

*Factors affecting Egg Quality &
Physico-chemical properties of Egg.....*

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Factors affecting Egg Quality

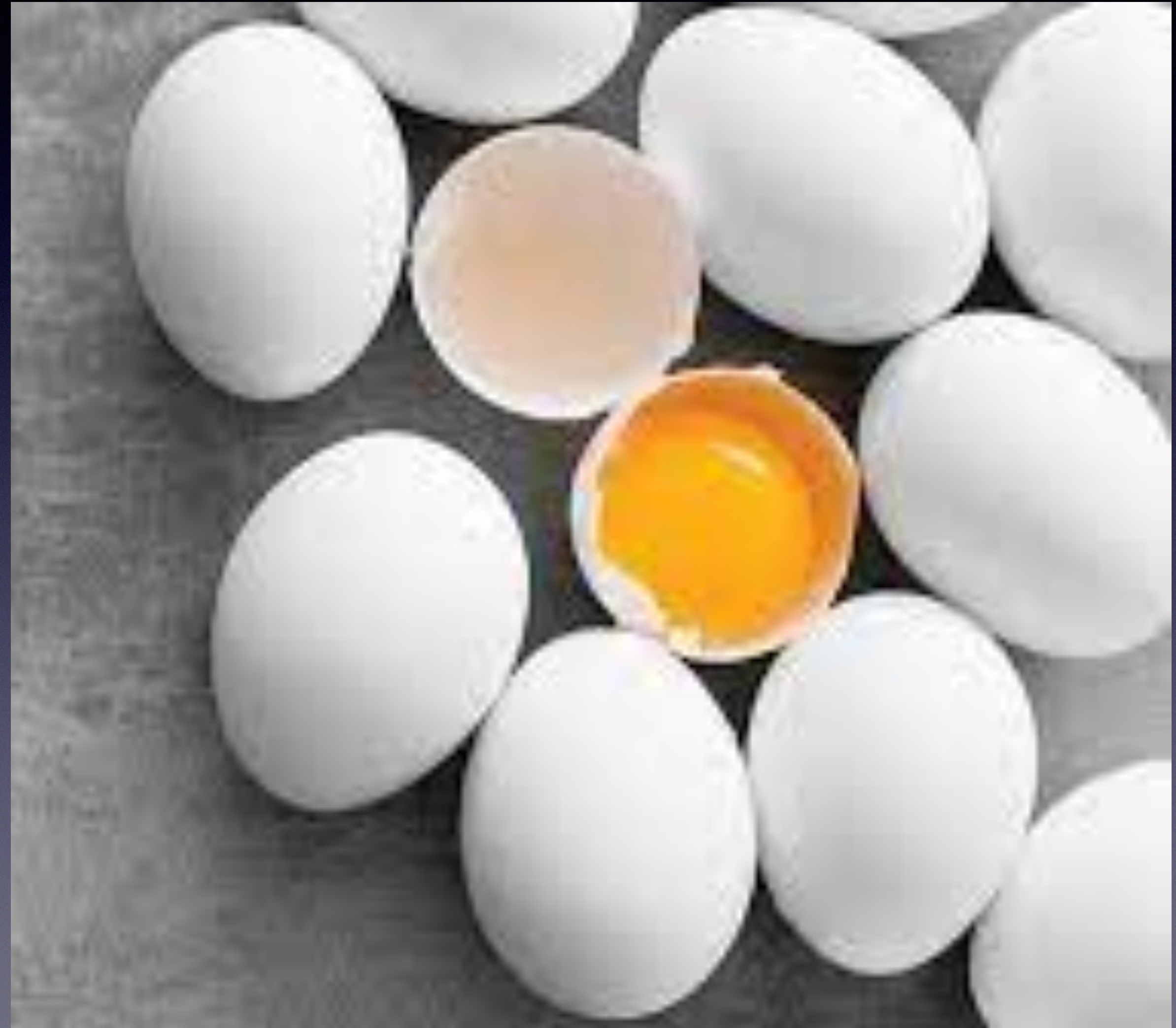
#Genetics

#Nutritional and Rearing System

#Physiological Status

#Egg Storage and Heat Treatment

#Species variation



Genetics

Selection plays an important role.

Layer breeds better quality eggs than meat purpose breeds.

