

codex alimentarius commission



FOOD AND AGRICULTURE
ORGANIZATION
OF THE UNITED NATIONS

WORLD
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ORGANIZATION



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Agenda Item 5a)

CX/MAS 05/26/7

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON METHODS OF ANALYSIS AND SAMPLING

Twenty-sixth Session

Budapest, Hungary, 4 – 8 April 2005

ENDORSEMENT OF METHODS OF ANALYSIS PROVISIONS IN CODEX STANDARDS

This document contains the Methods of analysis proposed by the following Committees and Task Forces in Draft Standards and Proposed Draft Standards under elaboration or as a revision of the methods included in adopted standards.

This document includes the replies of individual Committees and Task Forces to the questions from the last session(s) of CCMAS concerning specific methods of analysis under the relevant sections.

Part I. Methods of Analysis

- A. Codex Committee on Fats and Oils
- B. Codex Committee on Processed Fruits and Vegetables
- C. *Ad hoc* Intergovernmental Task Force on Fruit and Vegetable Juices
- D. Codex Committee on Fish and Fishery Products
- E. Codex Committee on Nutrition and Foods for Special Dietary Uses
- F. Codex Committee on Cereals, Pulses and Legumes (Draft Standard for Instant Noodles)

Part II. Sampling

Codex Committee on Cereals, Pulses and Legumes (Draft Standard for Instant Noodles)

PART I. METHODS OF ANALYSIS

A. CODEX COMMITTEE ON FATS AND OILS¹

1. Draft Standard for Fat Spreads and Blended Spreads (at Step 6)

COMMODITY	PROVISION	METHOD	PRINCIPLE	Note
Fat Spreads and Blended Spreads	Milk fat content (butyric acid)	AOAC 990.27 or AOCS Ca 5c-87 (97).	Gravimetry	see below CCFO discussion
	water, solids-non-fat and fat content	ISO 3727: 1977; AOAC 920.116; or IDF 80: 1977.	Gravimetry	method used for butter (Type I)
	Salt content	IDF 12B: 1988, ISO CD 1738 or AOAC 960.29.	Titrimetry	
	Vitamin A	AOAC 985.30; AOAC 992.04; or JAOAC 1980, <u>63</u> , 4.	Spectrophotometry	
	Vitamin D	AOAC 981.17.	Liquid chromatography	
	Vitamin E	ISO 9936: 1997	Spectrophotometry	

The Committee agreed that it was inappropriate to give results as a range using the natural range of butyric acid in milk fat as the natural variability of butyric acid in milk fat is very large, reportedly 2.9 to 4.0%. It was noted that many organisations prescribe an “average factor” for butyric acid to allow the estimation of milk fat in compound foods and the Committee agreed to follow this approach.

The Committee noted that the most effective way of monitoring the compositional quality of such products was through knowledge of the components used and recommended that the “traceability” of such products be investigated, possibility through the activities of the Codex Committee on Food Import and Export Inspection and Certification Systems (ALINORM 05/28/17, paras. 25-26 and Appendix IV).

2. Standard for Olive Oils and Olive Pomace Oils

COMMODITY	PROVISION	METHOD	PRINCIPLE	Note
Olive Oils and Olive Pomace Oils	Stigmastadienes	COI/T.20/Doc. no. 11 or ISO 15788-1:1999 or AOCS Cd 26-96 (03)	Gas chromatography	Type II (already endorsed)
	Stigmastadienes	ISO 15788-2: 2003	HPLC	Type III proposed

The Committee recalled that the Committee on Methods of Analysis and Sampling had endorsed temporarily the ISO 15788-2: 2003 method for stigmastadienes and referred it to the CCFO for consideration. The Committee agreed to recommend that the ISO 15788-2: 2003 method for stigmastadienes be retained as an alternative method, and so designated as a Type III method, with the ISO 15788-1 method designated as the Type II method (ALINORM 05/28/17, para. 37).

