TRAINERS GUIDE

WHEAT GRAINS QUALITY SPECIFICATIONS
EAS 51:2013
The East Africa Trade Hub (EATH) has produced a series of training tools to promote broad awareness, understanding and application of the regional harmonized staple foods quality standards which were approved and declared by the East Africa Standards Committee in July 2013. This trainer’s guide was created with stakeholder input and is intended to assist national and regional stakeholders facilitate widespread uptake of the regional standards along all segments of the staple foods value chains. EATH encourages stakeholders to update the trainers guide as needed so that it remains a relevant tool for all users.
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1. Introduction

1.1 Objective of the Trainers Guide

This trainer’s guide was created to assist farmers, traders, processors and certified graders to understand and apply the EAS 51:2013 wheat grains quality standard correctly in the determination of wheat quality. It aims at ensuring that wheat farmers, traders, grain handlers, and processors meet relevant standards, reduce post-harvest wastage and provide safe, appropriate quality Wheat to consumers.

Specific Objectives:

- To explain to wheat farmers, traders, grain handlers, and processors the meaning of the term quality, emphasizing that quality has two dimensions: “must-be quality” and “attractive quality”.
- To demonstrate to farmers, traders and dealers that the quality of wheat is measurable.
- To acquaint the farmers and traders with the common physical defects in wheat that can hinder market access and profitability.
- To demonstrate how physical defects are assessed in meeting standards requirements.

1.2 Basis of the Trainers Guide

- This is a training material for anyone working with wheat farmers, traders, grain handlers and grain processors.
- It is based on the fact that the trainer has more technical knowledge than the trainees.
- This manual outlines grading based on the EAS 51:2013 Wheat grain specifications.
- This training manual can be adapted to train various groups with different interests; farmers of production and delivery of quality crop; traders, grain handlers and processors, on grading delivered wheat.

1.3 Uses of Wheat

Wheat (Triticum spp.) is a cereal grain, originally from the Levant region of the Near East but now cultivated worldwide. Wheat is the third most produced globally after maize and rice. Wheat grain is a staple food used to make flour for leavened, flat and steamed breads, biscuits, cookies, cakes, breakfast cereal, pasta, noodles, couscous and for fermentation to make beer, other alcoholic beverages, or biofuel. Wheat is planted to a limited extent as a forage crop for livestock, although the straw cannot be used as feed. The whole grain can be milled to leave just the endosperm for white flour. The by-products of this are bran and germ. The whole grain is a concentrated source of vitamins, minerals, and protein, while the refined grain is mostly starch.

Common wheat, (Triticum aestivum L.), also known as bread wheat, is a wheat variety that is well adapted to modern industrial baking. Common wheat can be hard wheat or soft wheat, depending on grain hardness. It is utilized mainly as flour (whole grain or refined) for the production of a large variety of leavened and flat breads, and for the manufacture of a wide variety of other baking products.

Club wheat (Triticum compactum Host.) composes a subclass of soft white wheat. Club wheat has less potential for gluten strength / elasticity or dough water absorption and is therefore eminently suited to production of cookies/biscuits, requiring less bake-out and producing a more tender product. Club wheat flour, however, is best used for cake-baking, especially Japanese sponge cake production, where cake volumes are greater than those of soft white wheat, which also produce excellent cakes.
Durum (*Triticum durum* Desf.) in Latin means "hard", and the species is the hardest of all wheats. Its high protein content, as well as its strength, makes durum good for special uses, production of semolina (coarse flour), the main raw material of pasta making. Durum wheat is used extensively in bread-making. However, it is unusual in that, despite very high protein content, it is low in desirable gluten needed to form a glutinous web necessary for bread to rise. As a result, although 100 percent durum wheat breads do exist, in most instances bread dough contain only a portion of durum wheat and are supplemented substantially with commercial white flours, often those higher in gluten necessary to offset the poor gluten contribution of durum flour. When durum flour is used as the sole flour in bread, substantial additions of isolated wheat gluten are necessary to effect rising. Without it, 100 percent durum wheat breads are often heavy, with very close grain, and will split easily when raised for baking. Some durum wheat is milled into flour to manufacture medium-dense breads in Mediterranean and Middle Eastern countries and some into coarse durum grain grits used to produce couscous (cooked grits) in Arab countries.

