

**KENYA STANDARD**

**KS 2296:2022**

ICS 67.140.10

**Second Edition**

# **Chicken eggs — Methods for evaluation of quality**



**Kenya Bureau of  
Standards**  
Standards for Quality life

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National Public Health Laboratory

Government Chemist's Department

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# **Chicken eggs — Methods for evaluation of quality**

Kenya Bureau of Standards, Popo Road, Off Mombasa Road,  
P.O. Box 54974 - 00200, Nairobi, Kenya



+254 020 6948000, + 254 722202137, + 254 734600471



info@kebs.org



@KEBS\_ke



kenya bureau of standards (kebs)

## **Foreword**

This Kenya Standard was prepared by the **Meat and Poultry products** Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards

This standard specifies methods of sampling and test necessary to determine quality of fresh eggs. It

includes external quality factors as they appear under direct examination and internal quality factors as they appear before candling light or when the egg is broken out and measured by Haugh units plus visual examination of the yolk portions.

During the preparation of this standard, reference was made to the following documents:

*Regulations governing the voluntary grading of shell eggs*, 7 CFR Part 56, Effective March 30, 2008.

*United States Standards, grades, and weight classes for shell eggs*, AMS 56, Effective July 20, 2000.

IS 9810:1981(R2000), *Methods for evaluation of quality of chicken eggs*.

Codex Alimentarius website: [http://www.codexalimentarius.net/mrls/vetdrugs/jsp/vetd\\_q-e.jsp](http://www.codexalimentarius.net/mrls/vetdrugs/jsp/vetd_q-e.jsp).

USDA Foreign agricultural service website: <http://www.mrlatabase.com>.

USDA Agricultural marketing service website: <http://www.ams.usda.gov/AMSV1.0/Standards>.

European Union: [http://ec.europa.eu/enterprise/sectors/pharmaceuticals/veterinary-use/maximumresidue-limits/index\\_en.htm](http://ec.europa.eu/enterprise/sectors/pharmaceuticals/veterinary-use/maximumresidue-limits/index_en.htm).

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Acknowledgement is hereby made for the assistance derived from this (these) source (s) |



## Chicken eggs — Methods for evaluation of quality

### 1 Scope

This Kenya Standard specifies methods of sampling and test necessary to determine quality of fresh eggs. It includes external quality factors as they appear under direct examination and internal quality factors as they appear before candling light or when the egg is broken out and measured by Haugh units plus visual examination of the yolk portions.

### 2 Normative references

The following referenced documents referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies, see [ISO/IEC Directives, Part 2](#).

- I. AOAC Official Method 931.06:1931, Phosphorus (Total) (P<sub>2</sub>O<sub>5</sub>) in Eggs
- II. CAC/RCP 1, Recommended international code of practice — General principles of food hygiene
- III. EAS 39, Hygiene in the food and drink manufacturing industry — Code of practice
- IV. EAS 123, Distilled water — Specification
- V. ISO 4831, Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of coliforms — Most probable number technique
- VI. ISO 4832, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of coliforms — Colony-count technique
- VII. ISO 4833, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of microorganisms — Colony-count technique at 30 degrees C
- VIII. ISO 6491, Animal feeding stuffs — Determination of phosphorus content — Spectrometric method
- IX. ISO 6579, Microbiology of food and animal feeding stuffs — Horizontal method for the detection of *Salmonella* spp.
- X. ISO 13730, Meat and meat products — Determination of total phosphorus content — Spectrometric method
- XI. ISO 21527-1, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 1: Colony count technique in products with water activity greater than 0.95
- XII. ISO 21527-2, Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 2: Colony count technique in products with water activity less than or equal to 0.95
- XIII. KS EAS 38, Labelling of pre-packaged foods
- XIV. KS EAS 39, Hygiene in the food and drink manufacturing industry — Code of practice

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1 Description of shell condition and its cleanliness

**3.1.1 sound** shell is unbroken

**3.1.2 checked**

shell having a crack in the shell but shell membranes intact

**3.1.3 The leaker**

egg showing leakage through the shell and shell membranes allowing the contents to come out. Area of shell missing from the surface is more than 6 mm square.

