Theme 3: Animal Nutrition and Feeding

FEEDING SYSTEMS (Level 3)

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):

- ❑ What is a feeding system?
- ❑ Choosing a feeding system.
- ❑ Types of feeding systems.

2. Introduction

- There are different systems used in feeding animals.
- Under these systems animals can be purely fed on grass/pasture or supplemented with other feed resources.
- The feed can be provided using various methods under the different feeding systems e.g. cut and carry.
- Understanding various feeding systems helps select a suitable systems that fit a farm's need.
- Different feeding systems need tailored/specific feeding program to meet cows nutritional requirement.

3. Factors influencing choice of a feeding system

- Number of cows.
- Potential number of groupings (animal categories).
- Storage area for forage and concentrates/cereals/grains.
- Milking system and/or building for milking
- Housing.
- Manure management.
- Financial capability.

4. Guidelines for selecting a feeding system

Feeding systems should;

- Be able to deliver feed to each cow.
- Meet individual cow requirements.
- Offer feed *ad lib* (free choice); this encourages intake and optimize dry matter intake.
- Be simple, efficient and easy to provide feeds and manage (reduce feed cost).

5. Types of feeding systems

- Common type of systems are;
  i. Pasture/grazing systems (extensive feeding systems)
  ii. Semi-confined systems (semi-intensive feeding system)
  iii. Confined systems (zero-grazing system/intensive feeding system)

- Great output can be observed from different systems with feeding value evaluation.

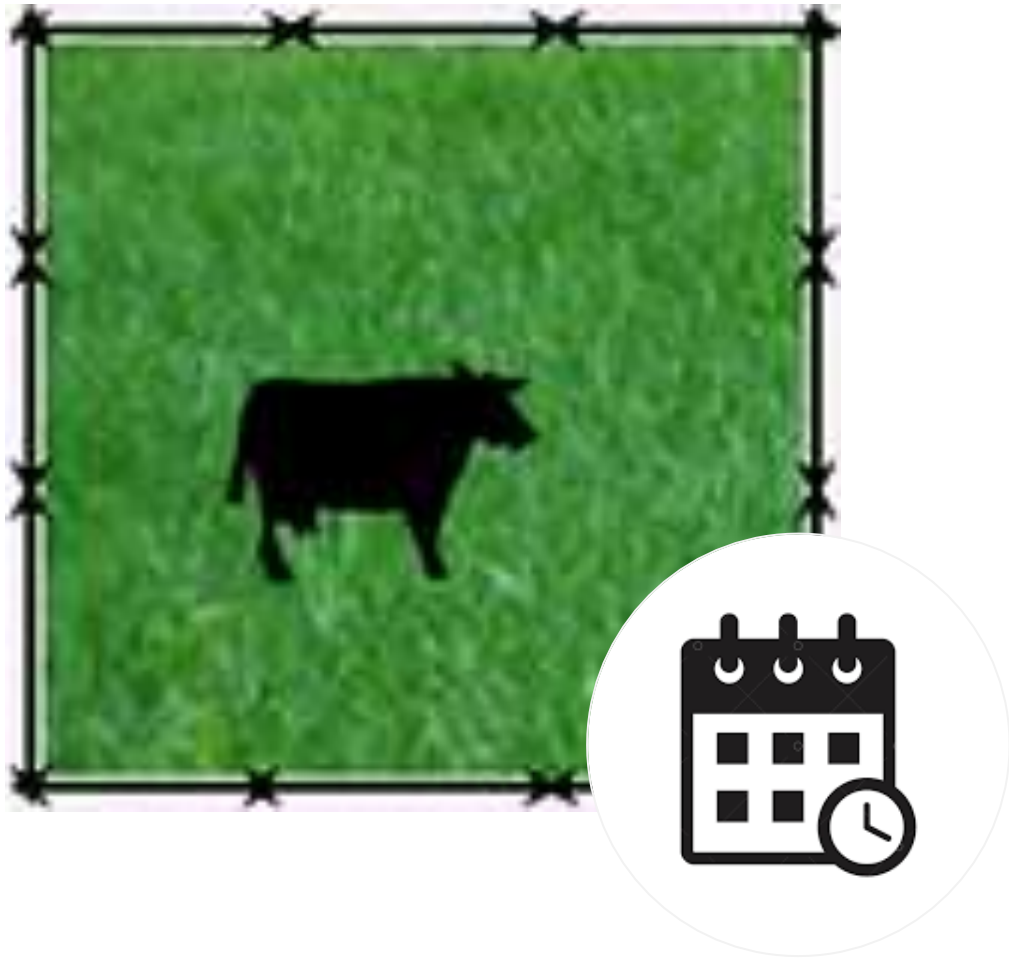
Further reference: See module on Estimating feeding value of fodder & feed.

