QUALITY CERTIFICATION FOR DRY COCOA BEANS
Which one is the best quality?
TOPIC QC

1. Introduction
2. Definition
3. Grading Procedure
   - Basic Inspection
   - Determination Of Grade
4. Analysis Test
5. Quality Certification
Important aspects of physical quality in cocoa beans based on Malaysian Standard MS 293:2005 – Specification for grading of Malaysian Cocoa Beans (4th Revision),
PURPOSE OF QC

To ensure the quality beans produced by the farmers follows the MS 293 : 2005 (SMC standard)

ACTIVITIES :

- LOCAL TRADE
- IMPORT
- EXPORT
CERTIFICATION PROGRAMS
COCOA BEANS – SPECIFICATION FOR
GRADING
(FOURTH REVISION)

ICS: 67.140.30
Description: cocoa beans, Theobroma cacao L., grading, specification

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DEPARTMENT OF STANDARDS MALAYSIA
BASIC REQUIREMENT

- The cocoa beans shall be from ripe pods and adequately fermented, free from smoky smell, free from objectionable or foreign odour and free from any evidence of adulteration.

- The cocoa beans shall be evenly dried throughout. The moisture content shall be less than or equal to 7.5%.

- The cocoa beans shall be reasonably uniform in size.

- The consignment shall be free from bean clusters and reasonably free from double bean.

- The consignment shall contain less than or equal to 2% waste by weight.

- The consignment shall be free from insects includes mites.

- The consignment shall be free from foreign matters.
<table>
<thead>
<tr>
<th>SMC</th>
<th>BEAN COUNT (100g)</th>
<th>MOULD (% mak.)</th>
<th>SLATY (%mak.)</th>
<th>INSECT DAMAGE / GERMINATED (%mak.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>≤ 100</td>
<td>≤ 3%</td>
<td>≤ 3%</td>
<td>≤ 2.5%</td>
</tr>
<tr>
<td>2</td>
<td>&gt;100 ≤ 110</td>
<td>≤ 3%</td>
<td>≤ 3%</td>
<td>≤ 2.5%</td>
</tr>
<tr>
<td>3</td>
<td>&gt;110 ≤ 120</td>
<td>≤ 3%</td>
<td>≤ 3%</td>
<td>≤ 2.5%</td>
</tr>
</tbody>
</table>
DEFINITION
ADULTERATION

ADULTERATION OF THE COMPOSITION OF GRADED COCOA BEANS BY ANY MEANS WHATSOEVER SO THAT THE RESULTING MIXTURE OR COMBINATION IS NOT OF THE GRADE PRESCRIBED, OR AFFECTS ADVERSELY THE QUALITY, FLAVOUR, OR ALTERS THE BULK OR MASS.
Bean cluster

Bean clump which consists of three or more beans fused together which cannot be separated by hand
Bean count

The total number of whole cocoa beans required to make a weight of 100 g
Broken bean

Cocoa bean of which a fragment is missing, the missing part being equivalent to less than half of the bean.
Cocoa bean

The fermented and dried, whole seed of *Theobroma cacao* L.
Defective bean

Cocoa bean which is internally mouldy, slaty, insect damaged, insect infested and germinated.
Double bean

Two beans fused together which cannot be separated by hand.
Fermented bean

Cocoa bean of which the colour of the cotyledons should range from partly purple and partly brown to a fully brown.
Flat bean

Cocoa bean of which the cotyledons are too thin to be cut to give a full length of the cotyledon surface.
Foreign matter

Any materials and particles other than cocoa beans and waste.
Fragment

A piece of cocoa bean less than half the original bean.
Germinated bean

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

Cocoa bean, of which the internal parts are found to have been attacked by insects which have inflicted damage visible to the naked eye or contain insect, at any stage of development.
Mouldy bean

Cocoa bean on the internal part of which mould is visible to the naked eye.
Piece of shell

Part of the shell without adhering cotyledon.
Slaty bean

Cocoa bean which shows a slaty colour on half or more of the internal surface
Smoky bean

Cocoa bean which has a smoky smell or taste.
Flat bean, fragment, pieces of shell, dried placenta and dried pulp
The decreasing order or gravity is as follows:

(a) Mouldy beans;
(b) Slaty beans;
(c) Insect damage, insect infested and germinated beans.
QUALITY OF DRY COCOA BEANS

1. Grading Procedure
2. Quality Equipments
3. Documentation Of Grading
4. Basic Inspection
5. Determination Of Grade
GRADING PROCEDURE

