DRAFT GAMBIAN STANDARD **GAMS 21: 2019**

Bread - Specification

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1. SCOPE

This Gambian Standard prescribes the requirements and methods of test for white bread ("senfourr", "tappa-lappa", "tappa-lappa senfourr"), whole meal bread and enriched bread.

2. DEFINITIONS

For the purpose of this standard, the following definitions shall apply:

2.1 **Bread** — is a product obtained by baking a yeast-leavened dough prepared from wheat flour.

2.2 **White bread** — White bread is a product obtained by baking yeast-leavened dough made from essential ingredients mentioned in **3** with or without additional ingredients prescribed in **4**.

2.3 **Whole meal bread** — is bread obtained by baking a yeast-leavened dough prepared from whole meal wheat flour or a mixture of whole meal wheat flour and wheat flour containing not less than 50 per cent whole meal wheat flour.

2.4 **Enriched bread** — is any bread claimed to be enriched, fortified or vitaminized and contains nutrient supplements.

2.7 **Stale bread** — is a bread which has lost the power of pleasing and which when placed in the mouth the crumb feels dry and crumbly, requires a substantial quantity of saliva and has no sensation of dissolution as it passes from the mouth during deglutination.

2.8 **Spoiled bread** — Is a bread which is either slimy in the interior, has an unpleasant odor, or with fungus growing on it (moldy), that is unfit for human consumption.

2.9 **Grain/Texture** — is the structure formed by the strands of gluten, including the area they surround.

2.10 **Crust** — the outer surface of the bread which includes all the brown and dry parts that are formed during baking.

2.11 **Crumb-** the soft inner part of bread.

3. Essential ingredients

3.1 **Wheat Flour** — complying with the requirements of GAMS18:2018, Standard for Fortified Wheat Flour.

3.2 **Baker's Yeast** — discretion of the baker to use the available types. E.g. dry yeast

3.3 **Iodized Salt** — complying with the requirements of GAMS 20:2018 - Gambian standard for Iodized salt

3.4 **Potable Water** — complying with the WHO guidelines for potable drinking water

4. Optional ingredients

4.1 **Milk or Milk Products** — complying with the requirements of the Codex standards for milk and milk products

4.2 **Gluten or improvers** — refer to table 1 for the requirement of food grade improvers

4.3 **Sugar** — complying with the requirements of GAMS CODEX STAN 212-1999 – Gambian Standard for Sugars**,** or any other permitted sweetening substance.

4.4 **Edible Oils and Fats** — complying with the requirements of GAMS 19:2018 - Gambian Standard for Fortified Edible Oils and Fats.

4.5 **Edible Starches** —The total proportion of which shall not exceed 2 per cent of wheat flour weight in the manufacture of bread. For whole meal bread, soya bean flour may be used up to 5 per cent of the wheat flour weight.

5. Improvers

Any of the following food grade quality improvers may be used within their specified limit

Table 1 - Requirement of food grade improvers

SL No.	Substance	Limit [ppm (max.)]
(i)	Ammonium perculphate	0.01
(ii)	Ascorbic acid	0.02

6. Bacteria and mould inhibitors

Bacteria and mould inhibitors consisting of any of the following food grade quality substances and amounts (Table 2) may be used:

Table 2 - Bacteria and mould inhibitors

SL No.	Substance	Limits (Expressed as percentage of the weight of wheat flour used) MAX.
(i)	Acetic or lactic acid	0.25
(ii)	Acid calcium phosphate	1.0
(iii)	Sodium di-acetate	0.3
(iv)	Calcium or sodium propionate	0.2
(v)	Vinegar (expressed as 4 per cent acetic acid)	0.5
(vi)	Sorbic acid or its calcium, potassium and sodium salts	0.1

7. General Requirements

7.1 **Bread Crust** — the crust shall have an appetizing golden, light brown colour and shall be free from blisters. The crust shall not be burned and shall be free from soot or any other foreign matter. The loaf shall be evenly baked on all sides including the bottom.