**3.1.4 smashed**

an egg the shell of which is smashed, crushed or scattered allowing the contents to come out

**3.1.5 clean**

free from foreign material, stain or other visual discolouration

**3.1.6 slightly stained**

a shell surface which is almost free from adhering dirt, but has slight stains without appreciably detracting its appearance limited to 1/16th of the shell surface

**3.1.7 moderately**

a shell that is free from adhering dirt but has stains covering to a moderate degree and limited to ¼ of the shell surface

**3.1.8 dirty**

egg shell having adhering dirt and stains covering more than ¼ of the shell surface

**3.1.9 roughness/smoothness of the shell.**

The shell shall not be overly rough nor smooth

#### 3.2 Description of air cell

**3.2.1 practically regular**

an air cell which maintains practically a fixed position inside the egg and presents an even outline with not more than 6 mm movement in any direction when it is turned

**3.2.2 free air cell**

an air cell that moves freely towards the uppermost point inside the egg as it is rotated slowly. The shell

membranes are intact allowing the air cell to move freely in any direction between them

### **3.2.3 bubbly air cell**

a ruptured air cell consisting of one or more small separate air bubbles floating beneath the main air cell

## **3.3 Description of yolk shadow outline**

### **3.3.1 outline slightly defined**

a yolk outline which is distinctly visible and blends into the surrounding white as the egg is rotated in front of the candler

### **3.3.2 outline fairly well defined**

a yolk outline which is discernible but cannot be outlined clearly when twirled in front of a candler

### **3.3.3 outline well defined**

outline of the yolk clearly visible as it casts a dark shadow when twirled in front of a candler

## **3.4 Description of yolk defects**

### **3.4.1 practically free from defects**

a yolk that shows no germ development, meat or blood spots

### **3.4.2 definite but not serious defects**

a yolk may show definite meat or blood spots on the surface with slight indications of germ development but without any pronounced or serious defects

### **3.4.3 definite and serious defects**

yolk showing development of germ spot on the yolk, visible as a definite area with no blood ring

## **3.5 Description of egg white**

### **3.5.1 clear**

egg white which is free from discolourations and presence of any free floating foreign bodies on it

### **3.5.2 firm**

egg white which is sufficiently thick or viscous and thus makes the outline of yolk slightly or indistinctly visible when twirled in front of a candler

### **3.5.3 reasonably firm**

egg white which is reasonably thick or viscous but enough to allow casting of the outline of the yolk when twirled and candled

### **3.5.4 weak and watery**

egg white which is thin and lacks in viscosity. It permits the yolk to approach the shell closely on candling,



making yolk outline clearly visible on twirling.

## **4 Sampling and testing**

### **4.1 Sampling**

Twenty eggs should be drawn from a lot at random for estimating the breakout quality of eggs.

### **4.2 Testing**

Carry out the following tests to determine the egg quality.

#### **4.2.1 External quality**

Determine the external quality of egg for the parameters given in 3.1 and 3.2.

#### **4.2.2 Internal quality**

Determine the internal quality of eggs for the parameters given in 3.3, 3.4 and 3.5 by candling and breaking out tests.

### **4.3 Candling**

**4.3.1** Hold the egg before a beam of 60 watt light in such a way that the light rays penetrate and illuminate the interior of the egg for inspection. Note any internal defects.

**4.3.2** Measure the aircell height by means of aircell gauge while candling prior to breaking.

### **4.4 Shell thickness**

After breaking the egg, boil the shell in 2.5 % sodium hydroxide solution for 5 min. Wash and dry in a thermostatically controlled oven at 100 °C to 105 for 24 h. Determine the thickness of the shell by screw gauge at three different longitudinal points and take the average of the readings.

