

Theme 13: Mechanisation of a dairy farm

SOP OF FARM MACHINERY (Level 3)

Topic	Training & information Content
13.1	Farm tools & equipment
13.2	SOP of farm machinery
13.3	Maintainance of farm machinery & equipment



1. You will learn about (learning objectives):

- ❑ The importance of having standard operating procedures in regards to machinery in a dairy farm.
- ❑ Steps in formulating standard operating procedures for a farm.
- ❑ Identify common standard operating procedures used for machineries in a farm.
- ❑ Step by step approach while implementing standard operating procedures undertaken during use, maintenance and repair machinery.



2. Introduction

Standard

Operating

Procedures

- Standard operating procedures (SOPs) are directions that explain how a particular job should be done and is contained in a document.
- In some places SOPs are placed in the open where it is can easily be identified and used.
- For example: how to use the milking machine, milking routine, tractor and farm machinery use & maintenance.



2.1 Introduction Cont'd...

- For larger farms with activities that require specific expertise and where execution of these activities is limited to one or a few staff members documents which stipulate operating procedures can support the proper execution of these activities.
- Especially in areas where daily routine, safe working environments and change of work force are required standard operating procedures ensure that;
 - Operations run efficiently.
 - Quality work is guaranteed even if a person in charge is absent.



4. Importance of SOP in a dairy farm

- Guides employee on handling activities by providing steps and/or tools for managing a situation.
- Improves communication and reduces conflict.
- Enables a person to help in case of an emergency.
- Ensures consistency in operations.
- Reduces training time on handling procedures.



5. Development of SOPs

- SOPs are important for any organization and one can create own farm specific standard operating documents that guides staff members with step by step tasks.
- SOPs in a farm are guided by good farming practices applicable to any activity within the dairy farm.



5.1 Development of SOPs Cont'd...

- For some operations within a dairy farm the SOP may be dictated by governing body or institutions such as; UNBS. In case of on farm milk processing.
- Milk processing procedures for example; have to be in adherence to the health act in a country to ensure that the final product being produced are safe for human consumption.



DEPARTMENTS AT DDA



DAIRY DEVELOPMENT DEPARTMENT

Registers dairy farmers groups, supports dairy farmers marketing organizations and dairy development activities such as dairy extension, dairy breeding research, dairy training, dairy products



REGULATORY SERVICE DEPARTMENT

The Regulatory Services Department responsible for registering and licensing milk processors and traders, advising Government on milk standards in liaison with the Uganda National Bureau of Standards (UNBS)



FINANCE & ADMINISTRATION DEPARTMENT

Provides financial, administrative and logistical support to the dairy development and regulatory functions of the authority as well as facilitate an institutional environment that sustains these core functions.

6. Keys factors in SOP

- SOPs should be readable.
- SOPs can be particular to an activity or function, where needed it can be divided into parts for example: how to start an engine, how to do repair & maintenance, how to shut down a machine.
- SOPs should be short and clear for people who cannot read and write.
- SOPs should be systematic (step by step) and logical.



6.1 Keys factors in SOP Cont'd...

- SOPs should be placed near the work station where it is required.
- Test, update and review regularly.
- Train employees to follow the steps of the SOP.
- Have a master copy.



7. Answers provided by SOPs

- The standard operating procedures provide solutions to various answers depending on the task such as;
 - **Who** – Identify the person responsible (contact person).
 - **What** – Identifies the purpose.
 - **When** – Gives a period/time required for particular task.
 - **Where** – Identifies place for operation 'where need be'.
 - **How** – Provides directions on task handling.



8. Developing standard operating procedures (SOPs)

- Plan - SOPs should be in line with goals intended.
- First draft - Make a detailed list from which you can derive a step by step order for operations/tasks.
- Internal review - Provide a platform for employees to discuss and share output, this helps improve the first draft and can identify areas that SOPs can be split to task specific functions.



