

Theme 8: Animal housing

FARM STRUCTURES & HOUSING

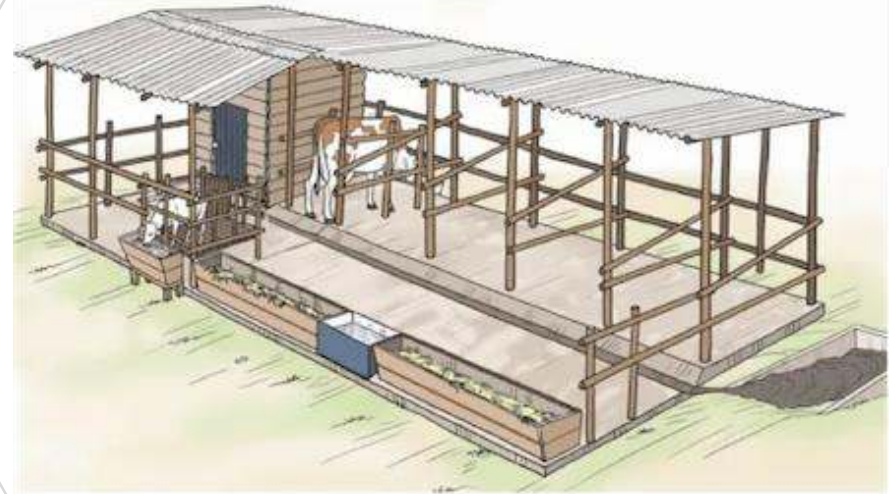
COWS/CALVES/YOUNG STOCK (Level 2)

Topic	Training & information Content
8.1	Farm structures & housing cows/calves/young stock
8.2	Construct small zero grazing unit (SNV handbook)
8.3	Prevention of heat stress in cow barns
8.4	Cow house ground floor plan design (SNV book)
8.5	Best management practice feed fences
8.6	Housing & cow comfort (animal welfare)
8.7	Housing & reduction greenhouse emissions
8.8	Use of sensors (activity meter) in dairy herds



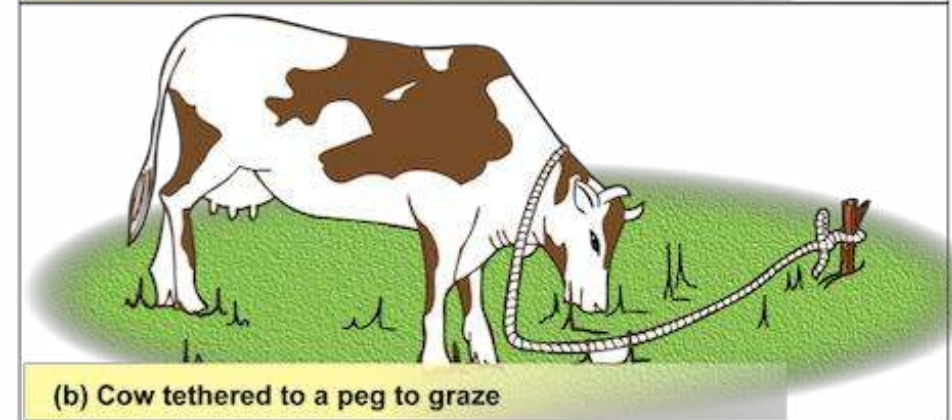
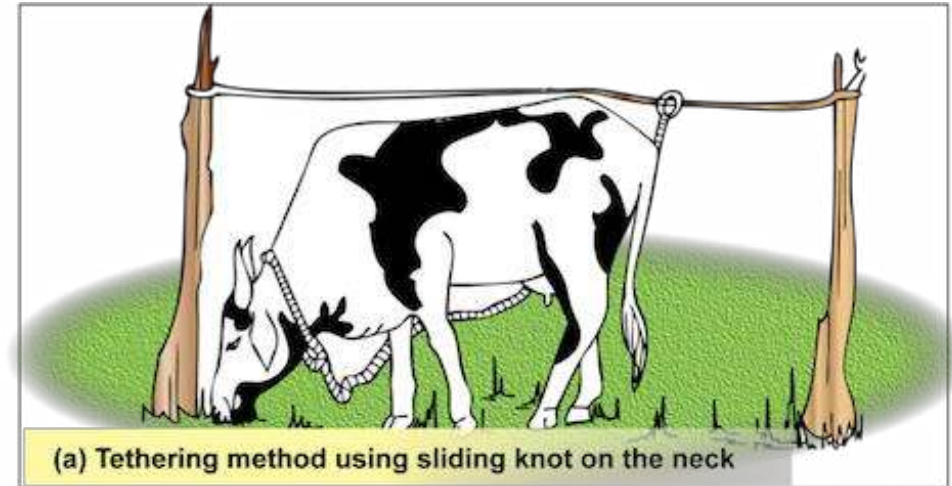
1. You will learn about (learning objectives):

- Types of farm structures in a dairy farm.
- Factors influencing the designs of farm structures.



2. Background

- Traditionally, a cow was grazed in the fields and rested under shades of trees. Sometimes others were raised in rooms with total enclosure.
- Cows could graze freely or tied with ropes and restrained on a selected area.
- Recently for commercial dairy farming systems, cows are restrained in systems known as zero-grazing, semi zero-grazing or in paddocks.
- In this module we will learn the different types of cow barns and farm structures in a zero-grazing and semi zero grazing set up.



