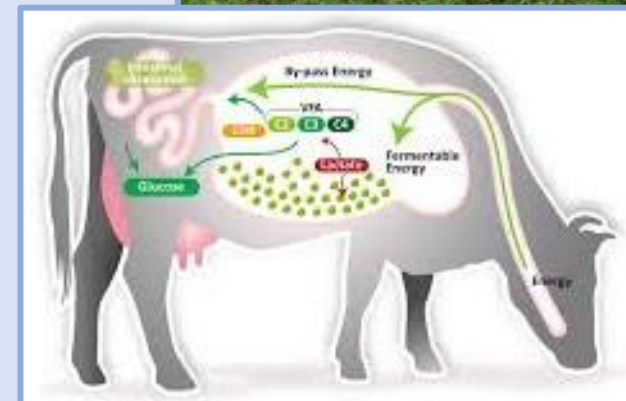


# METABOLIC DISORDERS (Level 2)

Topic	Training & information Content
3.1	Estimating feeding value of fodder & feed on dairy farms
3.2	Sampling feeds & forages/analysis interpretation
3.3	Estimating Dry Matter intake for various breeds/age categories of dairy cattle in the tropics
3.4	Reviewing feed intake, rumen fill, Body Condition Scoring (BCS)
3.5	Life weight estimation of cows
3.6	Rumen fermentation
3.7	Mineral & vitamin requirement, guidelines
3.8	Manure scoring and evaluation
3.9	Guidelines for ration calculations for various breeds, heifers, lactation stage (Rumen8)
3.10	Use of Rumen8 software for ration calculation
3.11	Optimization of ration with Rumen8
3.12	Feeding management guidelines
3.13	Feeding management of dry cows/close-up
3.14	Feeding systems
3.15	Metabolic disorders
3.16	Scoring locomotion and hoof condition
3.17	Mycotoxin in dairy cattle nutrition
3.18	Heat stress in dairy cattle nutrition
3.19	Monitoring feeding management, using KPIs (based on Rumen8)



## 1. You will learn about (learning objectives):

- Types of metabolic disorders affecting COWS.
- Causes of metabolic disorders.
- Prevention measures and management of metabolic disorders.



## 2. Introduction

- Metabolic disorders/problems are caused by too little or too much nutritional elements in a cow's body.
- There should be a balance of nutritional elements i.e. minerals.
- Metabolic disorders can be easily evaded only through correct feed management practices.



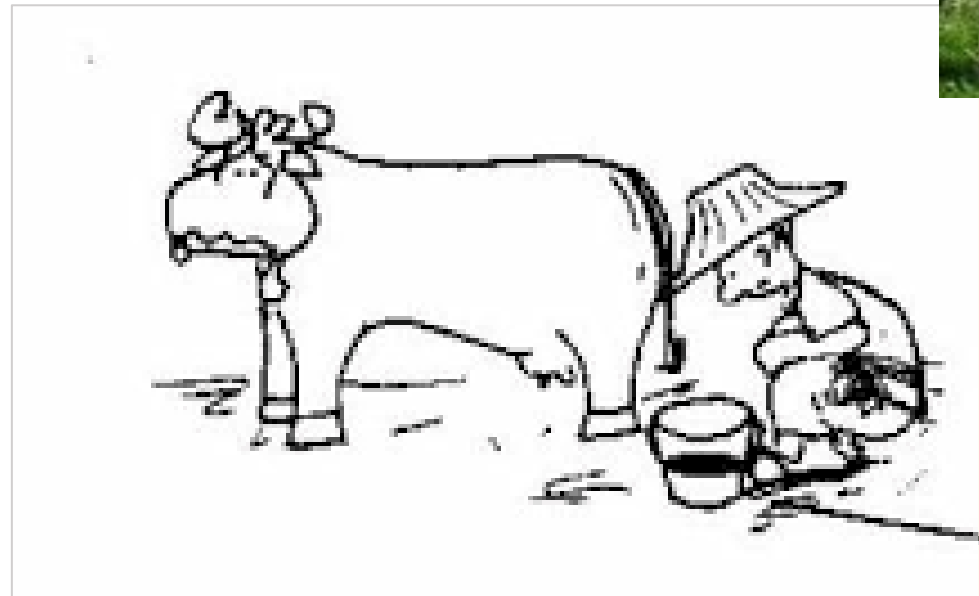
## 2.1 Introduction Cont'd...

