KENYA STANDARD

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Coppra — Specification

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In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Managing Director, Kenya Bureau of Standards, are welcome.

Kenya Bureau of Standards, 2018

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Foreword

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Kenya Standards are drafted in accordance with the rules given in the KS ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare National Standards. Draft Kenya Standards adopted by the technical committees are circulated to the technical committee members for balloting. Publication as a Kenya Standard requires approval by at least 2/3 of the members casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. KEBS shall not be held responsible for identifying any or all such patent rights.

This Kenya Standard was prepared by Technical Committee KEBS/TC 171, *Coconut and Coconut Related Products and Services*.

Introduction

Copra is the dried meat, or kernel, of the coconut. Coconut oil extracted from it has made copra an important agricultural commodity for many coconut producing countries. It also yields coconut cake which is mainly used as feed for livestock.

Copra has traditionally been grated and ground, then boiled in water to extract coconut oil. It was long used by pacific island cultures and became a valuable commercial product for merchants in the south seas and South Asia in the year of 1860s. Nowadays, the process of coconut oil extraction is done by crushing copra to produce coconut oil (70%); the by-product is known as copra cake or copra meal (30%). Once the oil is extracted, the remaining coconut cake is 18-25% protein but contains so much dietary fibre it can not be eaten in large quantities by humans. Instead, it is normally fed to ruminants.

Halved nuts are drained of water, and left with the meat facing the sky; they can be washed to remove mold-creating contaminants. After two days, the meat can be removed from the shell with ease, and the drying process is complete after three to five more days (up to seven total). Sun drying is often combined with kiln drying, eight hours of exposure to sunlight means the time spent in a kiln can be reduced by a day and the hot air the shells are exposed to in the kiln is more easily able to remove the remaining moisture. This process can also be reversed, partially drying the copra in the kiln and finishing the process with sunlight. There are advantages and disadvantages to both — starting with sun drying requires careful inspection to avoid contamination with mold while starting with kiln-drying can harden the meat and prevent it from drying out completely in the sun. In India, small but whole coconuts can be dried over the course of eight months to a year, and the meat inside removed and sold as a whole ball. Meat prepared in this fashion is sweet, soft, oily and is cream-colored instead of being white. Coconut meat can be dried using direct heat and smoke from a fire, using simple racks to suspend the coconut over the fire. The smoke residue can help preserve the half-dried meat but the process overall suffers from unpredictable results and the risk of fires.

Copra meal is used as fodder for horses and cattle. Its high oil levels and protein are fattening for stock. The unique benefits of copra meal for horses and cattle have been researched by Dr T.J. Kempton. The protein in copra meal has been heat treated and provides a source of high quality protein for cattle, sheep and deer, because it does not break down in the rumen.

Coconut oil can be extracted using either mechanical expellers, or solvents (hexane). Mechanical expelled copra meal is of higher feeding value, because it contains typically 8-12 % oil, whereas the solvent extracted copra meal contains only 2-4 % oil. Premium quality copra meal can also contain 20-22% crude protein, and <20ppb aflatoxin.

High quality copra meal contains <12 % non-structural carbohydrate (NSC) which makes this product well suited for feeding to all horses that are prone to ulcers, insulin resistance, colic, tying up, and acidosis. Copra has been classed as a dangerous good due to its spontaneously combustive nature. It is identified as a Division 4.2 substance. It has been forbidden by Organization (ICAO) from flight without the express written permission of a state authorized agency.

Coppra — Specification

1 Scope

This Kenya Standard specifies requirements and test methods for coppra.

2 Definitions

For the purposes of this Kenya Standard, the following definition apply.

2.1
copra
pieces of kernels obtained from the fruits of mature *Cocos nucifera Linn.* and sun dried or heat dried directly or indirectly

3 Grades

Copra shall be classified into 3 grades viz-a-viz;

i) Grade 1

ii) Grade 2

iii) Grade 3

4 Requirements

4.1 General requirements

The good copra shall be made of mature fruit and when dried, it shall be hard and fragile. The external surface shall be brown, smooth, free from mould or insect or other foreign matter and free from rancid odour or objectionable odour.

