

# QIM

A sensory analysis-based  
method of determining fish  
quality



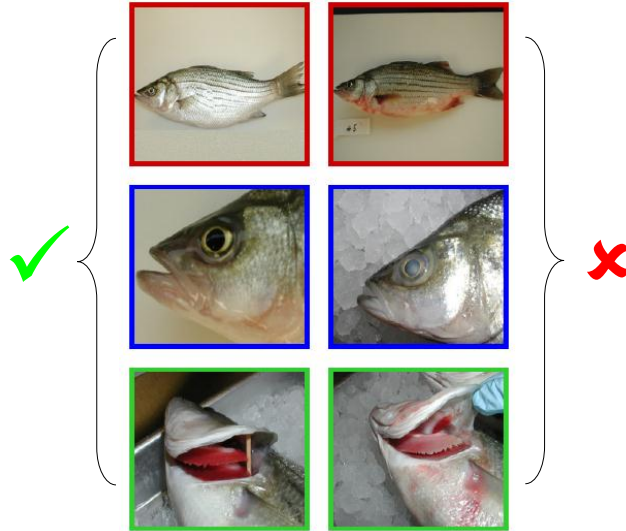
Eduardo Esteves  
Jaime Aníbal

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## *Post mortem* changes in sea food products

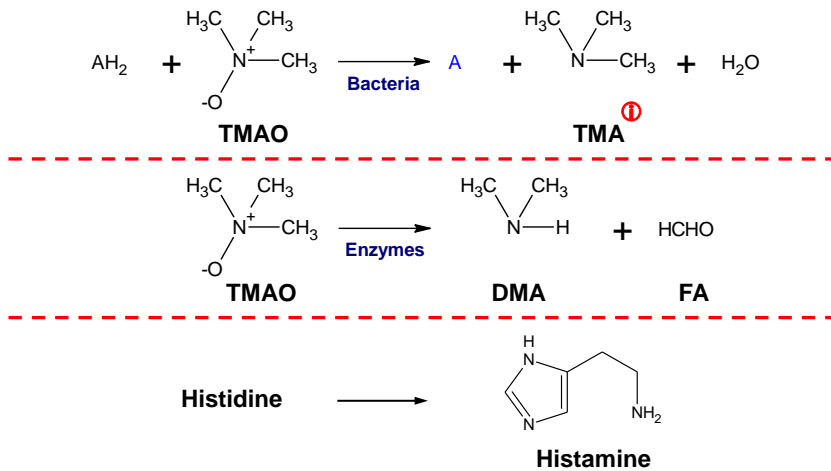
- Sensory changes
- Autolytic changes
- Microbiological changes
- Chemical changes

# Sensory changes



<http://www.seafoodlab.cmast.ncsu.edu/documents/QIM.pdf>

# Autolytic changes

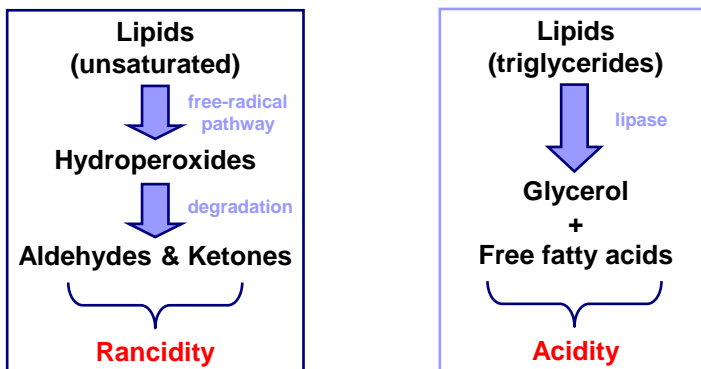


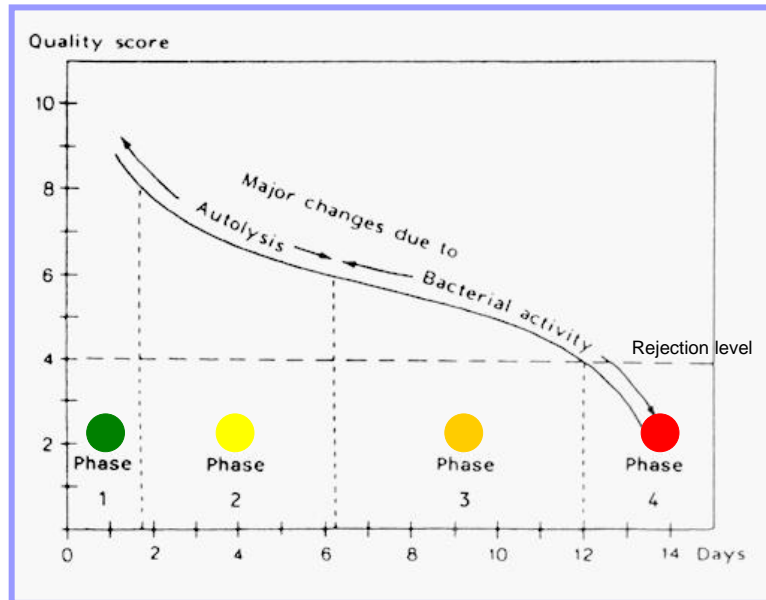
## Microbiological changes

- Specific spoilage organisms (SSO)
  - *Shewanella putrefaciens*
  - Vibrionaceae & Enterobacteriaceae
  - *Photobacterium* sp.
  - *Halococcus* & *Halobacterium*
- Spoilage is faster when  $SSO > 10^7$  CFU/g

## Chemical changes

- Lipid oxidation and hydrolysis





Adapted from Huss (1995) at <http://www.fao.org/docrep/v7180e/V7180E06.htm>

## Assessment fish freshness

- Traditionally, evaluated by sensory inspection.
- Since the 1970s, the EU uses a general scheme to grade fish freshness.
- Council Regulation (EC) No. 2406/96 establishes freshness grades before 1st sale of seafood...