- Who Can Perform Grading
- Place of Grading
- Lot Size
- Issuance of Grading Documents
PROBE
To collect samples of cocoa beans by thrusting a probe into bags at three different position of each bag.
QUALITY TOOLS

QUATERING TOOLS
To reduce bulk sample of cocoa beans for grading analysis.
QUALITY TOOLS

- **SECATEUR**
  To cut cocoa bean lengthwise during cut test.
QUALITY TOOLS

- DIGITAL BALANCE
  To measure weight of cocoa bean, broken bean, waste and foreign matter.
QUALITY TOOLS

MOISTURE METER
To measure moisture content of cocoa bean.
QUALITY TOOLS

- BLENDER
  To grind cocoa bean into powder for moisture content measurement.
QUALITY TOOLS

CUT TEST BOARD
To display beans that have been cut during cut test in determining mouldy, slaty, insect damaged, germinated and level of fermentation.
DOCUMENTATION OF GRADING

- Grading Request Form
- Grading Analysis Report
- Quality Certificate
3. BASIC INSPECTION

- Condition of Packaging
  a. Marking of bag
    - Grade
    - Name and Trademark of Exporter
    - Lot Number
    - Destination
    - Produce of Malaysia
    - 62.5 kg nett
BASIC INSPECTION

Condition of Packaging

b. Stitching of Bag

- Sewn twice
- Unbreakable 10 cm string loop to the left
- Loose 10 cm string to the right
BASIC INSPECTION

- Condition of Packaging
  - Bag Condition
    - New Jute Bag
    - Hydrocarbon-Free
Determination of Total Weight of Consignment

Nett Weight = Total Weight of Cocoa Consignment Less Weight of Empty Bags
Determination of Average Nett Weight Per Bag

Weight Per Bag = Total Weight of Cocoa Consignment Less Weight of Bags divided by Number of Bags
DETERMINATION OF GRADE
The activities involved are Collecting bulk sample, quartering and reducing samples, analysis the samples that includes beans count, defected beans and fermentation levels, report and certificate, Grade marking and affixing the seal.
✓ 30% Probing Sample Collection
✓ Select 30% randomly
✓ 3 Positions Probing on Each Bag
  ❖ 1\textsuperscript{st} – Top position
  ❖ 2\textsuperscript{nd} – Middle position
  ❖ 3\textsuperscript{rd} – Bottom position
✓ Beans collected in Polythene bag
SAMPLE COLLECTION USING PROBE

1. 1st BAG
   PROBE IN AT LEAST 25CM AT THE CENTRE OF THE TOP PORTION OF THE BAG

2. 2nd BAG
   PROBE IN AT LEAST 25CM AT THE CENTRE OF THE BOTTOM PORTION OF THE BAG. For lot <20.0 tons, second probing can be at any part except the bottom portion.

3. 3rd BAG
   PROBE IN AT LEAST 25CM HORIZONTALLY TO COLLECT SAMPLE FROM THE CENTRE PORTION OF THE BAG
DETERMINATION OF GRADE

- Examining Live Insects
- To determine the presence of live insects during sample collection for the consideration of fumigation requirement
DETERMINATION OF GRADE

- Detecting Off-Flavour
- To detect any off-flavour from beans during sample collection especially on smoky beans
DETERMINATION OF GRADE

- Examining Cocoa Beans
- To examine the physical condition of the cocoa beans such as sizes uniformity, colour and other general appearance.
DETERMINATION OF GRADE

Quatering Bulk Sample

Each quarter-Reference/Audit/Exporter/Grade Analysis
ANALYSIS
1. Waste content

- Determining Waste Content
  \[
  \% \ WC = \frac{\text{Weight of Sample} - \text{Weight of Whole & Broken Beans}}{\text{Weight Sample}} \times 100
  \]
STEPS

1. SAMPLES

2. WEIGHT EACH QUARTER

$S_1 = W$
3. SEPARATE THE BEAN, WHOLE BEAN, BROKEN BEAN, WASTE & DOUBLE BEAN
4. WEIGHT - \((W1)\)
PERCENTAGE OF WASTE:

\[
= \frac{W - W1}{W} \times 100
\]

\[W\] = Weight of sample (gm)

\[W1\] = Weight of whole bean, broken bean and double bean (gm)
Example:

\[
% \text{ Waste } S_1 = \frac{(317 - 312) \text{ gm} \times 100}{317 \text{ gm}} = 1.6 \%
\]