7.2 **Character of Crust** — a good crust is thin and breaks easily. It shall not be thick, tough, or rubbery.

7.3 **Mass** – the weight of the bread after baking shall be between 150g to 160g

7.4 **The Crumb** — the crumb shall be springy, with small pores uniformly distributed throughout and with thin cell walls. It shall be free from non-porous mass, foreign bodies, lumps of flour or salt, or any other evidence of incomplete mixing.

7.5 There shall be no hollow between the crust and the crumb.

7.6 The flavour shall be characteristic of fresh, well-baked bread, free from staleness, bitterness, or any other objectionable flavour or taste.

7.7 The bread shall be free from indications of 'rope' or 'mould'.

7.8 **Internal Grain/Texture** — the structure should be uniform with thin-walled cells. The ideal texture is soft and velvety, without weakness, and should not crumble.

7.9 **Colour of Crumb** — the ideal colour should be cream-white in the case of white bread and enriched bread, and brown in the case of whole wheat bread.

7.10 **Aroma** — Aroma is judged subjectively by the organs of smell. The aroma may be noted as sweet, rich, fresh, musty, metallic, flat, or sour.

7.11 **Taste** — the most important attribute of good bread is that it shall have pleasant and satisfying wheat taste. The ideal loaf shall be free from doughtiness and shall not be dry or tough.

7.12 **Foreign Matter** — the bread shall be free from any foreign matter except for negligible amount of dusting bran, maize flour or rice flour from the baker's shovel which may adhere to the bottom of the loaf.

7.14 The bread shall also conform to the requirements given in Table 3 below.

Table 3 - General Requirements for bread

Characteristic	Requirement			Method of test (ref. to Appendix)
	White Bread	Whole Wheat Flour Bread	Enriched Bread	
Moisture content, per cent (max.)	35 - 45	35 - 45	35 - 45	A
pH of aqueous extract	5.3 – 6.0	5.3 – 6.0	5.3 – 6.0	B
Acid insoluble ash, per cent m/m on dry basis (max.)	0.2	0.2	0.2	C
Crude fibre, per cent m/m on dry basis	0.3 (max.)	1.0 (min)	0.3 (max.)	D
Milk solids (whole or skimmed), per cent by mass (min.)	-	-	3.6	E
Fat, per cent (min.)	0.7	0.7	2.0	F

8. Hygiene

8.1 Bread shall be manufactured in premises complying with the GAMS CAC/RCP 1-1969: Gambian Standard on Food Hygiene and Good Manufacturing Practices, and the Gambian Code of Practice for Bakeries.

8.2 When tested by Codex methods of microbiological examination of foods, bread shall be free from pathogenic organisms and shall comply with the microbiological limits given in Table 4.

Table 4 – Microbiological limits for bread

ORGANISM	LIMIT
Total viable counts per g, max.	10^3
Yeasts and moulds counts per g, max.	10^2
Staphylococcus aureus in 30 g	Shall be absent
E. coli in 1 g	Shall be absent
Salmonella in 30 g	Shall be absent

9. Packaging

9.1 The product shall be packed in containers which will safeguard the hygienic and other qualities specified in this standard.

9.2 The storage, transportation, display and marketing of bakery breads must conform to the Gambian Standard on Good Hygienic Practices and Good Manufacturing Practices (GAMS CODEX STAN 212-1999-Rev 2003).

10. Labelling

10.1 In addition to the provisions of Gambian Standard for Labelling of Prepackaged Foods, the following specific provisions shall be clearly and indelibly marked on the wrapper in non-toxic and non-transferable ink.

i). Name of the product, including the declaration 'Sliced Bread' if the loaf is sliced prior to marketing.

ii). Name of the manufacturer and physical address.

iii). Details of enrichment and quantities added.

iv). Brand name.

v). Declaration of added improvers or mould and rope inhibitors.

vi). Where food grade colour is used it shall be declared in close proximity to the brand name with the words "FOOD GRADE COLOUR ADDED"

vii). Batch or lot number or an appropriate coding system.

viii). Net weight, in g or kg.

ix). Date of manufacture.

x). List of ingredients in a descending order.

xi). Expiry date.

xii). The declaration 'Product of The Gambia'.