3. Standard for Named Vegetable Oils

¹ ALINORM 05/28/17

Amendment proposed to the methods in the current Standard (ALINORM 05/28/17, para. 42)

COMMODITY	PROVISION	CURRENT METHOD	SUGGESTED REPLACEMENT	PRINCIPLE	Type
Named Vegetable Oils	Arsenic	AOAC 952.13	AOAC 952.13; AOAC 942.17, or AOAC 958.15 as Type II method	Colorimetry (Diethyldithiocarbamate)	III
		AOAC 942.17		Colorimetry (molybdenum blue)	III
		AOAC 958.15		AAS	II

B. CODEX COMMITTEE ON PROCESSED FRUITS AND VEGETABLES²

1. General Methods of Analysis for Processed Fruits and Vegetables

COMMODITY	PROVISION	METHOD	PRINCIPLE	Note
Processed fruits and vegetables (except canned bamboo shoots, pH determined by AOAC 981.12)	pH	ISO 1842:1991	Potentiometry	Type IV - Replace AOAC 981.12 and ISO 11289: 1983

REPLACE/UPDATE: At the suggestion of the 24th CCMAS (ALINORM 03/23, para. 67 and App. VI/H1) replace methods AOAC 981.12 and ISO 11289: 1983 by ISO 1842:1991 for processed fruits and vegetables.

Provisions in individual standards: Proposed draft Codex Standards for Processed Tomato Concentrates and Preserved Tomatoes (proposed for adoption at Step 5 by the 28th CAC) Sections 3.2.2.4 and 3.2.3.4 respectively.

² ALINORM 05/28/27, paras. 99-100 and Appendix VIII-Part I

2. Revocation and Replacement of Codex Recommended Methods (CAC/RMs) for Processed Fruits and Vegetables

The 20th Session of CCMAS (October 1995) advised the commodity committees to consider replacing Codex Methods of Analysis and Sampling (CAC/RMs) with more modern methods as appropriate and to replace the CAC/RM numbers with the original literature references, if possible (ALINORM 97/23, para. 52). The 21st CCMAS (March 1997) further recommended that when the original reference of a CAC/RM was available, this reference should replace the CAC/RM number, and when the original reference was not available, the full text of the method should be included in *Codex Alimentarius* Volume 13 and the CAC/RM number reference deleted (ALINORM 97/23A, para. 44). The 22nd Session of the Commission agreed to the abolition of the CAC/RM Numbering System as recommended by CCMAS (ALINORM 97/37, para. 145). The 22nd Session of the CCPFV therefore recommended the following amendments.

COMMODITY	PROVISION	CAC/RM	METHOD PROPOSED	PRINCIPLE	Note
Processed fruits and vegetables	Determination of Drained Weight	36-1970	AOAC 968.30 (Codex General Method for processed fruits and vegetables)	Sieving Gravimetry	Replace CAC/RM 36-1970 with AOAC 968.30, proposed as Type I AOAC 968.30 was endorsed by CCMAS as Type I for the determination of drained weight in the Codex Standards for Canned Bamboo Shoots, for Kimchi and the Draft Standard for Pickled Products (renamed Draft Standard for Pickled Fruits and Vegetables).
Canned green peas	Determination of Alcohol Insoluble Solids	47-1972	AOAC 938.10	Sieving	Replace CAC/RM 47-1972 with AOAC 938.10, proposed as Type II
Jams, Jellies and Marmalades	Determination of Mineral Impurities (Sand)	49-1972	AOAC 971.33	Gravimetry	Replace CAC/RM 49-1972 with AOAC 971.33 as Type II
Processed Tomato Concentrates	Determination of Mineral Impurities (Sand)	49-1972	AOAC 971.33	Gravimetry	Replace CAC/RM 49-1972 with AOAC 971.33 as Type IV