2.1 Background Cont'd...

- A cow barn is a structure that houses all groups of dairy animals and has several sections.
- A dairy farm also has other structures, i.e;
 - Milk storage room,
 - Farm offices and staff housing,
 - Farm stores; feed silos, silage bunkers etc.
 - Manure storage e.g. biogas structure.
 - Crush and chute,
 - Dip and spray race, and
 - Ideally an individual box for hoof trimming.



3. Different units in cow housing: grouping cattle

A dairy farm consists of different cows grouped by considering;

- Their gender; females are always separated from the males.
- Age of the cows; young stock are separated from mature cows.
- The stages of lactations, production levels, and size/weight of the cows; To monitor feeding.
- Health; Sick cows are separated from the rest of the herd.



3.1 Grouping cattle Cont'd...

Cattle in a farm can be grouped into;

- i. Cows in different lactation stages (early, mid & late lactation stages)
- ii. Dry cows (Far off/Close up)
- iii. Maternity (calving area)
- iv. Newborn and calves (age 0 – 3 months)
- v. Female young stock (weaners, age 4 -7 months)
- vi. Female young stock (age 8 – 11 months)
- vii. Bulling/unmated Heifers (age 12 – 15 months)
- viii. Mated heifers (age 16 – 19 months)
- ix. Pregnant heifers (age 20 months – delivery)
- x. Breeding bull(s)
- xi. Sick cows and new cows (quarantine).



4. Important natural behaviours of cows

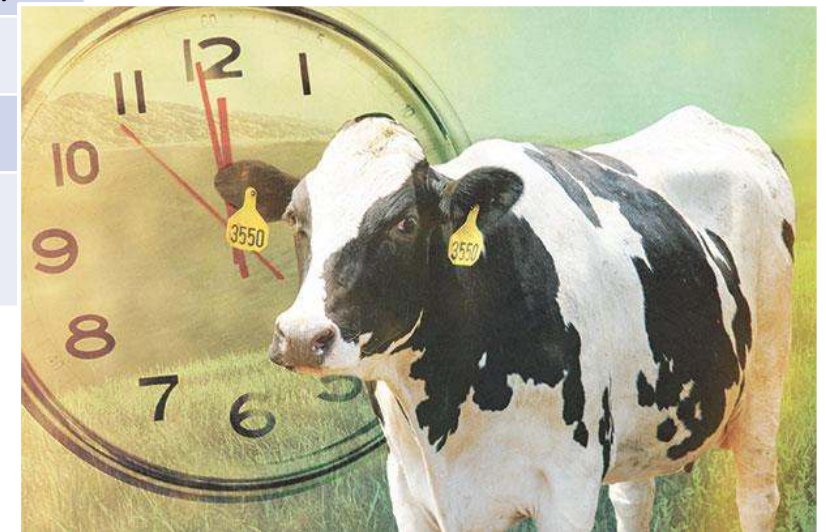
- The natural environment for a cow is grazing in grassland.
- When providing structures and cow housing, ensure the cow is comfortable with enough space to express her natural behaviors;
 - Heat during estrus cycles,
 - Grooming each other,
 - Other social interactions to determine ranking orders.



4.1 Important natural behaviours of cows Cont'd...

Activities of lactating cows in a 24 hours period in a cow barn

No.	Activity	Average time devoted to activity per day
1.	Eating	3-5 hours (9-14 times per day)
2.	Ruminating (chewing cuds)	7-10 hours
3.	Drinking water	30 minutes (6-10 times a day)
4.	Resting/lying down	12-14 hours
5.	Social interaction	2-3 hours
6.	Outside pen (Milking, walking time, etc.)	1.5 hours-3.5hours



5. Basic requirements of a cow house

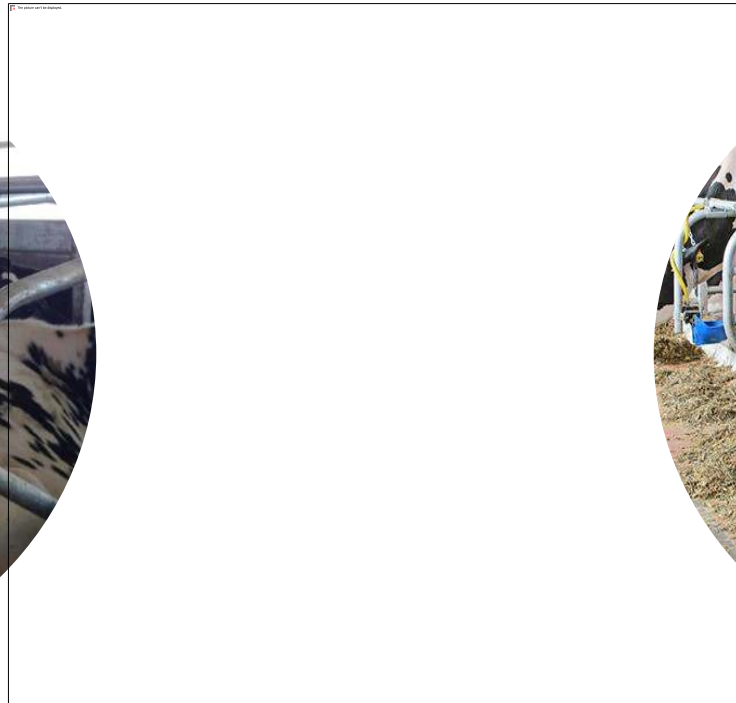
Cows have the following basic requirements that need to be considered while housing them;

- Provide adequate space - space for ease of rest, interactions and movement,
- Access to and availability of feed and water,
- A cow house/barn with enough fresh air (ventilation) and light,
- The barns should be clean and safe so that no animals suffer from injuries, wounds, infections and diseases.