8.1 Developing standard operating procedures (SOPs), Cont'd...

- External review - Remarks and feedback from external people assist in giving more insight for improvement.
- Testing - Do the task as listed, this helps identify where improvements can be made.
- Post - Create a final copy with changes as per test results and print text in a readable format (laminated) for external use and ensure to update as required.
- Train - Train employees as per the posted SOPs this ensures consistency



9. Standard operating procedures for farm machinery/equipment

- Note that there are a number of SOPs that can be made depending on activity, brand of machinery/equipment.
- We will be able to look at a few SOPs for machinery/equipment such as;
 - SOPs on how workers when working around equipment/machinery.
 - General SOPs on machine working condition.
 - SOPs when hitching, calibrating and unhitching tractor ploughs and planter.
 - SOPs when working with tractor in the field.
 - SOPs when handling maintenance of tractor & forage chopper/harvester.
 - SOPs when undertaking repairs & maintenance.



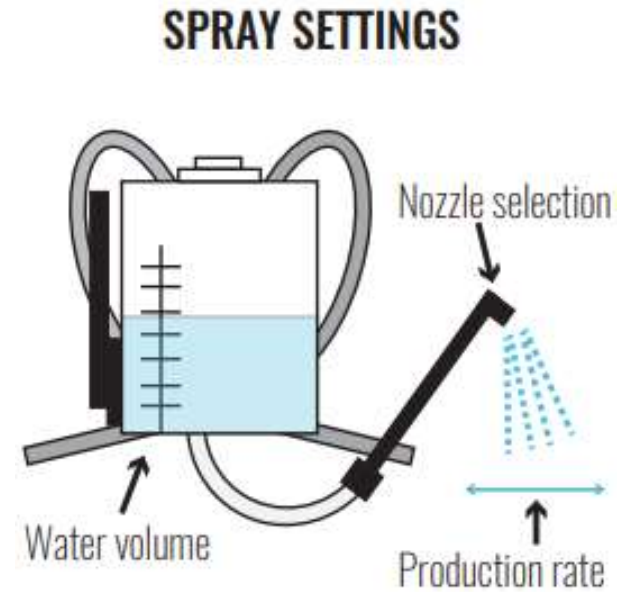
10. SOPs for workers when working with cleaning material & detergents

- All cleaning materials like brooms or detergents should be used for the right purposes only.
- All cleaning materials and detergents should be stored in designated area and conditions as per manufacturers instructions to avoid getting lost or spoilage.
- All cleaning detergents should be used at the right concentration as per instruction on the detergent label.
- When using or handling ensure you wear protective clothing, gloves and foot ware as indicated by manufacturer.



11. SOPs while operating a knapsack sprayer

- Always make sure to wear protective clothing such as; overall, gumboots, PVC gloves and sun hat at all times when spraying. Read label on pesticide to ensure the correct spray nozzle is selected for application (cone, fan or flood jet nozzle).
- Ensure the water volume is right as required to avoid concentrating or diluting the pesticide concentration.
- Dispose of pesticide container appropriately if finished and if some remain store appropriately for use in next application.
- Note: before and during spraying keep a watch on wind direction.
- Nozzle should be 50cm above ground unless advised.



11.1 SOPs while operating a knapsack sprayer Cont'd...

- Worker should move at a steady pace ensuring the nozzle is maintained at an even spraying height.
- One should spray upwind of the area just treated so that the wind blows drift away from the operator.
- After spraying dispose off the surplus pesticide left inside, never store with surplus left inside.
- Rinse the filters and tank with clean water.
- Wash PPE's separately and store after drying.
- Wash hands and face from top down before eating or drinking.



12. SOPs for workers while operating a machinery ???

- Read and follow manual as per manufacturers.
- SOPs need to be in line with laws and regulations as regards a particular activity.
- Dress appropriately (overall and shoes) for protection.
- Ensure you are in good shape and rested enough, operating machinery or tractor when tired is dangerous.
- Do not rush or take short cuts to finish an operation faster, risk situations increases with speed.