![Figure 1: Difference between durum and common wheat](image)
2. Grain Quality and Grain Quality Standards

2.1 Overview
This section is the basis for the remainder of the handbook. It is intended to aid the proper use of the EAS 51:2013 Wheat grain specifications quality standard. Farmers should know that Wheat quality assurance involves prevention of defects from the earliest stages of cultivation. This includes proper land preparation and using the right inputs. The standards only help to assess the quality of the harvested crop.

2.2 Quality
The term “quality” as applied to food material refers to those attributes of the food which make it agreeable to those who consume it. Attributes of quality involve colour, flavour, texture, nutritional value and the absence of harmful substances such as microorganisms, insects, pest and their metabolic products, chemical residue and noxious seeds.

Grain quality is generally assessed based on general aspects (characteristics that give value to the user) and safety aspects (characteristics that pose a hazard to the end user). For example, broken grain, low test weight wheat and high moisture grain reduce the amount and/or quality of flour a miller gets after milling. On the other hand, toxic seeds and pesticide residue could harm the consumer. Therefore, any grain that does not meet safety requirements is rejected despite looking physically appealing or meeting the general quality characteristics.

Grain quality may have different meanings to different people and may depend on the grain type and its end use. Since the requirements of farmers, traders, millers and consumers are not necessarily compatible; Quality Standards have to be established to even the playing field.

2.2.1 Quality Standards
Standards refer to the measures that serve as a basis for making comparisons or judging the accuracy of unknown samples. Standards are established for a variety of purposes including facilitating smooth and fair trading and protection of consumers. An example of a quality standard is the EAS 51:2013 Wheat grains – specification which was developed in order to harmonize Wheat quality requirements in East Africa.

Standards are developed by national, regional and international standards institutions often to enforce legislation. These bodies issue specifications for commodities as well as methods of testing. Examples of these bodies include Kenya Bureau of Standards (KEBS), East African Community (EAC), American Association of Cereal Chemists (AACC), Association of Analytical Chemists (AOAC), and International Standards Organization (ISO).

It is common for standards bodies to adopt standards issued by another body. For example, the EAS 51:2013 (Wheat grains specifications) has adopted ISO 605 test methods to determine foreign matter. All adopted Standards appear under “normative references”. When testing under a particular standard, all the standards referred to under “Normative references” have to be followed as well.

There are many standards, even for a particular crop depending on the origin and destination of the traded grain. For example, COMESA and EAC Wheat standards differ. Also Wheat grains and dry beans standards are different. For proper grading of grain to be done to determine the quality, the grader has to use:

1) The correct standard for the particular grain and market e.g. EAS 51:2013 Wheat Grains – specifications
2) The correct standard test method i.e. sampling and using the right procedure to grade
3) The correct standard test equipment e.g. using a 1.6 mm wide and 9.5mm long slotted sieve to determine broken grain in Wheat.

2.2.2 Quality Control
Quality control refers to a system of maintaining standards in products by testing a sample to see if it meets the required standards. It involves use of a particular standard, test method and equipment to detect defects and assess the quantity of certain physical, sanitary or chemical quality parameters.

Grain grading is a process of categorising grain based on certain quality parameters. This informs decisions such as storage of the grain, uses of the grain, the purchase price and so on.
3. Wheat Grain Quality Standards
This Trainers manual is based on the EAS 51:2013 Wheat grain specifications, a Wheat standard that was passed by EAC and adopted by partner states for implementation in their respective countries.

3.1 Presentation
The Standard defines Wheat as grain that consists of 50% or more common wheat (*Triticum aestivum* L.), club wheat (*Triticum compactum* Host.), and durum wheat (*Triticum durum* Dest.).

Wheat varieties are called "soft" or "weak" if gluten content is low, and are called "hard" or "strong" if they have high gluten content.

