

Quality assessment of a lot of frozen mackerel, respective  
frozen handcut mackerel fillets (*Scomber scombrus*)

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## RIVO report

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### Quality assessment of a lot of frozen mackerel, respective frozen handcut mackerel fillets (*Scomber scombrus*)

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Annex 1

## Summary

At the request of Van Ameyde Marine in Amsterdam RIVO BV assessed the quality of a number of blocks of frozen whole mackerel and a number of blocks of frozen handcut mackerel fillets (*Scomber scombrus*) by means of sensorial and chemical analysis.

The samples were taken from a lot, which was partial "damaged" during shipment from Shetland to Velsen. After discharging in Velsen the lot was sorted in a part of cartons in "good condition" and a part in cartons in "damaged condition".

According to the EC freshness scheme in general both parts of the lot of whole mackerel were qualified as being good.

Based on the results of the sensorial analysis the conclusion can be drawn that the quality of the samples of mackerel fillets varies between good and very good.

In all samples of mackerel fillets the histamine content was well below rejection level.

## 1. Introduction

Van Ameyde Marine in Amsterdam requested RIVO BV to take samples of a lot of frozen whole mackerel respective frozen handcut mackerel fillets (*Scomber scombrus*), in order to ascertain the quality by means of sensorial and chemical analysis.

## 2. Sampling and description of the lot

Mr. R. Simonides, sales representative of Ameyde Marine, stated that the lot was shipped of Shetland to Velsen for sequel export to Africa. During shipment from Shetland to Velsen the lot was damaged due to bad weather conditions.

After discharging in Velsen the lot was sorted in a part of cartons in "good condition" and in a part of cartons in "damaged condition" and then stored in a cold storage warehouse of Daalimpex Coldstores B.V. in Velsen.

The general labelling on the by Daalimpex coded cartons of whole mackerel as well as mackerel fillets was as follows:

Shetland Catch	(whole mackerel: 20 kg)
Gremista, Larwick	(mackerel fillets: 10 kg)
Shetland, ZE1 OPX	

The sampling of the lot took place on 17-03-2003 and was carried out by mr. R. Simonides, representative of Van Ameyde Marine, and mr. C. Papworth, representative of LGSA Marine in the presence of mr. K.K. Brünner and mr. J.W.M. Gouda, both employees of RIVO BV.

Besides sampling the "damaged" consignment three control samples were taken from a very recent "not damaged" consignment.

After sampling the sample-blocks were by RIVO BV recoded as follows:

Whole mackerel/ mackerel fillets	Cartons in "good condition"		Cartons in "damaged condition"	
	Daalimpex code	RIVO code	Daalimpex code	RIVO code
Whole mackerel	50764 0010 013	1		
Whole mackerel	50764 0010 0125	2		
Whole mackerel	50764 0010 0054	3		
Whole mackerel	50766 0010 0083	4	50766 0020 0003	13
Whole mackerel	50766 0010 0025	5	50766 0020 0015	14
Whole mackerel			50766 0020 0003	
Whole mackerel	50777 0010 0060	6	50777 0020 0017	16
Whole mackerel	50777 0010 0009	7		
Whole mackerel	50774 0010 0011	8	50774 0020 0002	17
Whole mackerel	50772 0010 0001	9		
Whole mackerel	50769 0010 0022	10	50769 0020 0002	18
Whole mackerel	50770 0010 0093	11	50770 0020 0041	19
Whole mackerel	50770 0010 0004	12	50770 0020 0042	20
Control sample	54041 0010	I		
Control sample	54041 0010	II		
Control sample	54041 0010	III		
Mackerel fillet	50780 0010 0005	1		
Mackerel fillet	50780 0010 0005	2		
Mackerel fillet	50780 0010 0005	3		
Mackerel fillet	50779 0010 0008	4		
Mackerel fillet	50778 0010 0007	5		

## 3. Examination

### 3.1 Sensorial analysis

After thawing, of each sample-block of whole mackerel five at random chosen fishes were judged according to the 3.0 point freshness scheme of the European Community (3.0 = excellent, 1.0 = borderline acceptability) with respect to the elements skin, skin mucus, consistency of flesh, gill covers, eye, gills and smell of gills (see Appendix A). The average score of the seven elements is considered as the quality-limiting factor.

