → Refrig. storage

PHP – High Pressure

Vibrio reduction

3 min @ 40,000 psi.

PHP – High Pressure

Pros:

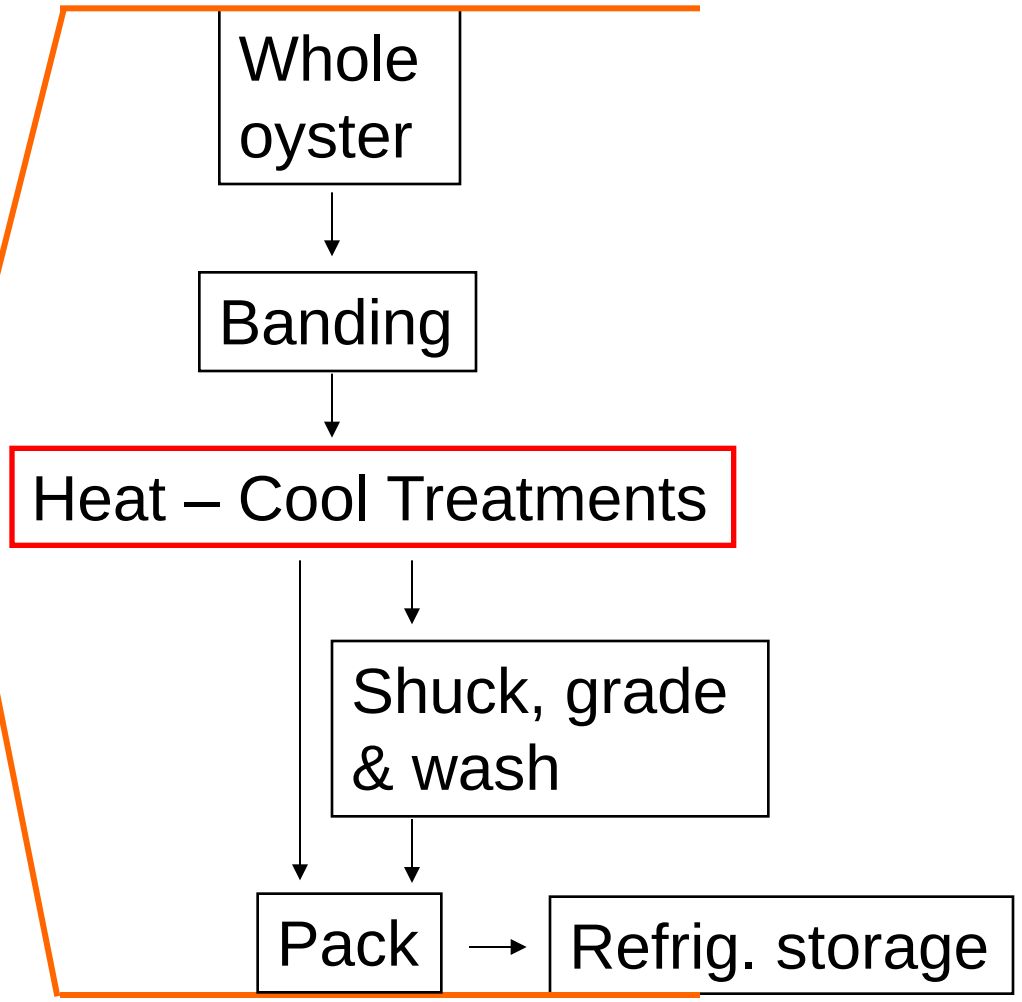
- Reduces labor to shuck shellstock for processors thru food service
- High product quality – product appearance excellent
- Market acceptance noted & acceptable in restricted markets (CA)

Cons:

- High initial cost – facilities, equipment and spare parts ($1.7M+)
- Needs trained maintenance personnel on-site
- Higher sale price for oysters when compared to traditional
- Royalty fees for new processors
- Market acceptance limited, not preferred

PHP - Cool Pasteurization

Patented process with required royalty fees



PHP – Cool Pasteurization

Processing parameters 24 min. @ 128^{o} F

PHP – Cool Pasteurization

Pros:

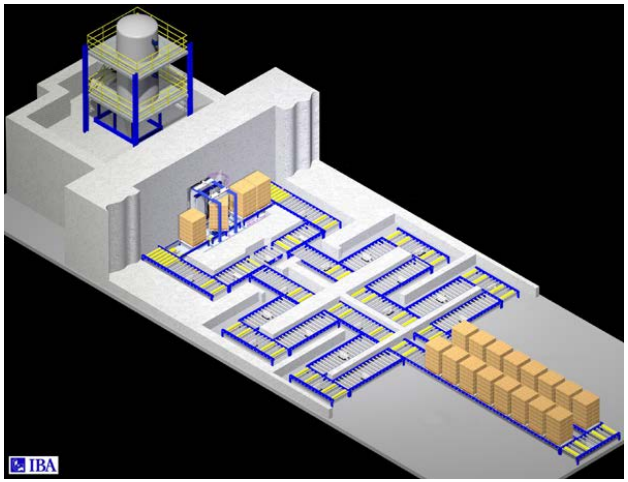
- Moderate initial cost – facility, equipment ($500,000)
- Higher yields than traditional (company claims)
- Market acceptance noted & acceptable in restricted markets (CA)

