VALUE ADDITION TO INDIAN MACKEREL (*Rastreliger kanagurta*) BY HOT SMOKING AND ASSSESSMENT OF THE SENSORY QUALITIES

By Christopher Hoareau
Fish Inspection and Quality Control Unit
Seychelles Bureau of Standards

Layout of Presentation

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Indian Mackerel

(*Rastreliger kanagurta*)

INTRODUCTION

Rastrelliger kanagurta

- pellagic shoaling fish, belong to scombridae family
- Annual landing - 250-300 tonnes, 6% - 8% total artisanal landing.
- Low interest in export market, due low economic value and highly perishable nature.
- 90% landed between November -April

Introduction (cont…)

- Local market unable to absorb during good season.
- Consumers prefer fresh mackerel, frozen storage develop early rancidity.
- Adding value by hot smoking
- Assess the market acceptability by sensory evaluation
- Likely food safety problems include microbial spoilage, histamine development and formation of PAH

Objectives

- Produce hot smoke mackerel with acceptable sensory qualities, low level of histamine and good keeping quality.
- Open new market opportunity for fishers and processors thus increasing their earnings.
- Provide consumers with a new product, stimulate increase in fish consumption, thus increase of protein intake.

Materials and Methods

Fish Preparation

- Fresh fish collected at point of landing.
- Cooled to 2°C- 0.5°C in ice slush
- Scaling, washing filleting and icing
- Yield of fillets approx. 44%

Brine Preparation and Brining

- 2 kg of salt – 20 litres of water
- Brine conc. of 100g salt/litre of water, approx. 40° on the salinometer
- Molasses added for flavour and colour
- Brining time – 15 minutes, fillet thickness -1 cm
- Brine temperature < 5° C
- Why this conc.? Consumers are use to this level in other smoked products e.g. in cold smoked marlin 1.5% salt in the fish.

Smoking

- Racking of fillets, skin down
- Smoking kiln - uses liquid smoke (Smokez Supreme C)
- Based on operator's experience following cycle was chosen:
  - Drying 30 minutes at 55°C
  - Smoking 16 minutes 60 °C
  - Drying 15 minutes at 60 °C
  - Smoking 16 minutes 55°C
  - Drying 10 minutes at 55°C

Sensory Assessment

- Aim was to find out if the smoked fish had good sensory qualities, acceptable to consumers.
- A positive response will give a general indication of success on the market.
- Sensory assessment (taste, flavour, salt level, colour)
- 25 standard questionnaire administered to fish establishments employees and fish inspectors
- Nineteen entries

Questionnaire used in sensory assessment.

Criteria Assessed	Characteristic of each criteria being assessed					
Saltiness	Acceptable level of salt		Slightly salty but acceptable		To salty	
Flavour	Pleasant odour and flavour typical of smoked fish		Slight odour and flavour of smoked fish		No odour and flavour of smoked fish	
Colour	Light brown, attractive		Slightly dull		Dark brown, over smoked, unattractive	
Juiciness	Very juicy		Slightly dry		Too dry	

Result of Sensory Assessment

Salt Level

Criteria	Scores	Percentage
Acceptable level of salt	17	90%
Slightly salty but acceptable	2	10%
Too salty, unacceptable	0	0%

Flavour

Criteria	Scores	Percentage
Pleasant odour and flavour, typical of smoked fish	19	100%
Slight odour and flavour of smoked fish	0	0
No odour and flavour of smoked fish	0	0

Result of Sensory assessment (cont.)

Colour

Criteria	Scores	Percentage
Light brown, attractive	18	95%
Slightly dull	1	5%
Dark brown, over smoked, unattractive	0	0

Dryness

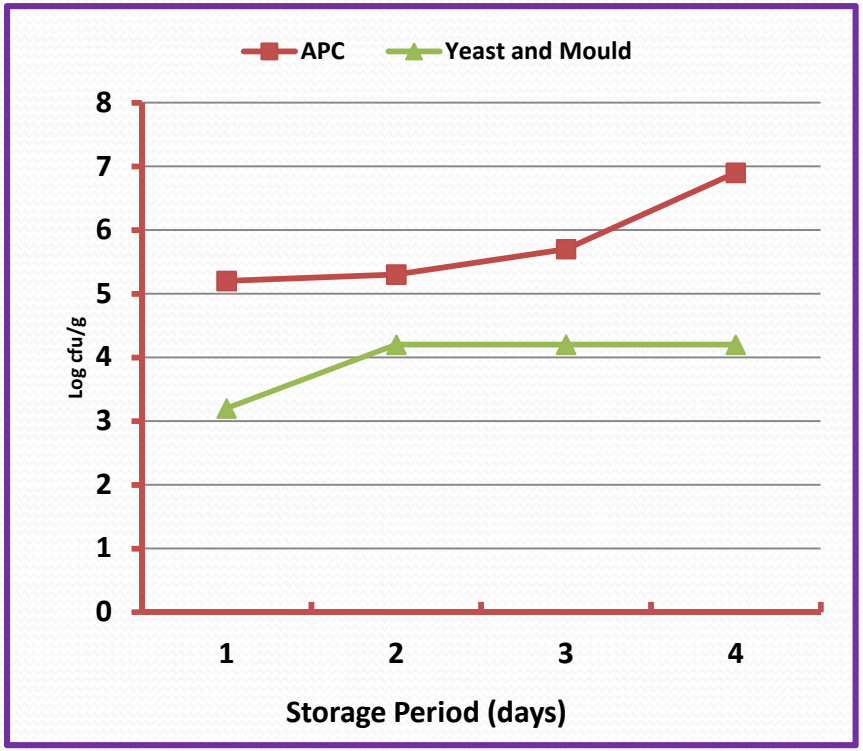
Criteria	Scores	Percentage
Very juicy	10	53%
Medium	8	42%
Too dry	1	5%

Sensory Assessment (cont.)