6. Pasture-based systems

- In pasture systems cows majorly rely on grazing.
- Grazing conditions affects feeding value of pastures. This is considered when supplementing, for example extra supplementation during drought period.
- The common grazing systems are:
  i. Continuous grazing system
  ii. Rotational grazing system
  iii. Management intensive grazing system (MIG)
    - Strip grazing
    - Mob grazing
    - First-last grazing

7. Pasture-based systems: Continuous grazing

- Cows are left to graze on a particular pasture for a long period of time, like a whole year.
- Cows are not restricted when grazing (no fencing).
- This system is commonly practiced but poorly managed; through poor fertilization and understocking or overstocking.
- It usually results in poorer quality and quantity of pastures.
- Feed supplementation is generally required for this system.

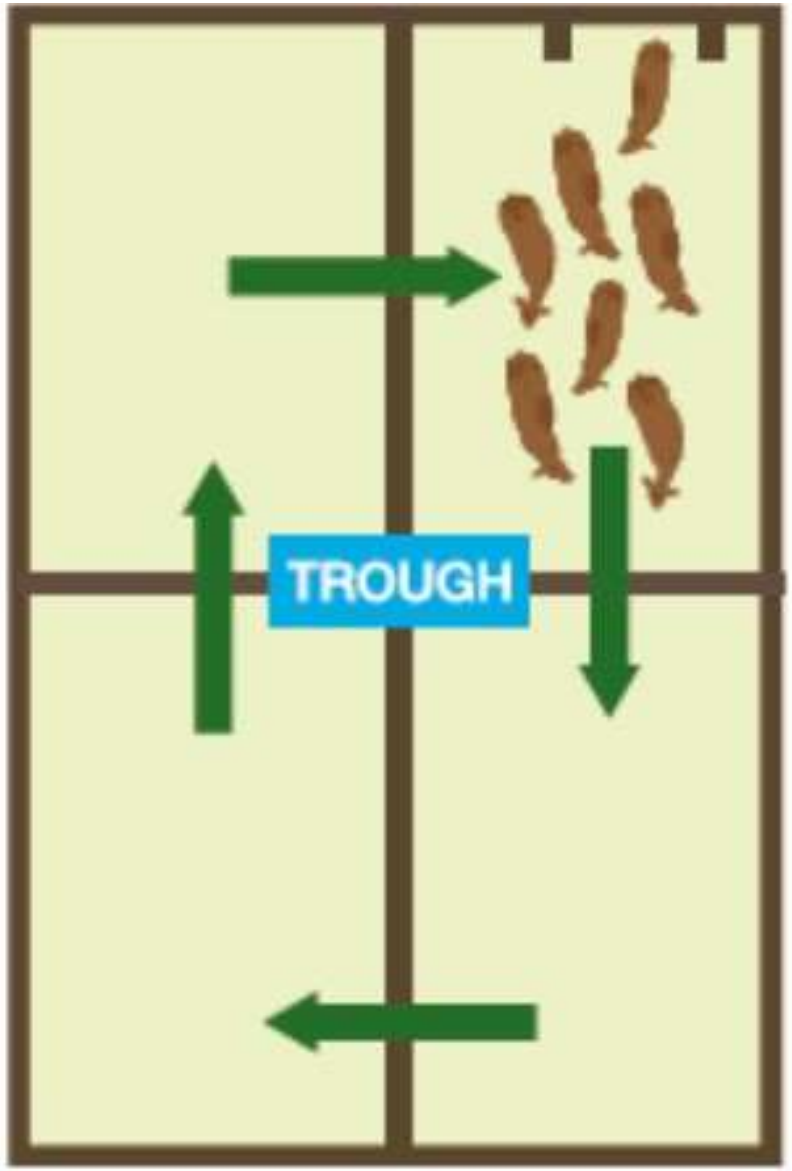


7.1 Characteristics of Continuous grazing

i. It is a one-pasture system.
ii. Animals are free to choose what to graze on.
iii. Pasture is unevenly grazed by animals, good quality vegetation is overgrazed leaving behind undesirable plants, weeds and overgrown vegetation.
iv. High frequency of undesired plants and weeds.
v. Manure is distributed unevenly.
vi. Stocking rate is usually low.