C. AD HOC INTERGOVERNMENTAL TASK FORCE ON FRUIT AND VEGETABLE JUICES³

Draft General Standard for Fruit Juices and Nectars

COMMODITY	PROVISION	METHOD	PRINCIPLE
Fruit Juices and Nectars	Sections 3.2 Quality Criteria and 3.3 Authenticity ⁴	Determination of Acetic acid EN 12632 or IFU Method No 66 (1996)	Enzymatic determination
		Determination of Alcohol (ethanol) IFU Method No 52 (1983/1996)	Enzymatic determination
		Determination of anthocyanins IFU Method No 71 (1998)	HPLC
		Determination of ash in fruit products AOAC 940.26 EN 1135 (1994) IFU Method No 9 (1989)	Gravimetry
		Determination of Beet sugar in fruit juices AOAC 995.17	Deuterium NMR
		Determination of Benzoic acid as a marker in orange juice AOAC 994.11	HPLC
		Determination of C ¹³ /C ¹² ratio of ethanol derived from fruit juices JAOAC 79, No. 1, 1996, 62-72	Stable isotope mass spectrometry
		Determination of Carbon stable isotope ratio of apple juice AOAC 981.09 - JAOAC 64, 85 (1981)	Stable isotope mass spectrometry

³ ALINORM 05/28/39, Appendix II

⁴ **3.2 Quality Criteria**

The fruit juices and fruit nectars shall have the characteristic colour, aroma and flavour of juice from the same kind of fruit from which it is made.

The fruit shall retain no more water from washing, steaming or other preparatory operations than technologically unavoidable.

3.3 Authenticity

Authenticity is the maintenance of the product's essential physical, chemical, organoleptical, and nutritional characteristics of the fruit(s) from which it comes.

3.4 Verification of Composition, Quality and Authenticity

Fruit juices and nectars should be subject to testing for authenticity, composition, and quality where applicable and where required. The analytical methods used should be those found in Section 9, Methods of Analysis and Sampling.

		Determination of Carbon stable isotope ratio of orange juice AOAC 982.21	Stable isotope mass spectrometry
		Determination of Carotenoid, Total/individual groups EN 12136 (1997) - IFU Method No 59 (1991)	Precipitation/fractionation
		Determination of Carotenoids, Total ISO 6558-2:1992	Column chromatographic separation and spectrometry
		Determination of Centrifugable pulp EN 12134 - IFU Method No 60 (1991/1998)	Centrifugation/% value
		Determination of Chloride (expressed as sodium chloride) EN12133 IFU Method No 37 (1968)	Electrochemical titrimetry
		Determination of Chloride in vegetable juice AOAC 971.27 (Codex general method) ISO 3634:1979	Titration
	Sections 3.2 Quality Criteria and 3.3 Authenticity	Determination of Essential oils AOAC 968.20 - IFU 45b	(Scott) distillation, titration
		Determination of Essential oils (in citrus fruit) ISO 1955:1982	Distillation and direct reading of the volume
		Determination of Fermentability IFU Method No 18 (1974)	Microbiological method
		Determination of Formol number EN 1133 (1994) IFU Method No 30 (1984)	Potentiometric titration
		Determination of Free amino acids EN 12742 IFU Method No 57 (1989)	Chromatography
		Determination of Fumaric acid IFU Method No 72 (1998)	HPLC
	Glucose and fructose (permitted ingredients)	EN 12630 IFU Method No 67 (1996) NMKL 148 (1993)	HPLC

