


# Post Harvest Handling: Methods to Measure Product Quality at the Marketplace

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# Why be interested in quality?

- Increased consumer demands
  - “High quality products”
  - “Consistent quality every time”
- 
- Good quality opens for increased market shares
  - Higher price!

# Many different methods, but...

- Require sample preparation (filleting, cooking..)
- Require very trained people
- Destructive (the fish can not be sold afterwards)
- Time consuming
- Too general (do not take species into account)

# Quality Index Method

- No need for sample preparation (whole fish)
- Only minimal training needed
- Objective
- Not time consuming (30 seconds per fish)
- Not destructive (the fish can be sold afterwards)
- Can predict remaining shelf life
- Specific (one list of parameters to each fish species)

# QIM for hybrid striped bass

- Fish from 2 farms
- Stored in ice for up to 16 days
- Trained panelists
- Evaluation of whole fish and cooked samples during storage period



# What was evaluated?



## Quality description

- Appearance
  - Whole fish, eyes, gills
- Odor
  - Whole fish, gills
- Texture
  - Whole fish



## Shelf life determination

- Appearance
  - Color, blood
- Odor
  - Fishy, cloves
- Flavor
  - Fishy, sweet, cloves
- Texture
  - Firm, juicy, flaky

## Quality Index Method (QIM) Scheme for Farmed Hybrid Striped Bass

Name \_\_\_\_\_

Date \_\_\_\_\_

Quality parameters		Descriptions	Point						
Whole fish	Skin color/appearance	Pearl-shiny, iridescent pigmentation all over	0						
		Less pearl-shiny, yellowish, stripes still distinct	1						
	<i>Discoloration*</i> (red spots, bruising) (body only)	<i>Slight to none</i>	0						
		<i>Minor (5 - 10%)</i>	1						
		<i>Severe (10 - 25%)</i>	2						
	Odor	Neutral, pond, fresh fish, seaweed	0						
		Melon, cucumber, green grass	1						
		Cardboard, fishy, putrid, rotten	2						
	Texture	In rigor	0						
		Firm, resilient, finger mark disappears immediately	1						
Soft, finger mark still persists after 3 seconds		2							
Eyes	Pupil	Black, clear, bright, iridescent	0						
		Dark gray, mat, dull	1						
		Milky, cloudy, hazy, light gray	2						
	Shape	Convex, bulging	0						
		Flat	1						
		Concave, sunken	2						
Gills	Mucus	Transparent, clear, none	0						
		Milky, clotted	1						
	Color/appearance	Bright red, red, burgundy	0						
		Pale red, pink, light brown	1						
		Brown, dull	2						
	Odor	Pond, fresh fish, fresh rain	0						
		Melon, cucumber, metallic	1						
Musty, fishy, putrid, rotten		2							
<b>Quality Index (total score)</b>			<b>0-14*</b>						

**Total possible score**

7

\* The score for "Discoloration" is not included in the Quality Index but reported separately.

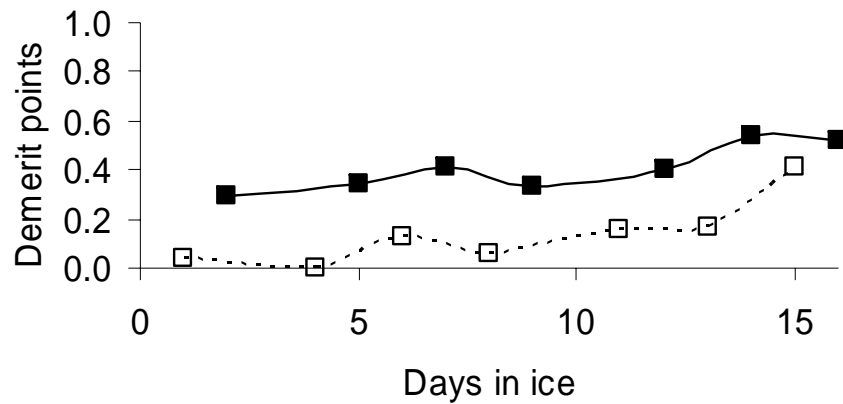
# Whole fish

Parameter	Description	Points
Color and appearance of skin	Pearl-shiny, iridescent pigmentation all over	0
	Less pearl-shiny, yellowish, stripes less distinct	1
Discoloration (red spots, bruising)	Slight to none	0
	Minor (5-10%)	1
	Severe (10-25%)	2
Odor	Neutral, pond, fresh fish, seaweed	0
	Melon, cucumber, green grass	1
	Cardboard, fishy, putrid, rotten	2
Texture	In rigor	0
	Firm, resilient, finger mark disappears immediately	1
	Soft, finger mark still persists after 3 seconds	2