After thawing the mackerel fillets were judged in raw state on odour and in cooked state on odour, taste and texture. Figures are given in an hedonic scale from 1-9: 1 = bad, 9 = excellent and 4 = border of acceptability.

### 3.2 Chemical analysis

In the five sample-blocks of mackerel fillets the content of histamine was determined. The chemical analysis was contracted out to a qualified routine laboratory.

## 4. Results

The results of the sensorial analysis of the whole mackerel according to the EC freshness scheme are given in table 1 (cartons in "good condition") and table 2 (cartons in "damaged condition").

The results of the sensorial analysis of the samples of mackerel fillets, according to the RIVO freshness scheme for raw and cooked mackerel, are summarised in table 3.

The results of the chemical analysis in the samples of mackerel fillets are given in table 4.

## 5. Conclusions

1. In general the conclusion can be drawn that both sorted parts of the lot (cartons of whole mackerel in "good condition" as well as cartons of whole mackerel in "damaged condition") are of good quality.  
Of all judged sample blocks the average of the seven sensorial elements in the EC freshness scheme is amply above rejection level. However, only with respect to the sensorial element gills and/or smell of gills the quality of two cartons in "good condition" (sample no. 1 and 3), two cartons in "damaged condition" (sample no. 17 and 19) and one control carton has to be considered as doubtful, because the score for this element in question is just below rejection level.
2. Based on the results of the sensorial analysis the quality of the five sample blocks of mackerel fillets varies between good and very good.
3. The histamine content in all five sample blocks of mackerel fillets is well below rejection level.



Table 1. Results of the sensorial analysis of the whole mackerel according to the EC freshness scheme (cartons in "good condition")

RIVO Sample code	Score sensorial element							Average score
	Skin	Skin mucus	Consistency of flesh	Gill covers	Eye	Gills	Smell of gills	
1	2.4	1.8	2.4	1.5	1.5	0.8	1.5	1.7
2	1.8	2.4	2.4	1.5	1.8	0.8	1.5	1.7
3	2.4	2.6	2.6	2.4	2.4	2.2	2.4	2.4
4	2.7	2.9	2.9	2.5	2.4	2.5	2.4	2.6
5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
6	2.4	2.4	2.4	2.4	2.4	2.4	1.8	2.3
7	2.4	2.7	2.7	2.4	2.4	2.4	2.7	2.5
8	2.4	2.4	2.4	1.8	1.5	1.8	1.5	2.0
9	2.7	2.5	2.4	2.6	2.4	1.5	1.4	2.2
10	2.6	2.2	2.4	2.9	2.4	2.4	2.4	2.5
11	2.9	2.9	2.4	2.3	2.4	2.3	2.9	2.6
12	2.4	2.4	2.4	2.7	2.4	2.7	2.7	2.5
Control I	2.4	2.9	2.5	2.4	2.3	1.5	2.6	2.4
Control II	2.9	2.4	2.9	2.4	2.4	0.8	2.4	2.3
Control III	2.9	2.9	2.9	2.9	2.4	1.8	2.4	2.6

Interpretation of the figures:

E-(extra)quality: > 2.7 (excellent)

A-quality: 2 - 2.7 (satisfactory to very good)

B-quality: 1 - 2 (just acceptable to satisfactory)

C-quality: <1 (rejectable)

Table 2. Results of the sensorial analysis of the whole mackerel according to the EC freshness scheme (cartons in "damaged condition")

RIVO Sample code	Score sensorial element							Average score
	Skin	Skin mucus	Consistency of flesh	Gill covers	Eye	Gills	Smell of gills	
13	2.9	2.9	2.9	2.4	2.4	1.8	1.7	2.4
14	2.7	2.7	2.4	2.7	2.7	2.7	2.7	2.7
15	2.7	2.3	1.5	1.4	2.3	1.4	1.3	1.8
16	2.4	2.4	1.5	1.8	1.8	1.8	2.4	2.0
17	2.2	2.1	2.2	2.2	2.2	0.7	1.3	1.8
18	2.9	2.7	2.9	2.4	2.4	1.8	1.8	2.4
19	1.5	1.5	1.5	0.8	1.5	0.7	0.7	1.2
20	1.8	1.7	1.7	2.3	2.3	2.2	2.4	2.1

