NIGERIAN CODE OF PRACTICE DRAFT NCP XXX: 20XX

COCOA BEANS-HARVESTING AND HANDLING (CODE OF PRACTICE)

Price Group:

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ICS XX: XXX

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STANDARDS ORGANISATION OF NIGERIA

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FOREWORD

Cocoa Beans is a produce of commerce obtained from *Theobroma cacao* that is grown in some parts of Nigeria and the quality used to be rated high but has recently experienced a decline due to unwholesome practices during processing.

This code of practice therefore provide guidelines and technical advice on food safety and quality for post harvest and processing of cocoa and ensures it meets national and international requirements.

In order to promote food safety and create awareness on the acceptable provisions for cocoa beans Standards Organisation of Nigeria authorized the development of the code of practice.

The Technical Committee on cocoa and cocoa products prepared this Code of Practice and in preparing this code, references were made to relevant International Standards and industry practices, all of which are hereby acknowledged.

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1. SCOPE

This Nigerian code of practice prescribes requirement for harvesting, fermenting, drying and storage of cocoa beans. It applies to farmers on the farm.

It does not cover transportation of cocoa beans.

2. NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this code of practice.

NIS 468:2014: Nigerian Industrial Standard for Cocoa beans

3. TERMINOLOGY

For the purpose of this Code of Practice, the following terms and some of the terminologies in Nigerian Industrial Standard for Cocoa beans- NIS 468:2014 apply

3.1 contaminated bean

Cocoa bean which is contaminated by odours or flavours, or by dust from other products such as other foods, or by products as oil, cement and tar.

3.2 cocoa beans

This refers to the whole seed which has been fermented and dried, that is, the fermented and dried, whole seed *of Theobroma cacao* L.

3.3 cleaning

The removal of soil, food residues, dirt, grease or other objectionable matter

3.4 drying

Reduction of moisture content of fermented cocoa beans to a level that is safe for storage and shipment where excessive acidity is eliminated through evaporation of acetic acid through the outer skin while it is moist. It is an extended part of fermentation.

3.5 dry cocoa

A commercial term designating Cocoa beans which have been evenly dried throughout.

3.6 defective beans

Cocoa beans which are internally mouldy, slaty, insect-damaged, or insect-infested.

3.7 double beans

Two beans fused together which can or cannot be separated by hand.

3.8 fermented bean

Cocoa bean which has been fermented for 6 days, the colour of the cotyledons ranging from partly purple and partly brown to a fully brown colour as shown by the cut test.

3.9 foreign matter

Any material or particle other than Cocoa bean and cocoa bean wastes (broken beans, fragments and pieces of shell).

3.10 fragment

A piece of Cocoa bean equal to or less than half the original bean

3.11 germinated bean

Cocoa bean of which the shell has been pierced, slit or broken by the growth of the seed germ.

3.12 insect-damaged / infested bean

Cocoa bean that have internal part which contains insect at any stage of development or have been attacked by insects which have caused damaged visible to the naked eye.

3.13 mouldy bean

Mould growth on the cotyledon cocoa bean which is visible to the naked eye..

3.14 slaty bean

Cocoa bean which shows a grey or purple colour on half or more of the surface exposed by the cut test

4.0 Processing

Processing of cocoa shall involve pod harvesting, pod breaking and removal of seed, fermentation of cocoa beans, drying and sorting.

4.1 Pod harvesting

4.1.1 From pollination, cocoa pods form, mature and ripen between 160 to 180 days. The pods shall be harvested at approximately 75% ripeness to avoid loss of the mucilage which is the source of sugar needed during the fermentation process.

4.1.2 Unripe pods should not be harvested. Beans of unripe cocoa pods contribute to defects such as 'slaty' beans.

4.1.3 A machete or bolo, pruning shear or cacao hook on a stick should be used to remove the pods from the tree. These tools shall be designed taking into consideration hygienic cleaning and disinfection (i.e. use of hot water or chlorine compound). They shall be cleaned by washing with water, application of detergent, rinsing with water and submerging in sanitizing solution as appropriate.

4.1.4 These tools should also be sharpened regularly using a file.

4.1.5 Harvesting should be done every week during peak season and every two weeks for non-peak season.

4.1.6 Harvested pods should be stored for 7 days in a shaded area, diseased pods shall be separated from healthy pods right in the field to avoid contamination during transport and storage.

4.1.7 Care should be taken not to damage, wound or cut the pods while it is removed from the tree. Damage can lead to fungal infection of the tree and ochratoxin contamination of the bean.

4.1.8 Wounded pods should not be stored.

4.1.9 Flower cushions should also not be damaged to allow flowers to produce pods for several years.

4.1.10 Diseased, rotten pods should be removed every week using a machete, bolo, pruning shear, this is to avoid spread of fungi to healthy trees.

4.2 Pod breaking and removal of seeds

4.2.1 Pod breaking should be done in the cocoa farm immediately after harvesting.

4.2.2 A baton or pod splitter should be used to break the pods.

4.2.3 Care should be taken during pod breaking not to damage the seeds and allow contamination by molds or entry of insects. The pod knife should be at most 1 cm wide to avoid damaging the bean.

4.2.4 The baton or pod splitter shall be designed taking into consideration hygienic cleaning and disinfection. It shall be regularly cleaned and disinfected by washing with water, application of detergent, rinsing with water and submerging in sanitizing solution as appropriate.