Anti-microbial potential of egg white is moderately inheritable.

Focus: Eggs with strong shell, stable egg white, superior egg white quality and proper yolk percentage.

Nutritional and Rearing System-1

- Affects weight of egg as well as egg yolk : egg albumen.
- Dietary calcium plays an important role in regulating the size of egg.
- High energetic diet and dietary supply of methionine and linoleic acid increases egg weight.
- The mineral, vitamin and fatty acid profile of the yolk varies largely on the feed composition.

Nutritional and Rearing System-II

- Yolk colour is determined by the amount of carotenoids in the diet.
- Free range birds lay larger size eggs than caged birds.
- Free range birds produce eggs with higher immunoglobulin Y content in the yolk.
- Free range birds produce eggs with lighter coloured yolks

Physiological Status

- Egg quality is influenced by age, stress and immune status.
- Healthier the bird better is the egg quality.
- Older hens lay eggs having more weight. The eggs show increase in the weight of albumen, increase in the weight of yolk and increase in relative weight proportions.
- With age the egg shell quality, height of albumin and strength of vitelline membrane decreases. Hence more chances of egg yolk rupture.

Egg Storage & Heat Treatment

- Egg storage conditions induce deep internal changes which lead to physic-chemical modifications.
- During egg storage:
 - Evaporation of water and exchange of CO₂ from egg shell surface.
 - Water exchange between yolk and albumen.
 - Increase egg air cell volume.
 - Loosening of vitelline membrane.
 - Floating of egg yolk.
 - Flattening of both yolk and albumen.



3 WEEK OLD EGG:
CHALAZAE SEPARATING
FROM YOLK, RUNNY
ALBUMEN (EGG WHITE),
YOLK BEGINNING TO
FLATTEN

FRESH EGG:
CHALAZAE INTACT, FIRM YOLK
AND ALBUMEN (EGG WHITE)