- Metabolic disorders mostly affects animals undergoing internal changes.
- For example, cows that just calve down undergo changes within their bodies. Also cows in high stress situations such as harsh climatic conditions and poor feeding.



### 3. General effects of metabolic disorders

- Metabolic disorders can be an entry path way for other diseases.
- Recovery from metabolic disorders uses resources.
- Reduces feed intake in cows.
- Negatively affects milk production.
- Affects fertility of cows.
- Death can occur if not noticed on time or if prolonged.



## 4. Metabolic disorders

- Examples of nutritional/metabolic disorders include;
  1. Milk fever
  2. Rumen acidosis
  3. Ketosis
  4. Grass tetany
  5. Displaced abomasum
- Despite that bloat is not a metabolic disease, it will be mentioned and discussed later in the module.



## 5. Milk fever (hypocalcemia)

- Milk fever is caused by low blood calcium in the cow's body.
- It mostly affects milking cows after calving down.
- Typically, milk is high in calcium (Ca) and this can lead to excessive drainage of calcium from the body. It is also influenced by alkaline digestive systems affecting Ca absorption.
- Older cows and Jersey breed and high producing cows are mostly affected.



## 6. Milk fever in lactating cows

- When cows calve down, calcium is needed for milk production and support muscle contraction.
- This causes cows to increase extraction of calcium from their body to enable milk (colostrum) production.
- Poor care will lead to milk fever.





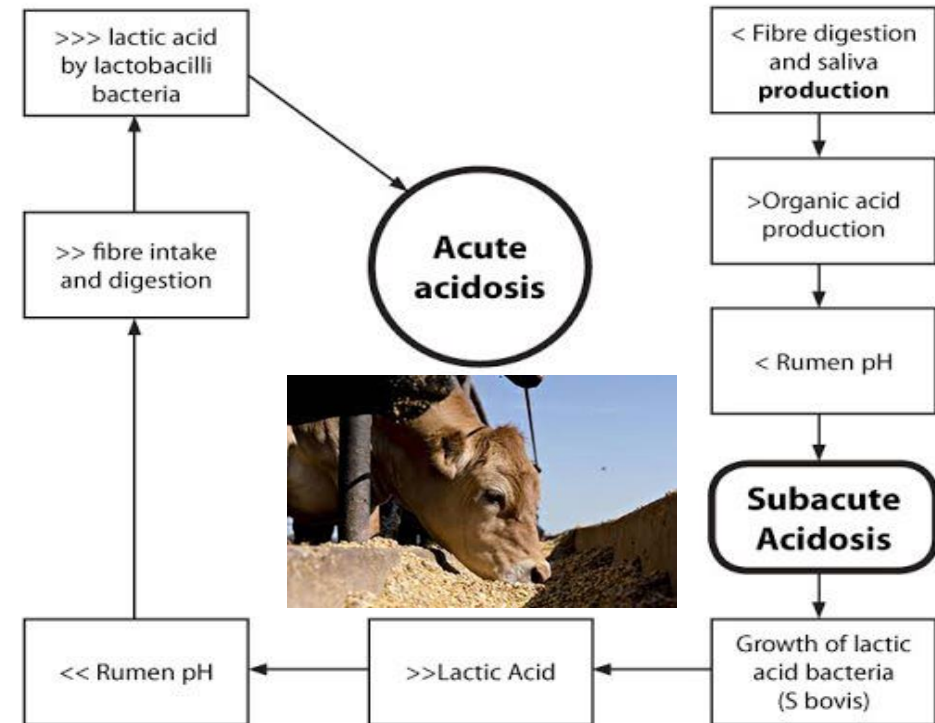
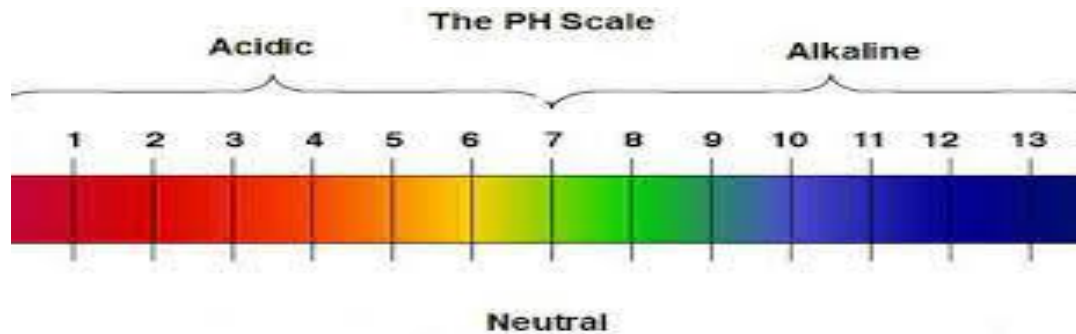
## 7. Symptoms of milk fever

