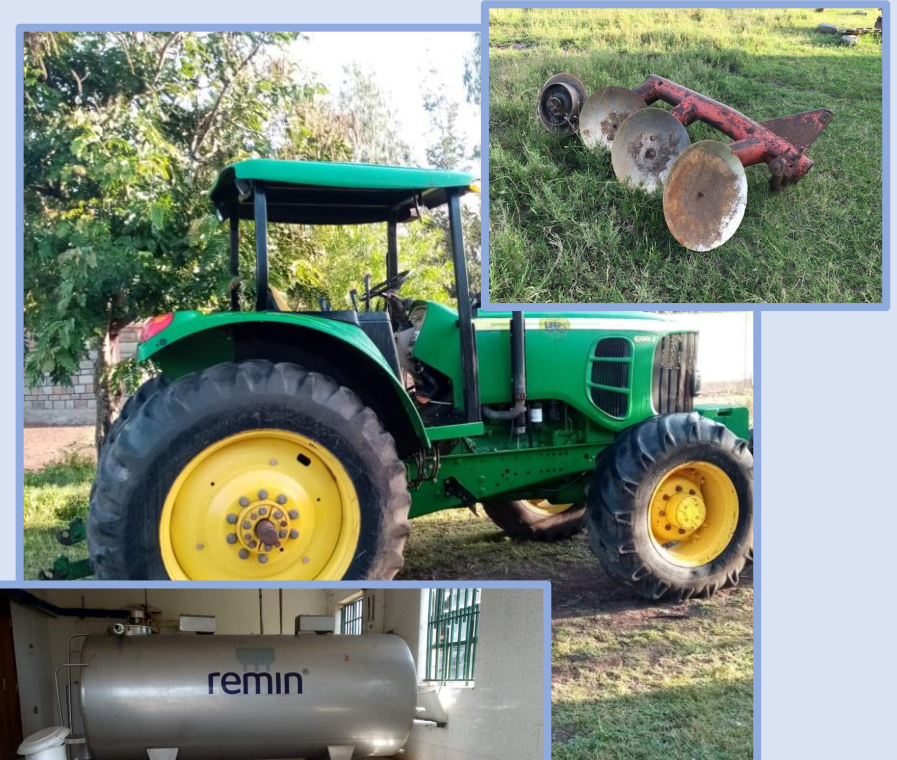


*Theme 1: Forage production and pasture management*

# OPERATING FARM EQUIPMENT AND SELF-PROPELLED TRACTORS - Level 2

Topic	Training & information Content
1.1	Planning of fodder/feed requirements for the dry season
1.2.1	Integrated soil fertility management I
1.2.2	Integrated soil fertility management II
1.3	Use of natural resources, compost making, farmyard manure, manure storage and use
1.4	Growing maize and sorghum for fodder and estimating time of harvest and yield
1.5	Brachiaria, Panicum, & Napier (cut and carry) grass management
1.6	Growing fodder trees and use of feed
1.7	Estimating of dry matter content, feeding value and yield of various fodder crops
1.8	Guidelines for Tropical pasture management and grazing management
1.9	Scaled mechanization of forage production and pasture management (harvesting practices)
1.10	Operating farm equipment and self-propelled tractors
1.11	Mechanization of feeding management
1.12	Economics of forage and pasture production



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

- ❑ How to operate various farm equipment & tractors.
- ❑ Standard operating procedures for operating various farm equipment and tractors.



## 2. Background

- Selecting the right machinery and equipment for your dairy farm is important to ensure reduction of unnecessary running cost.
- Proper maintenance of equipment ensures extended use and effectiveness.



### 3. Benefits of using mechanized equipment in a farm

- Operations are conducted timely.
- Encourages precision operations i.e. precision planting by tractors.
- Increases productivity in activities.
- Increases output increases profits for farmers.
- Minimizes losses during operations.