6. Cow barn design

- There are different systems to accommodate dairy cows; of which (i) free stall (cubicles), (ii) loose housing and (iii) tie-stalls are the most common.



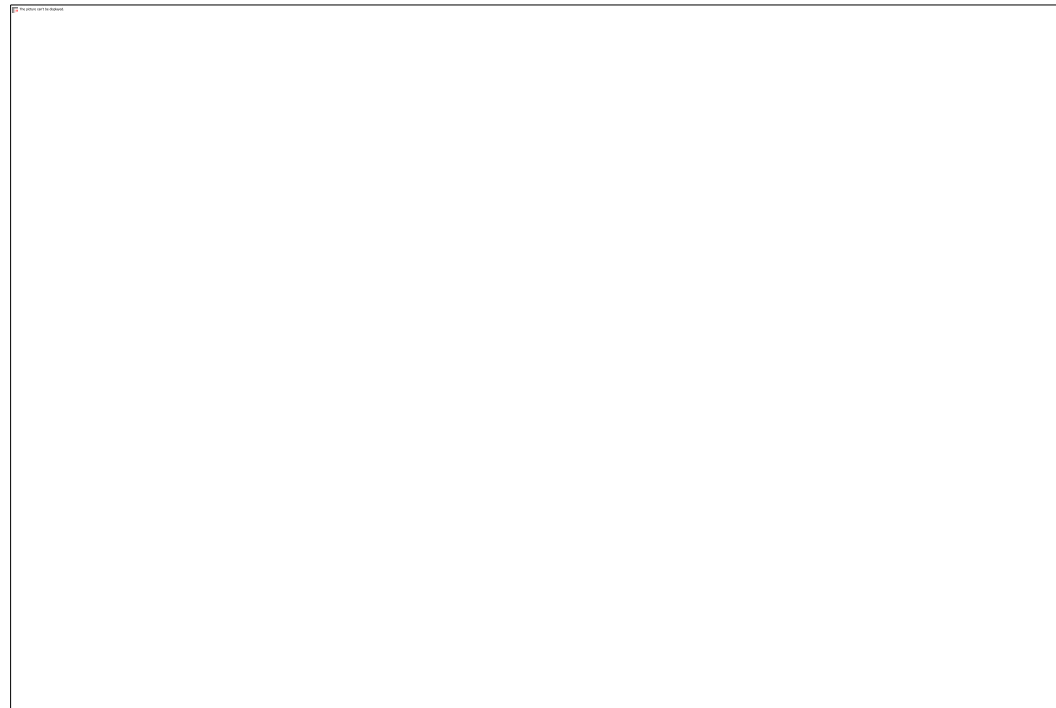
7. Free stalls system (Cubicles)

- A free stall has several sections that are well separated.
- The following are the main sections of a free stall barn;
 - i. Feeding area
 - ii. Walking area/alley (in the middle of the barn)
 - iii. Cubicles (resting area)



8. Loose housing system

- Loose housing is where the cows are allowed to move freely and have free access over the whole barn except for milking and treatment areas.
- The cows are divided into several categories and stay in one barn without cubicles, but instead a large resting area with soft bedding.



9. Tie-stall design

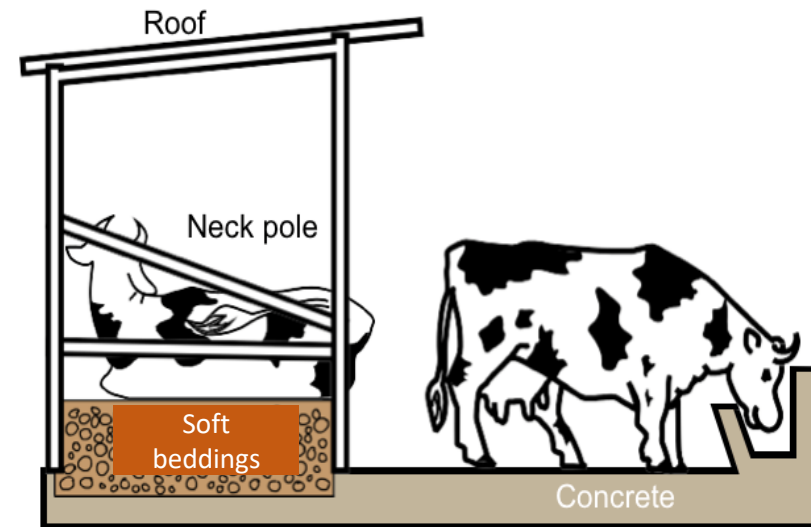
- This type of design restrains cows in one cubicle where they both eat and rest.
- The tie-stall design provides the least cow comfort of the three systems because animals are restrained and cannot exercise at will.
- Due to the restraining, the cows may develop high chances of lameness and chain injuries in the neck.



10. Recommended housing: Free stalls

- In this module, the free stall/cubicles system is recommended as the most appropriate design for the Eastern Africa situation.
- The free stall/cubicle gives the highest level of cow comfort. Cows are cleaner, with lower incidence of diseases and injuries.
- Compared to loose housing, the investment is comparable or slightly lower, due to the fact that on the same surface in a free-stall barn, a higher number of animals can be kept, but construction costs per square meter are higher.
- Loose housing also requires more use of bedding materials and labour to handle manure and wet places.