10.2 Any Health and/or Nutrition claim on breads shall conform to the provisions of Codex CAC/GL 23 *Guidelines for nutrition and health claims.*

APPENDIX A

DETERMINATION OF MOISTURE CONTENT

A1. PREPARATION OF SAMPLE

A1.1 **Samples shall be prepared as prescribed in** A2.1**.**

A1.2 The determination shall be done in duplicates.

A2. PREPARATION OF SAMPLES FOR CHEMICAL ANALYSIS

A2.1 Samples for chemical analysis shall be reduced to small pieces, and then mixed together to form a composite sample. The samples shall be transferred to thoroughly dried glass bottles and sealed.

A3. PROCEDURE

A3.1 Accurately weigh 10 g of the sample into a dish (porcelain or silica) which has been previously dried in an air oven. Dry the sample in an air oven maintained at 105 ± 2^{o}C for about 4 hours. Cool in a desiccator and weigh. Repeat this process for half an hour until two consecutive weightings shall not deviate by more than 1 mg. The loss in weight shall be taken as the per cent moisture. (Preserve the dry material left for crude fibre determination as per Appendix D.)

APPENDIX B

DETERMINATION OF pH OF AQUEOUS EXTRACT

B1. APPARATUS

pH of the aqueous extract of bread shall be determined by a pH meter.

B2. PROCEDURE

B2.1 Preparation of Aqueous Extract of the Material — Grind to a fine paste about 10 g of the material in a glass pestle and mortar, add 100 mL of water and mix thoroughly. Allow the mixture to stand for about 15 min.

B2.2 Determination of pH of Aqueous Extract — Determine the pH of the solution by the pH meter.

APPENDIX C

DETERMINATION OF ACID INSOLUBLE ASH

C1. REAGENT

C1.1 Dilute hydrochloric acid prepared by diluting concentrated hydrochloric acid with water in a ratio of 2:5.

C2. APPARATUS

C2.1 Muffle furnace at 600 ± 20^{o}C

C2.2 Water bath

C3. PROCEDURE

C3.1 Weigh accurately 5.10 g of finely powdered bread in a porcelain or platinum dish. Ignite the material in the dish with a suitable flame until it chars. Place the ignited bread in the muffle furnace. Heat at 600 ± 20^{o}C for at least 1 h. Remove the dish from the furnace and cool.

C3.1.1 Wet the ash with a suitable amount of hydrochloric acid, and place on a water bath for 10 min. Filter through a No.1 sinter glass crucible. Wash the crucible with water until the washings are free from acid. Dry the crucible in an air-oven for 2 h. Cool in a desiccator and weigh. Repeat the process until the difference between two successive weightings is less than 1 mg. Take the lowest mass.

C4. CALCULATION

Acid insoluble ash, per cent by mass (on dry basis) = $\frac{m_2 \times 100}{m_1}$

where,

m_1 = mass of sample, and
m_2 = mass of insoluble matter.

APPENDIX D

DETERMINATION OF CRUDE FIBRE

D1. REAGENTS

D1.1 Petroleum Ether —- Initial boiling temperature 35°C and 38°C, dry flask end point 52°C to 60°C, at least 95 per cent distilling at ≤ 54°C and 60 per cent distilling ≤ 40° sp.gr. at 60°F 0.630 to 0.660; evaporation residue ≤ 0.002 per cent weight.

D1.2 Dilute Sulphuric Acid — 1.25 per cent w/v solution in water.

D1.3 Sodium Hydroxide Solution — 1.25 per cent w/v solution in water.

D1.4 Ethanol — 95 per cent v/v suitable industrial methylated spirit may be used for routine purposes.

D2. APPARATUS

D2.1 Soxhlet Apparatus

D2.2 Muffle furnace, capable of being maintained at 600 ± 20°C.

