

A laboratory setting for grain grading. In the background, a person wearing blue gloves uses a digital thickness gauge to measure a grain sample. To the right, a hand holds a cob of yellow corn. In the foreground, three petri dishes are visible: the left one contains yellow corn kernels, the middle one contains small, light-colored grains (possibly wheat or barley), and the right one contains dark, round grains (possibly soybeans). The entire scene is overlaid with a semi-transparent blue and green gradient.

JUNE
2021

Grain Grading

Determination of Grain Quality

Scope



The background of the slide is a photograph of corn cobs. In the foreground, a cob is cut in half, showing the internal structure of the kernels. To its right, another cob is shown in full, with its kernels clearly visible. The background is filled with more corn plants and leaves, creating a natural, agricultural setting.

Introduction

What is grading?

Grading

- Grading is the inspection, assessment and sorting into categories
- Based on
 - Quality
 - Freshness
 - Legal conformity
 - Market value
- Grades are determined by end use quality e.g.,:
 - Milling characteristics
 - Flour yield
 - Quality of the final product

Standards



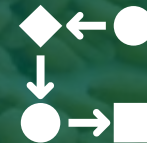
Basis for Judging
unknown samples



Provides pass or
fail criteria



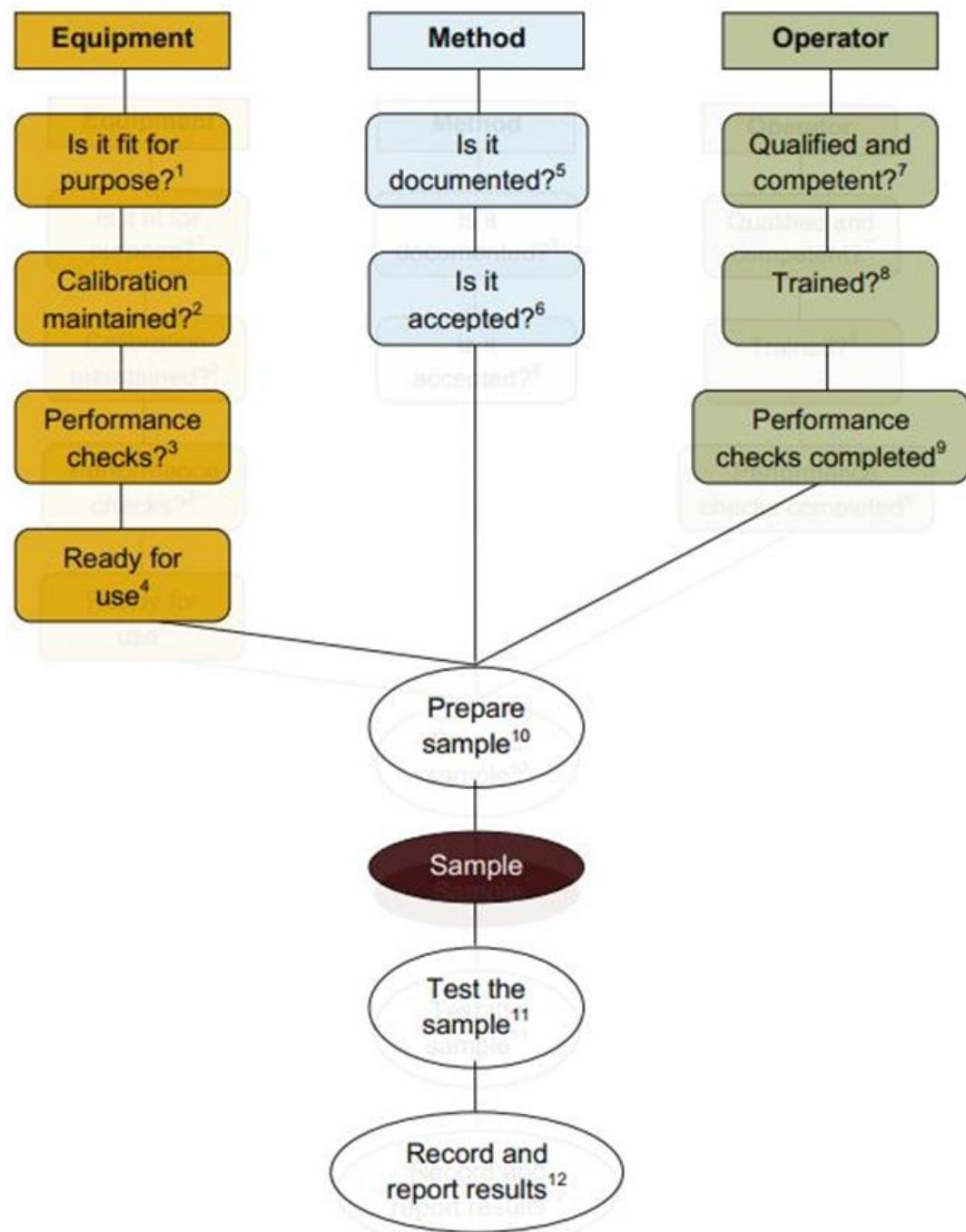
Standard
Specifications



Standard Test
Methods



Standard
Equipment



Standards Applicable in Rwanda

- RS EAS2:2017 – Maize (Grains) Specifications
- ISO 24333 – Cereals, and Cereal Product Sampling
- And many more

GRADING EQUIPMENT

Sample Mixing and Subdivision