Side elevation of a cubicle dairy cattle shed

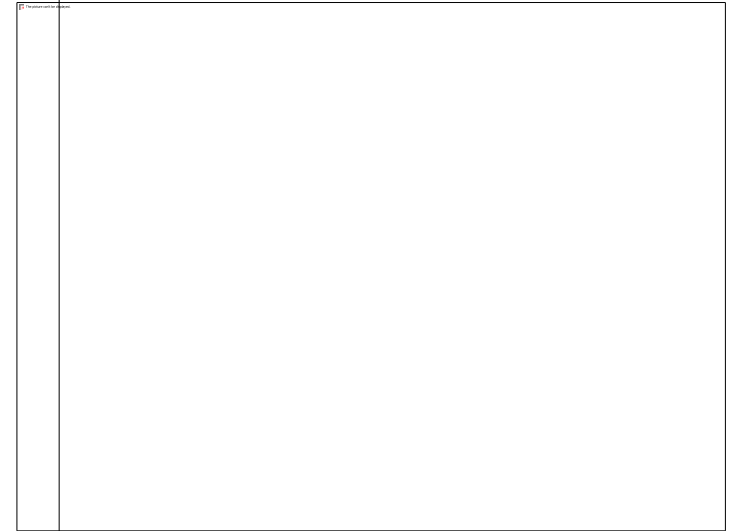
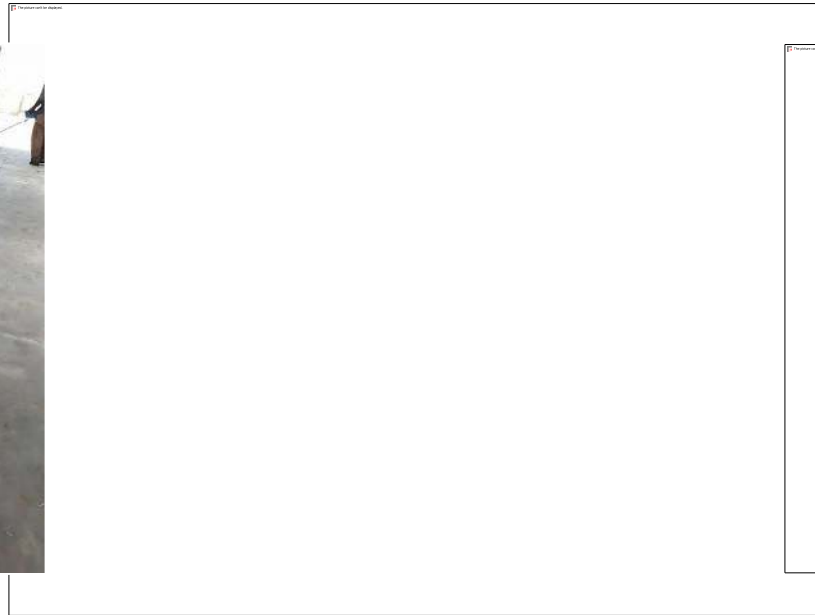


Resting and sleeping

Walking and manuring

11. Young stock housing

- The youngstock are divided into several categories and have different types of housing;
 - i. The newborns and calves before weaning are housed in separated individual calf pens.
 - ii. The weaners and yearlings are mostly housed in loose housing or cubicles.
 - iii. The mated and unmated heifers are housed in cubicles or loose housing.



12. Housing heifers

- Heifers are female youngstock that are ready to be served/mated or already mated.
- The mated heifers should be housed in structures that are similar to lactating cows (in this example, cubicles design) but with different dimensions due to the smaller size of the heifers.
- They are housed together so that they get used to the housing system prior to joining the lactating cows after first calving.



13. Housing female young stock between 6-12 months

- This group's stage/age is after the weaning stage and before the breeding stage.
- This category of heifers are mostly housed in a loose housing system or in some cases cubicles systems.



14. Housing Newborns and Calves

- Newborns and calves are not housed in groups, instead in individual pens under the same roof.
- The calf pens are constructed next to each other such that calves can see the other calves but with enough space in between to avoid physical contact with the other calves.
- Physical contact is limited for several reasons;
 - i. It helps with working hygiene.
 - ii. Limits the spread of infectious diseases since they are very delicate (have low immunity) during the first 3 months of their lives.
 - iii. Helps monitor milk, water and feed intake.
 - iv. Easier to monitor the behavior of the calf (abnormal behavior, sick calf etc.)



14.1 Features of a newborn calf pen

- Should be well ventilated, allowing airflow and light in the house.
- Choice of material is crucial; no solid walls, should be made of wire mesh or spaced wood.
- For cages under high roofs, they should not have a cover top/roof over it but remain open.
- The cage should have feeders (at least two holders for holding the feeders) for water and feeds.
- Should be elevated from the ground with slatted floors.
- For calf comfort, soft bedding such as straw and husks bedding should be used and cleaned daily.