D3. PROCEDURE

D3.1 For this determination, use the sample remaining after the determination of the total solids content (*see* Appendix A). Weigh accurately about 2.5 g of the sample and place in a sox let apparatus. Extract for 1 h with petroleum ether. Transfer the fat free material to a 1-litre flask. Add 200 ml of hot dilute sulphuric acid into the flask. Connect the flask to a water-cooled reflux condenser and heat, so that the contents of the flask begin to boil within 1 min. Now and then, rotate the flask frequently and boil for exactly 30 min. Filter the contents of the flask through fine linen (about 18 threads to the centimetre) held in a funnel. Wash the residue on the linen with boiling water until the washings are no longer acid to litmus. Then wash the residue on the linen into the flask with 200 ml of boiling sodium hydroxide solution. Fit a condenser to the flask and reflux for 30 min. Remove the condenser and filter the contents of the flask through the filtering cloth. Thoroughly wash the residue with boiling water. Transfer the residue to a Gooch crucible prepared with a thin but compact layer of ignited asbestos. Wash the residue thoroughly first with hot water and then with 15 mL of ethanol (95 per cent v/v). Dry the crucible and contents at 105 ± 2°C in an air-oven to constant weight. Cool in a desiccator and weigh. Ignite the contents of the crucible in a muffle furnace at 600 ± 20°C until all carbonaceous matter is burnt. Cool the crucible containing the ash in a desiccator and weigh.

D4. CALCULATION

D4.1 Crude fibre (on dry basis) per cent w/w = $100\frac{(m_1 - m_2)}{m}$

where,

m_1 = mass, in g, of Gooch crucible and contents before ashing,
m_2 = mass, in g, of Gooch crucible containing asbestos and ash, and
m = mass, in g, of the moisture-free material taken for the test.

APPENDIX E

DETERMINATION OF WHOLE MILK SOLIDS

E1. PRINCIPLE

Milk bread should contain lactose. The lactose is determined in bread after removing the other sugars present by fermentation with yeast. The following method involves extracting the sugars from bread with dilute alcohol, destroying the non-lactose reducing sugars by fermenting the alcohol-free extract with yeast and determining the lactose remaining by somogyi's method.

E2. REAGENTS

E2.1 **Yeast Suspension** — Wash baker's yeast by centrifuging with 4 times its volume of distilled water. Dilute to a 25 per cent suspension.

E2.2 **Yeast Nutrient Solution** — Containing 1.7 per cent bacto-peptone, 0.5 per cent dipotassium phosphate and 0.33 per cent magnesium sulphate.

E2.3 **Protein Precipitant** — Dissolve 50.0 g sodium tungstate and 6.0 g disodium phosphate in 200 mL water. Add slowly 220 mL of 2 N HCl, mix and dilute to 500 mL.

E2.4 **Somogyi's Reagent** —Dissolve 12.0 g sodium potassium tartrate, 20.0 g anhydrous sodium carbonate and 25.0 g sodium bicarbonate in 500 mL water. To this add with stirring 6.5 g copper sulphate ($CuSO_4.5H_2O$) previously dissolved in 100 mL water. Then mix this solution with another containing 10.0 g potassium iodide, 0.8 g potassium iodate and 18.0 g potassium oxalate dissolved in 200 mL water and dilute to a litre.

E3. METHOD

E3.1 Weigh 15.0 g of air-dried bread into a 200-mL volumetric flask containing 60 ml water. Mix, add 35 mL ethanol (95 per cent) and immerse in a boiling water bath for 15 min. Cool, dilute to the mark with more ethanol and centrifuge. Evaporate 150 mL of the supernatant liquor to 40 mL and dilute to 100 mL in a volumetric flask.