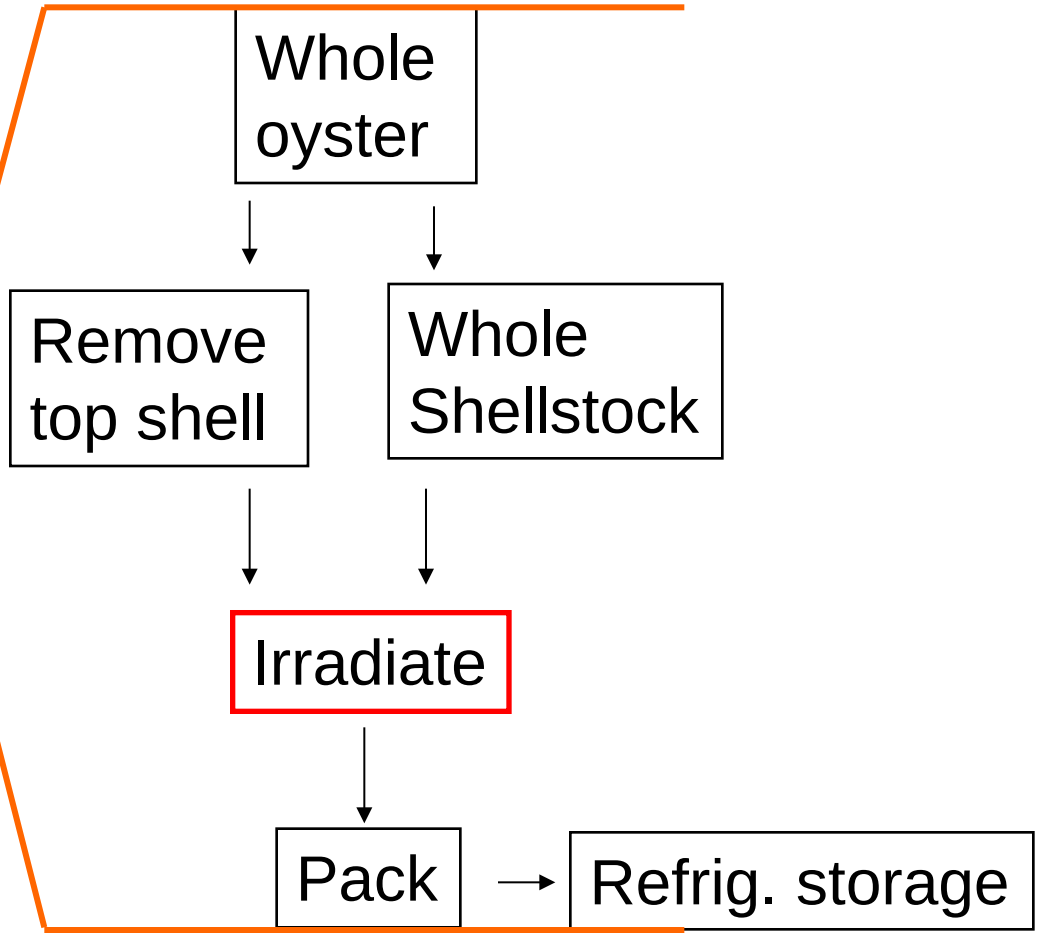
Cons:

- High initial cost – facilities, equipment ($500,000+)
- Needs trained maintenance personnel on-site
- Higher sale price for oysters when compared to traditional
- Royalty fees for new processors
- Market acceptance limited, not preferred

- Gamma
- X- Rays
- E-beam

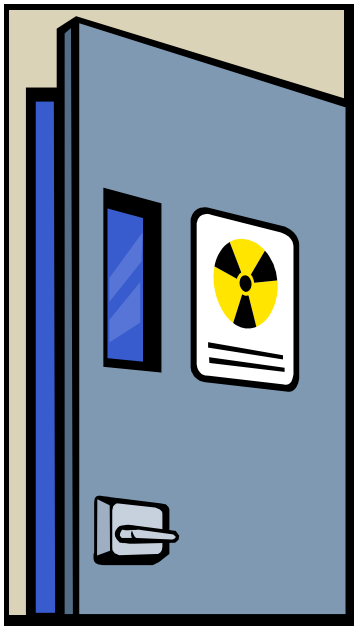
PHP - Irradiation





Irradiation - Regulatory Status

FDA issues new rule effective Aug 16, 2005 recognizing safe use of ionizing radiation for the control of *Vibrio* species and other foodborne pathogens in fresh or frozen molluscan shellfish (e.g., oysters, mussels, clams, etc.)



http://a257.g.akamaitech.net/7/257/2422/01jan20051800/edocket.access.gpo.gov/2005/05-16279.htm

PHP – Irradiation

Truck unloading

Oyster pallet used for dose mapping

Metal carriers for pallets

Loading pallets on carriers

Oyster box with dosimeters

Irradiation 0.82 kGy minimum absorbed dose

Unloading carriers and loading the truck

PHP – Irradiation

Pros:

