- **Diet**
- **The basic cause is thought to be excessive dietary energy intake.**

  **When laying hens are fed diets containing high levels of dietary energy the hens tend to deposit excess energy as fat deposits in their bodies, especially the liver.**
- **The problem is more common when feeds containing high levels of corn or other high energy ingredients is fed. Therefore, it is not advisable to feed chopped corn as the sole feedstuff to laying hens.**
- **Biotin deficiency may be effective on the condition**

- **Climate:** It is occure more often during spring or summer.
- **Raise:**Laying hens housed in cages are most often affected since they are less able to get sufficient exercise and dispose of the extra dietary energy.
- **Toxication:** Elementary P, carbontetrachlorure toxication and micotoxines may cause fat degeneration in liver.

- **Reduced egg production and size are the most common symptoms of fatty liver. Egg production is reduced from 75-85% to 45-55% within a week.**

- **The condition is most often seen in birds that appear to be healthy and in a state of high egg production. Non-laying hens will not eat as much of the high-energy feed and therefore are not affected as much as high producing hens.**

- **Mortality varies considerably among flocks but can become excessive in some cases. Lesions include accumulation of large amount of abdominal fat; enlarged, easily damaged liver and presence of blood clots that indicate that hemorrhages have occurred prior to death.**

- **The primary treatment for this condition requires an alteration of the diet or amount of dietary energy consumed. Replacement of some of the corn in the diet with lower energy feedstuffs like wheat bran can provide a lower energy diet. If a complete layer ration is being fed, addition of vitamins can be of benefit. If grains are the primary feedstuff, it is suggested that the birds be switched to a complete layer diet. Control of body fat is the only successful remedy for this condition and is best accomplished by regulation and reduction of total energy intake.**

- To prevent excessive fat accumulation
- Choline+methionine+Vit B12
- Balanced diet in Se and Vit E may prevent cell degeneration and bleeding
- Biotin and cholin addition to the drinking water

# Acidosis-Alkalosis

- Biologic reactions will occure at an optimum pH. Some mechanisms regulate this optimum pH.
- 1-Diluation
- 2-Buffer systems
- 3-Respiration, $CO_2$ loss
- 4-Renal mechanism

- Acidosis-alkalosis arise when bicarbonate levels increase or decrease in blood and it is compansated by respiration.
- Acidosis and alkalosis may be metabolic or respiratoric.
- In primer bicarbonate ($HCO_3$) insufficiency
- ⟶ Metabolic acidosis
- In primer carbonic acid ($H_2CO_3$) surplus
- ⟶ Respiratoric acidosis
- Metabolic and respiratoric alkalosis will occure in the reverse conditions.

- As birds pant, they tend to lose more CO2 and so changes in acid-base balance can quickly develop. With mild to severe alkalosis, blood pH may change from 7.2 through 7.5 to 7.7 in extreme conditions. This change in blood pH, together with loss of bicarbonate ions can influence eggshell quality and general bird health and metabolism.

- Once an egg come into uterus acidity will start to increase and reach maximum level at 22 hours. During this time bicarbonate levels decrease by 30%.
- Respiratory center is stimulated and excess CO2 is removed by respiration. This situation will be partly compansated with reduction of CO2 pressure at the rate of 15%.

- Shell formation normally induces a renal acidosis related to the respiration of filtered bicarbonate. At the same time, shell secretion induces a metabolic acidosis because the formation of insoluble $CaCO_3$ from $HCO_3$ and $Ca^{2+}$ involves the liberation of $H^-$ release would induce very acidic and physiologically destructive conditions,and be necessarily balanced by the bicarbonate buffer system in the fluid of uterus.

- Severe electrolyte imbalance can be prevented by considering the ratio of cation:anion in diet formulations.
- Electrolyte balance is usually a consideration of Na+K-Cl in the diet.
- Electrolyte balance is usually expressed in terms of mEq of the various electrolytes, and for an individual electrolyte this is calculated as Mwt/1000

- For example:
- A diet containing 0.17%Na, 0.80%K and 0.22%Cl
- Electrolyte balance of the diet:
- Mwt mEq
- Na: 23 23 mg/kg 1700/23=73.9 mEq
- K: 39.1 39.1 mg/kg 8000/39.1=204.6 mEq
- Cl: 35.5 35.5 mg/kg 2200/35.5=62mEq

- Overal diet balance:
- Na+K-Cl= 73.9+204.6-62=216.5mEq
- A balance of around 250 mEq/kg is usual

- While a mild metabolic acidosis is normal during eggshell formation a more severe situation leads to reduced shell production because of intense competition for $HCO_3$ as a buffer rather than shell formation.

# Gizzard Erosion

- Gizzard erosion is a condition, usually of broiler chickens, in which the lining of the gizzard is erroded and darkened by crater-like lesions. Affected birds have signs ranging from small localized cracks in the gizzard lining, through to severe erosion and hemorrhage.
- Causes of GE:
- Bacteria (erisipelas)
- Viruses (AI, Gumboro)
- Mycotoxins
- Non-infectious reasons (hemorragic syndrome, giserosine and histamine in fish meal, physical form of feed)
- Some vitamin-mineral (Vitamin E and B6, Zn, Cu, Se, Pb, Ar, Hg) defficiencies
- Yeast (candida albicans)
- Parasites (Nematode, gizzard worm)

- Gizzard erosion was initially thought to be associated with histamine levels in fish meal. Fish meals contain histamine, and following microbial degredation during pre-cooking storage, bacteria possessing histidine decarboxylase will convert variable quantities from histidine to histamine. Histamine has the effect of stimulating excessive acid production by the proventriculus, and it is this acid environment that initiates breakdown of gizzard lining. A product known as gizzerosine has been isolated from fish meal, and this has histamine-type properties in terms of stimulating acid secrection.

- Gizzerosine is formed by heating histidine and a protein during manufacture of fish meal. Gizzerosine is almost 10x as potent as is histamine in stimulating proventricular acid production and some 300x more potent in causing gizzard erosion.
- Because the mode of action of gizzerosine is via acid production and a change in gizzard pH, there have been attempts at adding buffers to prevent the problem. For example adding sodium bicarbonate has been reported to lessen the severty of gizzard erosion. (10kg/ton change only 0.3)

# *Chondrodystrophy, Slipped Tendon or Perosis*

- A syndrome characterized with
- Short legs
- Lameness
- Distortion of hock
- Slipping of Achilles tendon (or perosis)
- Malposition of leg distal to hock

- The fact that leg problems are more prevalent in broilers (and turkey) than egg-type birds, has led to the speculation of growth rate and/or body weight as causative factors.

- General nutritional factors can influence leg problems. For example:
- Energy restriction in the first few weeks,
- Deficiency of manganese, choline, zinc, either singly or in combination (although deficiencies of pyridoxine, biotin, folic acid, niacin may also be involved)
  Diets high in protein can interfere with folic acid metabolism and in so doing, increase the incidence of leg problem
- Mycotoxins
- High Chloride levels
- Canola meal (having a different mineral balance and high phytic acid)