Transfer 10 mL of this bread extract to a 50-mL conical flask, add 6.0 mL yeast suspension and 5 mL yeast nutrient solution. Also set up a blank commencing with 10 mL water. Close the flask with a stopper through which passes 6 mm glass tubing (about 10 cm long) and incubate at 30°C for 2 h 30

min with shaking. Then centrifuge for 10 min at 1 000 r.p.m. Transfer the supernatant liquor into a 50-mL volumetric flask and wash the residue with two 10-mL portions of water. To the liquor plus washings sadd 2.5 mL, mix and filter, rejecting the first few millilitres of filtrate. For the determination of lactose, pipette 5 mL of the filtrate into a tube, neutralize to phenol red with 0.5 N sodium hydroxide, add 5 mL Somogyi's reagent and drops of benzene. Then immerse the tube capped with glass bulb in boiling water for 15 min, cool, add 2.5 ml 2 N sulphuric acid and titrate the excess iodine with 0.005 N sodium thiosulphate using starch.

Set up the reference curve by taking 5-mL portions of Somogyi's reagent and plotting the difference between the blank and lactose solutions against the corresponding lactose content.

E4. CALCULATION OF RESULTS

E4.1 If *L* = g lactose in a 5-ml aliquot (obtained from the calibration curve) and

M = moisture in air-dried bread, per cent lactose in the air-dried bread

$$\frac{}{100 - M} = \frac{8.33 \times L \times 10^{4}}{} - 0.35$$

per cent non-fatty milk solids in the air-dried bread = 2*L*

APPENDIX F

DETERMINATION OF FAT

F1. PREPARATION OF SAMPLE

F1.1 Cut a loaf or half a loaf of bread into slices 2 to 3 mm thick. Spread the slices on paper and let them dry in a warm room until sufficiently crisp and brittle to grind well in a mill. Grind the entire sample to pass No. 20 sieve, mix well and keep in an air-tight container.

F2. PROCEDURE

F2.1 Transfer 50 g of the sample to a 600-mL beaker. Add 100 mL of distilled water and mix. Add 100 mL HCl, mix, cover and heat on a steam bath for 1 h, stirring well for about 6 or 7 times. Cool in a cold-water bath ($\leq 15^{o}C$) and stir. Add 10 g of Filter-Cel, or similar absorbent, stir, and mix completely. Prepare 90 mm buchner as follows:

Place two 9 cm S and S 588 blue ribbon, or equivalent, filter papers in a funnel and apply suction. Mix 10 g Filter-Cel with 50 mL H_2O and rapidly pour the mixture into the funnel. (This should make a smooth, even layer of Filter-Cel over paper, without cracks or openings.) Immediately filter the sample. Rinse the beaker several times with ice-cold H_2O just before filtration is complete, wash the sides of buchner with 100 mL ice-cold H_2O (or until a clear filtrate comes through). Up to this point do not let the pad suck dry. Continue with suction until Filter-Cel pad seems dry. Transfer this mass, without paper, from the buchner to the original beaker. Break up the mass with a rod, dry overnight on a steam bath, and then heat in oven at $100^{o}C$ for 30 min to remove all moisture (material shall be dry or fat results will be low). Break up any lumps and cool.

Prepare a large knorr extension tube of about 200 mL capacity (glass tubing 5 cm diameter, 12 cm high from shoulder to top of tube). Pack the tube with asbestos tamped tightly to form about 1 cm pad. Insert the stem of the tube into a 2-hole rubber stopper in a filtering bell jar connected to suction through a 2-way stopcock. Place 500 mL erlenmeyer within the bell jar so that the stem of the tube passes through the neck of the flask.

To the beaker and contents, add 100 mL ether-pet ether (+1) and macerate 3 to 4 min against the sides of the beaker with medium size, stiff metal spatula. Decant into the extension tube. Suck dry. Add 80 mL mixed ethers to the beaker. Work as before for 2 min. Transfer contents of the beaker to the extension tube, suck dry, and tamp with flattened stirring rod until all ether is removed. To the material in the tube add 80 mL mixed ethers used just previously to rinse out the beaker, mix thoroughly with the stirring rod for a few minutes, let is stand for 1 min, then suck dry, and tamp the material as before. Make two additional extensions, turning the suction on and off carefully to avoid loss of the sample in erlenmeyer. Transfer to 1 L beaker. Evaporate on a steam bath, completely transfer fat with small amounts of pet ether to a weighed 150 mL beaker, carefully evaporate pet ether on a steam bath, dry at $100^{o}C$ to constant weight (about 30 min), cool, and weigh.