- Difficulties in breathing due to weak heart rate.
- Cold ears and low body temperature.
- Dry muzzle.
- Stiffness of hind legs causing inability of muscle coordination.
- Animal falls easily with reduced ability to stand up.
- Cows leaning their head & neck towards their chest.
- In severe conditions it can lead to death.



## 8. Rumen acidosis

- Rumen acidosis happens in the rumen when the preferred pH levels drops.
- The optimum rumen pH ranges from 5.5-7. pH less than 5.6 is considered as acidosis.
- Cows are at risk of acidosis when they take in large amounts of concentrates.
- The risk of acidosis is further increased if forage: concentrate ratio is low 40:60. This leads to abnormal fermentation in the rumen that cause production of lactic acid, thus PH drops.



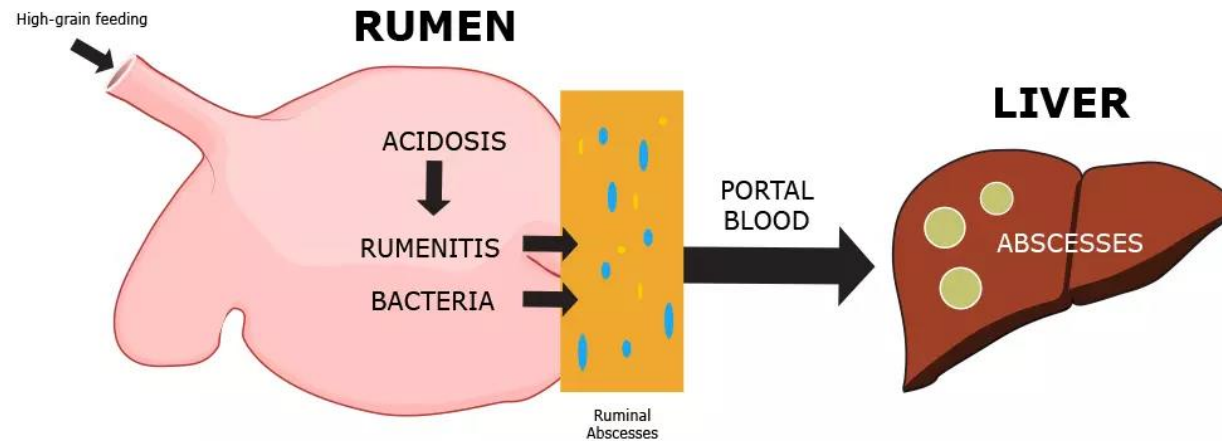
## 9. Signs of rumen acidosis

- Rumen pH dropping below 5 causes reduced appetite and affects the rumen flora.
- Consistency of manure changes eventually leading to diarrhea (manure score less than 2).
- Decreased rumination (chewing cud).
- Low skin temperature.
- Dehydration.
- Decreased urine pH.
- Hooves look abnormal (coronal band redden) and become tender.



## 10. Effects of rumen acidosis

- Acidosis is influenced by sudden shift to new rations especially that with highly fermentable carbohydrates.
- Acid producing bacteria in the rumen takes over, produce more acid. This damages the rumen wall linings and tissues.



Pathogenesis of liver abscesses in cattle fed a high grain diet.