## 4. Types of tools and equipment in a dairy farm

- i. Tractor and its implements
- ii. Harvesting equipment & machinery
  - Chopper
  - Harvester
- iii. Milking machine
- iv. Milk processing equipment



Photo: Felix Opinya



Tractor

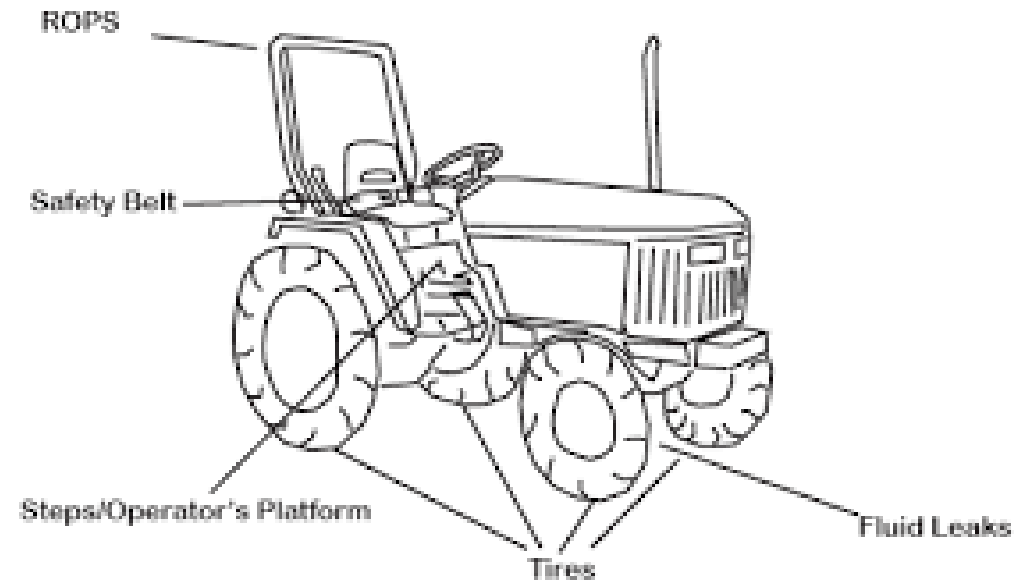


Milk pasteurizer

## 5. Safety tips when handling/operating a tractor

### Pre-operational safety tips

1. Only authorized driver should be given access to drive machinery.
2. Operators should be properly dressed before operating equipment.
3. Tractor should be well equipped i.e. seatbelts, roll over protection and tools in case of breakdown.
4. Ensure the three point-linkage securing pinions and safety chains are in good condition.
5. Check other important things with tractors before operating i.e. puncture, oil.



## 5.1 Safety tips when handling/operating a tractor Cont'd...

### General tractor safety tips

- Only experienced operator should handle a tractor.
- Carrying passengers should be avoided.
- Avoid jumping off a moving tractor.
- Power take off (PTO) shafts and connections should be guarded and kept clear when engaged.
- Avoid standing between tractor and implements when making a connection.
- Slow down the tractor on rough terrain.



## 6. Implements to attach to a tractor

- Implements can be attached to a tractors in various places.
- Attachments on a tractors can be classified according to;
  - i. Type of tractor implement
  - ii. Method/place of attachment
- Some of these farm implements include;
  - Ploughs (disc plough, mouldboard plough, chisel plough)
  - Disc harrow
  - Planter/seed drill
  - Manure spreader
  - Trailer
  - Pallet fork
  - Tractor driven harvester/chopper





## 7. Implements to attach to a tractor

### i. Trailing implements

- Are implements that are dragged by tractor, attached at the drawbar.
- Cannot be lifted or lowered.
- Examples; trailed mouldboard plough, disc harrow.



### ii. Mounting implements

- Are implements that can be lifted with the help of a hydraulic system.
- Weight is transferred to the tractor.
- Example; 3-disc plough.