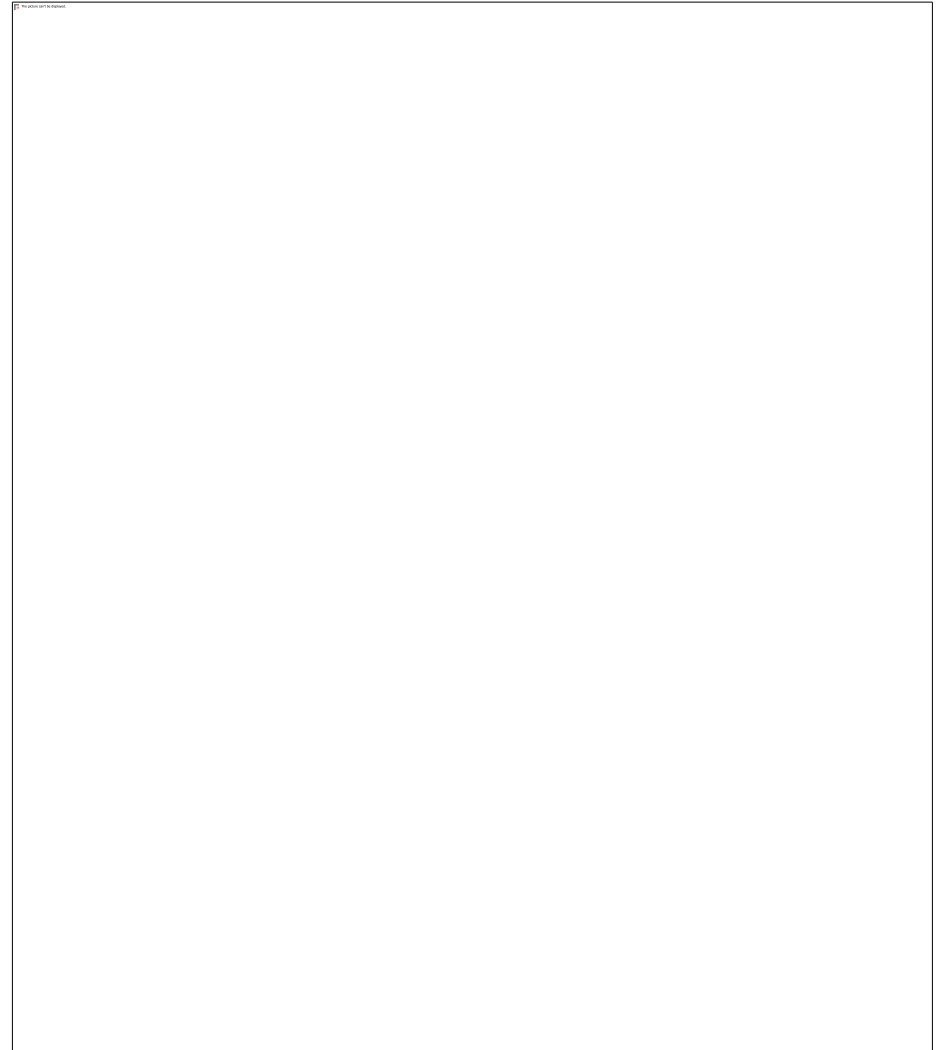
15. Maternity barn

- Adequate space in group maternity pens allows cows to isolate themselves during calving.
- Best maternity management practices are essential to properly manage dairy cows and newborn calves during the most crucial time of their life.
- These practices also help farm personnel and producers prevent common calving-related losses such as stillborn calves and retained placentas.
- Also helps monitor risk factors for poor cow performance through analysis of good quality maternity records.
- Provide fresh, dry bedding to maintain hygiene.
- Provide at least one stall per cow.