Adapted from Nagaraja, T.G. and M. M. Chengappa, 1998

## 11. Prevention of rumen acidosis

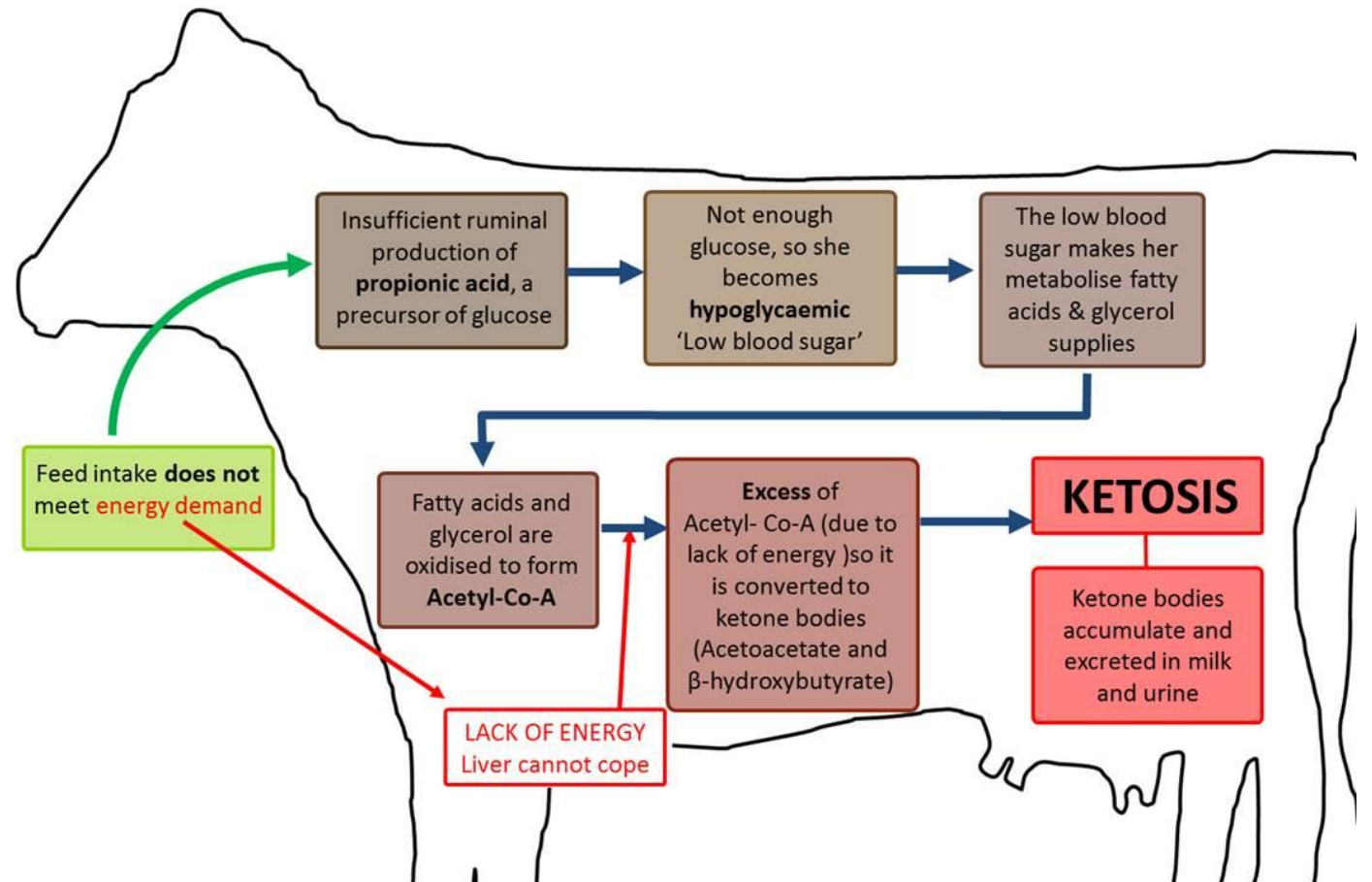
- Include fiber rich ingredients in the ration, this encourages saliva production through rumination.
- Chop forage at a size of 1-3cm.
- Introduce highly fermentable carbohydrates gradually to cows and at recommended amounts.
- Avoid extended grazing/feeding on high quality forages especially maize with corn.
- Encourage continuous delivery of feed i.e., small and frequent feeding.
- Total mixed ration can be used to avoid selective feeding to bring right balance of forage and concentrates.



## 12. Ketosis

- Ketosis occurs when animals get less energy from feed intake than they require based on their nutritional needs, e.g. growth, milk production and maintenance.
- It is caused by reduced forage intake due to underfeeding.
- Mostly affects high yielding dairy cows in early lactation stage.
- At this stage they experience a negative energy balance.