Factors Affecting

Storage conditions

Temperature

Humidity

Preservation Techniques used

Physico-Chemical Factors

viscosity

Surface Activity

pH

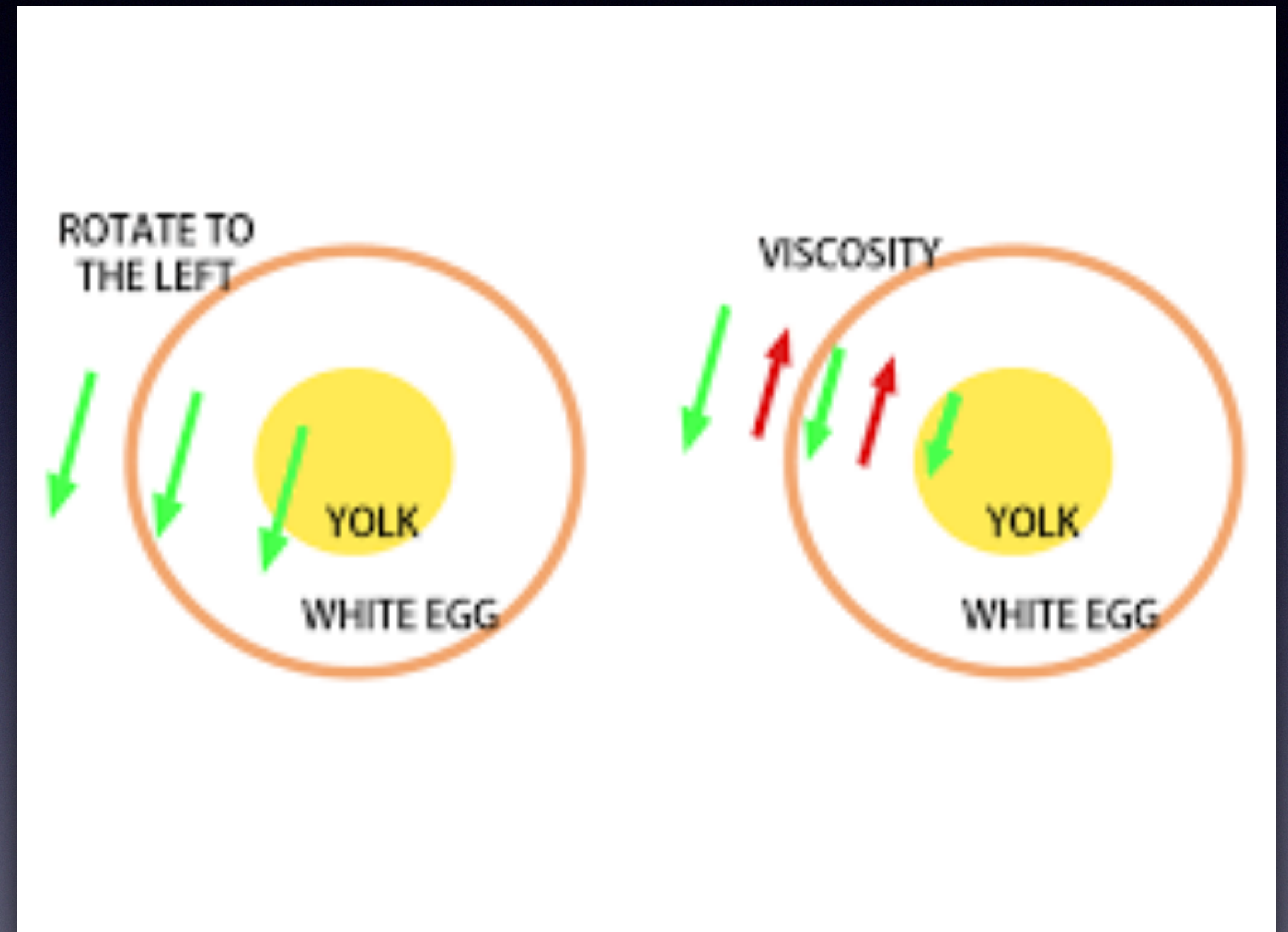
Colour

Freezing

Flavour

Viscosity

On storage, with time, first the viscosity of the albumen increases and then after certain amount of time as the pH of the albumin increases from 7.8-9.5 the albumen starts to liquify and become thin.



Surface Activity of Albumen & Yolk

- Due to the presence of proteins and phospholipids, both albumen and yolk have lower surface tension.
- Egg yolk in itself is an emulsion. Lecithin present in the yolk acts as the main emulsifying agent. Other fractions working as emulsion are lipovitellins.
- During storage water exchange takes place between yolk and albumen thinning the vitelline membrane and reducing the surface tension of the albumen.

Newly Laid Egg:

pH Albumen: 7.6-8.5

pH Yolk: 6.0

During Storage:

pH Albumen: 9.7 (max)

pH Yolk: 6.4 - 6.9

- pH of albumen and yolk rises due to loss of CO_2 through the egg shell pores.
- With increase in the concentration of CO_2 in the environment, the concentration of bicarbonate ions of albumen increases as carbonate ion concentration decreases.