![Soft and hard wheat](image)

3.1.1 Colour
Wheat comes in different colours: red, white, and amber.

![White and red wheat](image)

3.1.2 Test weight
Test weight, also called, “bulk density”, “bushel weight” or “standard of quality” in EAS 51:2013, is the weight per unit volume of wheat (grain density). It can be expressed as kilograms per hectolitre or grams per litre. High test weight grain tends to yield more flour.

3.2 Grain Defects
3.2.1 Broken Grains

> These are pieces of wheat kernels that pass through a 1.6 mm wide, 9.5 mm long slotted sieve.
3.2.2 Foreign Matter

These are organic and inorganic material other than wheat, broken kernels, other grains and filth. Organic matter is material of plant origin e.g. stalks, chaff, weed seeds, etc., while inorganic matter includes plastics, stones, glass, metals, etc.

3.2.3 Discoloured Grain

These are wheat kernels that are discoloured by heat, fermentation, moulds, weather or disease but do not include black point which is brown, dark brown or almost black discolouration at the end embryo end of the grain.

3.2.4 Germinated Grain

These are wheat kernels in which the pericarp covering the embryo has been raptured due to sprouting.

3.2.5 Pest Damaged Grain

These are wheat kernels which have been damaged by insects or other pests.
3.2.6 **Infested grains**

This is wheat containing any form of living organisms capable of causing damage or spoilage to wheat kernels.

3.2.7 **Immature grains**

These are wheat kernels which are distinctly green in colour.

3.2.8 **Heat damaged wheat**

These are kernels damaged by external heat or as a result of fermentation.

3.2.9 **Diseased weather damaged**

These are kernels with at least 1/3 of the surface physically damaged or mouldy due to weather conditions.
3.2.10 Wheat screenings
These are small undersized wheat kernels that are retained on the 1.6 mm slotted sieve but pass through a 2.0 mm slotted sieve.

Figure 16: Wheat screenings (left)

3.2.11 Defective grains
These are wheat kernels which are damaged. They include all defects discussed above.

3.3 Other grains
These are edible grains which are not wheat kernels.

3.4 Toxic and noxious weed seeds
These are seeds of weeds that are harmful or injurious to human or animal health.
4. Standard Requirements

4.1 Wheat Specifications Table (Grades)

Wheat grains are classified as Grade 1, Grade 2, Grade 3 or Grade 4 according to the limits indicated in the table below.

<table>
<thead>
<tr>
<th>Defect</th>
<th>Maximum limits</th>
<th>Method of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture Content % m/m max.</td>
<td>Grade 1 14</td>
<td>Grade 2 14</td>
</tr>
<tr>
<td>Standard of quality- kg/hl (g/0.5 L) min.</td>
<td>79(395)</td>
<td>75(375)</td>
</tr>
<tr>
<td>Protein %m/m, min. (N×5.7 at 11% moisture basis)</td>
<td>Hard/Strong Wheat</td>
<td>Grade 1 13.0</td>
</tr>
<tr>
<td></td>
<td>Soft wheat</td>
<td>Total 10.0</td>
</tr>
<tr>
<td>Foreign Matter, % m/m max.</td>
<td>Grade 1 0.40</td>
<td>Grade 2 0.70</td>
</tr>
<tr>
<td>Un-millable material above the screen, % m/m max.</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>Screenings, %m/m max. (2.0 mm slotted sieve)</td>
<td>Grade 1 5.0</td>
<td>Grade 2 5.0</td>
</tr>
<tr>
<td>Falling numbers, s, min.</td>
<td>Grade 1 350</td>
<td>Grade 2 300</td>
</tr>
<tr>
<td>Edible grains other than wheat (whole or identifiably broken), %m/m, max.</td>
<td>Grade 1 0.50</td>
<td>Grade 2 1.50</td>
</tr>
<tr>
<td>Wheat of other classes or varieties % m/m max.</td>
<td>Grade 1 1.0</td>
<td>Grade 2 2.0</td>
</tr>
<tr>
<td></td>
<td>Total 3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Total defective grains</td>
<td>Grade 1 3.0</td>
<td>Grade 2 5.0</td>
</tr>
<tr>
<td>Total Aflatoxins, ppb max.</td>
<td>Grade 1 10</td>
<td></td>
</tr>
<tr>
<td>Aflatoxin B1, ppb max.</td>
<td>Grade 1 5</td>
<td></td>
</tr>
<tr>
<td>Fumonisin, ppm max.</td>
<td>Grade 1 2</td>
<td></td>
</tr>
</tbody>
</table>