12.1 SOPs for workers while operating a machinery ???, Cont'd...

- Avoid drinking while operating a machinery.
- Be keen and attentive.
- Keep machinery and working area away from children and animals.
- Read and follow the manufacturer's operating and maintenance recommendations.
- Shut down/off all farm machinery before getting off or out.



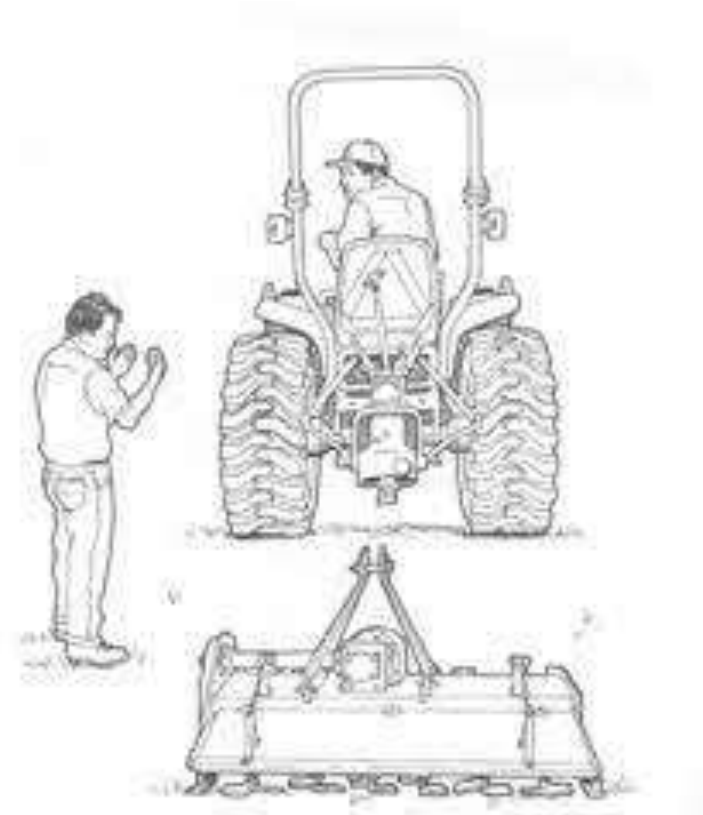
13. SOPs on how to keep machinery in working condition

- Read and understand the operator's manual before operating the equipment, do not assume way of operation especially for new employees and new brands/design
- Equipment should be made ready for operation in the off season/when it is not being used.
- Keep equipment in good condition (grease and sharpen equipment's before use). Tractors for example should be inspected regularly since they use public roads.
- Do not start an engine in closed shed/garage.
- Always keep the PTO properly shielded.



14. SOPs for attaching farm implements

- Where an extra person is assisting in attaching implements, visual contact and communication should be maintained.
- The person assisting should be outside the reach of the wheels of the tractor until the drawbar or hitch connection are lined up correctly.
- Ensure to leave area as an escape route so as to get away from the tractor path in case of any tractor movement.



14.1 SOPs for attaching machine implements

Cont'd...

- Make sure hitch pins are properly secured and only use approved hitch pins and replace in case of bent pins.
- The hitch pin has to be small enough to fit through the tongue of the trailer and tractor drawbar.
- The hitch pin should be strong enough to facilitate pulling of implement without breaking.
- Tractor should be in park or engine should be shut down when completing other hitching tasks.



15. SOPs for 3 Point link attachment

- To attach implements to a tractor first reverse the tractor towards the direction where the implement is.
- Ensure tractor is central and square to the implement before stopping.
- Attach starting from the left hand side then right hand side and finally the top link, the directions are in relation to the seated position of the tractor facing forward.
- Confirm that the pins for the 3 point linkage (see image) are secured by the retaining pins and tighten the check chains as necessary and lock off the top link.