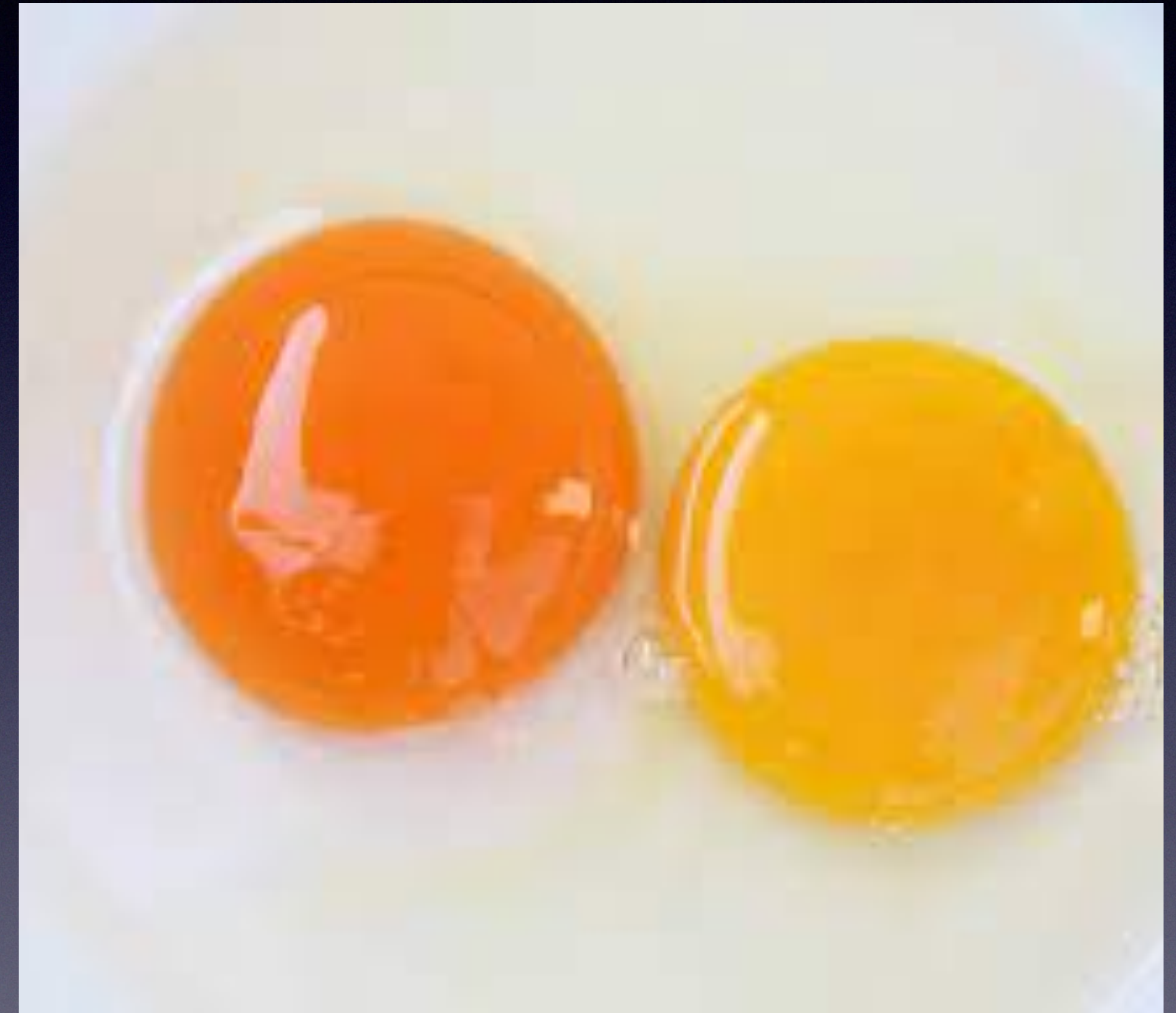
pH



Fresh Egg

- **Albumen:** Clear mass with a yellowish tint. It has two chalazae which have a cloudy appearance.
- **Yolk:** Yellow to orange in colour. Major source of colour are xanthophyll and carotene.
- The major xanthophyll present in the yolk of eggs are lutein, zexanthin and cryptoxanthin.

Colour



Freezing Point

- The freezing point of egg white is -0.45°C .
- The freezing point of egg yolk is -0.58°C .
- In shell, the egg contents may be cooled to a temperature of -3.0°C , without becoming frozen.
- Egg is reported to freeze at -6.0°C . At this temperature the yolk showed fatty appearance and increased viscosity but egg white showed thinning. Both these changes are irreversible.