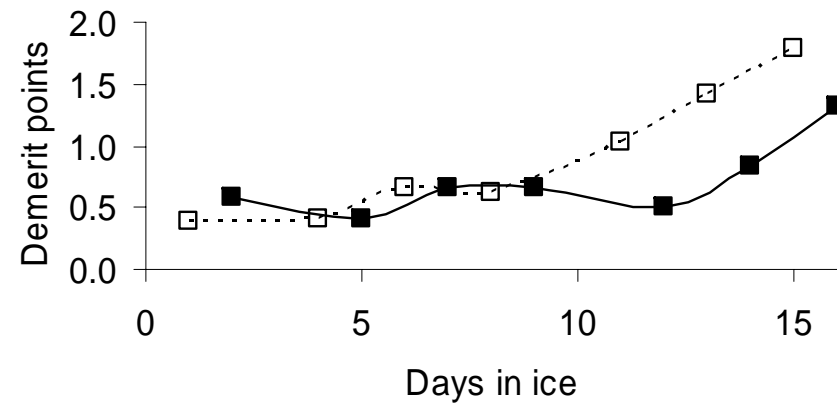
# Whole fish



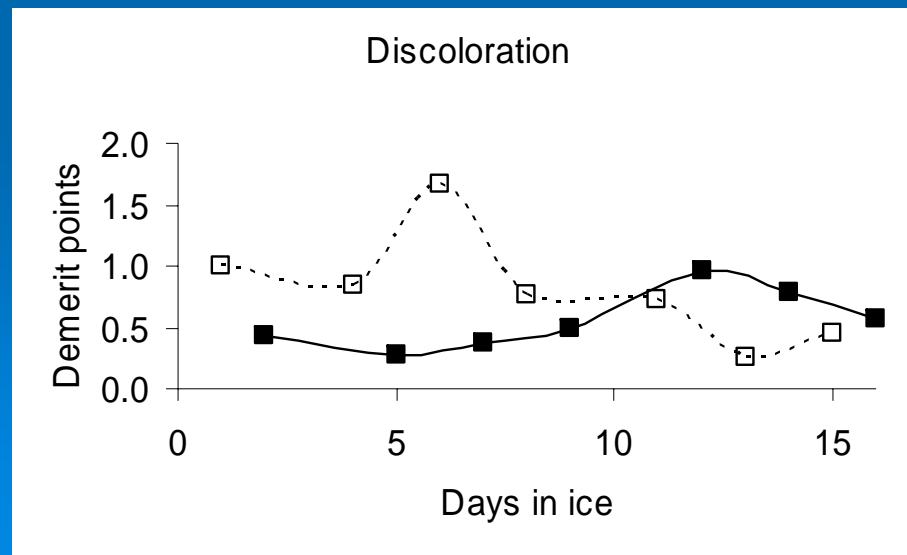
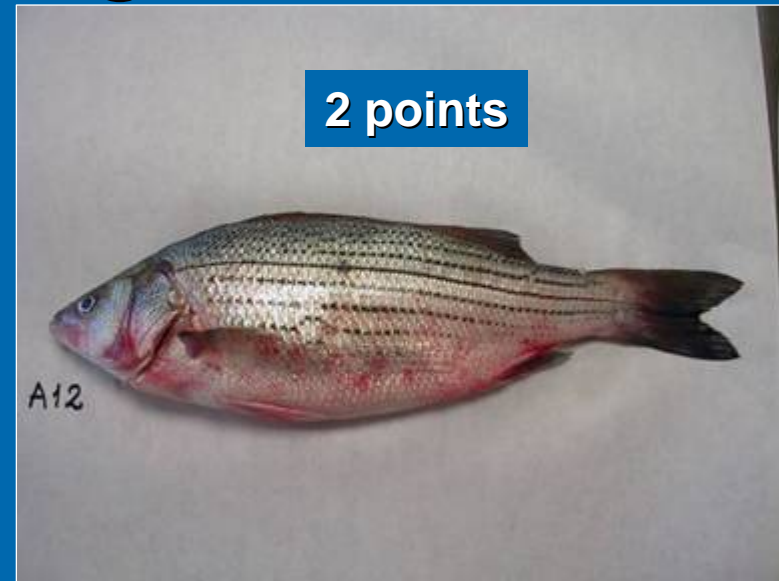
Skin color