16. Standards operations during transportation

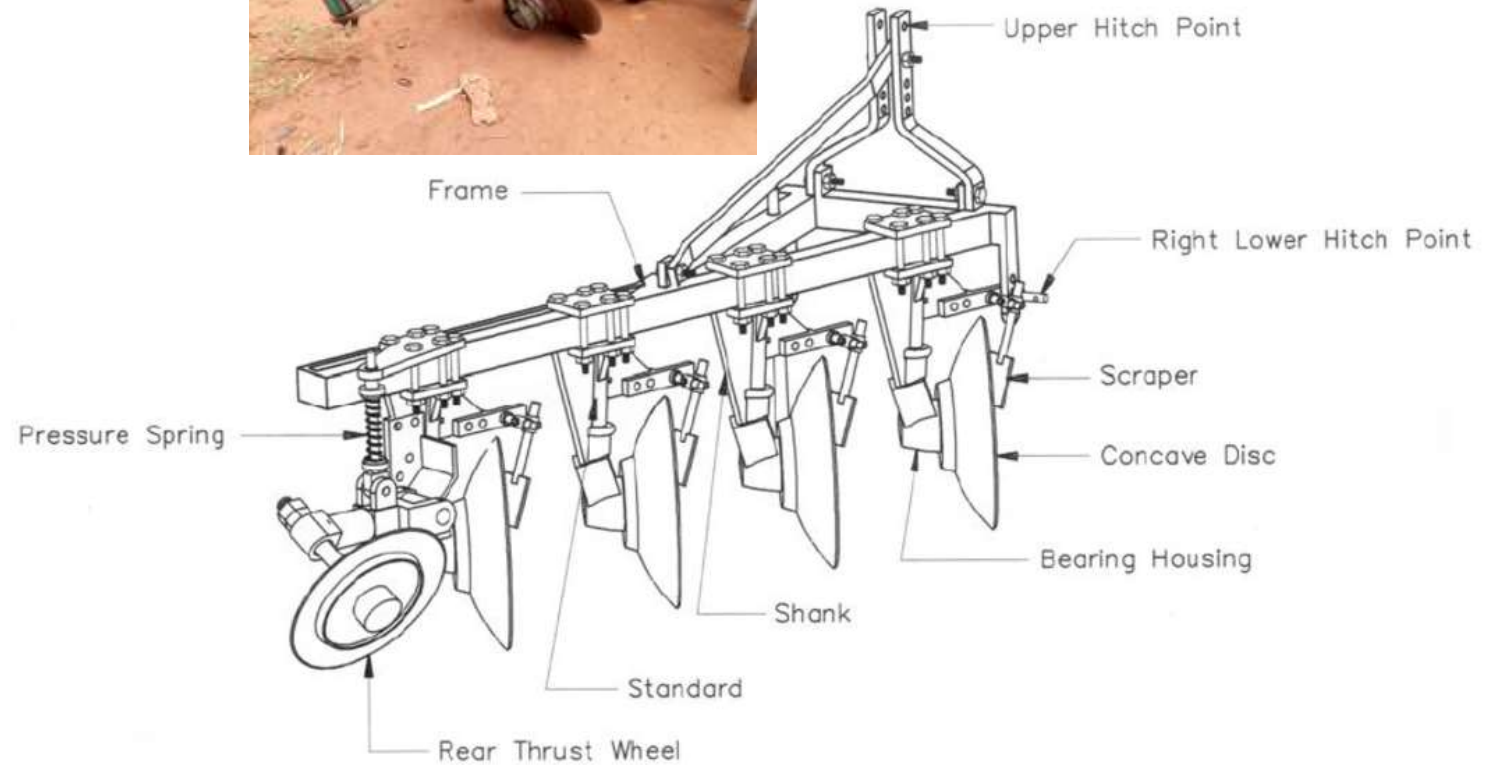
- Always ensure the tires are properly inflated, tires with cracks or deep cuts should be replaced.
- Ensure to place a clearance flag or warning signal to warn other road users in cases where the tractor has a wide implement attached and slow down.
- Securely fasten your seat belt to avoid injuries.
- Ensure that you lift implements in right technique to reduce strain when moving implement tongue before approaching the road.
- Gear should be in high first gear.
- Properly fit the three point linkage and lock with lynchpin.