4.2.5 Removal of seeds or wet beans attached to the placenta should be done by using a scooping tool/scooper. Likewise, seeds should be separated to avoid clustering.

4.2.6 Damaged seeds like black beans and insect-damaged beans should be discarded. Scooped beans should be placed in a suitable container (*i.e.* plastic bin to drain liquid for 16-18 hours) and should not be placed on the ground.

4.2.7 The collectors of the 'wet beans' should put a label in each batch of beans collected from specific farmer for traceability purposes.

4.3 Fermentation of cocoa beans

Fermentation of cocoa beans normally takes five (5) days. Factors that influence fermentation include ripeness of the pods, quantity of beans, type of cocoa and duration of fermentation. Fermentation is assessed by the odour, and external and internal colour of the beans.

4.3.1 Cocoa beans should be fermented in fermentation boxes usually made of wood, or in perforated baskets if in small quantities.

4.3.2 Design of fermentation structure, materials or area should take into consideration drainage of fermentation drippings, ease of turning and air circulation (i.e. slated floors, perforations, etc.).

4.3.3 Fermentation boxes or baskets should be covered to avoid loss of heat and prevent contamination from the air.

4.3.4 Materials used for fermentation should be regularly cleaned after each use. Baskets or boxes should be elevated from the ground to avoid contamination from the floor.

4.3.5 Cocoa beans should be turned 48 hours after loading in the fermentation boxes or baskets. The temperature during this period should reach 38°C to 39 °C. The process of turning ensures uniform heating of the beans, allows air to circulate, breaks lumps and prevents formation of moulds in the beans. Without the turning process, the beans will be improperly fermented, mouldy and will produce off-odours.

4.3.6 Care should also be taken to prevent the cocoa beans from getting in contact with water during the fermentation process by placing a cover on the fermentation boxes. The cocoa beans should remain in the boxes/baskets for the next three (3) days and the temperature should reach 45°C to 50 °C. Temperature lower than 45 °C will result to inadequately fermented cocoa bean.

4.3.7 Turning of beans in fermentation boxes should be done with a paddle or shovel, while beans in baskets using hand gloves to prevent direct contact of the seeds with the hands. Equipment, such as shovel or paddle also used to do manual turning shall be cleaned on a regular basis.

4.4. Drying of cocoa beans

Cocoa beans shall be dried to appropriate moisture level as specified in the relevant NIS standard for cocoa beans. The first day of drying is the full term fermentation of the cocoa beans. The beans will only develop the right brown colour inside if they are properly fermented and dried.

4.4.1 Cocoa beans should be sun dried or dried through artificial means.

4.4.2 Sun drying shall be done in elevated solar dryers to avoid contamination from the ground.

4.4.3 While on the drying bed, beans should be turned several times each day to ensure uniformly dried beans.

4.4.4 The dryers shall be covered with clear UV plastic or with a screen to prevent contamination from the air. Rapid drying causes the beans to retain excessive amounts of acetic acid which results in a sour taste. Excessive drying causes off-flavours. Insufficient drying results in mouldy beans.

4.4.5 Drying facilities and equipment shall be designed taking into consideration hygienic cleaning and possible disinfection. Drying equipment and materials shall be cleaned and disinfected when necessary after each batch and shall be dedicated only for the drying operation and not used for other purposes.

4.5. Sorting

Cocoa beans should be sorted to remove the flat, slaty, black, mouldy, small, double beans and beans with insect damage.

4.5.1 During sorting personnel shall wear protective clothing and footwear.

4.5.2 Manual sorting to remove defective beans shall be done with hands properly washed and using hand gloves to prevent direct contact of the dried cocoa beans with the hands.

4.5.3 Equipment and materials used for sorting and grading shall be cleaned after each operation.

5.0 Storage

- Once the drying and sorting processes have been completed, the cocoa beans should be placed in appropriate bags and stored.
- Bags of cocoa should be stored in raised platforms to prevent mouldness.
- Cocoa beans are sensitive to foreign flavours, therefore, it should not be stored in old sacks earlier used for maize or other foodstuffs. It should not also be stored near maize, tobacco or other foodstuffs to prevent weevils or insect attach. It should not also be stored in smoky area to avoid smoky beans

6.0 Documentation and records

Records of production, processing and distribution should be kept to facilitate traceability. The appropriate period should be longer than the shelf life of the dried cocoa (i.e. shelf life of cocoa beans + 6 months)

Farmers should keep up-to-date comprehensive records of all farming activities.

Records should be kept on the:

• Types, varieties and sources of planting materials;

• Types of pesticides and fertilizers and usage;

• Production site with lot codes;

• Suppliers of agricultural inputs;

• Lot number of agricultural inputs;

• Water management practices;

- Use of agricultural chemicals;
- Water quality and safety; and
- Pest control and cleaning schedules of premises, facilities, equipment and containers.

Personnel involved in the fermentation and drying operations should keep current all relevant information on each lot:

- incoming materials (growers, lot numbers);
- Fermentation and drying data (batch code, temperature and time of fermentation, physico- chemical analysis, etc.);
- Storage temperatures; and
- cleaning schedules for premises, facilities, equipment and containers.
- The conditions under which the cocoa will be stored

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