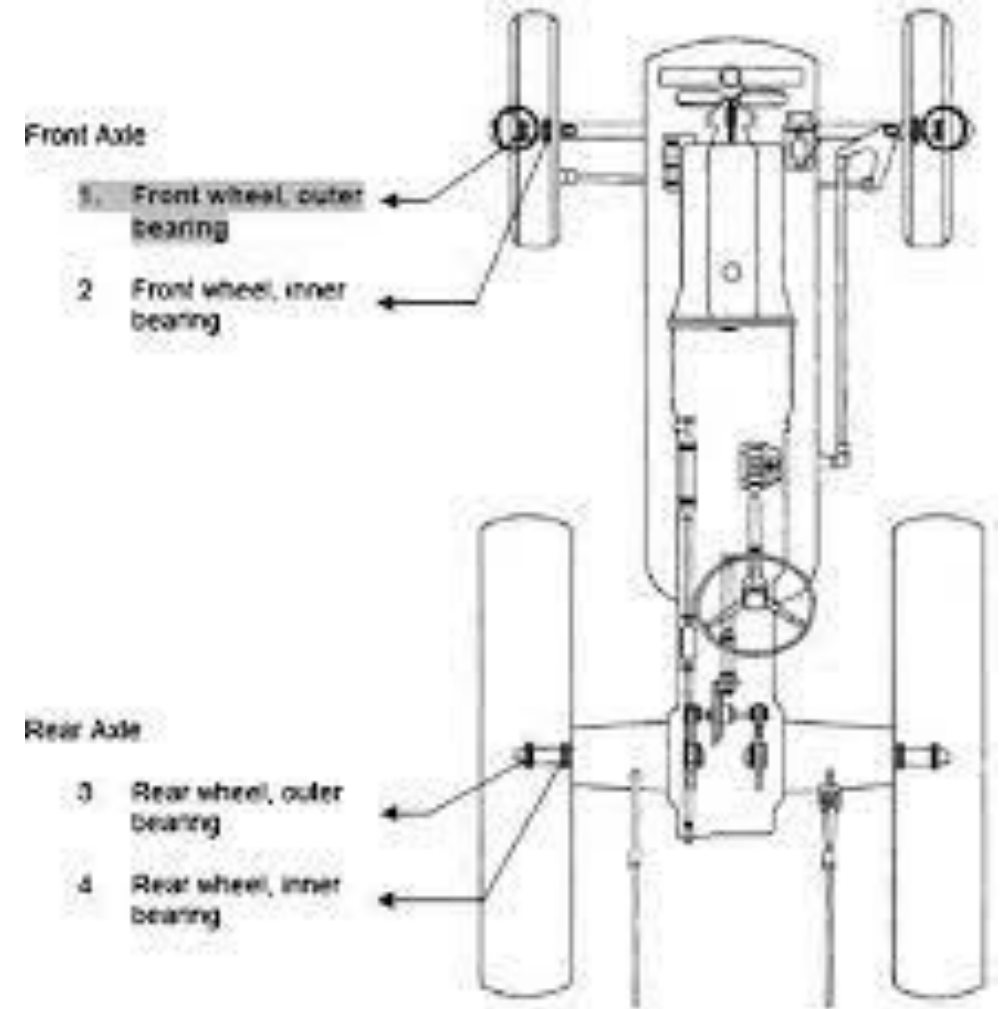
### iii. Semi-mounting implements

- Are implements that are lifted or lowered, supported by its wheels.
- No weight is transfer to the tractor.
- Example; Seed drill.



## 8. Implements to attach to a tractor

- These implements are attached to the tractor at the;
  - Front**
    - Are implements mounted before/on the front axle with help of front hitch or special attachments.
    - Examples; loaders, harvesters and lawn mowers.
  - Back/rear**
    - Are implements attached behind the rear axle.
    - Examples; disc harrow, plough, seed drill machine, cultivator.
  - Side/Middle**
    - Are implements attached between front and rear axle with the help of special attachments.
    - Examples; levellers, graders and lawn mowers.



## 9. Common tractor implements: Disc plough

- Is an implement attached at the back of a tractor.
- Has circular plates used for cutting and turning soil, supported by a furrow wheel at the far end.
- Used for initial land preparation and adapted to tillage.



## 10. Mouldboard plough

- Mouldboard plough works similar to disc plough.
- This implement has wedge shaped tips that aid in cutting vertically through the soil surfaces.
- Mouldboard ploughs turn furrow slices onto one side.
- It is mounted at the back of a tractor.



## 11. Chisel plough

- This implement has chisel like attachment.
- The chisels plough land with minimum disruption to soil compared to the other types of ploughs and is more sustainable.
- Chisel plough is used to break hard pans and deep tillage.
- It is a great tool for aerating soils as it loosens it.