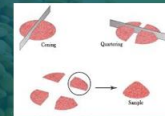
Mechanical Methods

- Use of Riffle or Boerner grain dividers
- Have slots that mix grain flow and buckets to collect grain
- Can mix and subdivide at the same time



Manual Methods

- Coning and quartering is used
- Generally used for large composite samples > 5kg to obtain smaller samples that can be mixed with mechanical equipment
- Maybe used to mix and subdivide smaller samples in absence riffle/Boerner dividers



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Moisture Meters

- Are of different types and technologies
- May test one or more grain types
- Some are more reliable than others
- Must be calibrated annually and cross-checked quarterly



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Test Sieves

- EAS 2:2017 requires a 4.5mm round sieve for broken grain determination
- Sieve must meet the ISO 5223 Test Sieves for Cereal Standard



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Others

- Sample collection tools:
 - 20-liter bucket to collect samples
 - 2-liter containers to store reference samples
 - Sample scoops



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Sample Mixing and Subdivision

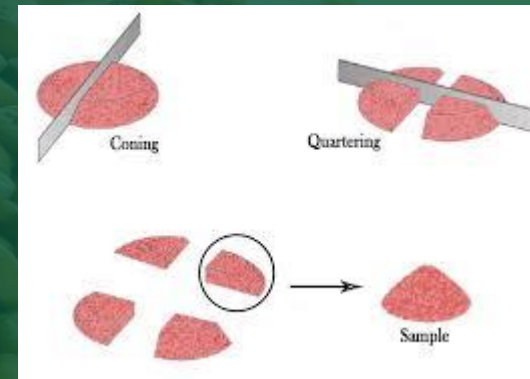
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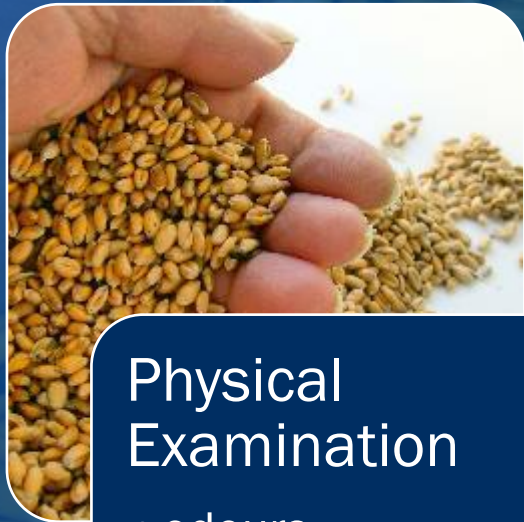


The background of the slide is a photograph of corn cobs in a field. In the foreground, a corn cob is cut in half, showing the internal structure of the kernels. To its right, another corn cob is shown in its entirety. The background is filled with more corn plants and their leaves, creating a natural, agricultural setting.