### Insufficient feed intake causes Ketosis



## 13. Signs of Ketosis

- Cow looks dull and inactive.
- Reduced feed intake.
- Reduced weight.
- Reduced milk yield.
- Sudden increase in milk fat content.
- Reduced rumen movements.
- Breath, milk and urine smells like acetone.



Weight loss in due to Ketosis

## 14. Prevention of Ketosis

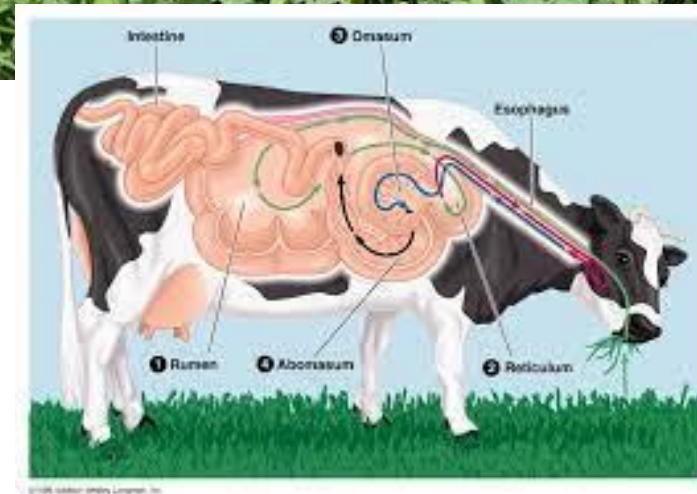
- Feeding quality feeds that meets the cow's energy requirement at all stages.
- The use of Total mixed ration to avoid selective feeding.
- Avoid overfeeding or over conditioning cows at calving periods.





## 15. Grass tetany

- Grass tetany is caused by low blood magnesium in the cow's body.
- It is common in lactating cows feeding on fresh and flourishing pastures that are heavily fertilized.
- Heavily fertilized pastures have high potassium which limits magnesium absorption.
- High potassium, low sodium and phosphorus affect magnesium absorption in the rumen.
- Feeding legume forage high in magnesium helps.
- Feed cows with sources of magnesium during high risk seasons.



## 16. Management of Grass tetany

- For grazing cows supply hay before or during grazing.
- Feed cows on wilted forages after cutting fresh forage. Wilt under a shade.

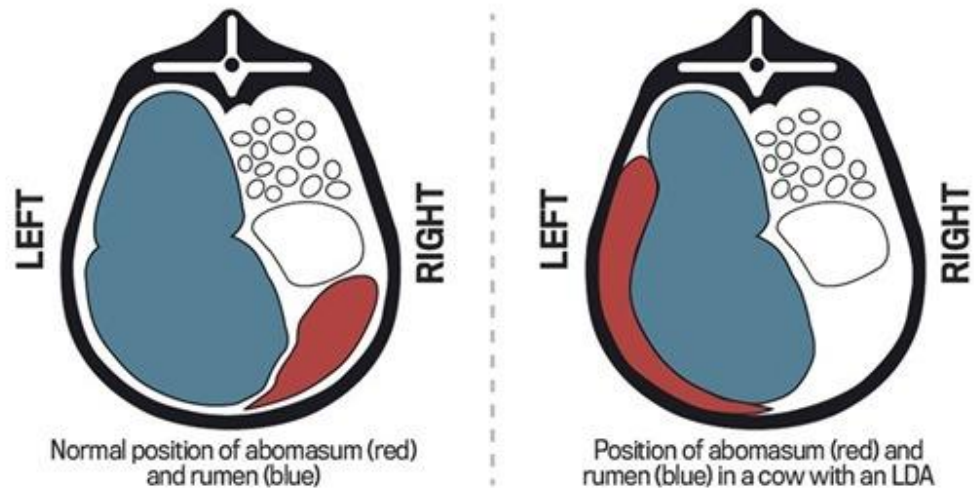
### Treatment of of grass tetany

- Inject magnesium sulphate under the skin.



## 17. Displaced abomasum

- When the abomasum moves to the left or right side of the abdominal cavity, it is known as displaced abomasum.
- Displacement of the abomasum is commonly to the left side.
- Occurs mostly during the first months of lactation.
- It is important to gradually introduce grain rations and ensure adequate fiber in the diet.