- Proven effective with Gamma and X-rays
- Moderate initial cost – facility, equipment, ‘dual trucking’
- Market acceptance noted

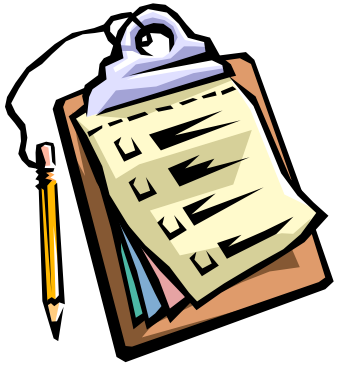
Cons:

- Availability of facilities and use of contracted services
- Higher sale price for oysters when compared to traditional
- Market acceptance limited, lacks experience
- Linger consumer concern for irradiated products vs. labeling

PHP – Status in USA

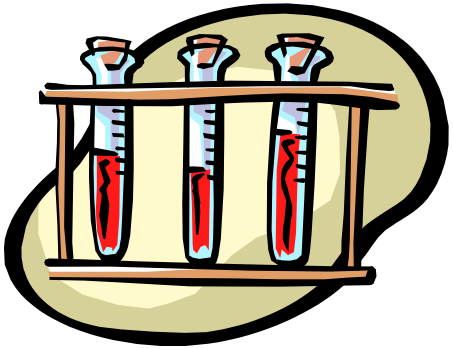
- Currently 5-6 freezing plants (CO_2 and N_2)
- Blast freezing has shown *Vv* reductions to non-detectable levels, but hesitant to use relative to cash flow and need for verification services
- One pasteurization plant with patent
- Three high pressure plants
- Limited irradiation plants available for shellfish
- Average cost of PHP product $0.25 – $0.50 per oyster (wholesale)
- Markets and Consumers will accept PHP, but prefer traditional

PHP Concerns ?



Support for
Validations & Verifications

Vibrio vulnificu levels



3 thu 100 MPN / g ?

PHP Concerns ?

Market and Consumer Preference vs. Acceptance

Product Characterization for Oysters

Proven approach:
Trained ‘food product profiling’ panels for sensory characterization of raw oysters

Sensory Profiling

Sensory Terminology

APPEARANCE	Product Color - Meat; Edges; & Visible Inner Shell Oyster Liquor - Opacity; Milkiness; & Air Bubbles Oyster Meats - Volume (fill); Plumpness; & Adductor
AROMA	Seaweed; Briny; Freshness; Metallic; Earthy; Iodine; Wet Burlap; Fecal & Shellfish
FLAVOR	Seaweed; Salty; Sweet; Sour; Bitter; Earthy; Wet Burlap; Umami
TEXTURE	Firmness; Chewiness
AFTERTASTE	Astringency; Chalky; Metallic

Sensory Definitions

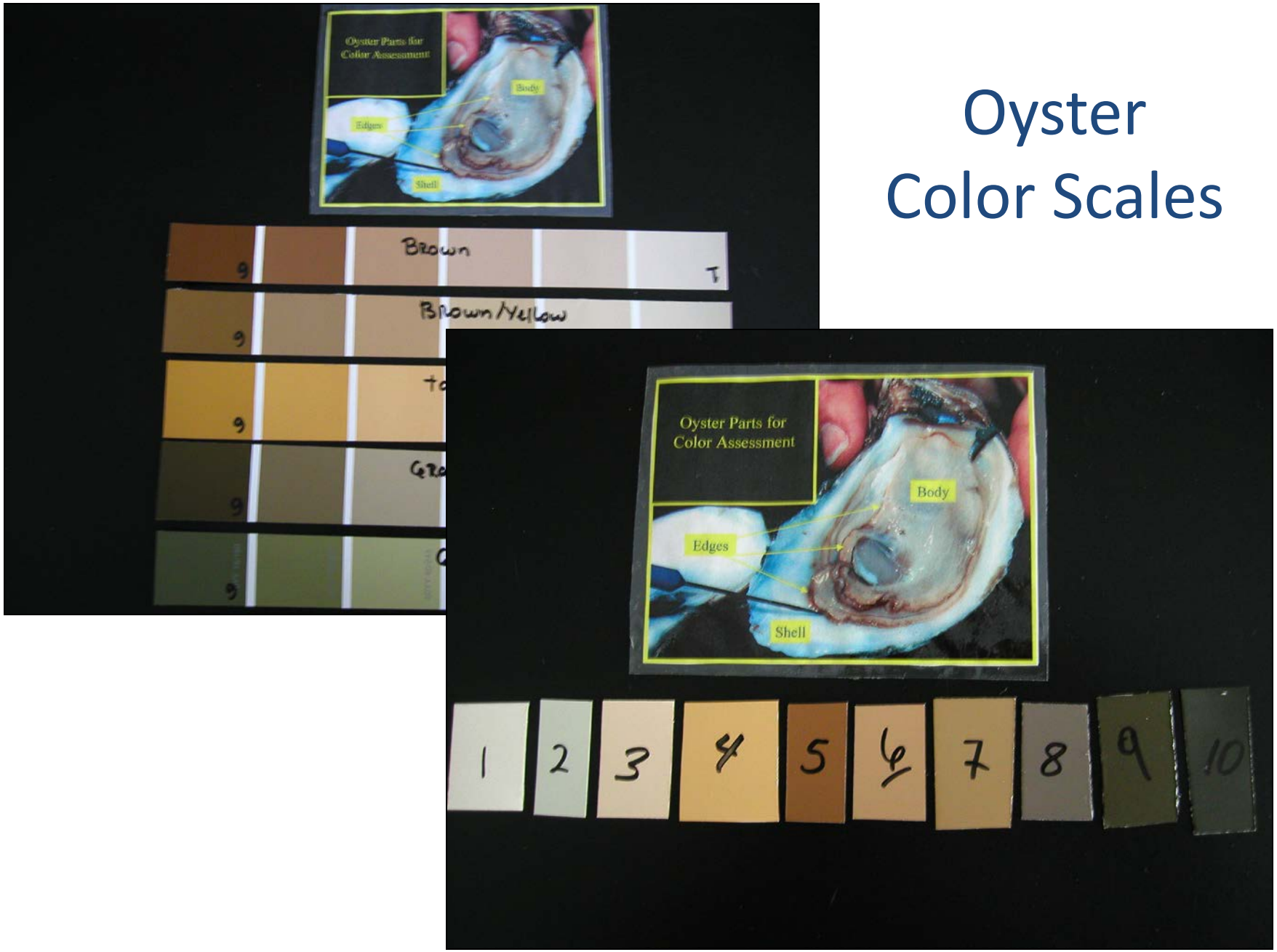
SEAWEED	Seaweed aroma or taste per Std SA10-wet seaweed
BRINY	Resembling saltiness or the sea per Std. B10-seawater, seaweed & oyster shell blend
SHELLFISH	Aroma similar to fresh shrimp per Sample Std. 10 (white shrimp from Gulf of Mexico)
UMAMI	Taste (savory) and mouthfeel produced by MSG