Grading Process

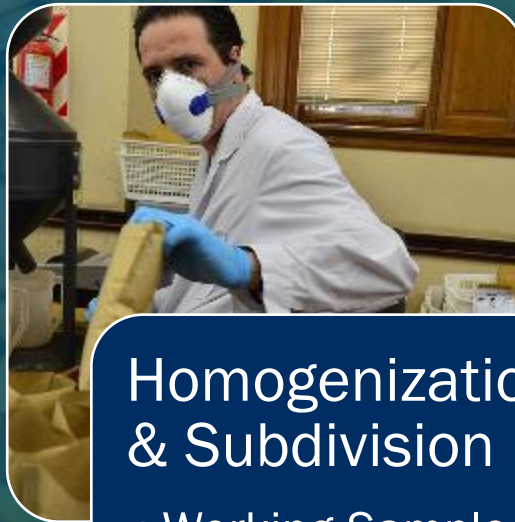
EAS 2:2017 & EAS 901:2017

Grading Process



Physical Examination

- odours
- infestation
- harmful or unusual conditions



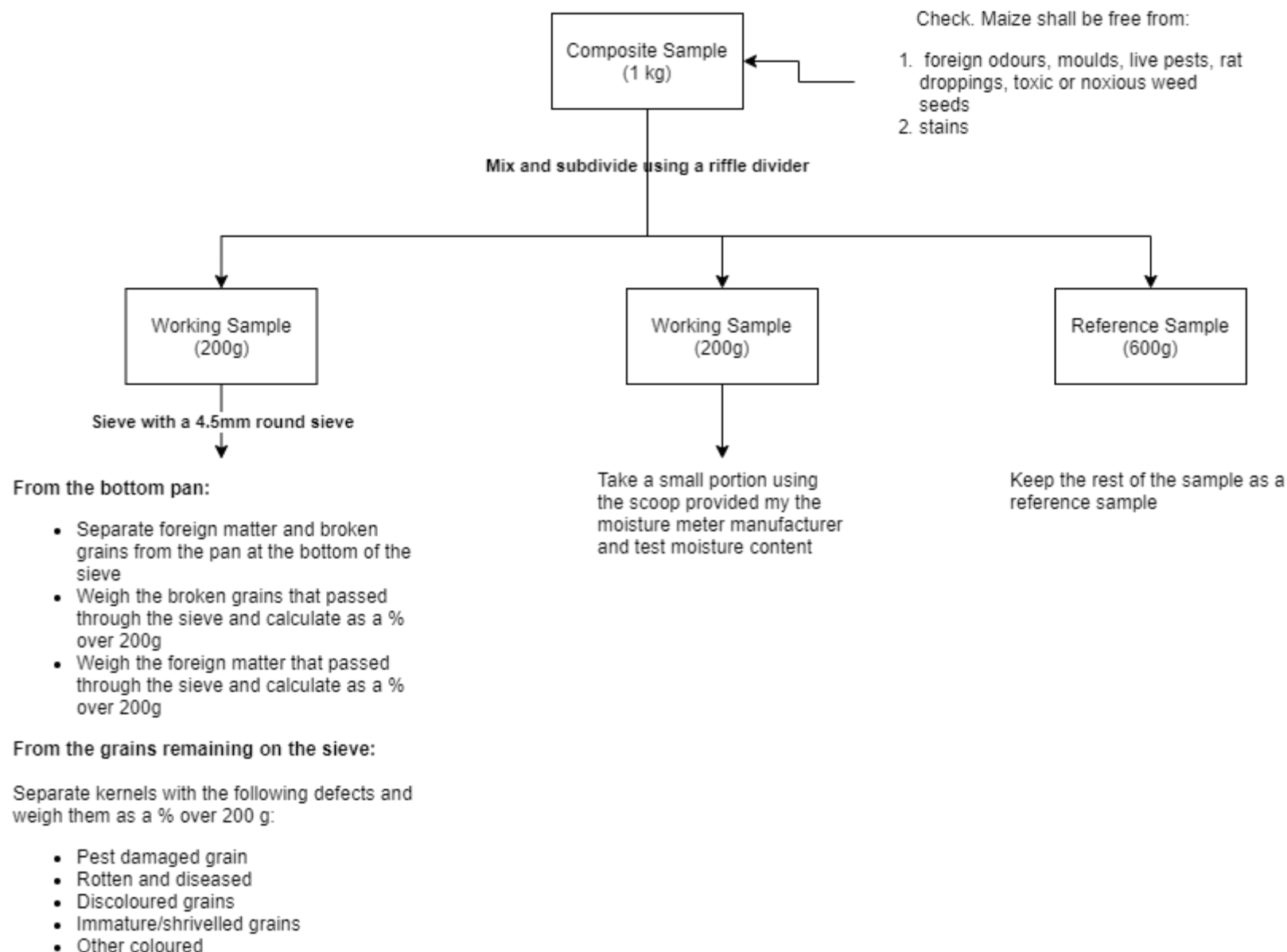
Homogenization & Subdivision

- Working Sample
- Reference Sample

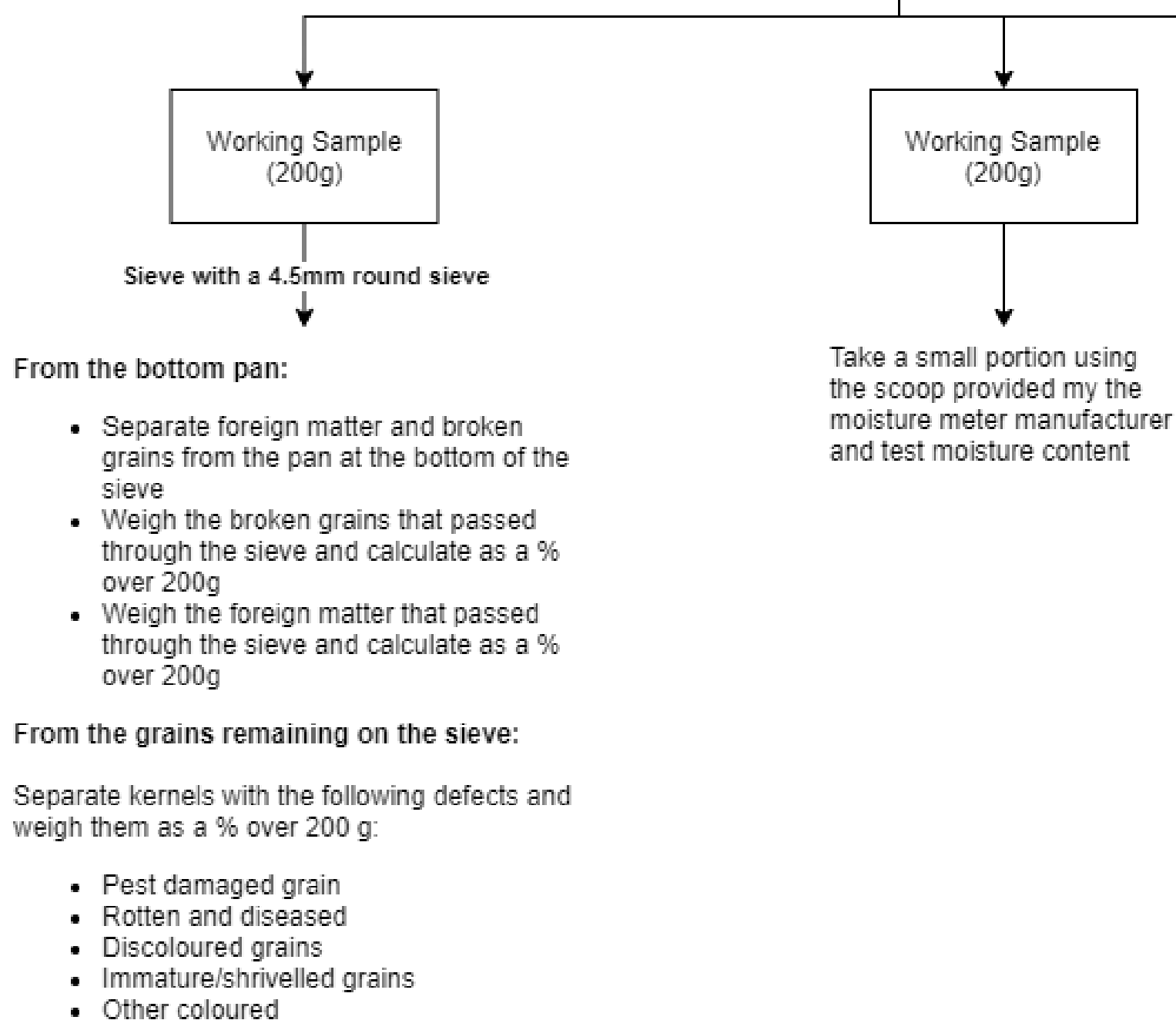


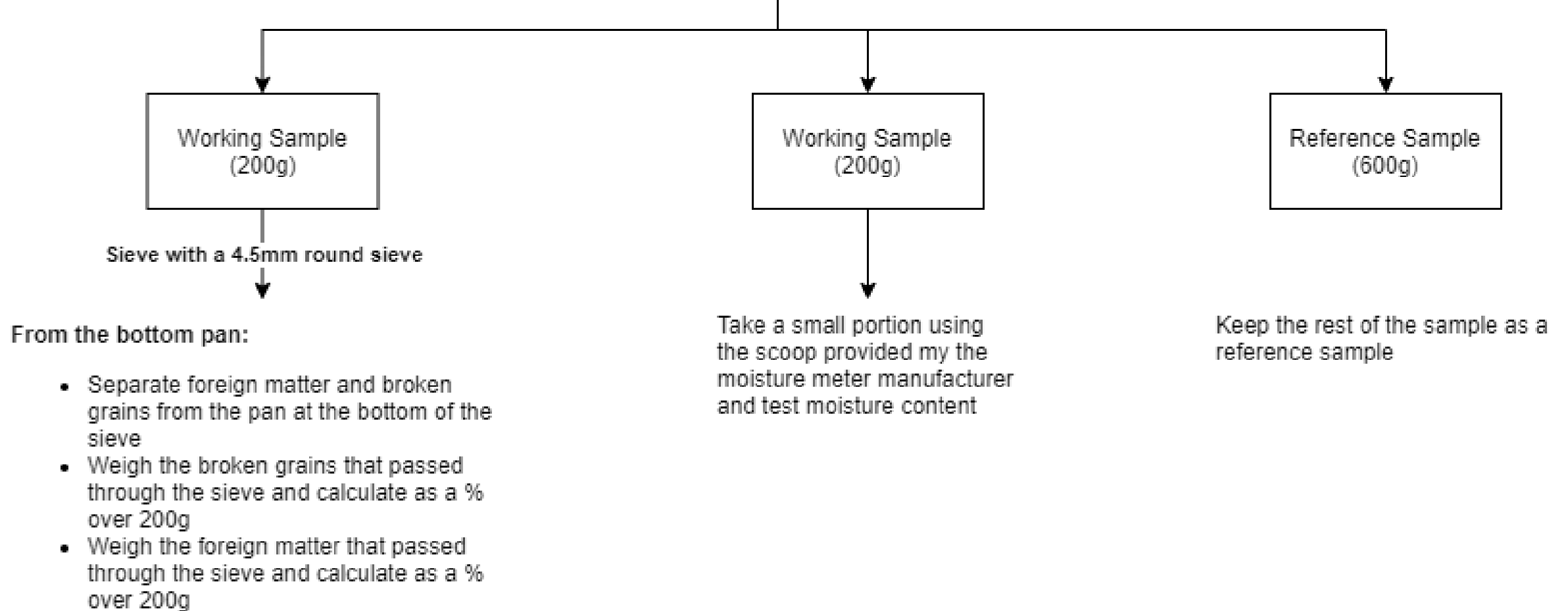
Grading

- Specification
- Test Method
- Test Equipment



$$\text{Defect \%} = \frac{w_1}{w_2}$$





From the grains remaining on the sieve:

Separate kernels with the following defects and weigh them as a % over 200 g:

- Pest damaged grain
- Rotten and diseased
- Discoloured grains
- Immature/shrivelled grains
- Other coloured

MAIZE GRADING SHEET

Customer: _____ Date: _____

Grain: _____ Variety: _____

Truck No. _____ D No. _____

Sampled By: _____ Signature: _____

Analysed by: _____ Signature: _____

MAIZE PARAMETERS



<i>PARAMETER</i>		<i>RESULT</i>		<i>ACCEPTABLE STANDARD</i>
Grade:		Grade 1	Grade 2	
Moisture Content		13.5	13.5% (Max)	
Foreign Matter		0.5% (Max)	1.0% (Max)	