F3. CALCULATION

Calculate per cent total fat on moisture free basis.

APPENDIX G

DETERMINATION OF VOLUME/MASS RATIO

G1. APPARATUS

G1.1 Wooden Box — Large enough to contain a loaf of bread in such a manner that the top surface of the loaf remains about 1.5 cm below the top level of the box, when the loaf is placed over a thin layer of rape seeds in the box.

G1.2 Rape Seeds

G1.3 Weighing Scale

G1.4 Loaf Volumeter — Manufactured by the National Manufacturing Company, Lincoln, Nebraska, USA.

G2. PROCEDURE

G2.1 Determination of Density of Rape Seeds — Weigh a 500-mL graduated cylinder on the weighing scale. Fill it to the 500 ml mark with rape seeds and reweigh. Take the average of three readings. Calculate the density of the seeds in the following manner:

$$\text{Density of seeds, (d), g/mL} = \frac{(B - A)}{500}$$

where,

B = average mass, in g, of the cylinder filled with the seeds up to the 500 mL level, and
A = mass, in g, of the cylinder.

G2.2 Determination of Volume of Loaf — Weigh the loaf after it is cooled to room temperature and record the weight. Fill the wooden box with rape seeds and level the top surface of the seeds by a wooden plate. Weigh the box with the seeds. Take two readings and record the average. Empty out the seeds leaving a thin layer at the bottom of the box. Place the loaf on this layer of seeds and fill the rest of the space in the box with rape seeds. Level off the surface of the seeds by a wooden plate. Weigh the box again. Take two readings and record the average.

NOTES: 1. Do not press the loaf while keeping in the box.
2. For sliced bread, test bread before bread is sliced.

G2.3 Determination of Volume (Loaf Volumeter) — The volume of bread may also be determined by the loaf volumeter which is a mechanical device for measuring the volume of loaf quickly.

G3. CALCULATION

G3.1 $$\text{Volume, in ml, of loaf} = \frac{C - E}{D}$$

where,

C = average mass, in g, of the box filled with seeds and mass of loaf,
E = average mass, in g, of the box filled with loaf, with seeds in the residual space, and
D = density (g/mL) of rape seeds.

G3.2 From the above, calculate volume/mass ratio for the bread.

APPENDIX H

SENSORY ANALYSIS TESTS FOR BREAD — METHOD OF SCORING FOR BREAD

H1. APPARATUS

H1.1 **White Porcelain Plates** — big enough to hold the sample under examination.

H1.2 **Knives** — for slicing the bread samples.

H2. PANEL OF JUDGES

H2.1 For awarding scores to bread, there shall be a panel of 3 to 5 judges. All the judges constituting a panel shall be conversant with the factors governing the quality of the product. The bread samples shall be opened and the contents placed separately into the white porcelain plates. Each judge shall independently examine the bread sample from each of the porcelain plates and assign scores for different characteristics.

H2.2 The judges shall consider the following characteristics:

(i) Colour of crust.

(ii) Symmetry of shape.
(iii) Crust character.

(iv) Grain/Texture. (v)

Colour of crumb. (vi)

Aroma.

(vii) Taste/chewability.

H2.3 **Systems of Scoring** — The variations within each factor are so described that the scores may be ascertained for each factor and expressed numerically on a scale of 100. Each judge shall give a score for the individual factors, by the method described in Table H1, and record his observations in the score sheet. Note key to score carefully.

H2.3.1 The scores, as number of points given by the judges for the samples under examination, shall be recorded in a tabular form in the score card (Part 1) and the average for each factor with overall average for each sample entered in the appropriate score card (Part 2).