## EU freshness grades

	E	A	B	Unfit (C)
<b>Skin</b>	Bright; shining; iridescent (not redfish) or opalescent; no bleaching	waxy; slight loss of bloom; very slight bleaching	dull; some bleaching	dull; gritty; marked bleaching and shrinkage
<b>Outer slime</b>	transparent; water white	milky	yellowish-grey; some clotting	yellow-brown; very clotted and thick
<b>Eyes</b>	convex; black pupil; translucent cornea	plane; slightly opaque pupil; slightly opalescent	slightly concave; grey pupil; opaque cornea	completely sunken; grey pupil opaque discoloured cornea
<b>Gills</b>	dark red or bright red; mucus translucent	red or pink; mucus slightly opaque	brown/grey and bleached; mucus opaque and thick	brown or bleached; mucus yellowish grey and clotted
<b>Peritoneum (in gutted fish)</b>	glossy; brilliant; difficult to tear from flesh	slightly dull; difficult to tear from flesh	gritty; fairly easy to tear from flesh	gritty; easily torn from flesh
<b>Gill and internal odours</b>	<b>all except plaice</b>	fresh; seaweedy; shellfishy	no odour; neutral odour; trace musty, mousy, milky, caprylic, garlic or peppery	definite musty, mousy, milky, caprylic, garlic or peppery; bready; malty; beery; lactic; slightly sour
	<b>plaice</b>	fresh oil; metallic; fresh-cut grass; earthy; peppery	oily; seaweedy; aromatic; trace musty, mousy or citric	oily; definite musty, mousy or citric; bready; malty; beery; slightly rancid; painty
				acetic; butyric; fruity; turnipy; amines; sulphide; faecal
				muddy; grassy; fruity; acetic; butyric; rancid; amines; sulphide; faecal

## Quality Index Method (QIM)

- Originally developed by the Tasmanian Food Research Unit (during the 1980s).
- Based upon **objective evaluation of certain attributes of raw fish** (e.g. skin, eyes, gills, etc.) using a **demerit points scoring system** (from 0 to 3).
- The **sum of demerit scores measures** (lack of) **sensory quality...**

# QIM scheme



*Morone saxatilis* x *M. chrysops*

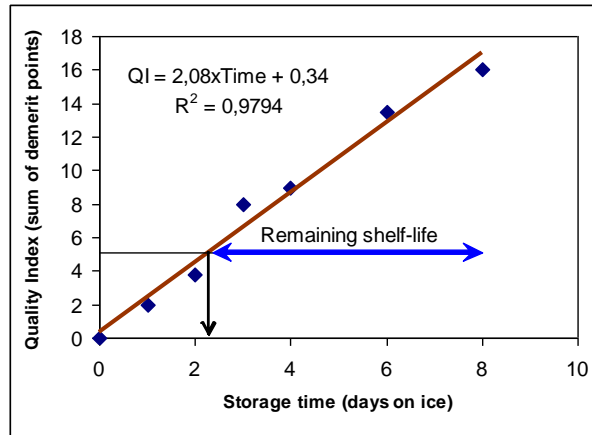
Quality Parameters	Descriptions	Points
Skin color/appearance	Pearl-shiny, iridescent pigmentation all over	0
	Less pearl-shiny, yellowish, stripes still distinct	1
Discoloration (red spots, bruising)	Slight to none	0
	Minor (5 - 10%)	1
	Severe (10 - 25%)	2
Whole fish	Neutral, pond fresh fish, seaweed	0
	Melon, cucumber, green grass	1
Odor	Cardboard, fishy, putrid, rotten	2
	Black, clear, bright, iridescent	0
Eyes	Dark gray, mat, dull	1
	Milky, cloudy, hazy, light gray	2
	Convex, bulging	0
Shape	Flat	1
	Concave, sunken	2
Color/appearance	Bright red, red, burgundy, uniform in color	0
	Pale red, pink, light brown	1
	Brown, dull, non-uniform in color	2
Mucus	Transparent, clear, none	0
	Milky, dotted	1
Gills	Pond, fresh fish, fresh rain	0
	Melon, cucumber	1
	Musty, fishy, putrid, rotten	2
Texture	In rigor	0
	Firm, resilient, finger mark disappears immediately	1
	Soft, finger mark still persists after 3 seconds	2
Quality Index (total score)		0-16

<http://www.seafoodlab.cmast.ncsu.edu/documents/QIM.pdf>

## Advantages of QIM

- Fast, non-destructive and objective method.
- No single attribute has excessive emphasis.
- The more distinctive changes during spoilage, the higher the score for a single parameter...


# QIM and shelf-life prediction



Adapted from Nunes M.L. & I. Batista (2004).

## Applied QIM

- QIM has been developed for several fish, crustacean and cephalopods species e.g.:
  - Anchovy
  - Cod
  - Gilthead seabream
  - Herring
  - Salmon
  - Sardine
  - Sole
  - Cuttlefish
  - Common octopus
  - Deepwater shrimp
  - etc.



# Thank you!

Eduardo Esteves @ <http://w3.ualg.pt/~eesteves>

Jaime Anibal @ <http://w3.ualg.pt/~janibal>

UNIVERSIDADE DO ALGARVE, Escola Superior de Tecnologia, Área Departamental de Engenharia Alimentar