Odor of whole fish



# Bruising



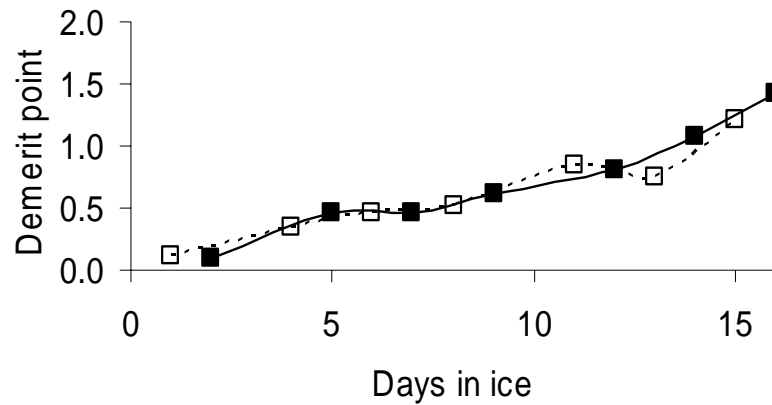
# Eyes

Parameter	Description	Points
Pupil	Black, clear, bright, iridescent	0
	Dark grey, mat, dull	1
	Milky, cloudy, hazy, light grey	2
Shape	Convex, bulging	0
	Flat	1
	Concave, sunken	2