(Note: The parameter, Total Defective Grains is not the sum total of individual defects. It is limited to 70% of the total of individual defects found during grading)

It is important to note that some of these defects can be corrected, changing the grade of the Wheat. For example, Wheat with high moisture content, foreign matter and broken grain can be cleaned and dried. On correction of the defects, a new grade may be assigned after sampling and grading again.
5. Determination of Grades (Grading)

5.1 Non-standard Test Method (Subjective Tests)

Formal grading methods are not always practical in the field. This is because the farmers or traders may lack the equipment needed to grade the grain based on Standard Test methods. The tests below are useful for getting a rough estimate of the grade of Wheat. Some of the tests are known to give results that are above those of the standard test method while others lower. Official results should be those that have been reached using Standard Test Methods.

5.1.1 Determination of Wheat defects using the count method

The EAS 51:2013 recommends this method to determine wheat defects. Wheat could be graded using the procedure below. For example, when grading for germinated grains:

i. Take a representative sample of the Wheat to be evaluated

ii. Use the quartering method to subdivide the Wheat down to about 100 grains.

iii. Use a 1.6 mm sieve to remove broken grains and foreign matter.

iv. Handpick all foreign matter retained on the 1.6 mm sieve.

v. Count the number of wheat grains retained on the sieve\( (\text{count}_1)\)

vi. Select all germinated grains and count them \( (\text{count}_2) \)

vii. Express the percentage of germinated wheat as:

\[
\frac{\text{count}_2}{\text{count}_1} \times 100
\]

All wheat defects including, pest damaged, weather damaged, shrivelled, discoloured, heat damaged, etc. can be estimated using this method. However, huge variances can be expected as compared to use of weight methods (% m/m).

Other quality parameters e.g. broken grain, moisture content, screenings, protein content, falling numbers, bushel weight, and mycotoxins, cannot be determined without use of equipment.

5.1.2 Determination of Moisture Content

In the field, most farmers do not have moisture meters or a grading laboratory facility. Non-standard tests can be used to estimate the dryness of Wheat. To do this:

Method 1

i. Pick 10 grains at random.

ii. Crush each grain between the teeth.

iii. A reasonably dry grain will crush without leaving a pasty feel in the mouth.

Method 2

i. Select a random sample of wheat.

ii. Fill a glass half-way with the wheat sample (the glass must be dry).

iii. Add 2 teaspoons of dried salt (the salt should be previously dried in a pan over a fire for 15 minutes).

iv. Shake the mixture for 2 minutes.

v. Leave to settle for 20 minutes.

vi. Pour out the mixture.

vii. Check for any salt clinging on the walls of the glass.
viii. If any salt is found on the walls of the glass, then moisture content is greater than 14%.

5.2 Standard Test Methods

5.2.1 Visual and Organoleptic Test

These are tests that are conducted using senses of sight, smell and taste. Wheat for human and animal consumption should be free from foreign odours, moulds, live insects, rat droppings, toxic or noxious weed seeds and other hazardous contaminants.

To check for this, the grain analyst needs to obtain a representative sample of the grain. Then s/he will use the senses of sight and smell to check the existence of these defects. This test is normally the first to be done. Other tests will follow if the wheat passes this test. This test can easily be conducted in the field because it does not require any equipment.