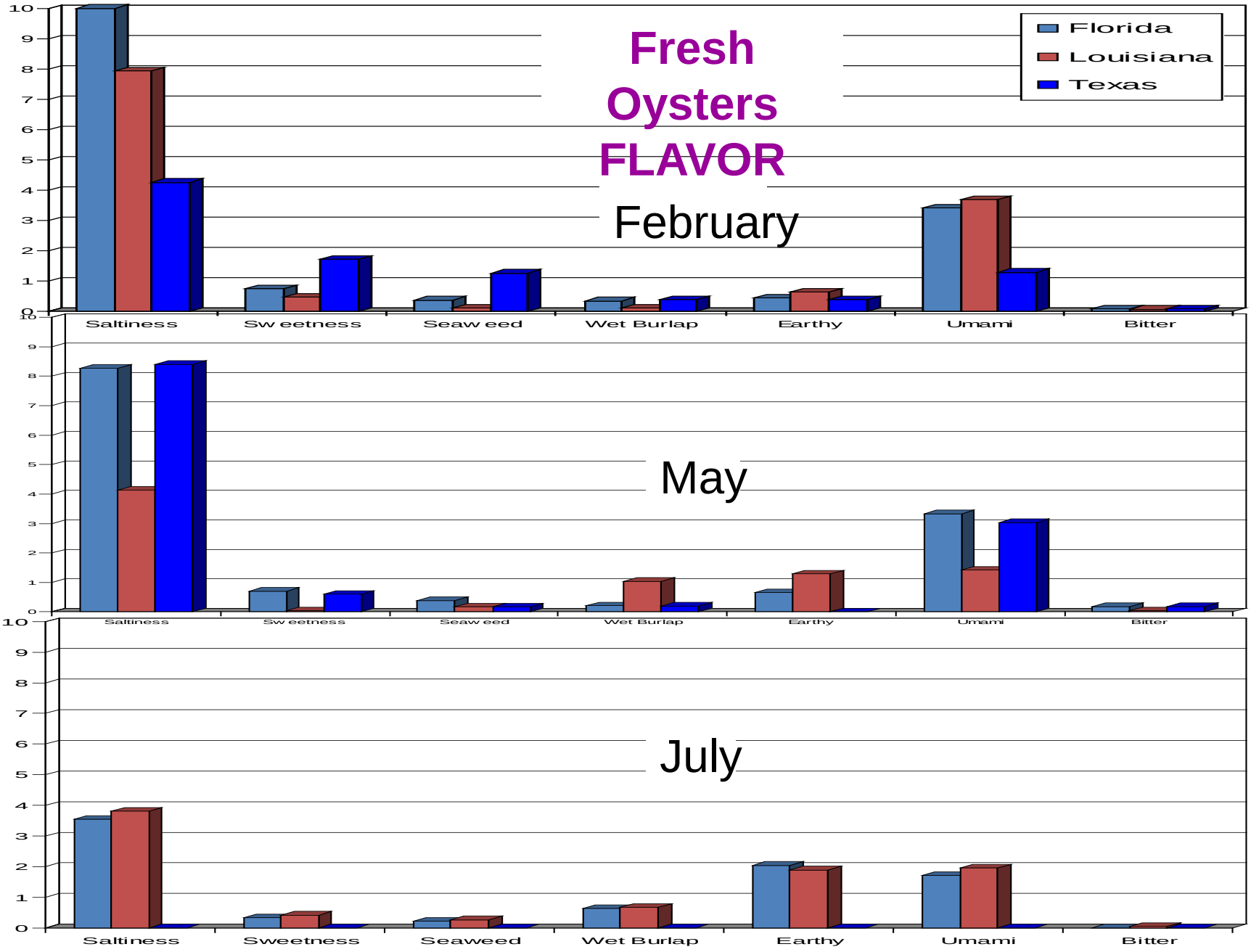
Sensory Standards

Firmness (15 point scale):	
0	Jello 211 (Knox gelatine)
2.5	Canned peaches-diced-4oz. Del Monte
5.0	Yellow American cheese (wrapped) Kraft