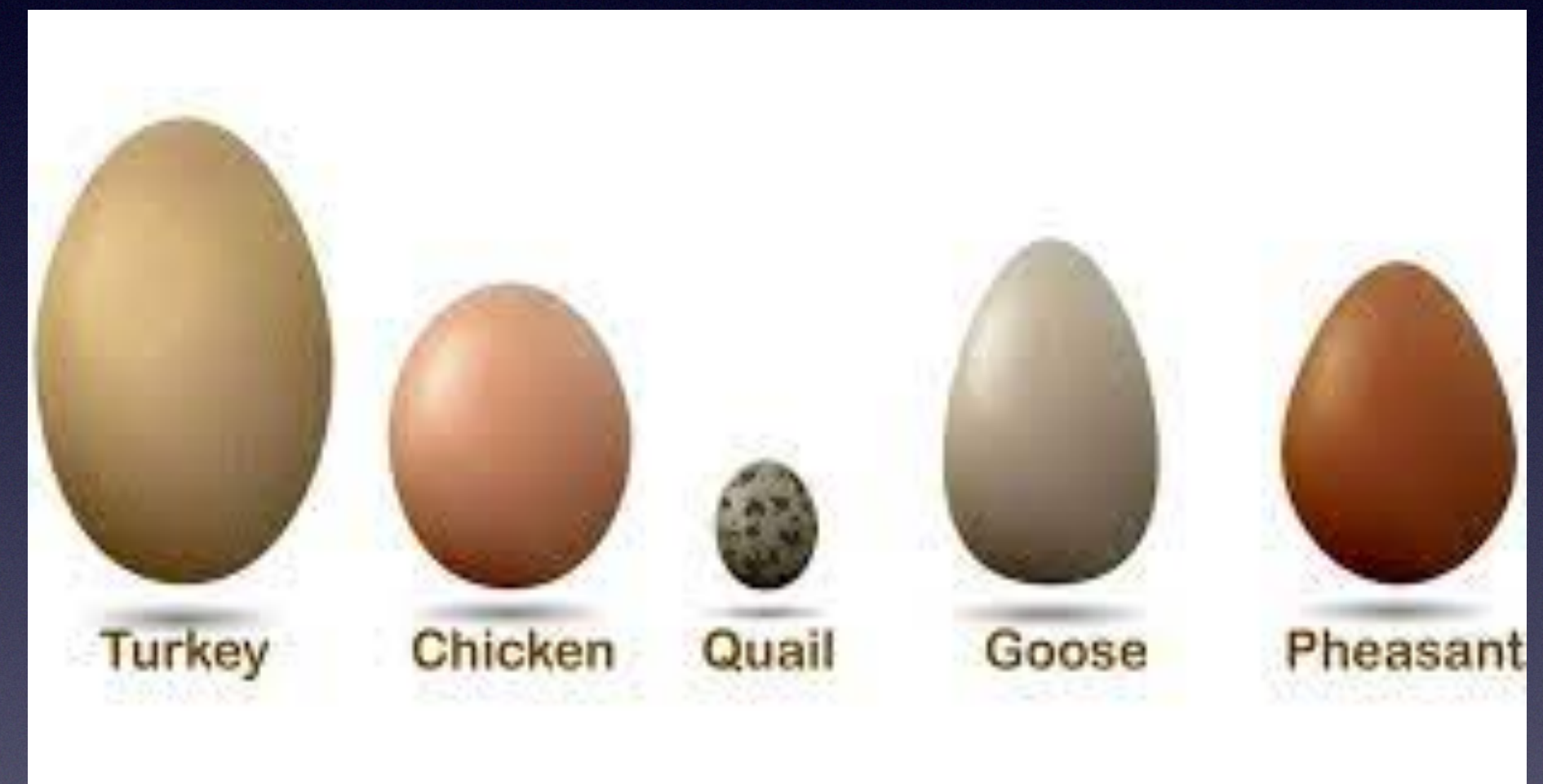
FLAVOUR

Fresh egg has mild flavour and odour which enhances on cooking. The dominant odour of cooked egg white is of sulphur, mostly due to release of H_2S gas. In low concentration H_2S gas has positive effect on flavour, while in high concentration it makes egg unpalatable.



- Egg composition from traditional domestic species share common characteristics.
- There is a significant difference in terms of energy, difference in the proportion of egg yolk and egg white.
- Lipid content in duck and goose egg is 13.0 %, more than that of chicken which is 9.50 %.
- Yolks from duck and goose egg have relatively higher fat content and higher percentage of yolk than chicken egg.

Species variation



- Mineral content of chicken egg less than rest of the domestic species.
- Energy from egg of:

Chicken: 143 kcal/100gm

Quail: 158 kcal/100gm

Duck: 185 kcal/100gm

Goose: 185 kcal/100gm

Turkey: 171 kcal/100gm

- Egg white is a very unfavourable medium for bacterial growth, due to its high viscosity and pH.
- With time the pH of egg increases from 7.8-9.5.
- Egg weight varies from 50-70gms.
- Egg laying cycle- 3 phases, Phase 1 (22-42wks age) Phase 2 (43-62wks age) and Phase 3 (63-72 wks age). Peak 42 wks age.
- Red mite infestation one of the biggest problems faced by the poultry industry. This issue is less prevalent in free range birds.
- Eggs are considered as “fresh” upto 28 days after laying.

Note





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