
EXPERIMENT 1 CANDLEING AND GRADING OF EGGS

Structure

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1.0 OBJECTIVES

After doing this experiment, you will be able to:

- candle an egg to observe the exterior and interior qualities of egg;
- grade an egg according to Indian standard and U.S. standard; and
- differentiate between fresh and old eggs.

1.1 INTRODUCTION

Candling determines the exterior and interior quality of shell eggs whereas grading in general involves the sorting of eggs to quality, size, weight and other factors that determine the relative value of the product. You have already studied about candling and grading of egg in Unit 3 of this course under the heading of egg handling, grading, preservation, packaging and storage where grading according to Indian standard and USDA standard has been discussed in detail. Now you will practically candle the egg and grade accordingly.

1.2 EXPERIMENT

1.2.1 Requirement

- Fresh and old eggs collected from farm/market.
- Batch type or commercial continuous type candler and grader for egg, or a candling lamp.
- Dial calipers
- Standard Tripod micrometer

1.2.2 Procedure

- i) Procure six farm fresh and six market eggs (not fresh).
- ii) Hold the eggs before a suitable light in the batch type or continuous egg candler and grader.
- iii) Put on the switch of the commercial candler.

- iv) Pick up the eggs with defects of egg shell, yolk, albumen and abnormalities like dirty shell, cracks, leakers, misshaped, rough, thin shelled eggs.

The defects in yolk and albumen are blood spots, meat spots and blood ring which render, the egg technology unsuitable for market channel. Disposed them separately according to their merits.

- (v) The grader separates eggs according to quality and size as extra large, large, medium, small. The fresh and old eggs may be broken and observed for broken out appearance of the egg.
- (vi) Classify the eggs as per Indian standards and U.S. standards given in following tables:

Table 1.1: Indian Standards for Table Eggs

Grade	Weight of individual egg (gm)	Weight per dozen (gm)	Weight per unit of ten (gm)	Shell	Air cell	White	Yolk
A. Extra large	60 and above	715 and above	596 and above	Clean, unbroken and sound shape normal	Upto 4 mm in depth, practically regular or better	Clear reasonably firm	Fairly well centred, practically free from defect, outline in distinct.
A. Large	53-59	631-714	526-595				
A. Medium	45-52	535-630	446-525				
A. Small	38-44	456-534	380-445				
B. Extra large	60 and above	715 and above	596 and above	Clean upto moderately stained, sound and slightly abnormal	8 mm in depth. May be free and slight bubbly	Clear, may be slightly weak	May be slightly off centered, outline slightly visible
B. Large	53-59	631-714	526-595				
B. Medium	45-52	535-630	446-525				
B. Small	38-44	456-534	380-445				
Eggs which do not qualify under the above two grades, may be debarred for entering Trade Channels as fresh shell eggs.							

Table 1.2: U.S. Standards for Quality of Individual Shell Eggs

Quality factor	AA quality	A quality	B quality
Shell	Clean Unbroken Practically normal	Clean Unbroken Practically normal	Clean to slightly stained ^a Unbroken Abnormal
Air cell	1/8 in. or less in depth Unlimited movement and free or bubbly	3/16 in. or less in depth Unlimited movement and free or bubbly	Over 3/16 in. or depth Unlimited movement and free or bubbly

White	Clear Firm	Clear Reasonably firm	Weak and watery Small blood and meat spots present ^b
Yolk	Outline—slightly defined Practically free from defects	Outline – fairly well defined Practically free from defects	Outline – plainly visible Enlarged and flattened Clearly visible germ development but no blood Other serious defects
For eggs with dirty or broken shells, the standards of quality provide two additional qualities. They are:			
Dirty		Check	
Unbroken: adhering dirt or foreign material, prominent stains, moderate stained areas in excess of B quality		Broken or cracked shell but membranes intact, not leaking ^c	

Source: USDA (1983A).

- ^a Moderately stained areas permitted (1/32 of surface if localized, or 1/16 of scattered).
- ^b If they are small (aggregating not more than 1/8in. in diameter).
- ^c Leaker has broken or cracked shell and membranes, and contents leaking or free to leak.

An alternate method of candling (Hand Candling Techniques):

If commercial candler is not available then you can follow the method described below:

You need only a candling lamp in which the light is focused onto the aperture, cushioning material should be fitted around the aperture to minimize leakage of light when the egg is in place and the aperture should not exceed 30mm in diameter.

Follow the steps:

- Direct the aperture away from your eyes to avoid glare.
- Keep the background in the candling area as dark as possible.
- Hold the broad end of the egg to the aperture and then turn the egg so that all the surface area has been seen.
- Quickly twist the egg in order to start the contents whirling. The visibility and movement of the yolk and any internal faults should be observed as the egg is twisted.

Break-out test and grading should be done as per the above mentioned method.

Calculate Albumen index and Yolk index:

The albumin index is determined by measuring the width of the albumen with dial calipers and the height of that using a standard tripod micrometer.

$$\text{Albumen Index} = \frac{\text{Height of thick albumen (mm)}}{\text{Width of thick albumen (mm)}}$$

For a good egg, albumen index ranges from 0.09 to 0.12.

Separate the yolk from white. Allow to stand for 5 minutes.

The yolk index is determined by measuring the width of the yolk with dial calipers and the height of the yolk using a standard tripod micrometer.

$$\text{Yolk index} = \frac{\text{Height of yolk (cm)}}{\text{Width of yolk (cm)}}$$

Yolk index ranges from 0.32 to 0.40.

1.2.3 Observation

1) Note your observation in a Table as follows and grade the eggs accordingly:

Egg no.	Weight of individual egg (gm)	Shell	Air cell	White	Yolk	I.S. Grade	US Grade
Fresh 1							
Fresh 2							
Fresh 3							
Fresh 4							
Fresh 5							
Fresh 6							
Old 1							
Old 2							
Old 3							
Old 4							
Old 5							
Old 6							

2) Record your observation of break out tests for following parameters:

Parameter	Fresh egg no.						Old egg no.					
	1	2	3	4	5	6	1	2	3	4	5	6
Height of albumen												
Width of albumen												
Albumen index												
Height of yolk												
Width of yolk												
Yolk index												