### **4.5 Haugh Unit (HU)**

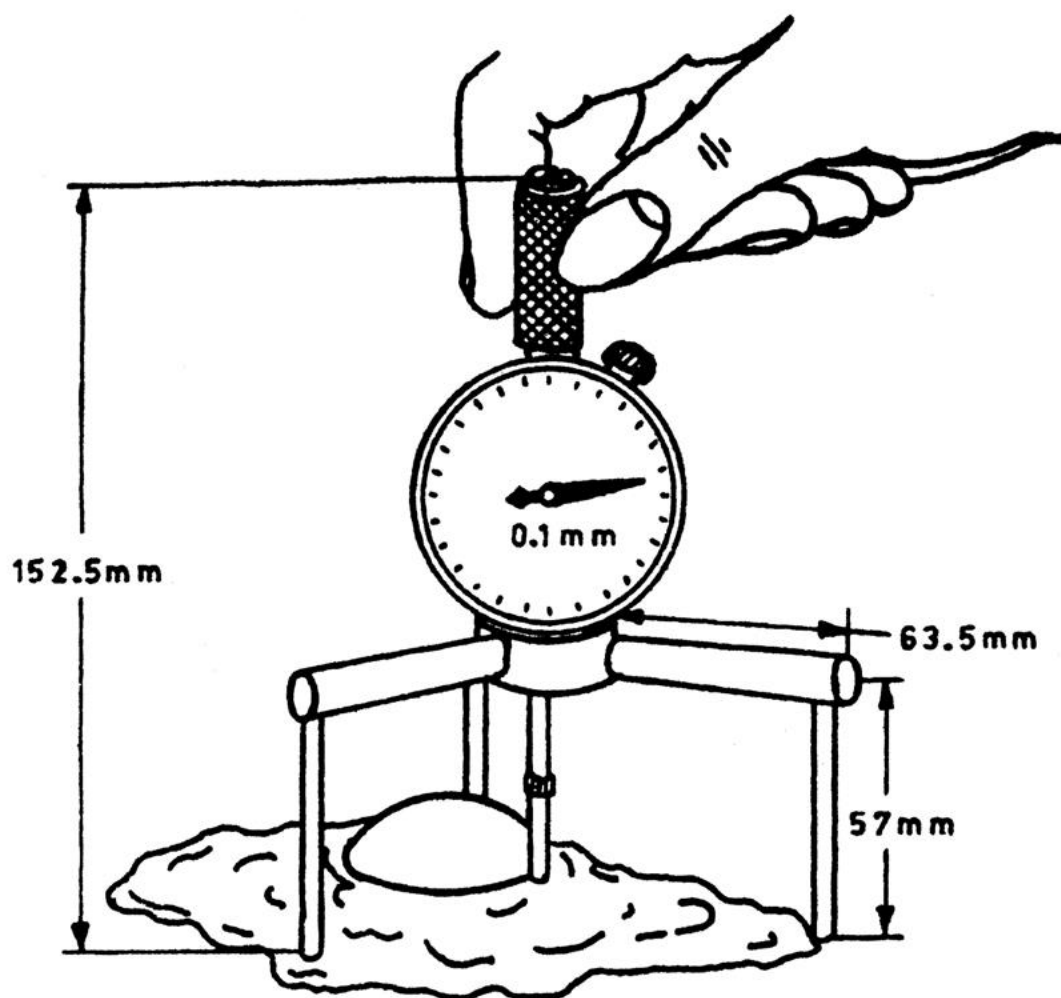
**4.5.1** Haugh unit can be measured by using the interior egg quality calculator. The following precautions should be followed while estimating the same:

- i) The internal temperature of eggs should not be lower than 7 °C or higher than 15 °C at the time of performing the breakout test.
- ii) Care should be exercised to see that the thick white is not punctured while breaking.
- iii) One egg at a time should be broken since it is important to measure the albumen height immediately after breaking.
- iv) Measurement of height of thick albumen should be made with the help of a spherometer or Haugh meter or micrometer as given in Figure 1.
- v) Care should be taken to avoid measuring the albumen height in an area where there is a chalaza for

air bubble.

**4.5.2** Eggs removed from the refrigerator should be kept for three hours at ambient temperature of  $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . Determine the Haugh unit reading of the eggs by the following procedure:

- a) Check the zero reading by placing the instrument on a flat surface and lowering the plunger until the point touches the surface. The pointer should be at zero. If not, slacken the clamp and turn the bezel so that the zero mark coincides with the pointer. Retract the point upwards to its full extent.
- b) Open the egg on to a flat glass plate of sufficient size to contain it, place the instrument over the egg, and lower the point until just touches the albumen. The height is then indicated on the dial.



**Figure 1 — Gauge for egg quality**

The HU can then be calculated from the following equation:

$$HU = 100 \log_{10} H + 7.57 - 1.7 M$$

where

HU = Haugh units of interior quality whose numerical value equals the quality value of the egg;

H = height, mm; and

M = mass, g.