	Sections 3.2 Quality Criteria and 3.3 Authenticity	Determination of sorbitol EN 12630 - IFU Method No 67 (1996) NMKL 148 (1993)	HPLC
		Determination of Gluconic acid IFU Method No 76 (2001)	
		Determination of Glycerol IFU Method No 77 (2001)	
		Determination of hesperidin and naringin EN 12148 (1996) - IFU Method No 58 (1991)	HPLC
	HFCS & HIS in apple juice (permitted ingredients)	JAOAC 84, 486 (2001)	CAP GC Method
	Sections 3.2 Quality Criteria and 3.3 Authenticity	Determination of Hydroxymethylfurfural IFU Method No 69 (1996)	HPLC
		Determination of Hydroxymethylfurfural ISO 7466:1986	Spectrometry
		Determination of Isocitric acid-D IFU Method No 54 (1984)	Enzymatic determination
		Determination of Lactic acid- D and L EN 12631 (1999) IFU Method No 53 (1983/1996)	Enzymatic determination
		Determination of L-malic/total malic acid ratio in apple juice AOAC 993.05	
		Determination of Naringin and neohesperidin in orange juice AOAC 999.05	HPLC
		Determination of pH-value EN 1132 (1994) IFU Method No 11 (1968/1989) ISO 1842: 1991	Potentiometry
		Determination of Phosphorus/Phosphate EN 1136 (1994) IFU Method No 50 (1983)	Photometric determination
		Determination of Proline EN 1141 (1994) IFU Method No 49 (1983)	Photometry

	Quinic, malic & citric acid in cranberry juice cocktail and apple juice (permitted ingredients and additives)	AOAC 986.13	HPLC
	Sections 3.2 Quality Criteria and 3.3 Authenticity	Determination of Recoverable oil AOAC 968.20 - IFU Method No 45b	Distillation and titration Scott method
		Determination of Relative density EN 1131 (1993) IFU Method No 1 (1989) & IFU Method No General sheet (1971)	Pycnometry
		Determination of Relative density IFU Method No 1A	Densitometry
		Determination of Sodium, potassium, calcium, magnesium EN 1134 (1994) IFU Method No 33 (1984)	Atomic Absorption Spectroscopy
		Determination of Sorbitol-D IFU Method No 62 (1995)	Enzymatic determination
		Determination of Stable carbon isotope ratio in the pulp of fruit juices ENV 13070 (1998) Analytica Chimica Acta 340 (1997)	
		Determination of Stable carbon isotope ratio of sugars from fruit juices ENV 12140 Analytica Chimica Acta.271 (1993)	Stable isotope mass spectrometry
		Determination of Stable hydrogen isotope ratio of water from fruit juices ENV 12142 (1997)	Stable isotope mass spectrometry
		Determination of Stable oxygen isotope ratio in fruit juice water ENV 12141(1997)	Stable isotope mass spectrometry
		Determination of Starch AOAC 925.38 IFU Method No 73	

	Sections 3.2 Quality Criteria and 3.3 Authenticity	Determination of Sugar beet derived syrups in frozen concentrated orange juice $\delta^{18}\text{O}$ Measurements in Water AOAC 992.09	Oxygen isotope ratio analysis
		Determination of Titrable acids, total EN 12147 (1995) IFU Method No Method No 3, (1968) ISO 750:1998	Titrimetry
		Determination of Total dry matter EN 12145 (1996) IFU Method No 61 (1991)	
		Determination of Total solids AOAC 985.26	Microwave oven drying
		Determination of Vitamin C AOAC 967.22	Microfluorometry
		Determination of Vitamin C CEN/TC275/WG9 N60	DNA

D. CODEX COMMITTEE ON FISH AND FISHERY PRODUCTS⁵

Draft Amendment to the Standard for Salted Fish and Dried Salted Fish of the *Gadidae* Family of Fishes (Section on Sampling and Analyses) (at Step 8)

COMMODITY	PROVISION	METHOD	PRINCIPLE
Salted Fish and Dried Salted Fish of the <i>Gadidae</i> Family of Fishes	Salt Content Water content	Described in the Standard	see Annex

E. CODEX COMMITTEE ON NUTRITION AND FOODS FOR SPECIAL DIETARY USES

Draft Revised Standard for Gluten-Free Foods (At Step 7)

COMMODITY	PROVISION	METHOD	PRINCIPLE	NOTE	TYPE/STATUS
Gluten-free foods	Gluten	Enzyme-Linked Immunoassay R5 Mendez (ELISA) Method	Immunoassay	CCFNSDU to provide clarification on the application of the Method (see below)	IV (Temporarily Endorsed by the 25th CCMAS)

