

Quality of Egg

Quality is defined as “the sum of characteristics of a given food item which influence the acceptability or preference for that food by the consumer”.

Based on this definition, it is clear that egg quality will mean different things to different people and the consumer’s perception of quality is likely to vary depending on their intended use of the egg and their own preferences.

There are two types of quality:

1. Internal quality of the egg
2. External quality of the egg

Internal quality of the egg

In general, the internal quality of the egg does not affect its nutritional value, but it affects the appearance and other aspects of the egg before and after cooking and consumption.

1. Egg white (albumen)

- In freshly laid egg, yolk is centered, surrounded by compact circle of thick albumen.
- Freshly laid egg has a slightly opaque appearance, which soon dissipates and the white become transparent.

The quality of the egg white is profoundly influenced by two factors.

1. the age of the hen that laid the egg, and
2. the length and conditions (primarily temperature) in which it is/has been stored.

- There is a marginal genetic effect, and one specific genetic defect that can cause “watery whites”.
- In addition, hens infected with Infectious Bronchitis will lay eggs with very poor albumen quality.
- Egg white quality begins to decline as soon as the egg is laid.
- The rate of decline depends primarily on the temperature in which it is kept. As a rule of thumb, temperatures higher than 15°C result in rapid loss of albumen height.
- Eggs held for 1 day at 20°C lose as much quality as they do when held for 7 days at 12°C.
- Egg storage in the production/processing chain should aim at temperatures no higher than 12°C. Consumers should be advised to keep eggs in a refrigerator (~ 4°C) for best results.

- Refrigeration also limits bacteriological multiplication in the unlikely event that a consumer receives eggs containing SE.
- The decline in albumen quality is a result of chemical changes in the egg white.
- When laid, the albumen is slightly alkaline, with a pH of about 7.5. This increases to 9.5 or more as storage is prolonged.

2. Egg yolk

- Yolk of freshly laid egg is round and firm. When egg ages, yolk absorb moisture from the albumin which increases its size and weakens the vitelline membrane.
- The most obvious quality of the egg yolk is its colour. Depending on nutrition of the laying hen, yolk colour can vary from a very pale yellow to deep orange.
- Pigments are transferred directly from the diet to the forming egg yolks. Hens fed diets in which the cereal components are primarily wheat, barley, sorghum or other non-pigmented grains will produce eggs with pale yolks. Eggs from birds fed a corn-based diet will have yellow yolks, while those from hens fed natural or synthetic pigments, or such feed ingredients as alfalfa meal, will be various shades of orange.
- There are strong consumer preferences for egg yolk colour. These are geographically based. Natural sources of pigment include alfalfa, marigold petals and corn gluten meal.
- Synthetic pigments are available as feed supplements where permitted; these include canthaxanthin, astaxanthin and β -apo-8-carotenoic acid.

3. Air cell

- Air cell can be formed between two shell membranes when freshly laid egg is cooled to room temperature.
- Air cell size can be determined by candling. Size increases with the age of the egg.

External quality of egg

1. Size

Size is expressed in terms of weight. Factors that affect size of the egg are

- Age of the bird (Older birds tend to lay bigger eggs)
- Season (Elevated environmental temperature reduce the intake of food and effect the size of egg).
- Genetic factor
- Nutrition of bird (dietary minerals and vitamins)

2. Shape

Most of the birds have round or oval shaped eggs. Shape is expressed in terms of shape index.

Shape index= $\frac{\text{Transverse diameter of egg}}{\text{Length of egg}} \times 100$

3. Shell color:

- Shell colour of different birds is white to different shades of brown.
- The colour of the shell is strictly a genetic affair.

There is no relationship between shell colour and nutritional value.

4. Shell soundness:

- Average shell thickness is 0.311 mm, thin shell eggs are undesirable as they can break during collection, marketing, processing and hatching.
- Weak shells are generally the result of nutritional faults; inadequate or incorrect form of dietary calcium, inadequate Vitamin D, and insufficient feed intake are the most common factors.
- In addition, older hens produce eggs with weaker shells.

Factors Causing Deterioration in Quality of egg

1. Length of holding time
2. Temperature
3. Humidity
4. Faulty sanitation
5. Rough handling

Changes in Quality during Storage of Egg

- In freshly laid egg, egg yolk is round and firm. Egg yolk absorbs moisture and increases its size and exerts the pressure on vitelline membrane which can easily break.
- Size of air cell also increased during storage.
- In freshly laid egg, egg white is opaque or clear and concentration of CO₂ is 0.5%.
- During holding or storage of egg, concentration of CO₂ is decreased.
- Egg white contain weak solution of carbonic acid, this weak solution dissociates into CO₂ and H₂O.
- Changes in CO₂ concentration also affect the hydrogen ion concentration and pH of the egg.
- pH of freshly laid egg is 7.6, which increased to 9.5 or higher (in case of very low quality of egg).