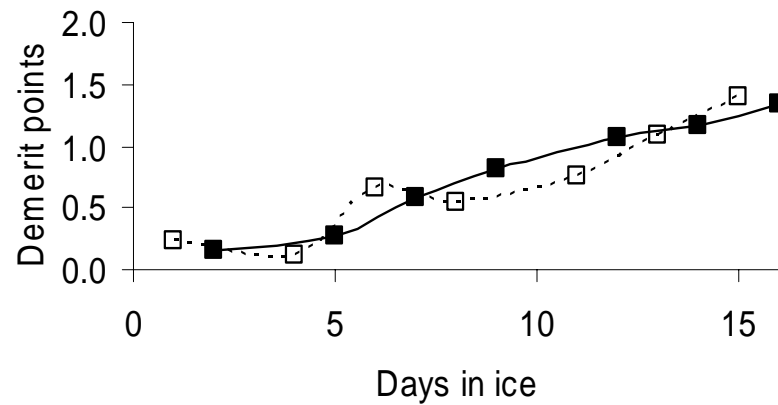
# Eyes



Color of pupils



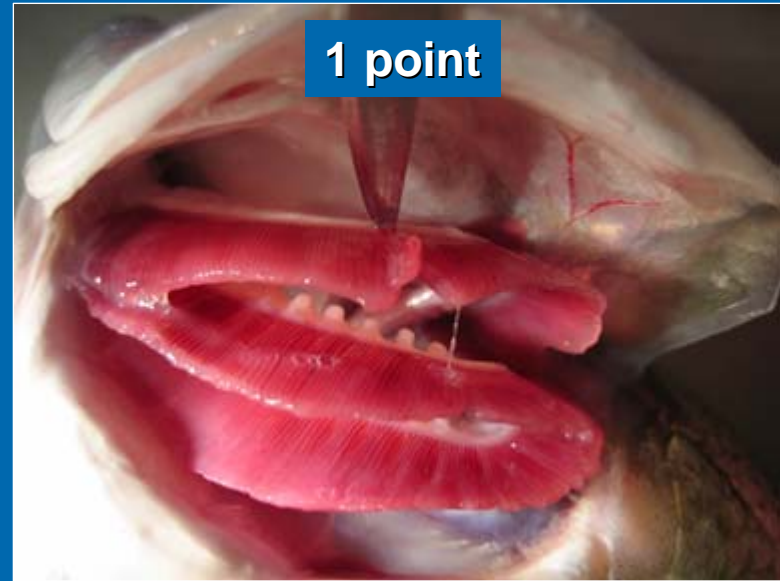
Shape of eyes



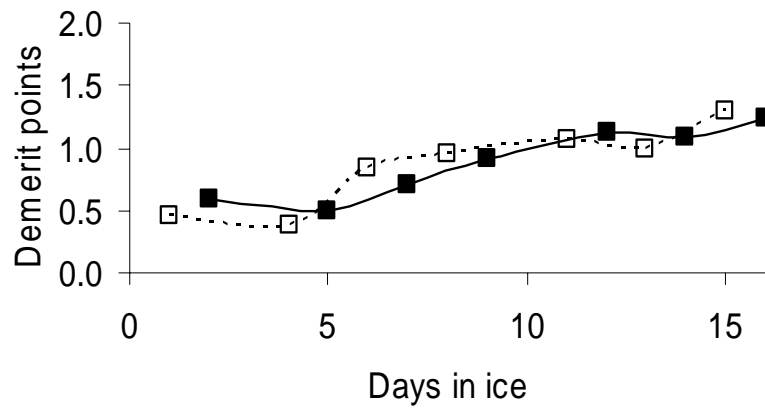
# Gills

Parameter	Description	Points
Mucus	Transparent, clear, none	0
	Milky, clotted	1
Color/ appearance	Bright red, red, burgundy	0
	Pale red, pink, light brown	1
	Brown, dull	2
Odor	Pond, fresh fish, fresh rain	0
	Melon, cucumber, metallic	1
	Musty, fishy, putrid, rotten	2

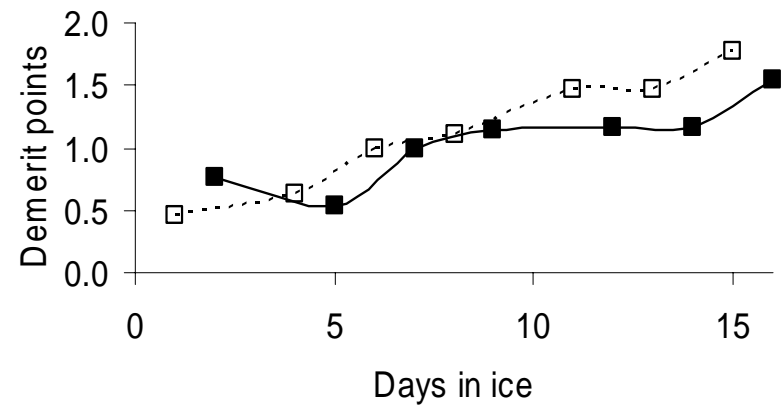
# Gills



Color of gills



Odor in gills



# What can this be used for?

- Quick quality evaluation
- Estimate the remaining shelf life

# Quick quality evaluation

- You can do it without a lot of preparation
- Compare your fish to fish from other farms
- You and the customer speak the same “language” – less risk of misunderstandings
- Evaluate the effect of changes in production on product quality
- Market your fish with measurable quality parameters
- Build trust – the customer knows what s/he gets