⁵ ALINORM 05/28/18, paras. 29-34 and Appendix IV

The Committee on Nutrition and Foods for Special Dietary Uses recalled that the CCMAS had requested the CCNFSDU to clarify what should be measured since section 6.2 of the draft revised Standard for Gluten-Free Foods referred to a detection limit of 10 ppm without specifying whether this apply to gluten or gliadins and how it related to the provision of “gluten free”. The Committee was informed that Enzyme-Linked Immunoassay R5 method measured gliadins and that it was necessary to use a conversion factor of 2 to convert levels of gliadins to gluten. Therefore the Committee agreed to amend the last line in Section 6.2 of the Standard and insert “gluten” after “ppm”. The Committee also agreed to discuss the Draft Standard for Gluten-Free Foods at its next session. The Observer from the Prolamin Working Group informed the Committee that method R5 Mendez (ELISA) was independently validated and that additional information regarding particulars of this method would be submitted to the CCMAS (ALINORM 05/28/26, paras. 6-7 and 148).

F. CODEX COMMITTEE ON CEREALS PULSES AND LEGUMES⁶

Draft Standard for Instant Noodles (elaboration by correspondence)

COMMODITY	PROVISION	METHOD	PRINCIPLE	Note
Instant Noodles	Moisture	AAAC Method (440-15A) or AOAC Method 925.10	Gravimetry	
	Oil (extraction of oil from instant noodles)	AACC 30-10, AOAC method 922.06.	Gravimetry	
	Acid Value	see below	Titrimetry	
	Acid Value – Japanese Method	see below		

9.4. Determination of Acid Value

Acid value of oil from fried instant noodles – mg KOH required to neutralize 1 g oil. Oil extracted from noodle is dissolved in alcohol-ether mixture and titrated with alcoholic KOH standard solution.

9.4. Determination of Acid Value- Japanese method

A. Definition and Principle

Acid value of oil from fried instant noodles = mg KOH required to neutralize 1 g oil. Oil extracted from noodle is dissolved in alcohol-ether mixture and titrated with alcoholic KOH standard solution.

B. Apparatus

a) Air-tight desiccator □ silica gel heated at 150°C is satisfactory drying agent.

C. Reagents

(a) Alcoholic potassium hydroxide standard solution - 0.05 mol/L. Dissolve 3.5 g potassium hydroxide in equal volume of water (CO₂-free) and add ethanol (95%) to 1 L. After mixing, let solution stand for several days keeping the solution CO₂-free. Use supernatant after standardization.

□ Standardization

Weigh required quantity of amidosulfuric acid (certified reference material for volumetric analysis) and place it into desiccator (≤2.0 kPa) for 48 hour.

⁶ CL 2005/5-CPL

Next, accurately weigh 1 to 1.25 g (recording the weight to 0.1mg), dissolve in water (CO₂-free), and dilute to 250 mL. Put 25 mL solution into Erlenmeyer flask, add 2 to 3 drops of bromothymol blue indicator and titrate with 0.05 mol/L alcoholic potassium hydroxide solution until color of solution change to faint blue.

Calculation:

Factor of molarity \square [g amidosulfuric acid \times purity \times 25] / 1.2136 / mL KOH

(b) Alcohol-ether mixture - Equal volumes ethanol (99.5%) and ether.

(c) Phenolphthalein solution - 1% in alcohol.

D. Titration

Before sampling, liquefy extracted oil using water bath. Weigh 1 to 2 g liquefied test portion into Erlenmeyer flask. Add 80 mL alcohol-ether mixture and a few drops of phenolphthalein solution. Titrate with 0.05 mol/L alcoholic KOH until faint pink color appears and retain for more than 30 s.

Perform blank test using only alcohol-ether mixture and phenolphthalein solution.

E. Calculation

Calculate using following equation.