7.5	Dried Apricots (Sun maid- Mediterran.
10	Jello 121 (Knox gelatine)
15	Cooked Chicken Breast-salad top (Plain Purdue)

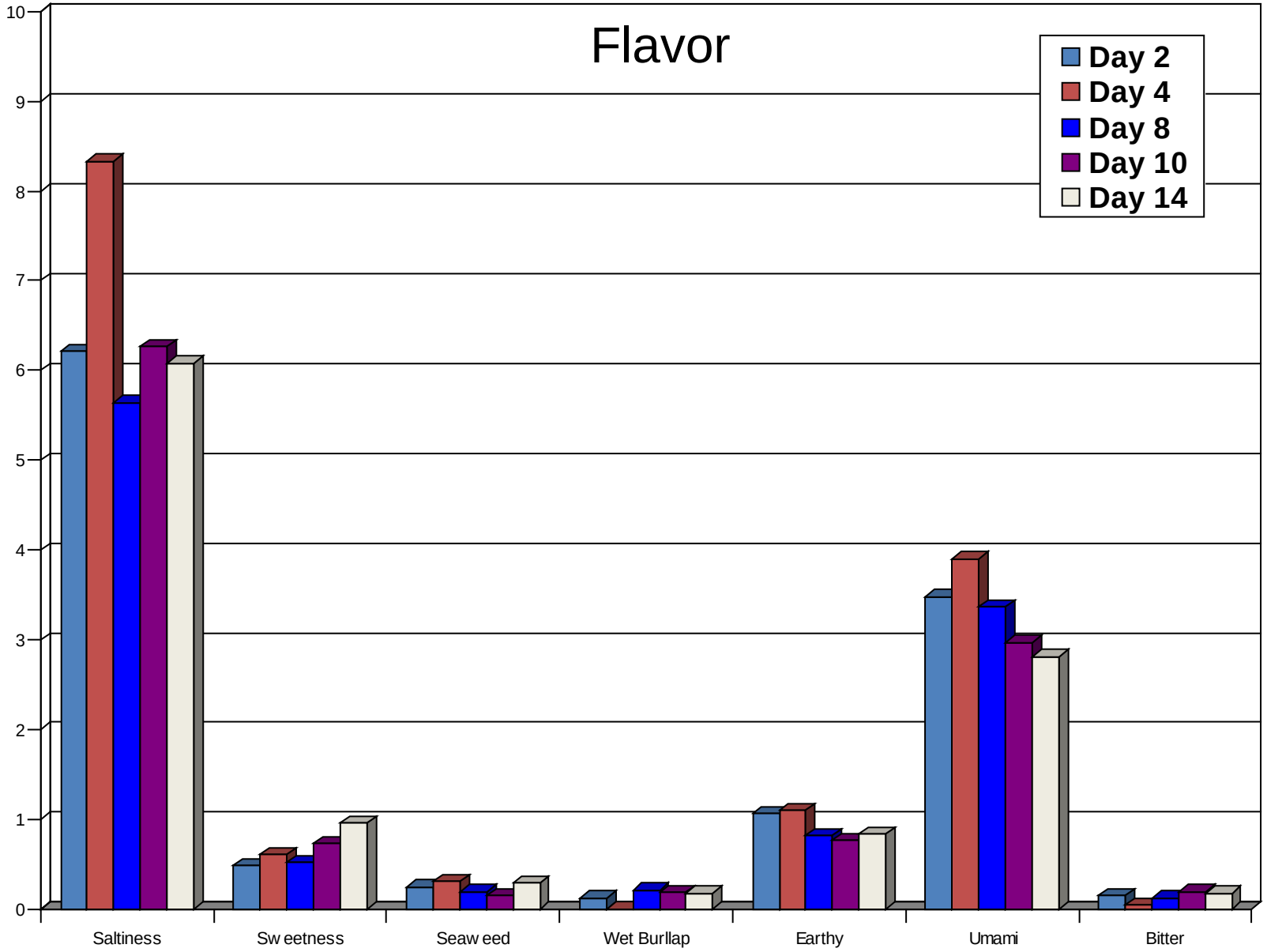
Product temperature is essential !