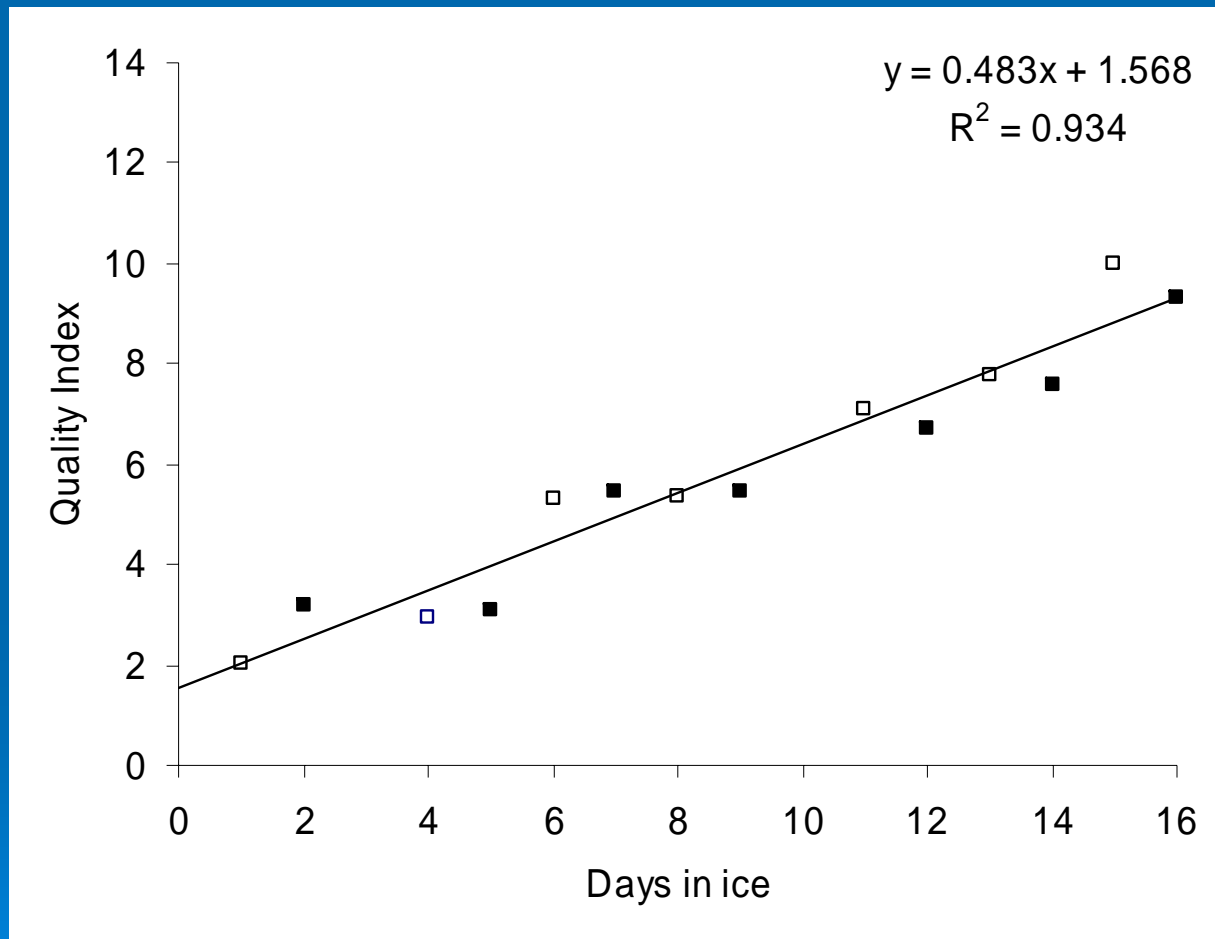
# Quality Grades

Quality Index	Quality Grade
0 – 5	high
6 – 9	medium
10 – 14	low

# Estimate the remaining shelf life

- Use it to better plan sales or processing
- The total sum of all demerit points is called the Quality Index (QI)
- The QI correlates closely to storage time in ice (if each parameter in the QI increases over time)
- Need to know relation between QI and time
- Need to know the total shelf life

# Quality Index and storage time



**This is for hybrid striped bass only  
Independent of farms and seasons**

# Shelf life?

- The sensory quality of cooked samples changed very little over the 16-day storage period
- Appearance and odor – no significant change over time
- Sweet flavor – decreased slightly over time.
- Firmness and juiciness - the parameters that changed the most. Fish softened and became dryer after app. 9 days.
- **Total shelf life – 14 days (“good quality” shelf life)**

# How to do it?

1. Evaluate the fish and add the scores -> **QI**
2. Find the corresponding storage time from the figure
3. Calculate the remaining shelf life  
(equals total shelf life minus storage time)

EXAMPLE...