## 12. Harrows

### i. Disc harrow

- This implement is used after a plough.
- They are used to make soil surfaces more levelled.
- Implement is attached with disc like plates that have been punctures/notched on the edges .
- Disc harrow is used to crumble soil clumps.
- Edges of the disc harrow plate uproots leftover crops as it loosens soil.



### ii. Spring tooth harrow

- Equipment largely used in the past to loosen and level soil surfaces.
- Has many flexible curved teeth facing the ground.
- Its is manually raised.

## 13. Planter

- The planter is an implement attached to the back/rear of the tractor and is closely similar to a seed drill.
- It gets connected to a tractor through a drawbar or 3-point hitch.
- Planters can be driven mechanically or using hydraulic system.
- Planter are used for planting seeds like wheat and maize.



## 14. Front-end loaders

- Front-end loaders are attachments made at the front end of the tractors just in front of the operator.
- Loaders are attached to tractors using special attachments like arms placed at the sides of the tractor to support the loader.
- They are most suitable for moving soil, manure or forage. Example; Pallet fork.



### Pallet fork

- Used to move objects like hay bales and boxed farm equipment.
- Can be attached to a front loader.



Pallet fork



## 15. Tractor trailers

- Tractor trailers are attached at the rear/back of the tractor.
- Used in different stages of production e.g., for carrying produce or farm inputs.
- Some trailer can tip over allowing easy offloading of produce. Example; Manure spreader.

### Manure spreader

- This implement ensures even spread of manure in fields.
- Can be attached to the tractor using a power take-off (PTO) shaft or it is ground-driven. The ground-driven spreader takes power from wheel movement.



## 16. Harvesting equipment

- Harvesting equipment should be well maintained prior to start of harvesting season.
- Farmers should keep equipment washed and free from harvests of last season to avoid any contamination.
- Common harvesting equipment's are:
  - Manual choppers
  - Self-propelled harvester



## 17. Manual chopper/chaff cutter

- Manual choppers are quite handy and assist in chopping variety of forages.
- Care should be taken when handling this equipment to avoid injuries e.g., hands are not allowed into the feeding port.



Photo: Felix Opinya



## 18. Milk handling equipment: Milking machines

### i. Portable milk bucket machine

- This type of milking machine is portable, taken from one cow to the other.
- Can contain one or two buckets.
- mainly used by small-scale farmers with few milking cows.

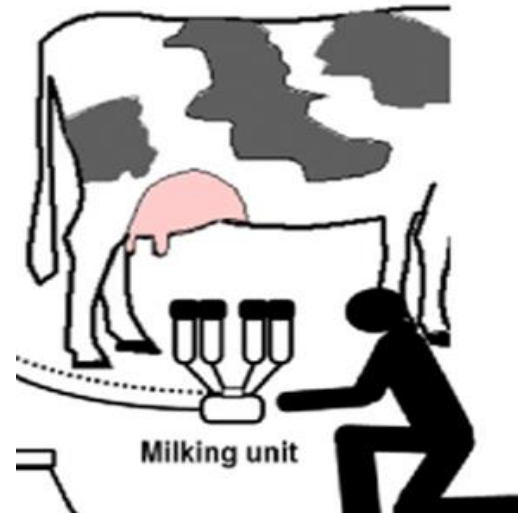


### ii. Fixed milk bucket machine

- Similar to portable milk bucket but machine in design but equipment is fixed in milking parlour.
- After milking a different cow is brought to where machine is for milking.

## 19. Operating a milking machine

1. Clean hands with soap and water.
2. Clean udder of the cow and dry it with clean cloth.
3. Fore-strip the teats for milk using your hands, this is to check for presence of mastitis.
4. Turn on machine and attach milking unit to the cow's teats.