Interpretation of the figures:

E-(extra)quality: > 2.7 (excellent)

A-quality: 2 - 2.7 (satisfactory to very good)

B-quality: 1 - 2 (just acceptable to satisfactory)

C-quality: <1 (rejectable)

Table 3. Results of the sensorial analysis of five samples of mackerel fillets according to the RIVO freshness scheme for raw and cooked mackerel

RIVO Sample code	Odour in raw state		Odour and taste in cooked state		Texture in cooked state	
	Description	Score <sup>1)</sup>	Description	Score <sup>1)</sup>	Description	Score <sup>1)</sup>
1	Metallic, fresh, cucumber	8.0	Fresh, creamy, broth, neutral	8.0	Firm, smooth	8.0
2	Still fresh, slightly metallic, slightly rancid	6.7	Still fresh, slightly rancid, broth	6.7	Still firm and smooth	7.0
3	Still fresh, slightly metallic, slightly rancid	6.7	Still fresh, slightly rancid, broth	6.7	Still firm and smooth	7.0
4	Still fresh, slightly metallic, slightly rancid	6.7	Still fresh, slightly rancid, broth	6.7	Still firm and smooth	7.0
5	Metallic, fresh, cucumber	8.0	Fresh, creamy, broth, neutral	8.0	Firm, smooth	8.0

<sup>1)</sup> Interpretation of the figures:

9 = excellent	8 = very good	7 = good
6 = satisfactory	5 = moderate	4 = acceptable
3 = rejectable	2 = bad	1 = very bad

Table 4. Results of the chemical analysis in five samples of mackerel fillets

RIVO sample code	LIMS no.	Histamine <sup>1)</sup> in mg/kg
1	2003/0556	<10
2	2003/0557	<10
3	2003/0558	<10
4	2003/0559	<10
5	2003/0560	<10

<sup>1)</sup> International for the histamine content a rejection level of 100 mg/kg is used.

**APPENDIX A**Freshness scheme of the European Community for mackerel <sup>1)</sup>

Sensorial element	Freshness score <sup>2)</sup>			
	E: >2.7	A: 2-2.7	B: 1-2	C: <1
Skin	Bright pigmentation, bright, shining iridescent colours; clear distinction between dorsal and central surfaces	Loss of lustre and shine; duller colours; less difference between dorsal and ventral surfaces	Dull, lustreless, insipid colours; skin creased when fish curved	Very dull pigmentation; skin coming away from flesh
Skin mucus	Aqueous, transparent	Slightly cloudy	Milky	Yellowish grey, opaque mucus
Consistency of flesh	Very firm, rigid	Fairly rigid, firm	Slightly soft	Soft (flaccid)
Gill covers	Silvery	Silvery, slightly red or brown	Brownish and extensive seepage of blood from vessels	Yellowish
Eye	Convex, bulging; blue-black bright pupil, transparent "eyelid"	Convex and slightly sunken; dark pupil; slightly opalescent cornea	Flat; blurred pupil;	Concave in the centre; grey pupil; milky cornea
Gills	Uniformly dark red to purple. No mucus	Less bright colour, paler at edges. Transparent mucus	Becoming thick discoloured opaque mucus	Yellowish; milky mucus
Smell of gills	Fresh seaweed; pungent; iodine	No smell of seaweed. Neutral smell	Slightly sulphurous, fatty smell, rancid bacon curtings or rotten fruit	Rotten sour

<sup>1)</sup> Council regulation (EC) No. 2406/96 of 26 November 1996.

<sup>2)</sup> Interpretation of the figures:

E-(extra)quality: > 2.7 (excellent)

A-quality: 2-2.7 (satisfactory to very good)

B-quality: 1-2 (just acceptable to satisfactory)

C-quality: <1 (rejectable)