Oyster Color Scales

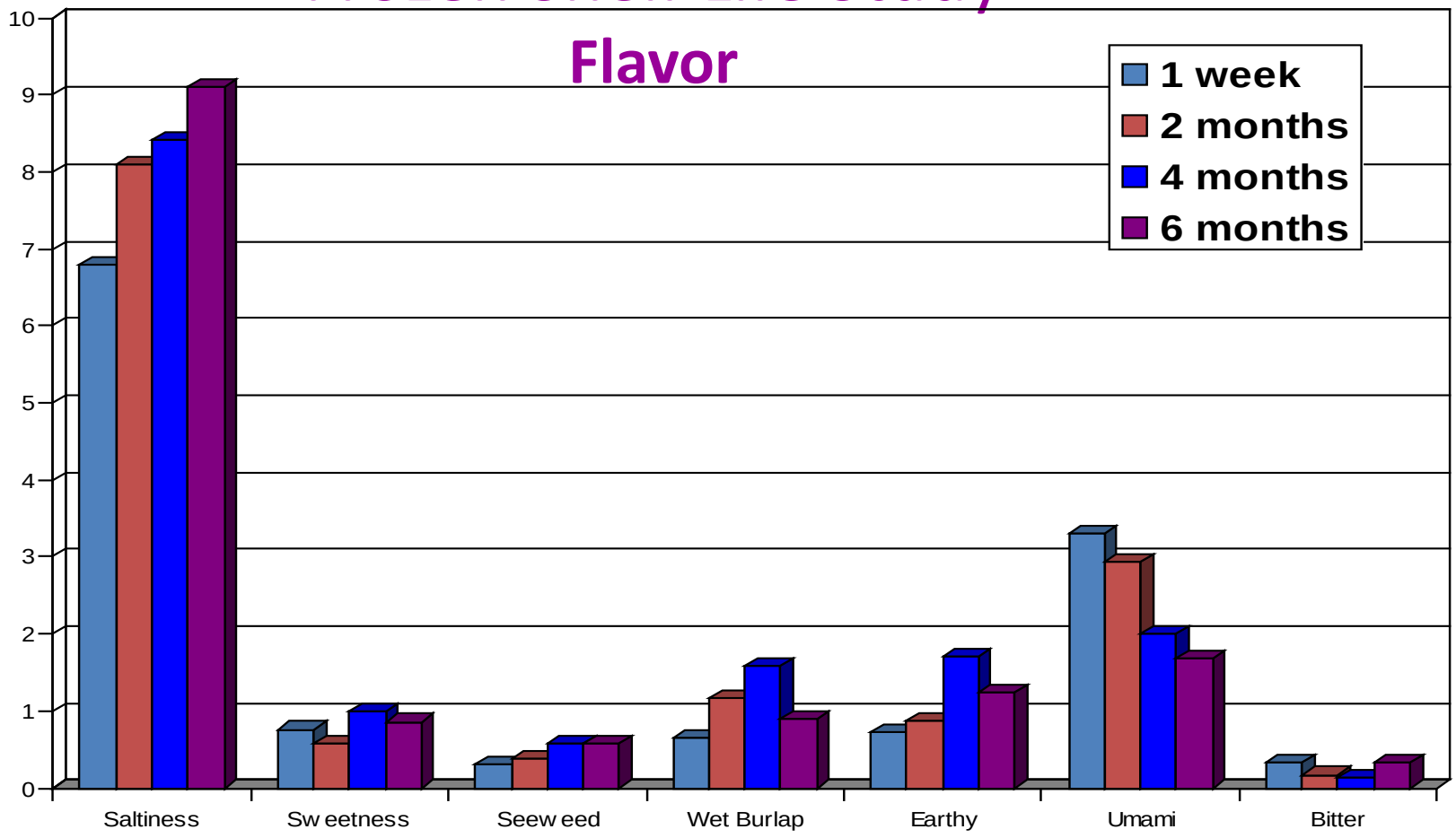



Fresh
Oysters
FLAVOR
Florida
Louisiana
Texas
February
May
July
Saltiness
Sweetness
Seaweed
Wet Burlap
Earthy
Umami
Bitter