4.2 Characteristic quality of each grade shall comply with the requirements given in Table 1.

Table 1 — Characteristic quality of copra (clause 4.2)

Item	Grade 1	Grade 2	Grade 3	Analysis as clause
Moisture content % by weight, max.	5	6	7	10.2
Oil content (on dry basis) % by weight, min.	64	62	60	10.3
Free fatty acid (as lauric acid) % by weight, max.	1	2	5	10.4
Aflatoxin B1 content, mg/1000 kg	Not found	Not found	Not found	10.5
Mould pieces % by weight, max.	None	5	10	10.6
Impurities percent by weight, max.	0.5	1	2	10.7
Charred or black pieces % by weight, max.	None	4	8	10.8
Colour of the expelled oil, max.	4	7	11	10.9

5 Hygiene

To the extent possible in Good Manufacturing Practice, the product shall be free from objectionable matter such as fungi spores, soil, stains (chemical), among others.

6 Container

The coppra that has been processed shall be packed in appropriate container.

7 Weights and measures

Net weight of each container shall not be less than that declared on the label.

8 Marking and labelling

8.1 The package shall be clearly and indelibly marked by figures, letters or code clearly and legibly indicating the following:

i) Name of the product "Copra";

ii) Grades;

iii) Net weight in SI Unit;

iv) Name of manufacturer or trade mark or name of distributor;

v) Country of origin.

8.2 In the case foreign language is used, the meaning shall correspond to that in Kiswahili.

9 Sampling and criteria for conformity

Unless otherwise agreed upon, the method of sampling shall be, as follows:

9.1 Lot

All the product manufactured at the same time.

9.2 Sampling

The sample shall be drawn at random from the same lot complying with sampling plan given in Table 2.

Table 2 — Sampling plan

Lot size container	Sample size container
10 to 50	3
51 to 100	4
101 to 200	5
201 to 300	7
301 to 800	8
801 to 1300	9
1301 and over	min. 1%

9.3 Preparation of the composite sample

The sample drawn shall be mixed thoroughly. If necessary, additional samples shall be taken to make up the total weight of 9 kg. In case the total sample is more than 9 kg, it shall be decreased to 9 kg by, quartering. The sample obtained shall be then divided into 3 equal portions, kept in a clean and hermetically sealed

container and labelled with name of sampler and date of sampling. One portion of sample shall be subjected to the test and the other two shall be taken back to the factory.

9.4 Criteria for conformity

The lot shall be considered as conforming to this standard provided that the test results on sample obtained from clause 9.3 meet all the requirements specified in clause 4.

Annex A
(normative)

Test methods

A.1 Preparation of the sample.

About 200 g of the sample of clause 9.3 having been assessed as provided for in clauses 10.6, 10.7, 10.8 shall be ground finely enough to pass through the 1.00 mm sieve and transfer to a well stoppered glass bottle so as to be used for chemical analysis.

A.2 Moisture content

This enhances mould growth in the copra and brings about decay.

A.2.1 Apparatus

2.1.1 Weighing balance, having readability of 4 significant figures.

2.1.2 Aluminium dish of 4.5 cm, of diameter together with the cover.

2.1.3 Electric air oven, equipped with thermostat.

2.1.4 Desiccator, containing an efficient desiccant.

A.2.2 Procedure

Weigh accurately about 5 g of the fine copra in a dried and weighed aluminium dish provided with a lid. Heat the uncovered dish and its lid in an electric oven at 100-102 °C for a period of 2 h. Then remove from the oven and immediately cover the lid. Cool in a desiccator to room temperature and weigh. Repeat this process for an hour, heating, cooling and weighing until the difference in weight between two successive weighing is less than 1 mg.