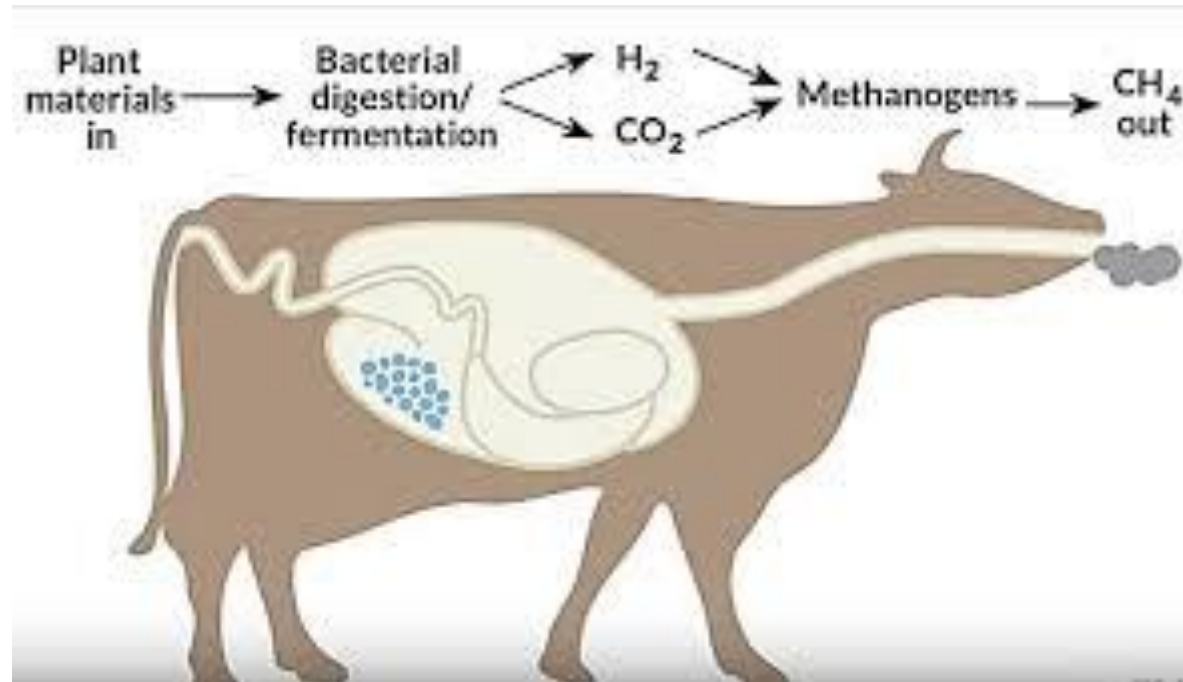
## 18. Signs of displaced abomasum

- Reduced feeding hence dry matter intake drops.
- Decrease in milk production.
- Discomfort and pain.
- When hitting the right rib cage a high echoing ping sound can be heard instead of a deep thud.



## 19. Bloat

- Bloat occurs when a cow produces gas in the rumen and expelling the gas becomes impossible.
- Gases are produced in the rumen when digestive processes takes place.
- Belching removes these gases produced.
- Bloated animals however usually have difficulties belching (erasticating), interrupting gas expulsion.