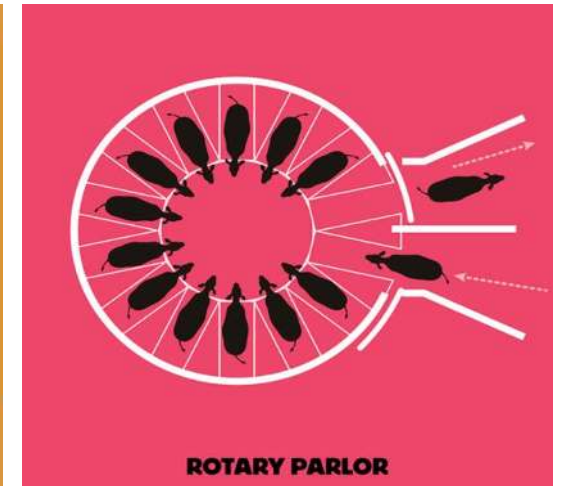
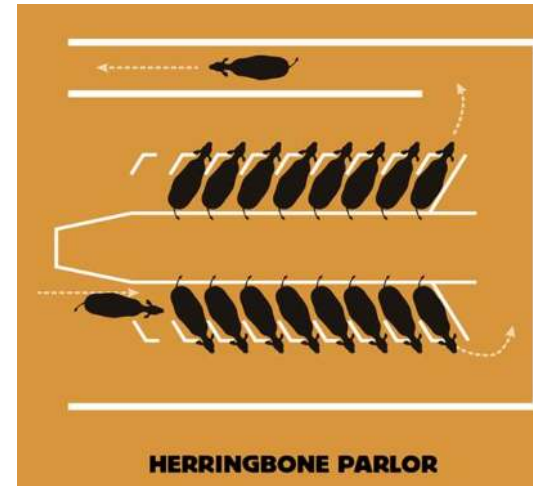
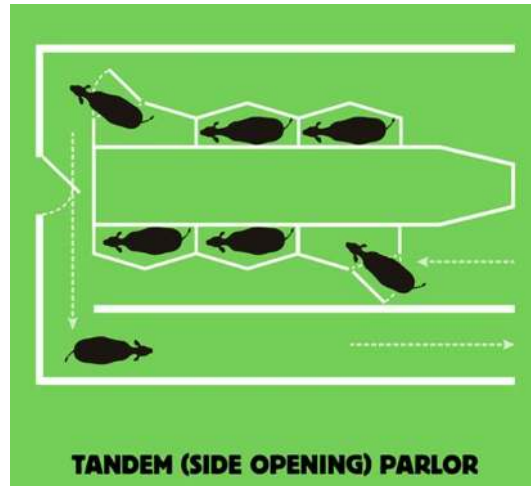
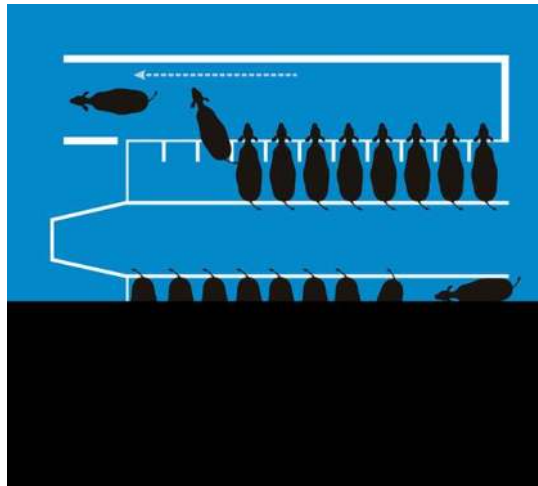
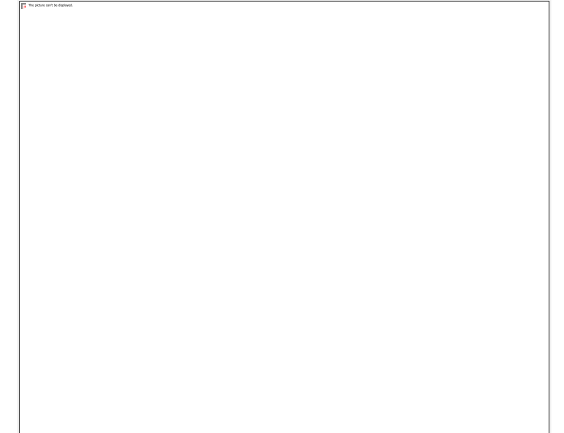
16. The milking parlour

- A milking parlor is where cows are milked on a dairy farm.
- The milking parlour should be located near the lactating cows because they make 1-2 trips per day to be milked.
- The flow of cows to and from the milking parlour should be managed and well designed to ensure a smooth flow of cows.



17. Hand milking versus machine milking

- For few milking cows, hand milking is the most economical milking technique.
- When the number of cows increase, the farmer may use a movable or a permanent bucket milking.
- For medium and large dairy herds, a permanent milking system that supplies milk directly to the cooling tank is recommended. For example a parallel, tandem or herringbone parlour.
- A milking parlour for hand and bucket milking requires that both the milker and cow are comfortable during the milking process.



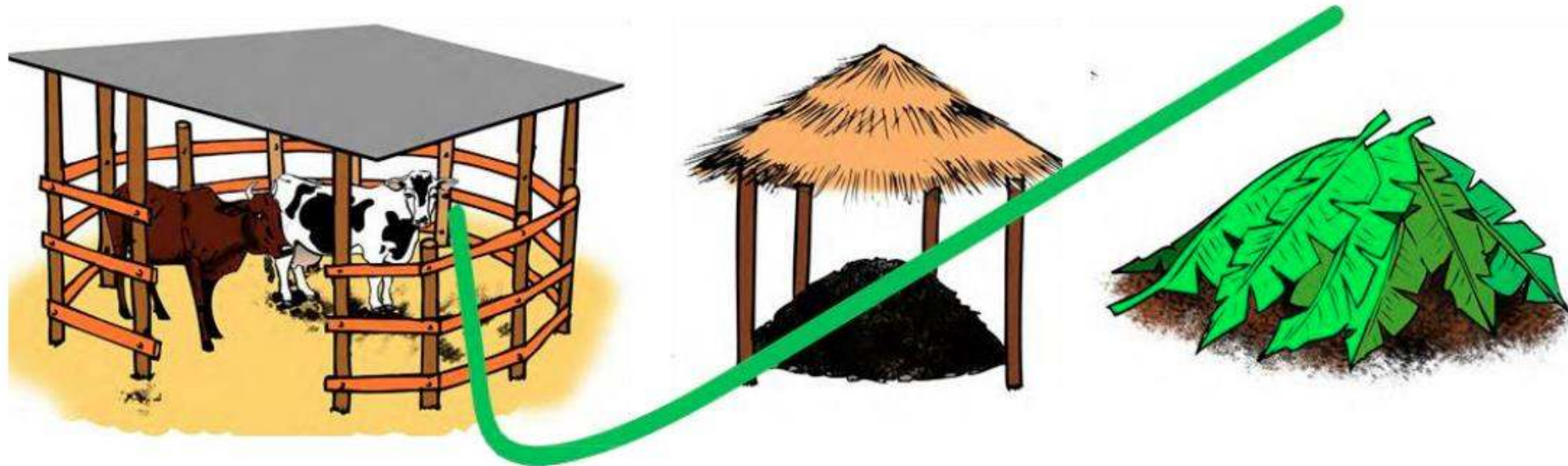
18. Milk collection room and cooler

- The milk room is used to store milk in bulk using milk tanks and coolers. It can also store milk related equipment such as milk collecting containers etc.
- Important critical check points for milk room include frequency of cleaning, sanitation and accessibility.
- Install all equipment in the milk room on a slightly raised platform to allow for drainage after cleaning and in case of leakages. Floor should slope towards a drain.
- Milk rooms should not store any kind of chemicals, medication or feeds because they may contaminate the milk (flavor and smell).