5.2.2 Testing for Foreign Odour

i. General test for foreign odour

i. Obtain a representative sample
ii. Spread out the sample on a flat surface and smell it.
iii. If no odour is detected, return the sample into the container and seal it.
iv. Leave the sealed container for 24 hours and re-examine the sample.
v. The smell should be typical of Wheat without other smells e.g. chemicals, mouldiness’, earthy, rotten, musty smell, etc.

ii. Rapid Test for foreign odour

i. Obtain a representative sample
ii. Put a small quantity of ground or un-ground wheat kernels in a container
iii. Pour some warm water (60 – 70 °C) into the wheat and cover the container
iv. After 2-3 minutes, decant the water and note whether foreign odour is present.

Any grain with objectionable odour should be rejected.

5.2.3 Testing for Presence of Visible Infestation

i. Obtain a representative sample
ii. Spread about 100 grams of the sample on a warm plate (at 40 °C).
iii. Cover the plate with a glass jar (bell glass jar if possible) to prevent the insects from escaping
iv. After 15 minutes, sieve the grain through an appropriate sieve, e.g. 1.6 mm slotted sieve
v. Check for living insects, dead insects and insect larvae.
vi. Using a scalped, cut across wheat kernels that are insect damaged, to check for live or dead insect (primary pests) harbouring in the grain.
vii. Note the presence of rodent droppings.
viii. Reject the grain of it has one or more live insects.

5.2.4 Determination of Moisture Content

The EAS 51:2013 requires that the moisture content of clean, dry wheat should not exceed 14% m/m determined by representative samples in accordance with ISO 711 and ISO 712. However, this requires expensive equipment, including a grinding mill and a constant-temperature oven electrically heated.

In the field, moisture meters can be used for the estimation of moisture content. To determine moisture content using moisture meters, follow the manufacturer’s instructions. **Ensure that the moisture**
meters are maintained and calibrated often so as to get accurate results. Calibration of moisture meters is done by National Standards organization, appointed agents, and some manufacturers of the equipment.

![Moisture meters](image)

**Figure 25: Moisture meters**

### 5.2.5 Determination of Foreign Matter

i. Place a clean dry basin (Bottom Pan) in place to receive any materials that may go through the sieve  
ii. Weigh 200 grams of the representative sample ($Weight_1$)  
iii. Put the Wheat in the sieve provided (1.6 mm slotted-hole sieve).

![Slotted grain sieve](image)

**Figure 26: Slotted grain sieve**

iv. Shake the sieve horizontally for 30 times for about 15 seconds.  
v. Collect all the foreign organic matter that has passed through the sieve.  
vi. Weigh all the foreign matter collected from the bottom ($Weight_2$)

\[
\text{Foreign matter} = \frac{Weight_2}{Weight_1} \times 100
\]

### 5.2.6 Determination of Un-millable material above the sieve

These are foreign materials retained on top of the 1.6 mm slotted sieve after removal of foreign matter and broken grain.

i. From the sample retained on top of the sieve in 5.2.5 above ($Weight_1$)  
ii. Handpick all un-millable foreign matter retained on top of the 1.6 mm slotted sieve.  
iii. Weigh the matter un-millable matter ($Weight_2$)  
iv. Express the results as a percentage

\[
\text{Un-millable matter above the screen} = \frac{Weight_2}{Weight_1} \times 100
\]
5.2.7 **Determination of Broken Grains**

i. From the working sample weighed in 5.2.5 above ($Weight_1$)

ii. Collect all the whole and broken grains that passed through the 1.6 mm slotted-hole sieve.

iii. Weigh the broken grain ($Weight_2$)

iv. Express the percentage of broken Wheat as follows:

\[
\text{Broken Grain} = \frac{Weight_2}{Weight_1} \times 100
\]

5.2.8 **Filth**

i. From the working sample weighed in 5.2.5 above (200 grams) ($Weight_1$)

ii. Collect all the filth that went through the sieve and that which remains on top.

iii. Weigh the filth ($Weight_2$)

iv. Estimate the percentage filth level as:

\[
\text{Filth} = \frac{Weight_2}{Weight_1} \times 100
\]

5.2.9 **Determination of defective grains**

i. Obtain a representative sample.

ii. Mix and subdivide the sample using a sample divider or the quartering method to obtain a working sample of 25 g.

iii. Use the 1.6 mm slotted sieve to remove foreign matter and broken grains.