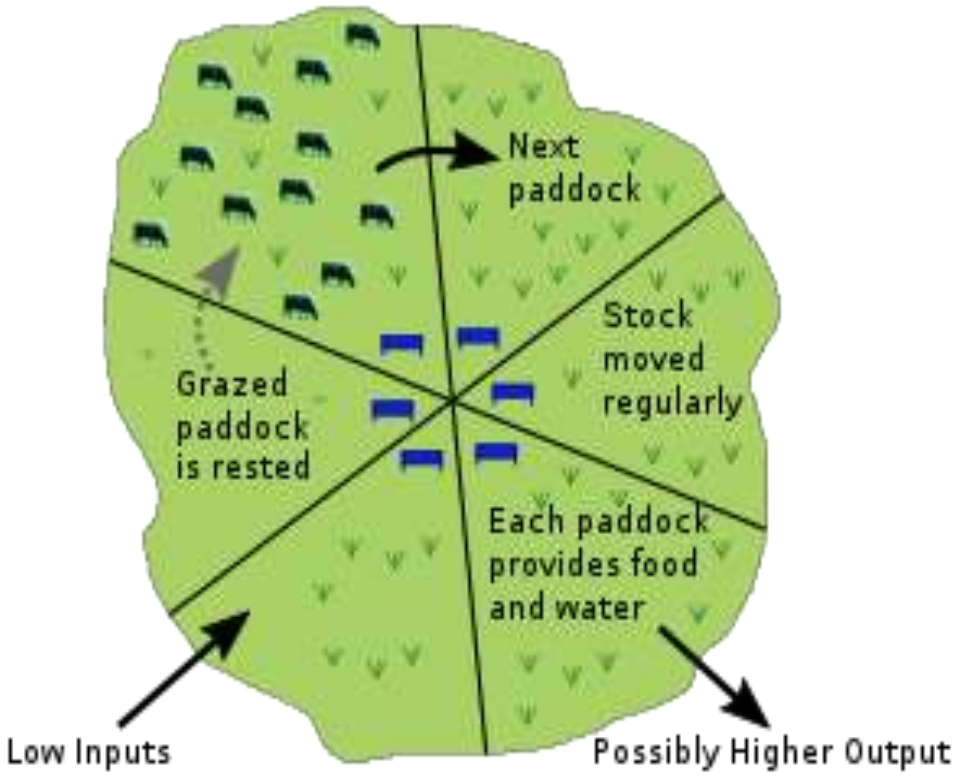
8. Pasture-based systems: Rotational grazing

- Pastures are divided into sections known as paddocks. Animals move from one paddock to another once a paddock has been utilized after grazing.
- Once the last paddock has been grazed, animals go back to the first paddock and the herd will start rotating the paddocks once again.
- Once a paddock is grazed it is left to rest. The ‘rest period’ facilitates recovery/re-growth of the vegetation (grasses, legumes and other nutritious herbs).
- Length taken in paddock is dependent on;
  - Stocking rate (number of cows in particular paddock).
  - Size of paddock.
  - Height of grass (yield).