Acid value [mg/g] = (mL test portion – mL blank) \times factor of molarity \times 2.806 / g test portion

PART II. SAMPLING

F. CODEX COMMITTEE ON CEREALS PULSES AND LEGUMES⁷

Draft Standard for Instant Noodles (elaboration by correspondence)

9.1. Sampling

Sampling shall follow the “General Guidelines on Sampling” adopted by the CAC at its 27th Session.

⁷ CL 2005/5-CPL

DRAFT AMENDMENT TO THE CODEX STANDARD FOR SALTED FISH AND DRIED SALTED FISH OF THE *GADIDAE* FAMILY OF FISHES
(CODEX STAN 167-1989, Rev. 1-1995)
(At Step 8 of the Procedure)
(Amendments to the current Standard are underlined)

7.4 PREPARATION OF FISH SAMPLE

1. Before preparing of a subsample adhering salt crystals should be removed by brushing from the surface of the sample without using water.
2. The preparation of fish samples for the determination of salt content, and water content in order to calculate the % salt saturation of the fish should be carried out according to AOAC 937.07. The analysis should be on the edible portion of the fish.
3. Determination should be performed at least in duplicate.

7.5 DETERMINATION OF SALT CONTENT (CURRENT SECTION 7.4 RENUMBERED)

1. Principle

The salt is extracted by water from the preweighed sample. After the precipitation of the proteins, the chloride concentration is determined by titration of an aliquot of the solution with a standardized silver nitrate solution (Mohr method) and calculated as sodium chloride.

2. Equipment and chemicals

- Brush
- Sharp knife or saw
- Balance, accurate to $\square 0.01$ g
- Calibrated volumetric flasks, 250 ml
- Erlenmeyer flasks
- Electric homogenizer
- Magnetic stirrer
- Folded paper filter, quick running
- Pipettes
- Funnel
- Burette
- Potassium hexacyano ferrate (II), $K_4Fe(CN)_6 \cdot 3H_2O$, 15% w/v (aq)
- Zinc sulphate, $ZnSO_4 \cdot 6H_2O$, 30% w/v (aq)
- Sodium hydroxide, NaOH, 0.1 N, 0.41% w/v (aq)
- Silver nitrate, $AgNO_3$, 0.1 N, 1.6987% w/v (aq), standardized
- Potassium chromate, K_2CrO_4 5% w/v (aq)
- Phenolphthalein, 1% in ethanol
- distilled or deionized water

3. Procedure

- (i) Five gram of homogenized subsample is weighted into a 250 ml volumetric flask and vigorously shaken with approximately 100 ml water.
- (ii) Five millilitre of potassium hexacyano ferrate solution and 5 ml of zinc sulphate solution are added, the flask is shaken.
- (iii) Water is added to the graduation mark.

(iv) After shaking again and allowing to stand for precipitation, the flask content is filtered through a folded paper filter.

(v) An aliquot of the clear filtrate is transferred into an Erlenmeyer flask and two drops of phenolphthalein are added. Sodium hydroxide is added dropwise until the aliquot takes on a faint red colour. The aliquot then diluted with water to approximately 100 ml.

(vi) After addition of approximately 1 ml potassium chromate solution, the diluted aliquot is titrated under constant stirring, with silver nitrate solution. Endpoint is indicated by a faint, but distinct, change in colour. This faint reddish-brown colour should persist after brisk shaking.

To recognize the colour change, it is advisable to carry out the titration against a white background.

(vii) Blank titration of reagents used should be done.

(viii) Endpoint determination can also be made by using instruments like potentiometer or colorimeter.

4. Calculation of results

In the equation of the calculation of results the following symbols are used:

A= volume of aliquot (ml)

C= concentration of silver nitrate solution in N

V= volume of silver nitrate solution in ml used to reach endpoint and corrected for blank value

W= sample weight (g)

The salt content in the sample is calculated by using the equation:

$$\text{Salt concentration (\%)} = (V \times C \times 58.45 \times 250 \times 100) / (A \times W \times 1000)$$

Results should be reported with one figure after the decimal point.