A.2.3 Calculation

$$\text{Moisture content, \% by weight} = \frac{100\,(W_1 - W_2)}{W_1 - W}$$

where,

W= weight in g of the aluminum dish,

W_1= weight in g of the aluminum dish and the sample before drying, and

W_2= weight in g of the aluminum dish and the sample after drying,

A.3 Oil content

A.3.1 Apparatus

A.3.1.1 Soxhlet apparatus, with a suitable thimble for containing 10 g of sample or other suitable extractor.

A.3.1.2 Water bath

A.3.1.3 Glass mortar

A.3.2 Reagent

A.3.2.1 Petroleum ether, B.P. 40°- 60°C.

A.3.3 Procedure

Weigh accurately about 10 g of the sample dried as described in clause A.2.2 in a thimble. Place the thimble in the Soxhlet extractor, or its equivalent, under which a weighed flask has been placed, extract with petroleum ether for 6 h. Remove the thimble from the extractor and dry it. Transfer the contents to a glass mortar and grind as finely as possible. Return the ground material to the thimble; wash out the mortar with petroleum ether and add to the extractor. Repeat the extraction with petroleum ether for another 2 h. Evaporate off the solvent on water bath to remove all solvent. Dry the oil in an oven at 100-102 °C for 30 min. Cool in a desiccator and weigh. Repeat the process for 30 min heating and cooling until the difference in-weight between two successive weighings is less than 1 mg. Record the lowest weight.

A.3.4 Calculation

$$\text{Oil content (on dry basis), \% by weight} = \frac{100\,(W_1 - W_2)}{W_1}$$

where,

W= weight in g of the dried sample,

W_1= weight in g of the Soxhlet flask with the extracted oil, and

W_2= weight in g of the empty Soxhlet.

A.4 Free fatty acid

A.4.1 Apparatus

A.4.1.1 250 cm^3 Erlenmeyer flask.

A.4.2 Reagent, solution and preparation

A.4.2.1 Standard sodium hydroxide solution or potassium hydroxide solution -0.1 mole/dm^3.

A.4.2.2 Phenolphthalein indicator solution prepared by dissolving 1 g of phenolphthalein in ethyl alcohol (95 % by volume) and dilute to 100 cm^3 with ethyl alcohol.

A.4.2.3 Mixture of ethyl alcohol and diethyl ether, 1:1 by volume, neutralized to phenolphthalein with standard solution as clause A.4.2.1.

A.4.3 Procedure

Weight accurately about 5 g of the oil extracted by method given in A.3.3 in a 250-cm^3 Erlenmeyer flask. Add 50 cm^3 of mixture in clause A.4.2.3 and shake well to dissolve the oil. Add 2 to 3 drops of phenolphthalein indicator and titrate with standard sodium hydroxide or potassium hydroxide solution until a definite pink colour persists for at least 15 s.

A.4.4 Calculation

$$\text{Fatty acid (as lauric acid), \% by weight of extracted oil} = \frac{V \times M \times 200a \times 100}{1000 \times W}$$

where,

V= volume in cm^3 of standard sodium hydroxide or potassium hydroxide solution,

M= concentration of standard sodium hydroxide or potassium hydroxide solution in mole/dm^3, and

W= weight in g of the oil.

NOTE Remark *a* means molecular weight of lauric acid.

A.5 Aflatoxin B1 content

A.5.1 Apparatus

A.5.1.1 Soxhlet apparatus, with a suitable thimble for containing 10 g of sample or other suitable extractor.

A.5.1.2 Chromatographic-plate, 200 x 200 mgr, including stand and developing tank.

A.5.1.3 250 cm^3 conical flask, and glass stopper.

A.5.1.4 Graduated pipette, readable from 0 to 5 cm^3.

A.5.1.5 Thin layer coater

A.5.1.6 UV lamp

A.5.1.7 Desiccator, suitable for containing the chromatographic plate of clause A.5.1.2

A.5.2 Reagent, solution and preparation

A.5.2.1 Petroleum ether, B.P. 40-60 °C

A.5.2.2 Mixture of chloroform and ethyl alcohol, 99: 1 by volume

A.5.2.3 Diethyl ether

A.5.2.4 Mixture of chloroform and methyl alcohol, 19:1 by volume.