iv. Pour the wheat retained on the sieve on a bench.

v. Pick defective grains (pest damaged, discoloured, germinated, immature, heat damaged, diseased weather damaged, frost damaged and shrivelled wheat kernels)

vi. Weigh all defective grains picked ($Weight_2$)\(^1\)

vii. Express the percentage defective grains as:

\[
\text{Defective grains} = \frac{Weight_2}{Weight_1} \times 100
\]

5.2.10 **Total Defective Grains**

This refers to all defects mentioned above.

i. From the working sample weighed in 5.2.5 above (200 grams) ($Weight_1$)

ii. Collect the Wheat grains retained by the sieve

iii. Pour them on a bench

iv. Pick all defective grains by hand (diseased, discoloured, stained, immature/shrivelled, pest damaged, etc.)

v. Weigh the defective wheat kernels ($Weight_2$)

vi. Express the percentage total defective grains as:

\[
\text{Total defective grains} = \frac{Weight_2}{Weight_1} \times 100
\]

---

\(^1\) EAS 51:2013 Wheat grains specifications required that you put together all defective grains and weigh them. However, in some standards, defective kernels are separated into their class of defect (e.g. pest damaged, immature, shrivelled, etc.) and weighed separately.
5.2.11 Assessment of Contrasting Varieties
This involves picking out all grains with contrasting kernel characteristics including the colour, shape and length of the kernel, shape of the germ, crease and brush.

![Contrasting wheat varieties](image)

Figure 27: Contrasting wheat varieties

5.2.12 Determination of Bulk density
Determination of bulk density should be done in accordance to ISO 7971-1 and ISO 7971-3. There are several equipment for determining bulk density. Most come with instructions which have to be followed strictly.

![Measuring cup and cox funnel for bulk density](image)

![Hectolitre test weight kit](image)

Figure 28: Measuring cup and cox funnel for bulk density

Figure 29: Hectolitre test weight kit

The common field method for determination of bulk density generally involves weighing grain that occupies a 0.5L measuring cup. The process is as follows:

1. Clean the grain using the 1.6mm slotted sieve (foreign matter affects bulk density)
2. Place a cox funnel, with its outlet shut, on top of the 0.5L cup
3. Pour the grain into the cox funnel using a suitable scoop.
4. Open the cox funnel slide and fill the 0.5L cup until it overflows.
5. Remove the funnel from the 0.5L cup.
6. Sweep the top of the cup using a suitable stick to remove excess grain in a light semi-circular motion.
7. Transfer the contents of the 0.5L cup into the pan of a weighing pan and weigh the grain to the nearest 5 g.

5.2.13 Determination of Protein content
Determination of protein content is done in accordance with ISO 20483 which uses the Kjeldahl method as the reference method. This involves decomposing the grain sample using sulphuric acid, to remove ammonium sulphate. This is followed by distilling the sample using sodium hydroxide to convert ammonium sulphate to ammonia, the determining the amount of ammonia.
(hence nitrogen) by back titration. In practice, this analysis is largely automated. In the field, it is possible to use equipment that employs infra-red technology to estimate protein content.

![Old method for protein determination](image1.png) ![Modern equipment](image2.png)

**Figure 30: Old method for protein determination**  
**Figure 31: Modern equipment**

### 5.2.14 Determination of falling numbers

Determination of falling numbers is done in accordance with ISO 3093. Falling numbers is an indicator of the extent of sprouting of wheat. Wheat germination released enzymes that cause digestion of the endosperm (starch). This test required specialised equipment. The basis of the test is to measure the time it takes for a stirrer to fall through a gelatinised slurry in a test tube, made from flour of the wheat sample.

![Falling number machine](image3.png)

**Figure 32: Falling number machine**

### 5.2.15 Determination of Mycotoxins

Mycotoxins are a group of chemicals produced by certain mould fungi. This broad category includes Aflatoxins and Fumonisin, which appear in the 4.1 Wheat Specifications Table (Grades) above. These fungi, *Aspergillus flavus* and *Aspergillus parasiticus*, can be recognized by their yellow-green or grey-green, or pink colours.