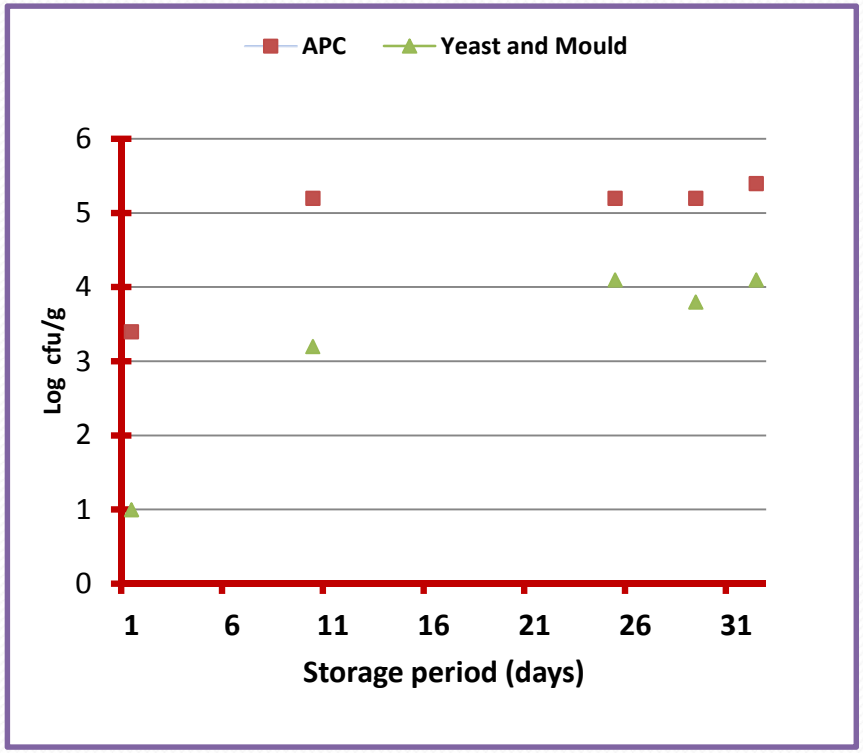
- Based on the scores for the four parameters, the product was very acceptable.
- At 1.0 to 1.5% salt in the product, most assessors found it acceptable
- There was verbal expression of appreciation from the some assessors.
- The highest score was 100% for flavour and odour.
- Lowest score was for dryness, this can be easily controlled by reducing drying period.

Result of Microbiological analysis

Storage at ambient temperature (24-28°C)



Storage under chill condition (6-8°C)



Result of Microbiological analysis (cont)

Storage at ambient temperature

- Slow growth of APC (2 logs in 96 hrs) (10^5 to 10^7)
- Maximum growth between 72- 96 hrs
- Yeast and mould grew faster within the first 24 hrs (10 folds 1.5 x10^3 to 1.5x10^4)
- Chemicals in the smoke mainly acids and aldehydes had inhibitory effect.

Storage under chill condition

- APC growth significant from day 1 to 10 (2 logs)
- Both APC and yeast/mould growth showed same pattern of increase.
- Lapse in testing b/t day 10- 25 - however no significant increase in APC but 1 log increase in yeast and mould. Some samples had visible mould growth at day 10.

Histamine analysis

- Mackerel belong to scombridae family, posses large quantity of histidine in muscles tissues.
- Histamine produced by decarboxilation of histidine under condition of temperature abuse. Organisms causing dexacarbolation include *Klebsiella spp, Morganella spp, Proteus spp.* Optimal growth range 15°C – 30°C
- Histamine tested on day one and after one month under chill storage.
- HISTAMARINE , Enzyme Immunoassay Kit Ref. IM2369 method.
- Very negligible, levels were between 1.5 to 1.55 ppm

Conclusion

- Response very positive and encouraging.
- Possibility exist for a good market for hot smoked mackerel in Seychelles
- Absence of E coli in all samples means that microbial growth is mainly associated with spoilage organisms rather those of public health significance.

Conclusion (cont….)

- Storage at ambient temperature not recommended more than 2 days - due to significant growth of APC and Yeast and Mould

- Storage at 4°C – 6°C showed significant growth of yeast and mould after 10 days. Absence of E coli in all samples means that microbial growth is mainly associated with spoilage organisms rather those of public health significance

Recommendations (cont.)

- **Testing for food safety parameters such as PAH (benzo-a-pyrene, chrysene and benz-a-anthracene.**
- **Conduct a market acceptance survey of the product.**
- **Undertake a consumers preference test based on 1) level of salt and 2) comparing the products after smoking using liquid smoke and traditional method such as saw dust.**
- **Conduct a cost benefit analysis to ensure that on a commercial basis, the project is economically viable.**

Thank you for your attention!!