Learning activity 1

Test for freshness of eggs

**Objective**

To investigate the freshness of raw chicken eggs.

**Principle**

The air space, also known as air cell, is the empty space formed at the large end of the egg. It holds oxygen. Initially, there is either no air cell or a small one. When an egg is laid, it is warm. Then as the warm egg cools, the air cell becomes large and apparent to the eye, the egg contents shrink, and the inner membrane pulls away from the outer membrane. The air cell increases in size with age, cooling, and moisture loss.

When an egg ages, there are numerous changes to the egg. Contents inside the shell shrink and the air cell enlarges due to water loss. The yolk flattens as the yolk membrane thins, and the surrounding thick white becomes thinner, no longer holding the yolk centred in the egg. Also, the thick white thins as sulphide bonds break and it loses CO2 with age. Another change with age is that the chalazae cord appears less prominent.

**Test 1: Salt Water Test**

**Equipment & materials**

|  |  |
| --- | --- |
| **Equipment** | **Materials** |
| Scale  Measuring cup  Glass x 3 | Salt 25 g x 3  Water 250 ml x 3  Egg 3 (packed date about 3 weeks apart)  Sample A stale egg  Sample B fresh egg  Sample C very fresh egg |

**Procedure**

1. Make 3 glasses of salt water by dissolving 25 g salt into 250ml water in a glass.
2. Put one egg in each glass.
3. Observe.

**Results**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample** | **Location of Egg**  **(circle as appropriate)** | | | **Direction of Egg**  **(circle as appropriate)** | | | **Freshness of Egg** |
| A | Floats on water surface | / | Sinks to the bottom | Lay flat | / | Stand on one end |  |
| B | Floats on water surface | / | Sinks to the bottom | Lay flat | / | Stand on one end |  |
| C | Floats on water surface | / | Sinks to the bottom | Lay flat | / | Stand on one end |  |

**Questions**

1. Why will stale egg floats on the water surface?
2. Why will very fresh egg lay flat on the bottom of water?

**Answers**

1. As egg ages, air cell enlarges due to water loss. The air cell causes the egg to float in salt water.
2. The air cell in an egg is the empty space formed at the large end of the egg. Initially, there is either no air cell or a small one. Therefore, very fresh egg will sink and lay flat on the bottom of water.

**Test 2: Plate Test**

**Equipment & materials**

|  |  |
| --- | --- |
| **Equipment** | **Materials** |
| Laminated paper with gridlines | Egg 3 (packed date about 3 weeks apart)  Sample A stale egg  Sample B fresh egg  Sample C very fresh egg |

**Procedure**

1. Crack an egg on a sheet of paper with gridline. (A flat surface and ruler will work as well.)
2. Measure the area that the egg covers.
3. Compare the height of the egg yolk.

**Results**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample** | **Dimension of Egg White (cm)** | | | **Height of Egg Yolk**  **(circle as appropriate)** | | | | | **Consistency of Egg White** |
| A |  | x |  | Short | / | Medium | / | Tall |  |
| B |  | x |  | Short | / | Medium | / | Tall |  |
| C |  | x |  | Short | / | Medium | / | Tall |  |

**Questions**

1. Why will egg white from stale egg spread wider?
2. Why will egg yolk from very fresh egg be the tallest?

**Answers**

1. As egg ages, the thick egg white surrounding the yolk becomes thinner, it no longer holding the yolk centred in the egg. Egg white becomes runnier and flatter.
2. In very fresh egg, the yolk membrane is strong, the yolk remains round. As an egg ages, the yolk flattens as the yolk membrane thins.

Reference:

Vickie A. Vaclavik, Elizabeth W. Christian. *Essentials of food science.* New York, NY: Springer, c2008.