The presence of Aflatoxin is tested using thin layer chromatography, high performance liquid chromatography or absorbance meters (e.g. Elisa readers), rapid test kits and Black light.

Aflatoxin may be found in good looking grain. Mouldy wheat does not necessarily have high Aflatoxin levels. It could contain other mycotoxins though.

Representative samples have to be taken to a laboratory capable of testing for Aflatoxin. The results should not exceed **10 ppb** of total Aflatoxins and **5 ppb** for Aflatoxin B1.

For Fumonisin, the results should not exceed 2 ppb for any of the four grades.
5.2.16 Contaminants

Wheat must be free of heavy metals in amounts stipulated by the Codex Alimentarius Commission. The contaminant limits are:

- Arsenic 0.1 mg/Kg
- Cadmium 0.1 mg/Kg
- Lead 0.2 mg/Kg
- Mercury 0.1 mg/Kg
- Tin 0.1 mg/Kg

Mg/Kg is equivalent to ppm (parts per million)

Heavy metal quantities can only be determined by testing in a laboratory using a spectrophotometer.

5.3 Hygiene

The product covered by the provisions of the EAS 51: 2013 Standard shall be prepared, packed, stored, transported and distributed under hygienic conditions. This implies that maximum care must be taken to ensure that wheat is packaged in clean containers by clean people. The areas that the Wheat is stored should be clean and meet hygiene standards. These stores should be free from pests (e.g. rodents, cockroaches, weevils and other vermin). Modes of transport should also be clean.

When tested by appropriate methods of sampling and examination, the wheat shall be free from pathogenic micro-organisms, substances originating from micro-organisms, or other poisonous or deleterious substances in amounts which may constitute a health hazard.
Pathogenic micro-organisms are minute living microbes that may cause diseases commonly referred to as germs. They include harmful bacteria, yeasts and moulds. A quick test for these harmful bacteria is done by determining the presence of coliforms. This is done by incubating a weighed sample in specific media at a specified temperature for a period of 48 hours.

It is not feasible to do this test in the field.

5.4 **Packaging**
Wheat, when not handled in bulk, shall be packed in new bags (maximum 50 kg net weight) or similar acceptable protective containers which will safeguard the hygienic and other qualities of the wheat. In East Africa it is common practice to package wheat in second-hand bags. For a wheat consignment to comply with the requirements of EAS 51: 2013, new bags must be used.

The containers including packaging material shall be made only of substances which are safe and suitable for the intended use. These materials should be food grade and in the event of need for verification, a certificate from the supplier should be available to demonstrate that the materials have been declared for use in foods and foodstuff.

5.5 **Labelling**
The following information shall be provided in order to comply with the requirements of EAS 51:2013

5.5.1 **Product Identification**
The name of the product to be declared on the label should be as follows: “Wheat Grains”.

The product must be labelled by the crop year. This is the year in which the Wheat was harvested.

5.5.2 **Type and Grade**
The Grade of wheat must be indicated on packaging. Include a statement regarding genetically modified organisms (GMO) status. Considering that wheat is normally open-pollinated, it is important to know whether the Wheat was grown in close proximity with genetically modified grains. In the absence of this information it is necessary to carry out a laboratory test for verification.

5.5.3 **Net Contents**
The net contents shall be declared by mass in kilograms.

5.5.4 **Name and Address**
The name and address of the producer, packer, distributor, importer, exporter or vendor of the food should be declared.

5.5.5 **Country of Origin**
The country of origin of the wheat shall be declared (e.g. Product of Tanzania)

5.5.6 **Lot Identification**
Each container or bag must be permanently marked in code to clearly identify the packer and the lot. This is important for traceability and recall during all stages of the product chain should any safety issues arise.
5.5.7 Non-Retail Containers

For non-retail containers, required product information should be labelled on the container or in accompanying documents. The name of the product and the name and address of the manufacturer or packer must appear on the container. However, the name and address of the manufacturer or packer may be replaced by an identification mark provided that such a mark is clearly identifiable with the accompanying document.