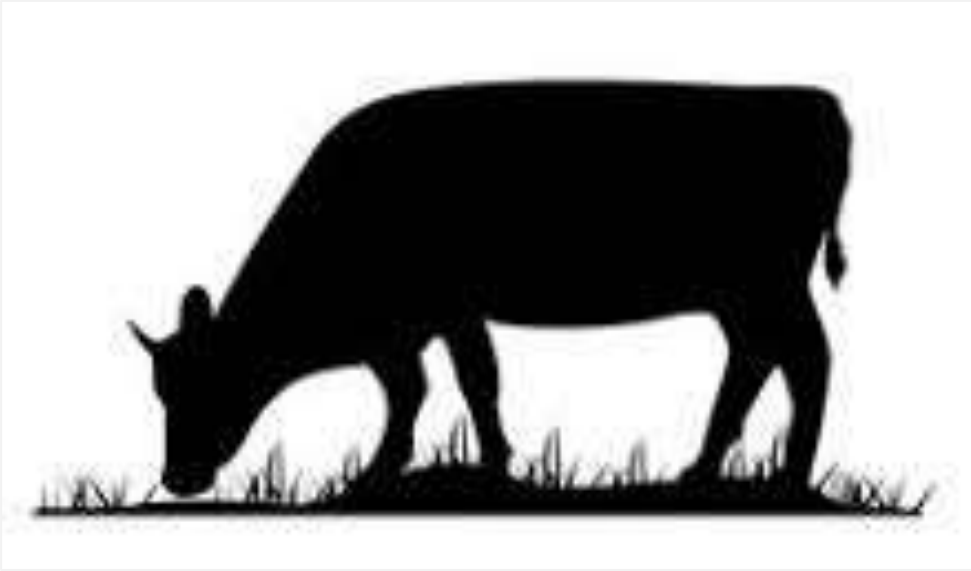
8.1 Importance of Rotational grazing

- Pastures are given a rest period allowing regrowth, leading to improved grass quality.
- The system can identify grass shortage and surplus allowing flexibility through increase and/or decrease of the number of animals in the paddock.
- Allows for better grass production per acre and budgeting. Quality of grass can be managed in situations where the aim is to maximize grass intake and production per animal.
- Improves animal productivity and performance through weight gain, milk production, animal health and reproduction.
- Rotational grazing allows for better nutrient access to soil through even manure distribution.



9. Pasture-based systems: Management intensive grazing system (MIG)

- MIG refers to several systems that allows farmers to subdivide and utilize particular pastures, allowing other grazing areas to rest and recover. This controls grazing.
- Farmers incur more costs at initial stages of production such as fencing and water systems.
- The system also requires higher level of skills and management.

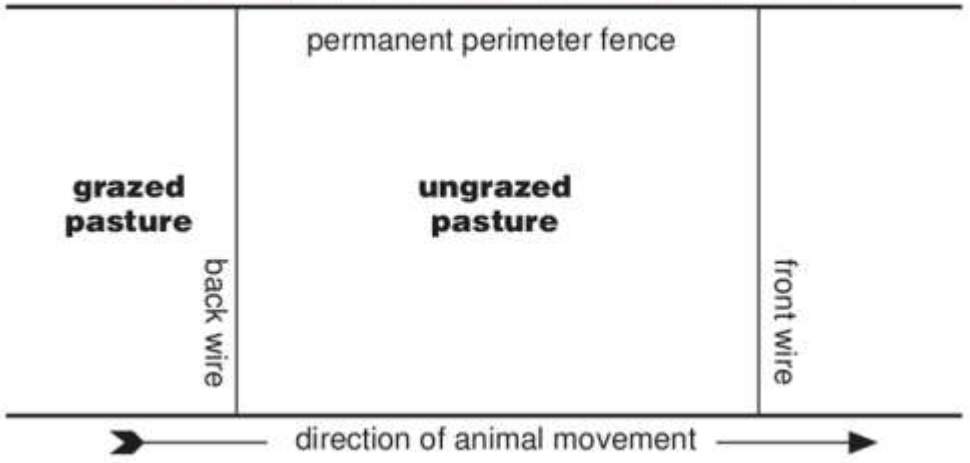


9.1 Grazing systems under MIG

- The system involves more paddocks/subdivision of pastures to increase rest period and decrease days of grazing per rotation.
- Examples of such type of systems are:
  i. Strip grazing
  ii. Mob grazing
  iii. First-last grazing

10. MIG: Strip grazing

- In this type of system the pastures are subdivided into manageable areas by restricting the areas which cows can graze on.
- Cows are kept off already grazed areas by creating a back fence to restrict cows.
- The system utilizes movable or electric fences.
- This system can also be used for supplementary feeding of hay, crop residues or grazing of other forage crops such as turnips without wastage.