17. SOPs when adjusting machine implements at the farm

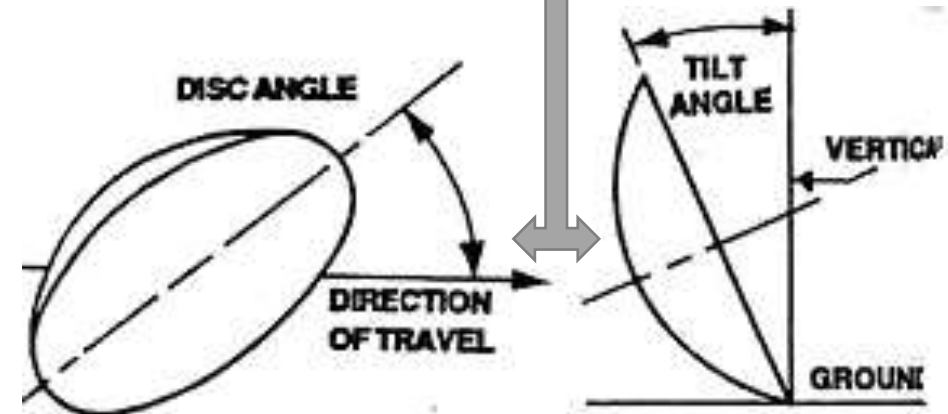
- There are various adjustments that are made for a variety of implements this adjustments are foe example:

- Cutting angle adjustments
- Width of cut adjustment
- Levelling adjustments
- Tightening of bearings
- Scrapper adjustments



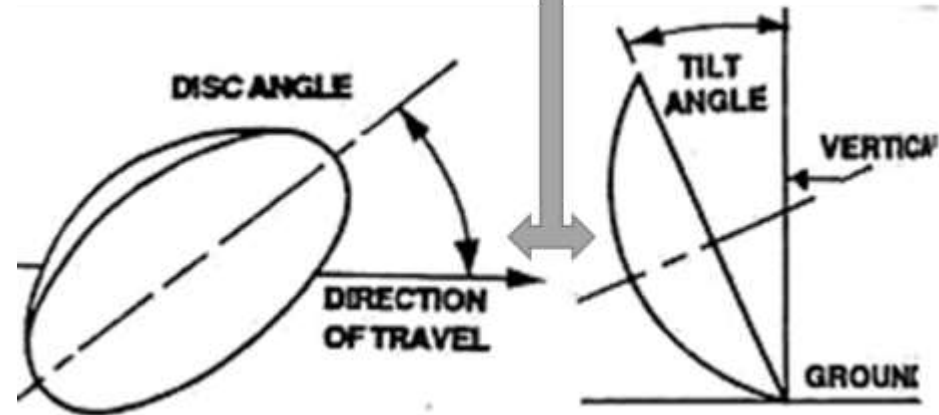
17.1 Cutting adjustments 'plough'

- Cutting adjustments for ploughs include; disc angle and tilt angle adjustment. This enable ploughs cut through the soil easily.
- Disc angle is normally between 42° - 45° , increasing the disc angle improves the disc penetration and requires a greater pull.
- Reducing the angle increases the disc rotation with respect to the ground speed and reduces the tendency of the plough to cut.