A.5.2.5 Mixture of silica gel "G" and water, prepared by dissolving 25 g of silica gel "G" in Erlenmeyer flask with 50 cm^3 of distilled water and-shake for 1 min.

A.5.2.6 Nitrogen gas

A.5.3 Procedure

A.5.3.1 Coating of chromatographic plate

Transfer mixture of silica gel "G" and water into a thin layer coater and uniformly coat the plate to the thickness of 250 m. Keep the coated plate on the stand and allow to air dry for 10 min. Then heat in an oven at 70 °C for 2 h and cool in a desiccator.

A.5.3.2 The extraction of 3:1 from the sample.

Weigh accurately about 10 g of the sample prepared as in Clause A.1 and dry it as the method specified in A.2.2. Extract oil with petroleum ether for 8 h in the-Soxhlet apparatus. Regulate the siphon rate to 1 cycles per tour. Dry the residue in a thimble at the temperature of 60 °C.

A.5.3.3 The extraction of aflatoxin B1

Extract the copra obtained from clause. A.5.3.2 with the mixture of chloroform and ethyl alcohol for 4 h in a Soxhlet apparatus with siphon rate of 6 cycles per hour. Evaporate off the solvent in the Soxhlet flask on a water bath and at the same time pass nitrogen gas into the extracted content till it dries. Pipette 2.5 cm^3 of the mixture of chloroform and ethyl alcohol into it and mix well.

A.5.3.4 Determination of aflatoxin B1

Drop 20 x 10^{-3} cm^3 of the solution obtained from A.5.3.3 on to the chromatographic plate coated as clause A.5.3.1 at the position of 1.5 cm away from the lower seam. Dry and vertically place the plate in the developing tank containing diethyl ether. Cover the lid and allow standing until a proper solvent front is obtained (approximately 12 cm) in order to expel oil or other substances soluble in diethyl ether from aflatoxin. Remove the plate from the developing tank and allow drying. Then vertically replace in the developing tank containing mixture of chloroform and methyl alcohol and cover the lid. Allow standing till a proper solvent front is obtained (approximately 10 cm). Remove the plate and let dry. Inspect the fluorescence emitted from the aflatoxin which dissociated itself from the sample under ultra violet condition the Rf value is about 0.55. Lack of fluorescence indicates the absence of aflatoxin B1.

A.6 Mouldy pieces

Weigh accurately all the sample obtained from 9.3. Separate the mouldy pieces. The whole mouldy pieces and mouldy parts cut-off shall be weighed. Report the result as percent by weight.

A.7 Impurities

Examine the rest of the sample from clause A.6 for other impurities such as soil, straw, sand or shell. Brush pieces of samples thoroughly so as to remove all adhering impurities both from internal and external surfaces of the kernel. Collect and weigh the impurities. Report the result as percent by weight.

A.8 Charred or blank pieces

Examine the rest of the sample from Clause A.7. Separate and weigh the blank pieces. Report the result as percent by weight.

A.9 Colour of the expelled oil

Determination of colour of the expelled oil is made by comparing oil colour with the standard colour plate.

A.9.1 Apparatus

A.9.1.1 Lovibond tintometer or colorimeter

A.9.1.2 25.4 mm (1 in) glass cell

A.9.2 Method of test

A.9.2.1 The oil for colour comparison shall be clarified by means of filtration at room temperature or at the temperature not exceeding 10 °C – 15 °C of the boiling point of oil or fat. Prior to filtration, diatomaceous earth may be added with the amount of 0.5 g/300 g of oil. Stir well for 2.5 min and filter with Whatman filter paper No.12 or its equivalent.

A.9.2.2 Fill the filtered oil from A.9.2.1 in a glass cell. Read the colour value of red and yellow from the Lovibond scale at the temperature specified in A.9.2.1

A.9.2.3 Colour value shall be calculated by the following formula. colour value = Y + 5 R where Y = the total of yellow obtained R = the total of red obtained.