Fresh Oysters- Shelf-Life Study



Frozen Shelf Life Study



Virtually Training and Product Characterization

Dolphin Bay Delights

Natural Sea Aroma

Salty Rating 6.5

Umami Scale *‘A’*

Plump & Full Cups

Verified

$4.00 / dozen

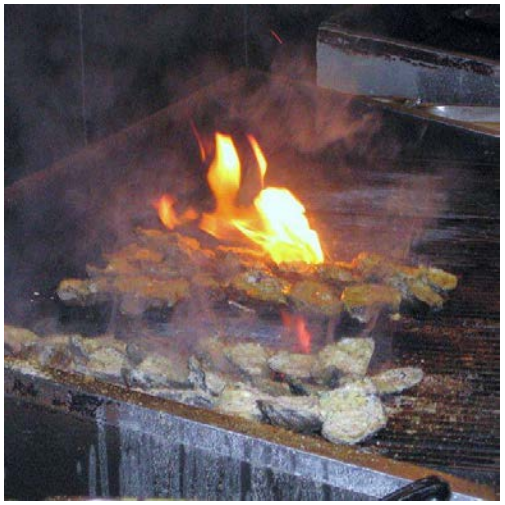
Panorama of Oyster Options

Florida – Taste a Difference

Monkey's Elbows

Cat Point Delights

Fish Hawk's



Whole or Half-Shell Oysters

↓

Heating

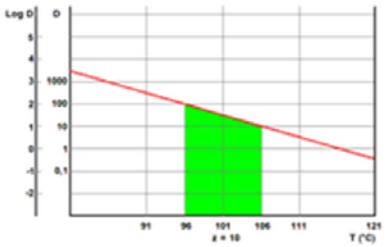
↓

Serving

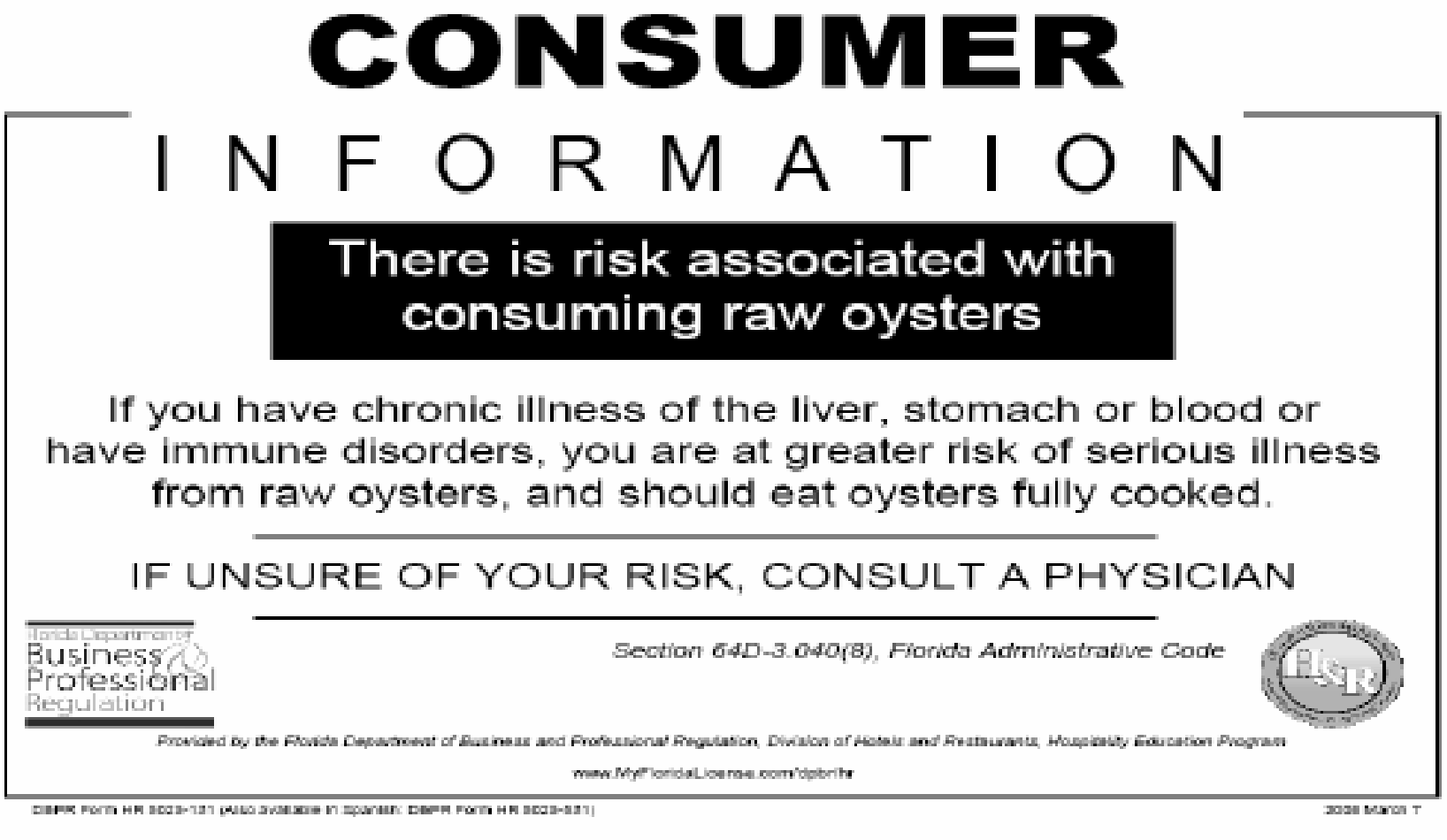
The caveman was right !

‘PHP’ - COOKING

- D value – the decimal reduction time required at a certain temperature to kill 90% of the organisms
- Z value – the temperature required for one log reduction in the D-value
  - $$z = \frac{T_2 - T_1}{\log D_1 - \log D_2}$$



What does “Cooked” actually mean



CONSUMER

INFORMATION

There is risk associated with consuming raw oysters

If you have chronic illness of the liver, stomach or blood or have immune disorders, you are at greater risk of serious illness from raw oysters, and should eat oysters fully cooked.

IF UNSURE OF YOUR RISK, CONSULT A PHYSICIAN

Florida Department of Business & Professional Regulation

Section 64D-3.040(8), Florida Administrative Code

Provided by the Florida Department of Business and Professional Regulation, Division of Hotels and Restaurants, Hospitality Education Program

www.MyFloridaLicense.com/dbpr/hr

DBPR Form HR 5023-131 (Also available in Spanish: DBPR Form HR 5023-531) 2008 March 7

www.MyFloridaLicense.com/dbpr/hr/forms/sign_and_charts

What does “Cooked” actually mean

Heat Resistance

Contents

Heat resistance of *V. cholerae*.