5. Reference method

As reference method a method should be used which includes the complete ashing of the sample in a muffle furnace at 550°C before chloride determination according to the method described above (leaving out steps (ii) and (iv)).

6. Comments

By using the given equation all chloride determined is calculated as sodium chloride. However it is impossible to estimate sodium by this methodology, because other chlorides of the alkali and earth alkali elements are present which form the counterparts of chlorides.

The presence of natural halogens other than chloride in fish and salt is negligible.

A step, in which proteins are precipitated (ii), is essential to avoid misleading results.

7.6 DETERMINATION OF WATER CONTENT

- i) Determination of % salt saturation as required by the standard, should be in accordance to AOAC 950.46.B (Airdrying (a))
- ii) Determination of water content in the whole fish, when needed in the commercial trade of klippfish and wet salted fish, the method of sampling the fish should be carried out according to the "Determination of Water Content in Whole Fish by Cross Section Method" defined in "Annex B".

DETERMINATION OF WATER CONTENT IN WHOLE FISH BY CROSS SECTION METHOD

1 Principle

The fish is cut in sections as described in method. The sections are cut in smaller bits to a collected sample. The water content of the collected sample is determined by drying. Examinations and experience have shown that the water content of this collected sample is closed to the “true” water content of the fish.

2 Equipment

- Soft brush
- Basins (steel, glass, porcelain)
- Scissors
- Band saw
- Knife
- Weight, 1 g precision
- Oven. 103-105°C
- Desiccator

3 Preparation of sample

Salt particles on the surface of the fish are brushed away.

The weight of the fish is determined to 1 g accuracy.

The length of the fish is measured as the distance between the cleft in the tail and a line drawn between the tips of the earbones.

4 Procedure

(i)

The sampling of the fish is described in the enclosed figure.

A) Wet salted fish is sliced in sections by knife

B) Salted and dried salted fish is sliced in sections by band saw.

1) A section of 20mm measured from a line drawn between the earbones, dotted line on figure, is cut.

2) The next cut is a 40 mm section.

3) A 2 mm section is cut from the front part of the 40 mm section and collected (see 7. Comments).

4) The next cut is a new cut of a 40 mm section.

5) A 2 mm section is cut from the front part of the 40 mm section and collected.

6) The entire fish is cut in 40 mm sections from which are cut 2 mm sections (see enclosed figure).

7) All sections of 2mm, marked II, IV, VI, VIII in the figure, even numbers, are collected to a collected sample.

(ii)

The 2mm sections in the collected sample are cut with scissors in smaller pieces directly in tared basins just after the fish is cut.

(iii)

The basins containing the sample are weighted.

(iv)

The basins containing the samples are put in the oven at 103-105°C for drying to constant weight (18 hours over night).

(v)

The basins are taken from the oven to a desiccator and cooled.

(vi)

The basins are weighted.

5. Calculation of results

In the equation of the calculation of results the following symbols are used:

W1 = Weight of fish and basins before drying, g.

W2 = Weight of fish and basins after drying, g.

Ws = Weight of tared basins, g

The water content in the fish is calculated by using the equation:

Water content, g/100g = $100 \times (W1 - W2)$

$(W1 - Ws)$

The result is reported to the nearest gram, together with the length and the weight of the analysed fish.

6. Control analysis of whole fish.

The determination of water content in whole fish by cross section method appears to give the closest result compared to water content determined by the drying of the whole fish (ALINORM 03/18, Appendix IX)

7. Comments

Each sampled fish should be packed and sealed in a plastic bag before analysis. The samples should be stored under chilled or refrigerated conditions from the time of sampling to the time of analysis.

The analysis must be performed as soon as possible after the fish has been sampled.

