

QIM

A sensory analysis-based
method of determining fish
quality



Eduardo Esteves

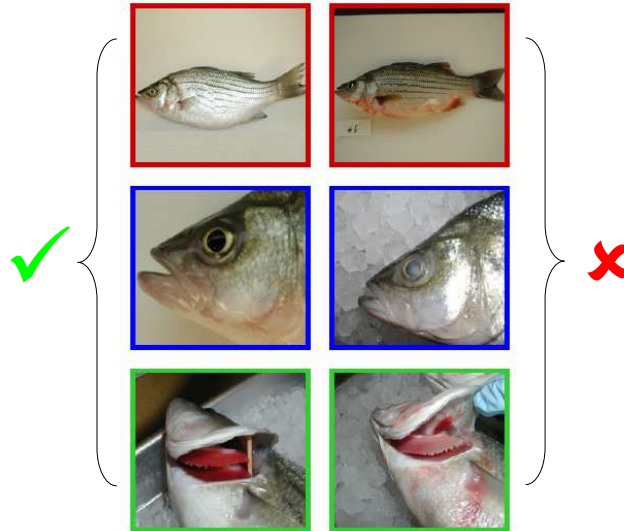
Jaime Aníbal

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Post mortem changes in seafood products

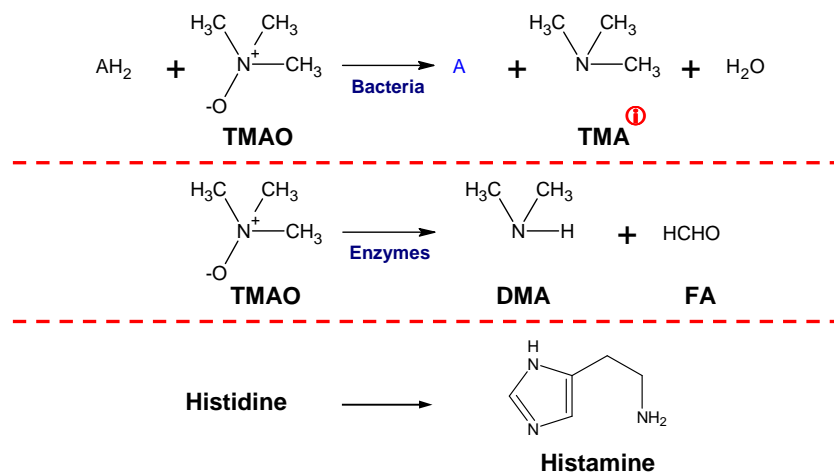
- Sensory changes
- Autolytic changes
- Microbiological changes
- Chemical changes

Sensory changes



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

Autolytic changes

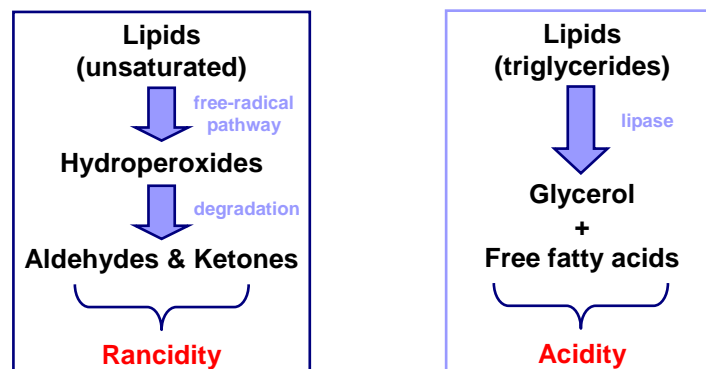


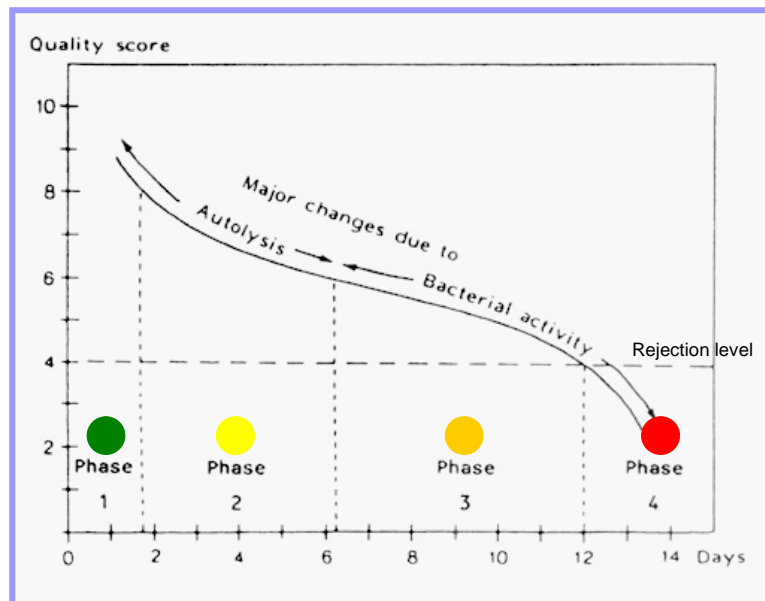
Microbiological changes

- Specific spoilage organisms (SSO)
 - *Shewanella putrefaciens*
 - Vibronaceae & Enterobacteriaceae
 - *Photobacterium* sp.
 - *Halococcus* & *Halobacterium*
- Spoilage is faster when SSO > 10⁷ 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)
Skin		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
Outer slime		transparent; water white	milky	yellowish-grey; some clotting	yellow-brown; very clotted and thick
Eyes		convex; black pupil; translucent cornea	plane; slightly opaque pupil; slightly opalescent	slightly concave; grey pupil; opaque cornea	completely sunken; grey pupil opaque discoloured cornea
Gills		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
Peritoneum (in gutted fish)		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
Gill and internal odours	all except plaice	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	acetic; butyric; fruity; turnipy; amines; sulphide; faecal
	plaice	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	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*

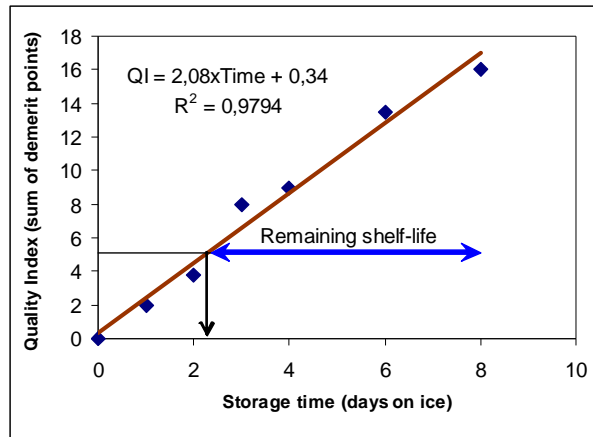
Quality Parameters	Descriptions	Points	
Whole fish	Skin color/appearance	Pearl-shiny, iridescent pigmentation all over	0
		Less pearl-shiny, yellowish, stripes still distinct	1
	Discoloration (red spots, bruising)	Slight to none	0
		Minor (5 - 10%)	1
	Severe (10 - 25%)	2	
Odor		Neutral, pond, fresh fish, seaweed	0
		Melon, cucumber, green grass	1
		Cardboard, fishy, putrid, rotten	2
Eyes	Pupil	Black, clear, bright, iridescent	0
		Dark gray, mat, dull	1
	Shape	Milky, cloudy, hazy, light gray	2
		Convex, bulging	0
	Flat	1	
	Concave, sunken	2	
Gills	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, clotted		1	
Odor		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!

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