11. MIG: Mob grazing

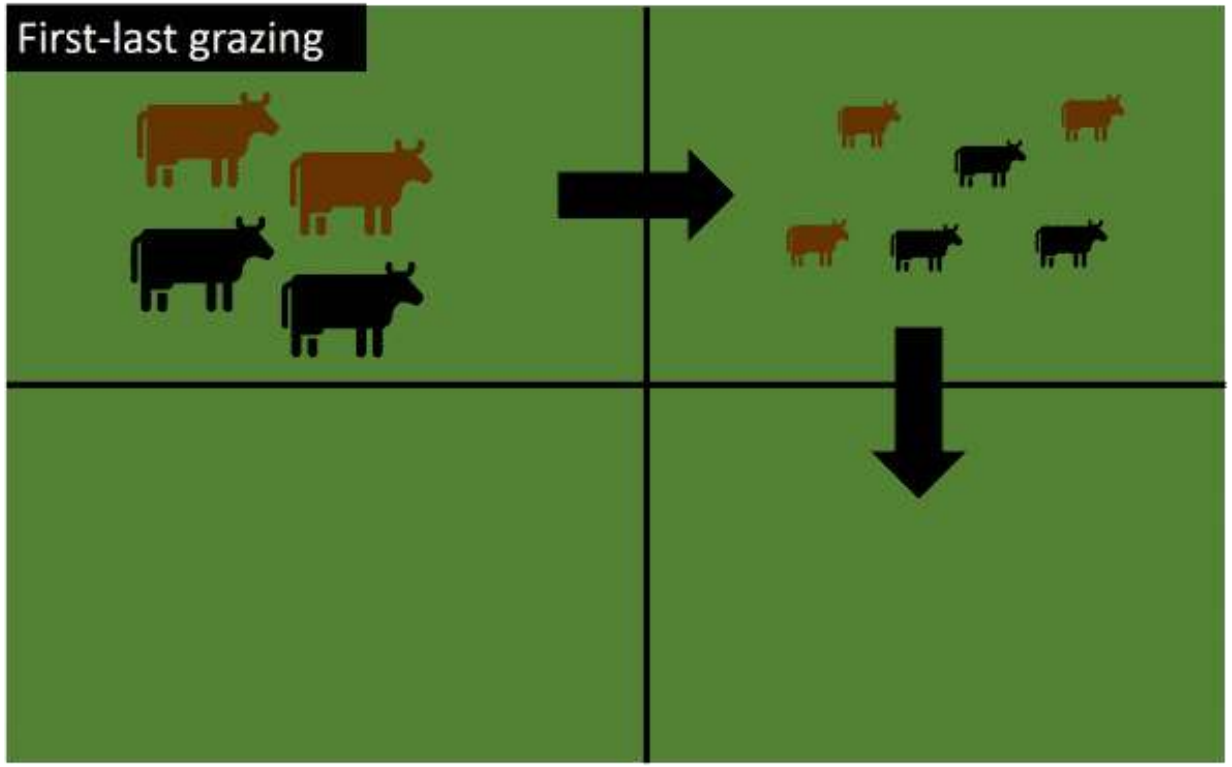
- This system is similar to strip grazing. Cows are given a flexible but restricted area for grazing on daily basis.
- The stocking rate with mob grazing is also higher and the goal is that the cows graze on every plant.
- Animals are generally shifted daily to new grazing areas and are not allowed to go back to already grazed area.
- Pastures are left to recover for 60-120 days.

11.1 Benefits of Mob grazing

i. There is uniform consumption of forage as all the forage is given attention due to small area in relation to cow stocking rate.
ii. Extended grazing period (60-120 days).
iii. Less fertilizer cost due to even distribution of manure and urine.
iv. Better soil health and reduced erosion; thanks to organic matter build up through trampling that mixes soil, uneaten forage and manure.
v. More plant diversity.
vi. Improved livestock health as a result of the long rest period allowing for destruction of any eggs that may cause spread of pests and diseases, such as worms.

12. MIG: First-last grazing

- This grazing system allows the farmer to give considerations to a particular group of cows. For example, animals with higher energy requirements (early lactation and growing young stock).
- It also allows the group with the highest nutritional requirements to access the newly re-grown vegetation first before groups with a lower nutritional requirement such as late lactation, dry cows and in-calf heifers.
- This system helps farmers utilize pastures efficiently while meeting different nutritional requirements of animals.



13. Benefits of MIG systems

i. Improved animal performance. These systems maximize daily energy and protein intake.
ii. Improved land use efficiency. The pastures have a higher production and utilization per acre.
iii. Better weed control.
iv. Reduced need for mechanized harvesting of the pastures.
v. Stocking rate may be increased.
vi. More evenly distributed manure.