H2.4 Ascertaining the Score

H2.4.1 Agreement *Among Judges* — To ascertain uniformity of judgement among the judges, the total score assigned by each of them for contents of the same sample shall be calculated by adding up the scores for the various individual characteristics. If the difference between the maximum and the minimum of the total score so obtained does not exceed (3 + 5), where 3 is the number of judges, the scoring shall be deemed as uniform for the sample under consideration. If the difference exceeds (2 + 5), the most outlying score, that is the one which is farthest from its immediate neighbour (the scores being arranged on scores of remaining judges examined) (*see* score card Part 1), shall be discarded and the uniformity among the scores of remaining judges examined.

H2.4.2 When the consistency is thus established, the overall average scores given by the judges whose scoring has been found to be consistent shall be calculated for each sample. The average score for each individual characteristic shall also be calculated by taking into account the corresponding scores as given by the same judge for the same bread sample (*see* score card Part 2).

Key to Score

(i) External

(*a*) **Colour of crust** — Penalize 1/2 point for each fault in Column 1 and 1 point for each fault in Column 2.

(*b*) **Symmetry of shape** — Penalize 1/2 point for each fault in Column 1 and 1 point for each fault in Column 2.

(*c*) **Crust character** — Penalize 1/2 point for each fault.

(ii) Internal — Penalize 1 point for each fault in Column 1 and 2 points for each fault in Column 2.

TABLE H1. SCORE SHEET FOR INDIVIDUAL JUDGE

DETAILS OF THE SAMPLE

(*a*) Product……..

(*b*) *as) Batch No

(*c*) Sample No.…….. (*d)*

Date of Sampling …….. (*e)*

Name of Manufacturer …… (*f*)

Date of Manufacture/Minimum Date of Durability …….

SAMPLE No.	EXTERNAL CHARACTERISTIC	PERFECT SCORE	SAMPLE SCORE	PENALIZED FOR	
				Column 1	Column 2
	Colour of crust	5		Not uniform, light, dark, dull, streaked, blisters	Black top, mouldy, black bottom
	Symmetry of shape	5		Low end, uneven top, hollow top, overlapping	Shrunken side, shrunken end
	Crust character	5		Thick, hard, brittle, rough, blisters, foreign matter, rubbery	

	Grain/Texture	25		Open, coarse, small holes, crumbly, damp	Large holes, foreign bodies, lumpy, thick cell walls
Dirty, mouldy	Colour of crumb	23		Grey, streaky, dark, dull	
	Aroma	13		Flat, none, yeasty, strong	Acidy, musty, sour, metallic
bitter, gummy	Taste/Chewability	25		Flat, tough, salty	Sour, dry, doughy metallic taste,
	Total scores	101			
	comments				

SCORE CARD (PART 1)

DETAILS OF THE SAMPLE

(*a*) Product …….. Sample No……..

(*b*) Name of Manufacturer…….. Date of Sampling…….

(*c*) Date of Manufacture/Minimum Date of Durability……

(*d*) Batch No……

SCORE CARD (PART 1)

DETAILS OF THE SAMPLE

(*a*) Product ………………………………………………………… Sample No.………………………..

(*b*) Name of Manufacturer……………………………………….. Date of Sampling…………………

(*c*) Date of Manufacture/Minimum Date of Durability…………

(*d*) Batch No…………………………………………………….

FACTOR	Colour of Crust					Symmetry of Shape					Crust Character					Grain/Texture					Colour of Crumb					Aroma					Taste/Chewability					Total Score				
JUDGE SAMPLE NO. (CODED)	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E

SCORE CARD (PART 2)

AVERAGE SCORE

DETAILS OF THE SAMPLE

(*a*) Product…….. Sample No…….

(*b*) Name of Manufacturer…… Date of Sampling……

(*c*) Date of Manufacture/Minimum Date of Durability……..