NOTE An alignment chart for finding Haugh units without having to make calculation from the above formula is given in Figure 2.

#### 4.6 Albumen index

Albumen index can be determined by measuring the height of the thick albumen by spherometer or micrometer and average width of the thick albumen by using vernier calipers:

$$\text{Albumen index} = \frac{\text{Height of thick albumen in mm}}{\text{Average width of thick albumen in mm}}$$

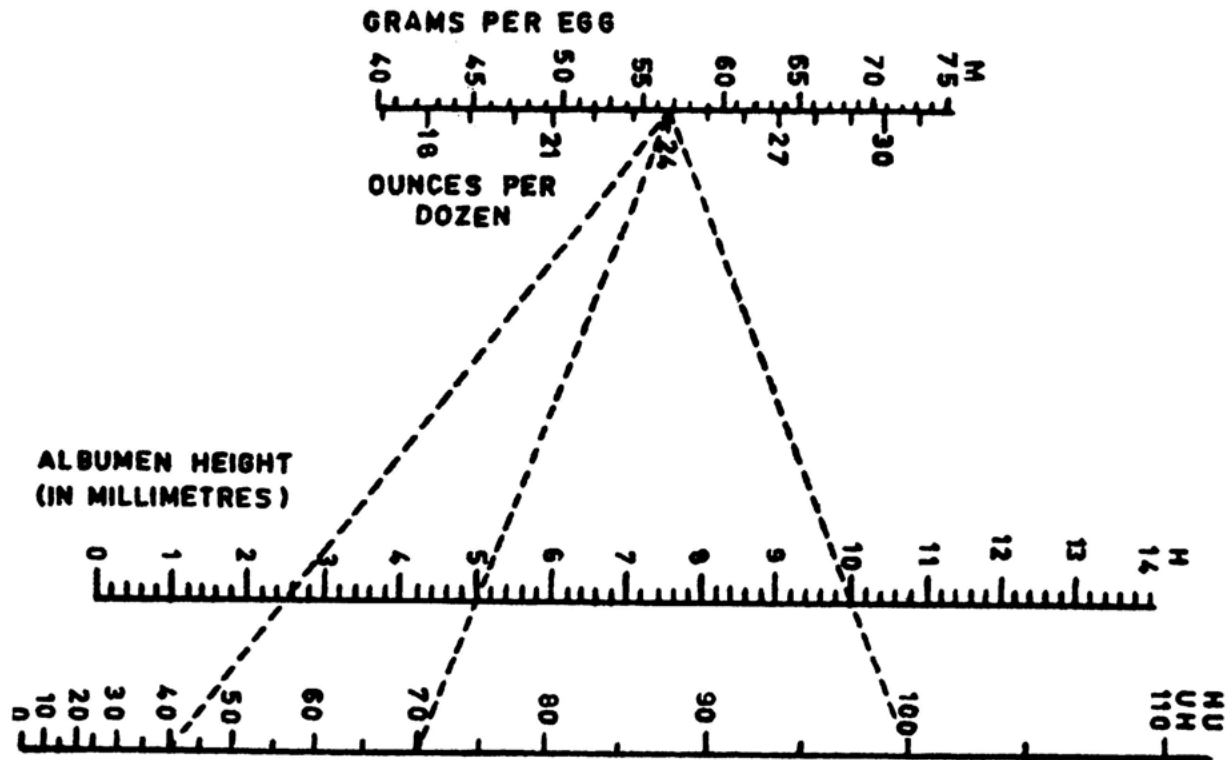


Figure 2 — Alignment chart

#### 4.7 Yolk index

Yolk index can be determined by measuring the height or width of the yolk after it has been separated from the albumen or of the yolk in its natural position when the egg is broken out on a flat surface.

$$\text{Yolk index} = \frac{\text{Height of yolk in mm}}{\text{Average diameter of yolk in mm}}$$

## Bibliography

- [1] ISO #####-#, *General title — Part #: Title of part*
- [2] ISO #####-##:20##, *General title — Part ##: Title of part*

A **Bibliography**, if present, shall appear after the last annex.

The bibliography may include

- documents that are not publicly available,
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For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address.