## Quality Index Method (QIM) Scheme for Farmed Hybrid Striped Bass

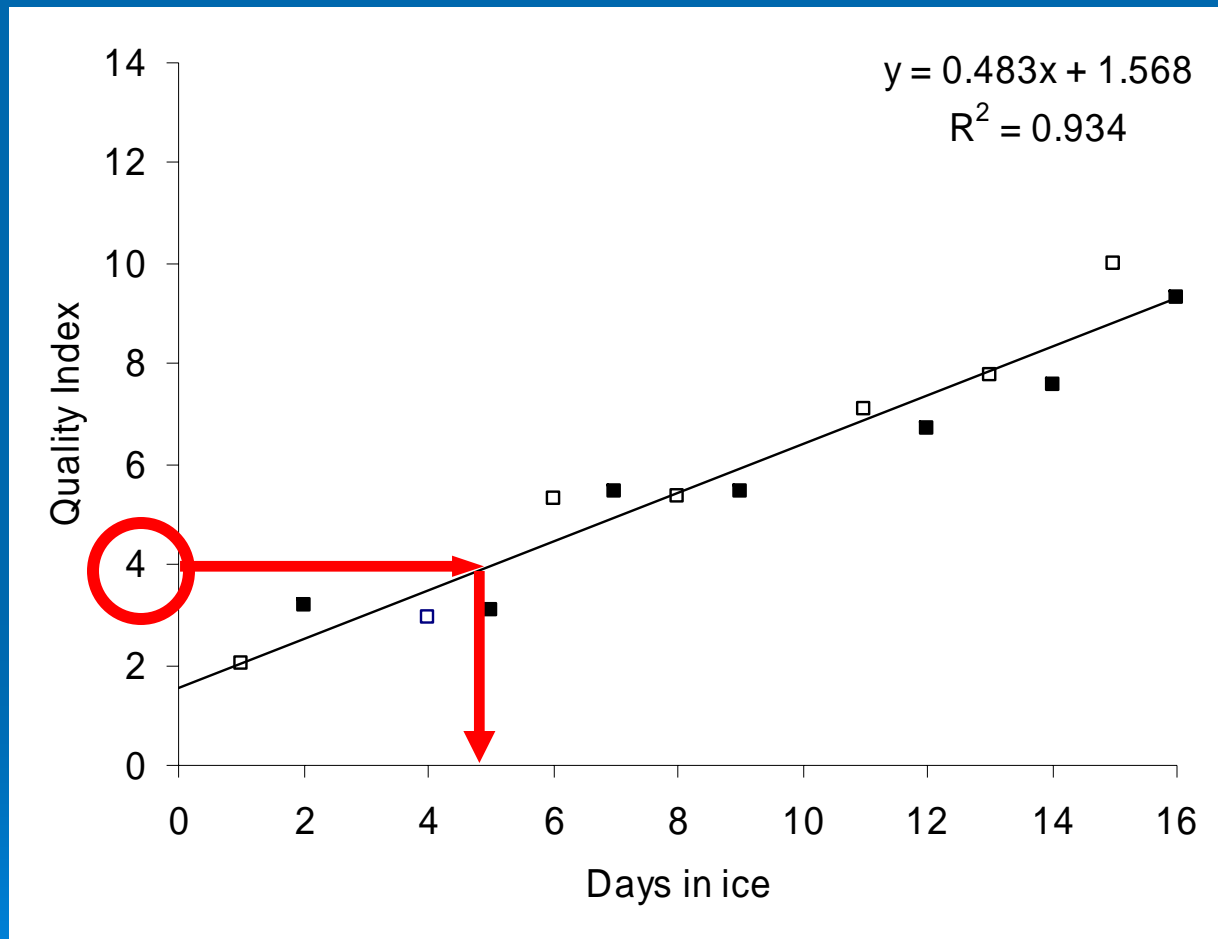
Name \_\_\_\_\_

Date \_\_\_\_\_

Quality parameters		Descriptions	Point						
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		Less pearl-shiny, yellowish, stripes still distinct	1						
	Odor	Neutral, pond, fresh fish, seaweed	0	0					
		Melon, cucumber, green grass	1						
		Cardboard, fishy, putrid, rotten	2						
	Texture	In rigor	0						
		Firm, resilient, finger mark disappears immediately	1	1					
		Soft, finger mark still persists after 3 seconds	2						
	Eyes	Pupil	Black, clear, bright, iridescent	0					
Dark gray, mat, dull			1	1					
Milky, cloudy, hazy, light gray			2						
Shape		Convex, bulging	0						
		Flat	1	0					
		Concave, sunken	2						
Gills	Mucus	Transparent, clear, none	0	0					
		Milky, clotted	1						
	Color/appearance	Bright red, red, burgundy	0						
		Pale red, pink, light brown	1	1					
		Brown, dull	2						
	Odor	Pond, fresh fish, fresh rain	0						
		Melon, cucumber, metallic	1	1					
		Musty, fishy, putrid, rotten	2						
	<b>Quality Index (total score)</b>			<b>0-14</b>	<b>4</b>				

QI is 4 !!

# Example



**The fish is 5 days old!**

# Example

Remaining shelf life

= total shelf life - storage time

= 14 days - 5 days

**is 9 days !**

# You only need the QI

Quality Index	Storage time	Remaining shelf life
1	0	14
2	1	13
3	3	11
4	5	9
5	7	7
6	8	5
7	11	3
8	13	1
9	15	0

Margin of error  $\pm 1$  day

# Some additional findings

- Earthy/muddy off flavors occur occasionally
  - Why do they occur?
  - Is this only a seasonal problem?
  - How do we prevent it from occurring?
- Fish from different farms look different
  - Color of skin, intensity of the stripes, degree of bruising...
  - How can this be controlled better?
  - Can we “design” fish with certain quality parameters to certain markets?

# Acknowledgments

- David Green and Greg Bolton, NCSU Seafood laboratory
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