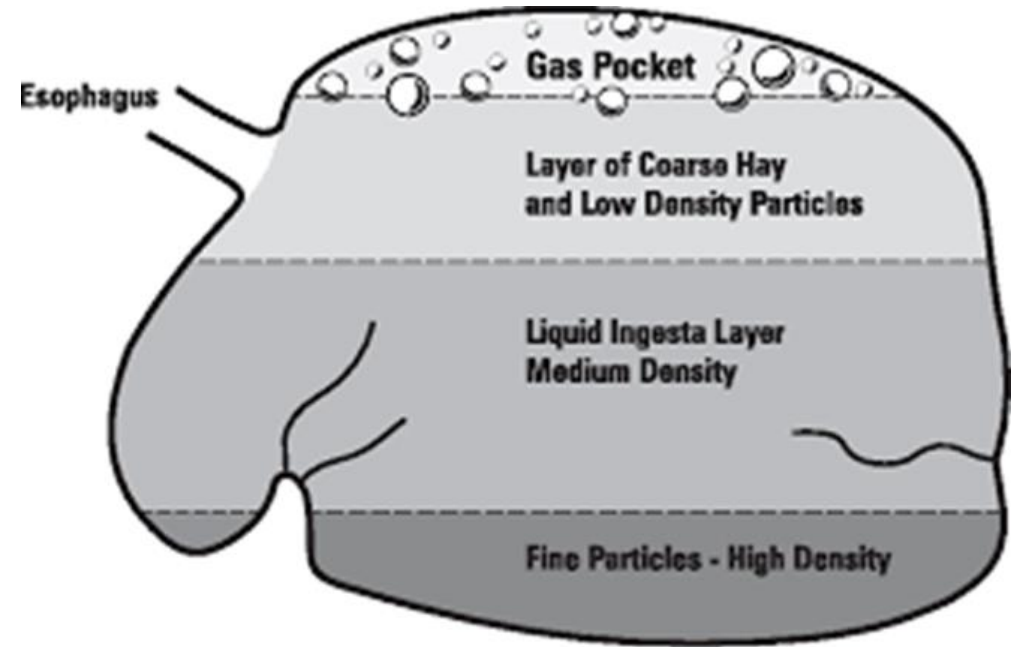
## 20. Types of bloat

- There are two types of bloat experienced by dairy cows;
  - i. Frothy/primary bloat
  - ii. Free gas/secondary bloat

### i. Frothy/primary bloat

- This is the most common type of bloat.
- Occurs when cows feed on fresh forages.
- Fermentation of forages especially legumes causes froth (foam) to be formed that blocks gases from being released.

**Note:** Walking the cow can help breakdown the foam/froth.

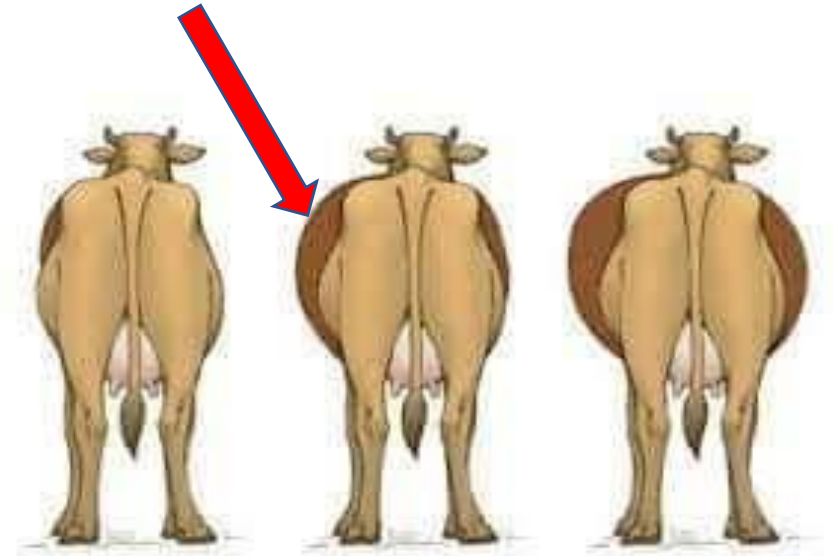


### ii. Free gas/secondary bloat

- This is bloat caused when there is an obstruction especially in the oesophagus.
- This makes it difficult to eliminate gases formed during fermentation.

## 21. Signs of bloat

- To confirm bloat symptoms in a cow;
  - Area between the ribs and hip bone (left side-where the rumen is located) sticks out.
  - When protruding area is touched cow shows sign of pain (rumen & abdomen).
  - Discomfort will also be noticed and labored breathing.
  - Cow's can also collapse when bloat is extreme.



Mild

Moderate

Severe



## 22. Prevention of bloat

- Introduce new diets gradually to cows to allow time for adaptation to change.
- Feed dry hay before feeding fresh grass or grazing on pastures or use of total mixed ration.

**Note:** In case of bloat signs encourage the cow to walk this help release gases by breaking down the foam/froth.





## 23. Take home messages/Summary

- Ration formulation for cows should aim to balance forages and concentrates (grains).
- Minimum forage content in the ration is 40% and concentrates not be more than 60%.
- Feeding a total mixed ration (TMR) can help avoid selective feeding by cows.
- Observe animals for symptoms (problems) before they go out of hand.