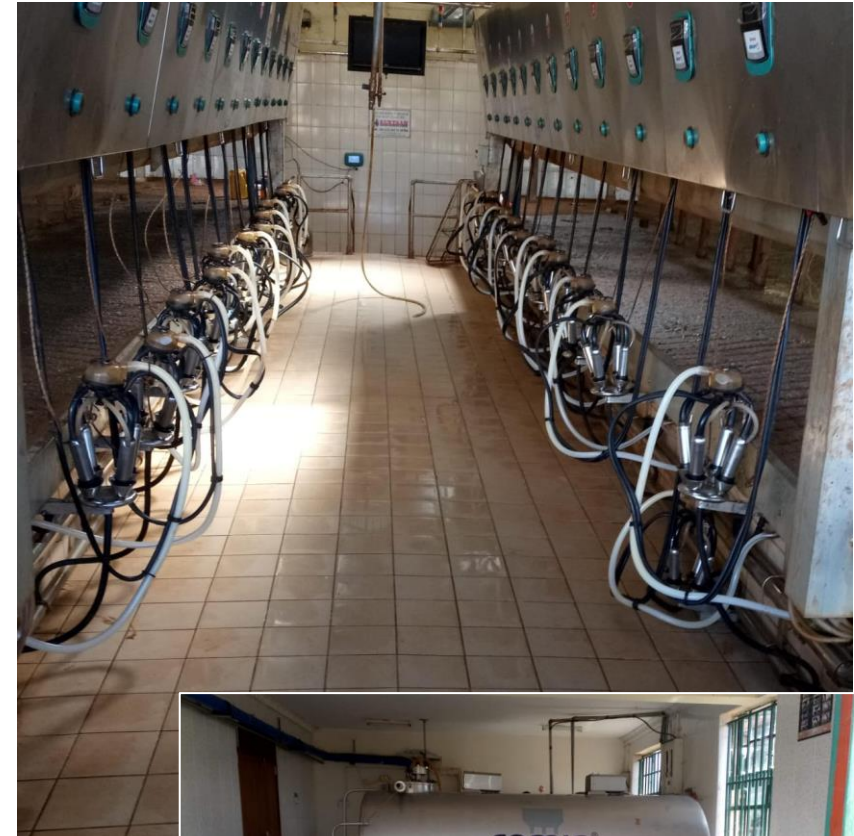
## 19.1 Operating a milking machine Cont'd...

5. Adjust milking unit for proper placement to obtain square shape.
6. Observe milk flow to identify right time to detach milking unit and avoid “blind” milking.
7. Turn off vacuum before detaching the milking unit, pulling teat cups while vacuum is still on can damage teat ends.
8. Disinfect teats by dipping them in a disinfectant solution.
9. Before milking another cow wash machine before attaching milking machine for next milking.



## 20. Pipeline milking machines

- This system is fixed within the milking parlour and is commonly used with fully zero-grazed cows.
- System is fully auto-mated to meet with needs of a large farm to milk many milking cows at same time.
- After milking, milk volume is recorded using a recorder jar or milk meter.
- Diameter of pipes is in relation to volumes of milk produced.
- The system then transfers milk to a cooling and storage tank.



## 21. Handling milking machine after milking

- Drain all the milk that is still in the pipeline (between the receiver and milk tank).
- Disconnect milk pipeline from tank, avoid mixing of water and milk.
- Remove and replace filters; they should be used once.
- Clean milking equipment including its outer surfaces.





## 22. Cleaning a milking machine

1. Use hot water and detergent to clean washing machine as instructed by equipment supplier.
2. Procedure for hand washing or automatic cleaning (pipeline milking machine) should follow equipment supplier guidelines.
3. All equipment's linked to milk handling/storage chain should follow equipment supplier procedure i.e. the whole pipeline milking machine chain.

**Note:** Pipeline milking machine chain includes bulk tank for milk storage



## 23. Milk processing equipment

- Milking processing equipment should be kept clean at all times.
- Milking area should be clean and milk should be strained immediately to prevent entry of foreign materials e.g. hair.
- Milk should also be covered after milking to avoid contamination by factors in the environment.
- Cooling should be done immediately after milking.



## 24. Milk cooling systems

- After milking, milk should be well stored to maintain milk quality by avoiding contamination.
- Scale of production influences cooling methods. Common method of cooling by farmers is placement of milk in cold water at intervals while changing water.
- Modern methods of cooling involves use of milk coolers and refrigerators.
- Precooling can be done using main or ground water supply systems at specified temperature ranges.



Milk cooler

## 25. Milk pasteurizer

- Milk pasteurization involves heating milk to a particular temperature within the shortest time possible to kill pathogens that make milk go bad.



Photo: Felix Opinya