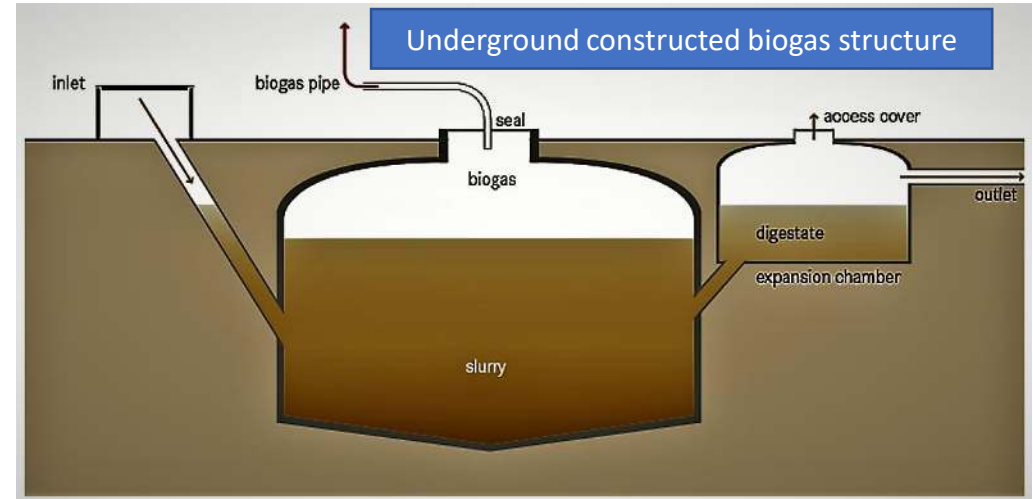
19. Manure storing structures

- Manure storage options include stockpiling, dry stack, composting, liquid storage or hauling away.
- The type of storage structure used depends on the physical consistency of the manure to be stored and whether manure treatment is a part of the manure management system.
- Solid manure storage structure can be constructed from concrete or wood.
- Liquid manure is typically stored in one of the following structures: deep pits under the building floor housing the animals, outside below ground earthen pits or concrete storage, outside above ground tank storages, treatment lagoons and holding ponds.



20. Biogas structures

- Biogas can be used on the farm to save on other energy sources. It is a by-product of manure.
- The biogas structures are constructed just near the cow barn and have connecting pipes to the region the gas is needed for use.
- The picture shows several biogas structures; an underground structure and on the ground structure.



21. Biosecurity structures: Foot bath

- Biosecurity structures are focused on reduction or prevention of introducing new diseases from outside sources, including infectious diseases onto the farm.
- There are two types of structures; footbaths and sick-bay/isolation barns.
- Install footbaths in areas where the cows and people pass through them such as the entrances and exits of every section in a dairy farm.
- Footbaths have solutions that disinfect the animals and people passing through them.



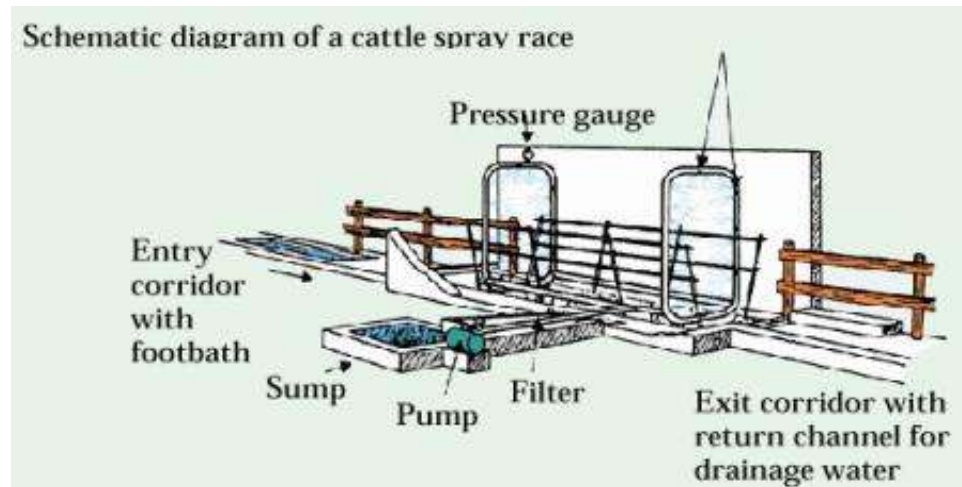
22. Biosecurity structures: Sick-bay and quarantine barns

- The best solution to prevent newly acquired animals introducing diseases into the farm is through hosting them in a quarantine facility.
- Quarantine is one of the most important biosecurity tools and consists of separation of specific groups of animals to prevent transmission of infectious diseases.
- Sick cows should be separated from the rest of the herd to prevent spread of diseases and monitor them closely.