Repeat the reading for next quarter.
EXAMPLE OF WASTE AVERAGE:

Average % waste = \frac{S_1 + S_2 + S_3 + S_4}{4}

Example = \frac{1.8 + 1.8 + 2.2 + 2.2}{4} = 2.0 %
2. Bean count

- To determine Bean Count

\[
BC/100gm = \frac{\text{No. of Whole Beans} \times 100}{\text{Weight of Whole Bean}}
\]

\[
\% \text{ Broken Bean} = \frac{\text{Weight of 4 Qtrs Broken Bean} \times 100}{\text{Total Weight of 4 Qtrs}}
\]
STEPS:

1. Take the final quarter sample
2. Separated the bean and count
Count the whole bean

Weight the whole bean for each quarter

S1 S2 S3 S4
Bean Count = \[
\frac{\text{Total whole bean} \times 100}{\text{Weight of whole bean}}
\]

Example:

\[(S_1) = \frac{243 \text{ bean} \times 100 \text{ gm}}{238 \text{ gm}}\]

= 102 bean

Repeat the process for the next quarter
Calculate the average of the bean count

\[
\frac{S_1 + S_2 + S_3 + S_4}{4} = \frac{100 + 100 + 100 + 100}{4} = 100
\]
3. Cut test

- To conduct Cut Test

% Insect Damaged = \( \frac{\text{No. of ID Bean} \times 100}{\text{Total No. of Bean Cut}} \)

% Germinated = \( \frac{\text{No. of Germinated Bean} \times 100}{\text{Total No. of Bean Cut}} \)
To conduct Cut Test

\[
\% \text{ Mouldy} = \frac{\text{No. of Mouldy Bean} \times 100}{\text{Total No. of Bean Cut}}
\]

\[
\% \text{ Slaty} = \frac{\text{No. of Slaty Beans} \times 100}{\text{Total No. of Bean Cut}}
\]
4. Fermentation level

- To conduct Cut Test

  % Fully Brown = \(\frac{\text{No. of FB Bean} \times 100}{\text{No. of Bean Cut}}\)

  % Partly Purple/Brown = \(\frac{\text{No. of PPB Bean} \times 100}{\text{No. of Bean Cut}}\)

  % Fully Purple = \(\frac{\text{No. of FP Bean} \times 100}{\text{No. of Bean Cut}}\)
STEPS:

1. Take one quarter which the higher bean count.
2. Cut the bean and display the surface of cotyledon.
Display all the cotyledon and count the defeated bean and the colour of fermentation levels.
Defeated Levels:

- Mouldy
- Slaty
- Insect Damaged
- Germinated
5. Moisture content

- Determining Moisture Content

\[
\% \text{MC} = \frac{\text{Total of 4 MC Readings}}{\text{Total Number of Readings}}
\]
Take the 4 reading from the moisture grain master meter and find average
STEPS:

1. Take one quarter sample
2. Grind the beans (40 beans)
3. Put the grind bean inside the small plastic bag
Average result for moisture content:

\[ \% \text{ Moisture Content} = \frac{\text{Four reading MC}}{\text{Number of reading}} \]

Example: \[ \frac{7.0 + 7.0 + 7.0 + 7.0}{4} = 7.0\% \]
QUALITY CERTIFICATION FOR DRY COCOA BEANS

Owner: [IVORY COAST COCOA BEAN]

This parcel of dry cocoa beans has been inspected and graded in compliance with MS 293:2005: Cocoa Beans Specification for Grading (Fourth Revision) with SMC GRADE (8S) with parameters as stated below:

<table>
<thead>
<tr>
<th>SMC Major Parameters</th>
<th>Bean Count (100 gm)</th>
<th>Moisture (%)</th>
<th>Slaty (%)</th>
<th>Insect Damaged (%)</th>
<th>Germinated (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>97</td>
<td>3.89</td>
<td>-</td>
<td>2.54</td>
<td>0.85</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Parameters</th>
<th>Waste %</th>
<th>Moisture %</th>
<th>Foreign Odor</th>
<th>Foreign Matters</th>
<th>Fermentation Level (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.62</td>
<td>6.9</td>
<td>-</td>
<td>-</td>
<td>90.68</td>
</tr>
</tbody>
</table>

The validity of the grade is certified correct on the date of inspection below:

Graded: [MD BUKH BIN DAME]
Date: 05/07/2012

Certified: [MOHD RAZIM BIN A. GHANI]
Date: 05/07/2012

Verified: [for Direktor General]
Date: 05/07/2012

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