14. Feeding Cows on pastures

- Pasture intake is influenced by;
  i. Time spent on pastures.
  ii. Rate of biting pasture (bite rate).
  iii. Size (quantity) of each bite – factor that farmers can control through pasture management.
- These factors are influenced by palatability (quality) of pastures. Cows graze selectively, which means they tend to pick young re-growth especially the leaves.
- Cows are selective and tend to ignore pastures that are trampled on or are contaminated with soil, dung or urine.
- Time spent walking in pastures increases feed requirement for movement which needs to be considered when calculating cow rations.

15. Checklist for cows on pasture-based systems

- Cow appearance: dull and rough haircoat may signify pasture deficiencies or infestation by pests and diseases.
- Cow behavior: refusing to graze, isolating themselves or discomfort while walking implies health problems.
- Grazing behavior: by cows helps identify when to rotate cows to new paddocks (walking especially in the morning).
- Rumen fill and body condition score helps farmer determine if pasture feeding is sufficient.
- Specific injuries and infections confirms bullying, infections or pests and disease infestations.

16. What grazing systems accomplish

- Well managed grazing systems:
  i. Enhances the natural behavior of cows by providing a natural habitat to feed and interaction.
  ii. Grazing animals maintain the ecosystem by stimulating plants growth and facilitating nutrient exchange.
  iii. Stabilizes supply of forage throughout the grazing season/period.
  iv. Improves grazing efficiency by encouraging uniform growth and use of grazing area.

17. Pasture based problems

Health related problems

- Transfer of intestinal and lung worms.
- High contact and transfer of diseases from neighboring herd, for example East Coast Fever.
- Skin problems; sunburn especially on white hair coated cows.

Feeding related problems

- Underfeeding if pastures are poorly managed.
- Need of supplementation during drought.
- Reduced feeding during extreme weather (very hot and heavy rainfalls).

18. Semi-confined systems

- This is also known as semi-intensive feeding system.
- Cows access pastures in the field for a period of the day and get confined the rest of the time mostly at night.
- At confined places the cows are provided with extra feed either cut and carry forages, concentrates or a mixture of both.
- Proper mixing of the ration in semi-confined systems is key to prevent selective feeding.

19. Fully confined feeding systems

- Are best known as intensive-feeding systems, for example zero-grazing or indoor cow barns.
- Animals are housed in relatively densely populated barn where feed and water are brought to them.
- Forages are harvested manually or mechanically and transported and spread along the feed fence or in a feed trough for the cows to feed.
- Partially mixed rations or totally mixed rations are commonly used feeding methods in confined feeding systems.

20. Advantages of confined feeding systems:

Fully and semi confined feeding systems

i. Improved feed management through control of feed quantity and quality for cows.
ii. Improved cow productivity and performance through supplementary feeding for cows at semi- confined feeding system.
iii. Confining cows during the dry period of the year allows pastures to recover and rest, allowing rapid recovery after the first rains in the wet period.
iv. Feeding animal in a confined feeding system (zero-grazing, feedlot) reduces energy requirements as a result of reduced walking to access feed and water.
v. Animal health, reproductive activity, weight and body condition score is easier to observe and monitor in confined feeding systems.

21. Bunk feeding

- Bunks (feeding trough) may be made of wood, cement, aluminum or stainless steel as an area for placing feeds for housed animals (zero-grazing, feedlot, or semi-zero grazing systems).
- It is a very common method for feeding or supplementary feeding of cows.
- Two to three cows can share a feed bunk.
- Feeds (cut and carry forages, conserved feeds i.e. hay, silage and concentrates) are placed in a bunk separately or mixed together in a total mixed ration for cows to feed on.

22. Feed lot

- This is a feeding operation used in intensive animal farming.
- A feedlot is often used for supplementary feeding of cows and (or beef animals).Mostly a total mixed ration (TMR) is fed to the cows while they are in the feedlot.
- A TMR is a mixture of a variety of feed ingredients with a goal to formulate a specific nutrient density in a single feed mix.
- In a TMR, feeds mixed are those such as:
  - Forages
  - Grains/concentrates
  - Minerals and vitamins
  - Additives

Further reference: Module on Mechanization of feeding management.

- END -