Temp.		D-Value	Medium	Reference
(ºC)	(ºF)	(min.)		
48.9	120	9.17	Shrimp homogenate	Hinton and Grodner, 1985
49	120.2	8.15	Crabmeat	Shultz et al., 1984
54	129.2	5.02	Crabmeat	Shultz et al., 1984
54.4	129.9	0.43	Shrimp homogenate	Hinton and Grodner, 1985
60	140	2.65	Crabmeat	Shultz et al., 1984
60	140	0.39	Shrimp homogenate	Hinton and Grodner, 1985
65.5	149.9	0.32	Shrimp homogenate	Hinton and Grodner, 1985
66	150.8	1.60	Crabmeat	Shultz et al., 1984
66	150.8	1.22	Crayfish homogenate	Grodner and Hinton, 1985
71	159.8	0.30	Crabmeat	Shultz et al., 1984
71	159.8	0.30	Crayfish homogenate	Grodner and Hinton, 1985
71.1	160	0.31	Shrimp homogenate	Hinton and Grodner, 1985
76.7	170.1	0.30	Shrimp homogenate	Hinton and Grodner, 1985
77	170.6	0.27	Crayfish homogenate	Grodner and Hinton, 1985
82	179.6	0.27	Crayfish homogenate	Grodner and Hinton, 1985
82.2	180	0.28	Shrimp homogenate	Hinton and Grodner, 1985

Heat resistance of *V. parahaemolyticus*.

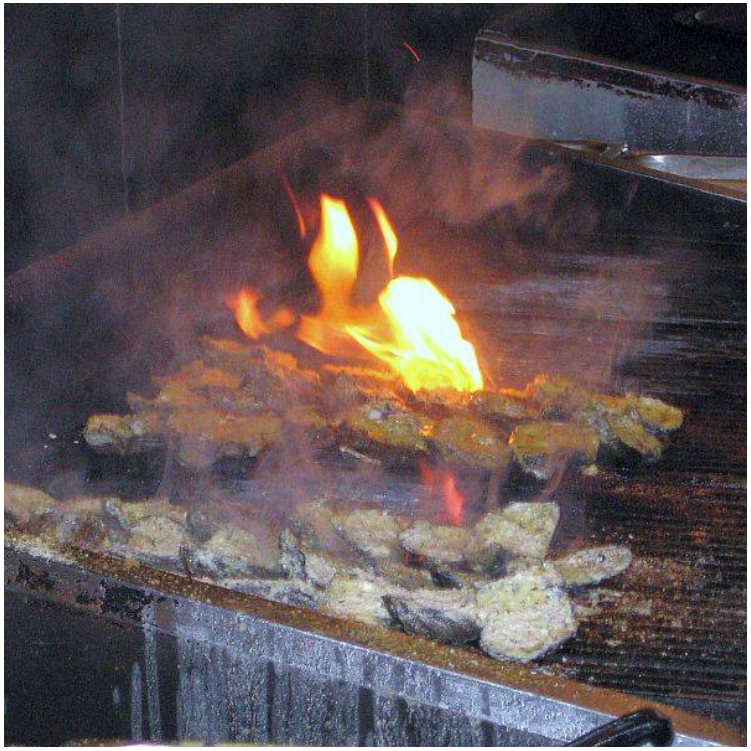
Temp.		D-Value	Medium	Reference
(ºC)	(ºF)	(min.)		
47	116.6	65.1	7.5% NaCl	Beuchat and Worthington, 1976
49	120.0	0.82	Clam homogenate	Delmore and Chrisley, 1979
51	123.8	0.66	Clam homogenate	Delmore and Chrisley, 1979
53	127.4	0.40	Clam homogenate	Delmore and Chrisley, 1979
55	131	0.29	Clam homogenate	Delmore and Chrisley, 1979

Heat resistance of *V. vulnificus*.

Temp.		D-Value	Medium	Reference
(ºC)	(ºF)	(min.)		
47	116.6	2.40	Buffered saline	Cook and Ruple, 1992
50	122	1.15	Buffered saline	Cook and Ruple, 1992


DRAGO'S
SEAFOOD RESTAURANT
&
OYSTER BAR


Acme
OYSTER HOUSE®
Since 1910 • New Orleans Seafood



Restaurant Settings

- Asked to cook normally
- Insert temperature probe
- Recorded thermal consequences

Conclusions

- All trials over 145°F for 15 sec
- Many over 200°F internal temperature
- More likely “over done” for micro purposes

KEY DRIVER
is SOURCE

Whole or Half-Shell
Oysters

‘PHP’ - COOKING

Heating

Serving

HACCP Controls
for
Food Service

Summary

- At least four PHP options developed
- PHP methods with validations and verifications
- PHP encouraged and recognized by prevailing governance
- Commercial experience proves PHP product acceptance
- Challenge remains regarding PHP product preference
- Concerns hampering commercial adoption


Thank You