Broken Grains		2.0% (Max)	4.0% (Max)	
Insect Damage		1.0% (Max)	3.0% (Max)	
Immature Grain		1.0% (Max)	2.0% (Max)	
Live Infestation		Nil	Nil	
Rotten Diseased		1.0% (Max)	2% (Max)	
Discoloured		1.5% (Max)	2% (Max)	
Other Colours		0.5% (Max)	1% (Max)	
Total Aflatoxin		10 ppb (Max)	10 ppb (Max)	
Total Defective		5.0% (Max)	9% (Max)	

Remarks: Accepted/Rejected _____





Grain Defects

Odour

- Grain should be free from mouldy or any other objectionable odour



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Broken Grains

- Pieces of grain kernels that pass through a 4.5mm sieve
- Collected in the bottom pan
- If kernel is broken but does not pass the sieve, it isn't considered broken grain



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Foreign Matter

Grain should be free from:

- Organic matter e.g., cobs, foliage, etc.
- Inorganic material e.g., sand, soil, glass, etc.
- Other grain than maize, e.g., broken kernels and other grains are NOT foreign matter



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Filth

Impurities of animal origin e.g., droppings, fur, etc



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Pest Damaged

Kernels with damage caused by rodents, insects, mites, etc.



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Immature/Shrivelled Grain

- Grains which are underdeveloped, thin and papery in appearance



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Discoloured

- Grain damaged by heat, frost or water
- Discolouration must be >25% of the surface



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Other coloured

- Maize of other colours, e.g., red or yellow maize



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Rotten Diseased

- Grains with decay, moulds, or bacterial decomposition
- Renders the maize unsafe for consumption



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Stained Grain

- Grain kernels whose natural colour has been altered by external factors e.g., soil, etc



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Thank You!

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