(d) Batch No……

SAMPLE NO. (CODED)	AVERAGE SCORE FOR						
	Colour of Crust	Symmetry of Shape	Grain/ Texture	Colour of Crumb	Aroma	Taste/ Chewability	Total

APPENDIX I

DETERMINATION OF CALCIUM IN BREAD — METHOD 1

J1. APPARATUS

J1.1 **Platinum, silica, or porcelain ashing dishes**, about 60 mm diameter, 35 ml capacity. Porcelain evaporating dishes of about 25 mL capacity are satisfactory. Do not use flat-bootomed dishes of greater diameter than 60 mm.

J1.2 **Muffle furnace**, capable of operating at 550^{o}C.

J1.3 **Gooch crucible**.

J1.4 **Fritted glass filter**, Jena 1-G4 or other.

J1.5 **Glassware**, as required.

J2. REAGENTS

J2.1 **Magnesium nitrate solution**, (Dissolve 50 g of Mg (NO_3).6H_2O in water and dilute to 100 mL), or

J2.2 **Redistilled NHO_3**,

J2.3 **Oxalic acid solution**, 3 per cent,

J2.4 **Potassium permanganate**, 0.05 N,

J2.5 **Bromocresol green indicator**, 1 per cent,

J2.6 **Sodium acetate solution**, 20 per cent.

Weigh 3 g to 5 g of the prepared sample into a shallow, relatively broad ashing dish that has been ignited, cooled in a desiccator, and weighed soon after attaining room temperature. Incinerate in a furnace at about 550^{o}C (dull red) until a light grey ash results, or to constant weight. Cool in the desiccator and weigh soon after room temperature is attained. Reignited CaO is a satisfactory drying agent for the desiccator.

J3. DETERMINATION

Ash 10.0 g of flour in ashing dish as directed above. Cool, and weigh if percentage of ash is desired. Continue ashing until practically carbon-free. To diminish ashing time, or for samples that do not burn practically carbon-free, use one of the following ash aids: Moisten ash with 0.5 to 1.0 mL of the magnesium nitrate solution or with redistilled HNO_3. Dry contents and carefully ignite in a muffle to prevent spattering. (A white ash with no carbon results in most cases). Do not add these ash aids to self-raising flour (products containing NaCl) in a platinum dish, because of vigorous action on the dish.

Cool, add 5 mL of HCl, allowing the acid to rinse the upper portion of the dish; evaporate to dryness on steam bath; dissolve the residue by adding, accurately measured, 2.0 mL of HCl; heat for 5 min on steam bath with watch-glass on the dish; wash off the watch-glass with water; then filter into a 400-mL beaker. Dilute to about 150 mL.

Add 8 to 10 drops of bromocresol green indicator and sufficient 20 per cent sodium acetate solution to change the pH to 4.8 to 5.0 (blue). Cover with a watch-glass and heat to boiling. Precipitate the calcium slowly by adding 3 per cent oxalic acid solution, a drop every 3 to 5 s, until the pH is changed back to 4.4 to 4.6 (optimum for a calcium oxalate precipitation) as indicated by the appearance of a distinct green shade. (Change of colour will indicate an excess of oxalic acid - more would develop yellow tints, showing undesirable displacement of pH) Boil for 1 to 2 min and allow the mixture to settle until clear or overnight.

Filter the supernatant liquid through quantitative filter paper or a Gooch crucible, or on a fritted glass filter; wash the beaker and precipitate with about 50 mL of NH_4OH (1+50) in small portions, using a wash bottle delivering a very small stream. Break point of filter and wash filter or crucible with a mixture of 125 mL of water and 5 mL of H_2SO_4 at 80°C to 90°C. Titrate at 70°C to 90°C with 0.05 N $KmnO_4$ until a slight pink colour is obtained, add filter paper, and continue titration if necessary. Correct for blank and calculate calcium as mg/kg. One mL of 0.05 N KmnO4 = 1 mg of calcium.

DETERMINATION OF CALCIUM IN BREAD BY ATOMIC ABSORPTION SPECTROPHOTOMETRIC METHOD WITH HOLLOW CATHODE LAMPS — METHOD 2

This is an alternative recommended method where such facility exists.