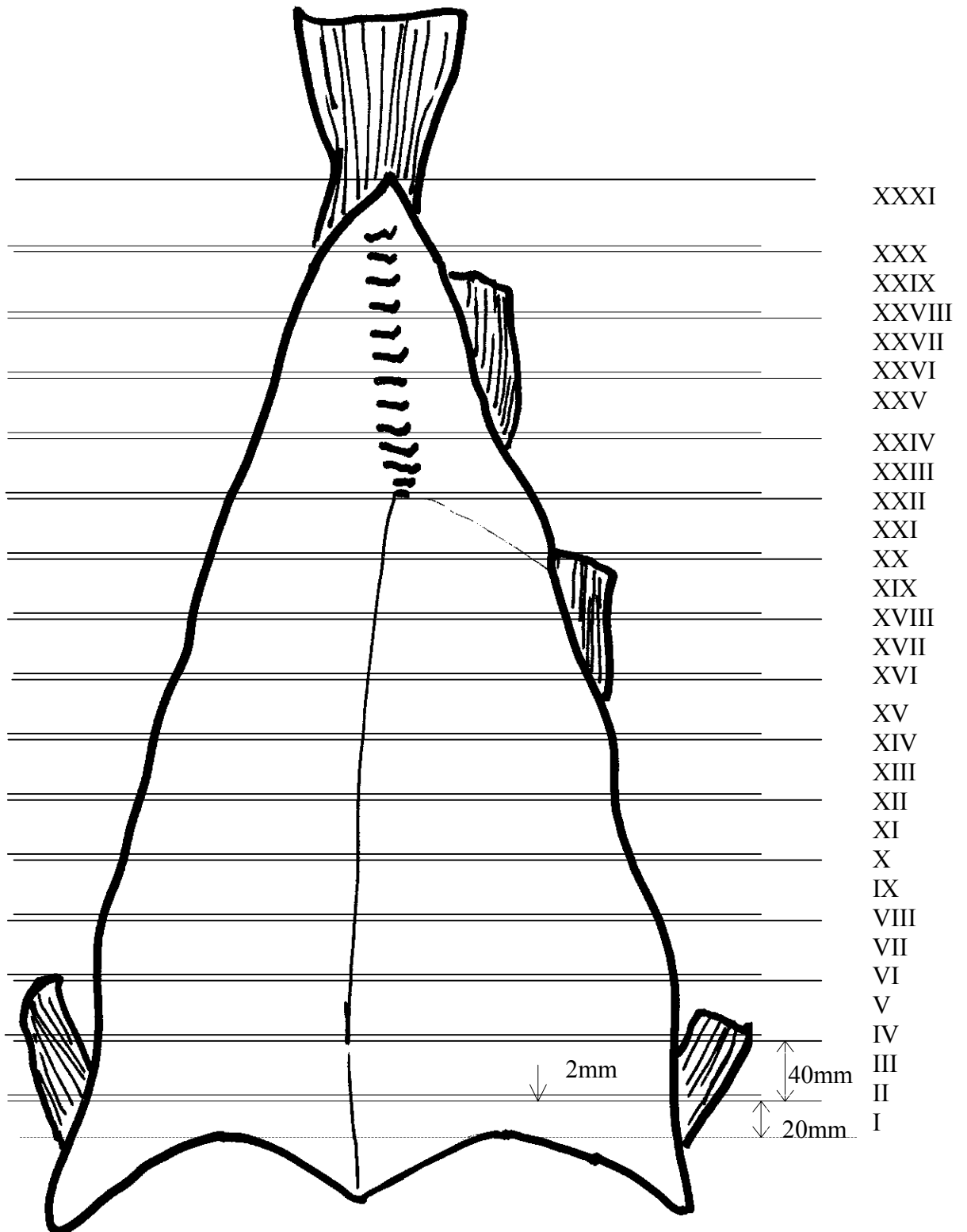
It might be difficult to cut sections of 2 mm when the fish has a water content above 50% but the section must be close to 2 mm.

To minimise the loss of water from the 2mm sections it is important to weight the collected sample immediately after the fish is cut in sections.

Determination should be performed at least in duplicate.

FIGURE

Sampling procedure.



All section labelled by even numbers , II, IV,VI,VIII etc. are collected to constitute one sample.