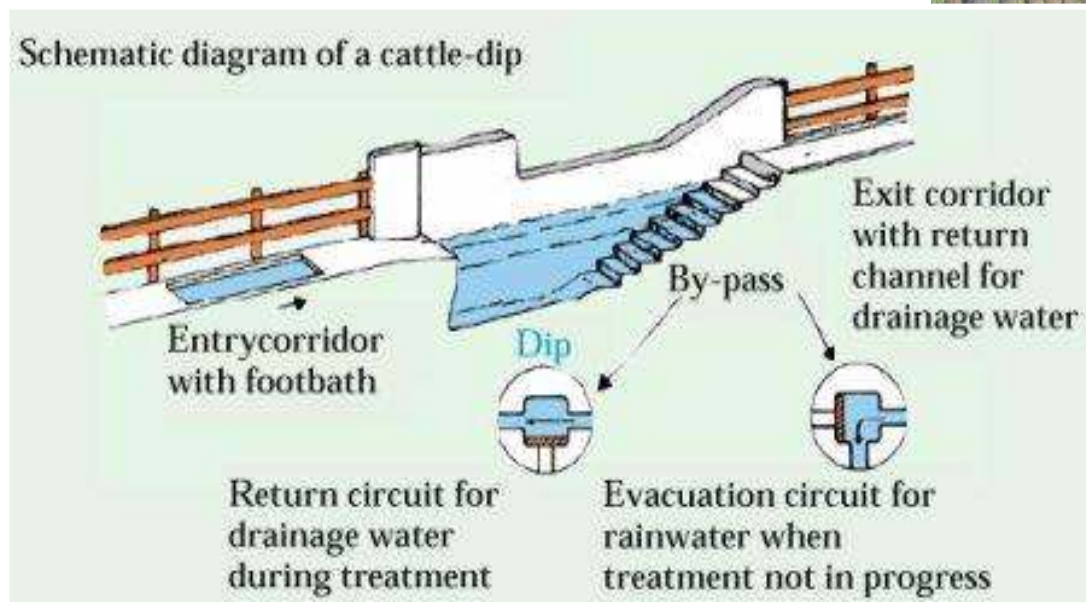
23. Spray race

- The spray race is economically efficient and ecologically effective in animal spraying for large scale farms, to improve on management of tick-borne and tsetse fly transmitted diseases.
- The tunnel construction allows for continual stock movement through the spray race, which reduces animal stress and saturates the animals so tick control is improved.
- The design allows all groups and sizes of cows to go through it.



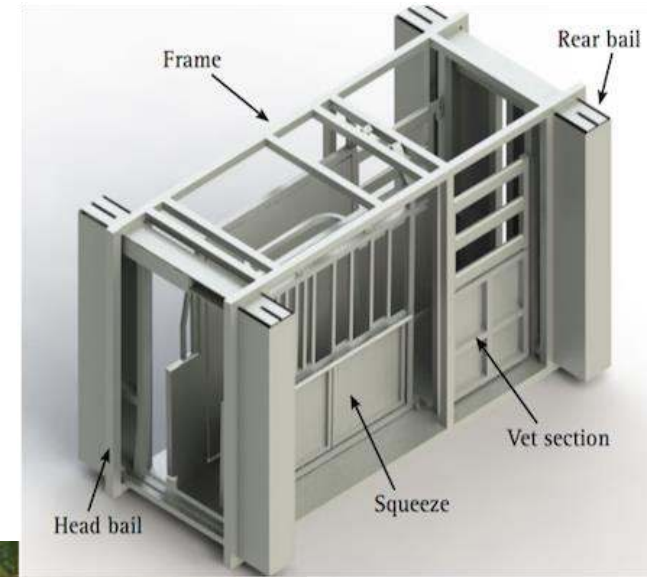
24. Cattle dip

- A cattle dip is designed as a narrow channel that allows one cow at a time to walk through, immersing them progressively deeper into the liquid until the animal is completely immersed apart from its head.
- The channel then becomes progressively shallower until the animal exits after successfully immersing.



25. Cattle crush

- Cows have to be constrained during routine operations such as recording, vaccination, ear tagging, weighing and animal health/veterinary procedures.
- A cow's crush holds the animal immobilised to minimise the risk of injury to both the animal and the handler.



26. Farm store facilities

- An efficient and effective feed storage and handling system is vital to any modern dairy farm.

Types of farm stores

- i. The fodder chopping and feed mixing area,
- ii. Dry feed material stores such as haylage, supplements and concentrate,
- iii. Silage bunkers/silos,
- iv. Drug and insemination materials stores,
- v. Other farm equipment storage such as farm machinery.



27. Silage storage structures

- Silage are stored in structures called bunker silos; which is a large flat area usually with walls along two sides.
- The floor should be concrete, asphalt, or some other impervious material to keep the silage clean and prevent liquid from leaching from the pile into the ground below.
- The chopped plant materials are spread in even layers on the floor. As the pile gets taller, heavy tractors or payloaders are driven across the top to tightly pack the material.
- When the bunker is full, a large sheet of plastic is used to cover the exposed top surface.



28. Dairy farm fence structures

- The most effective and long lasting fences have correct layout and built with appropriate material and construction. The cost of a properly built fence often returns its value in a short time.
- Physical fencing is typically for long term use
- Some physical fencing can be more expensive than other types.



29. Farm offices

- A commercial dairy farm has a farm office to oversee and report all the daily activities on the farm.
- The offices also serve as a meeting place with service providers, farm workers and investors.
- It can house the drugs and insemination tools.
- Reporting and record keeping tools updates.