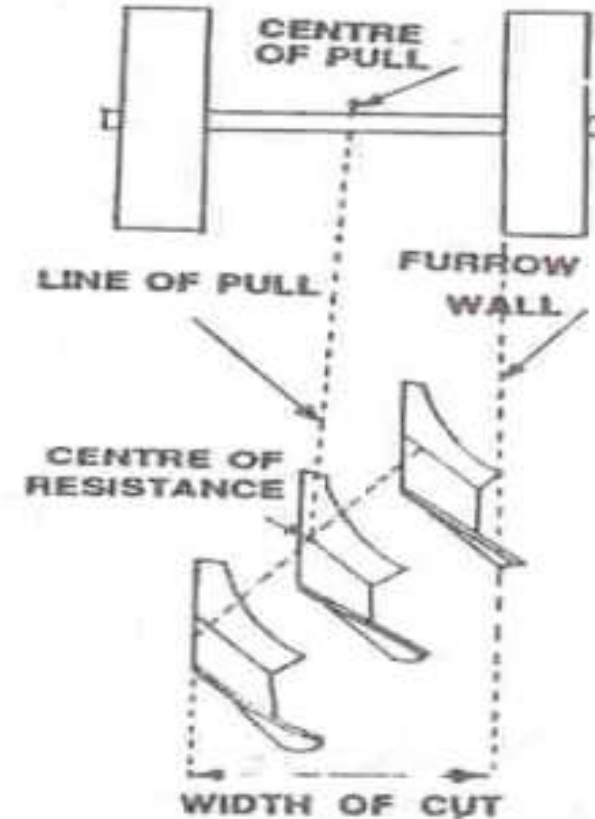
17.2 Cutting adjustments 'plough' Cont'd...

- Tilt angle ranges from 15° - 25° , decreasing the tilt angle improves disc penetration in loose soils
- Increasing the tilt angle improves the disc penetration in heavy and sticky soils.
- Note to improve ploughing deeper in soils one should also add extra weight to the plough.



17.3 Width of cut adjustments 'Plough'

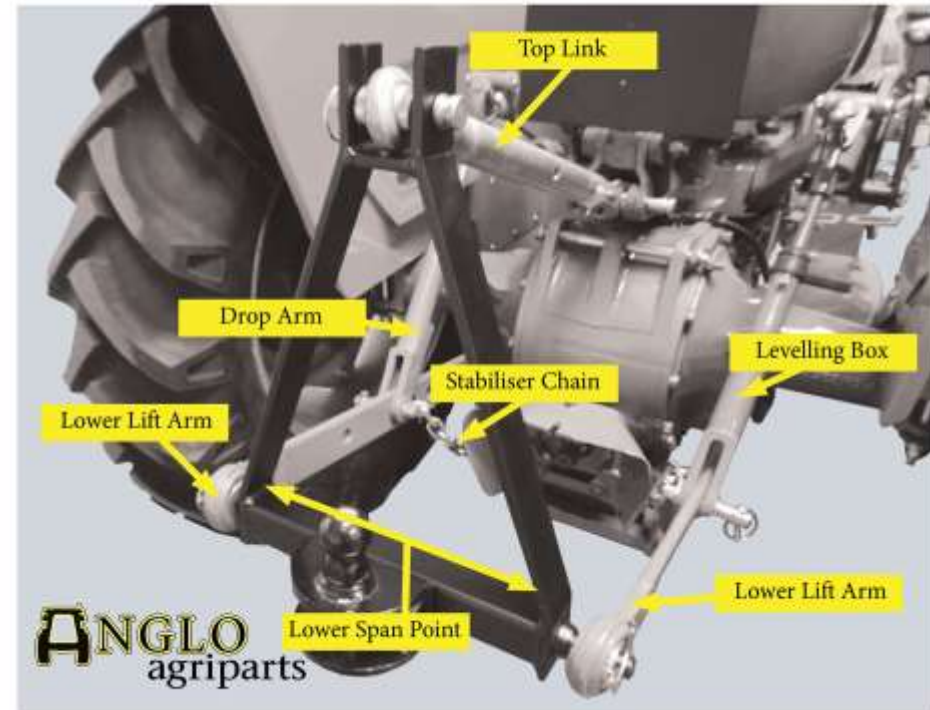
- The width of cut range differs depending on the diameter of the blade.
- The cutting width ranges between 18-25 cm.
- Adjustments can be made to meet with the penetration and draft requirements of the farm.
- **Note;** Draft refers to the tendency of a plough (tillage implement) to move or be forced in a direction at right angles to the direction of its forward motion



Centre of resistance

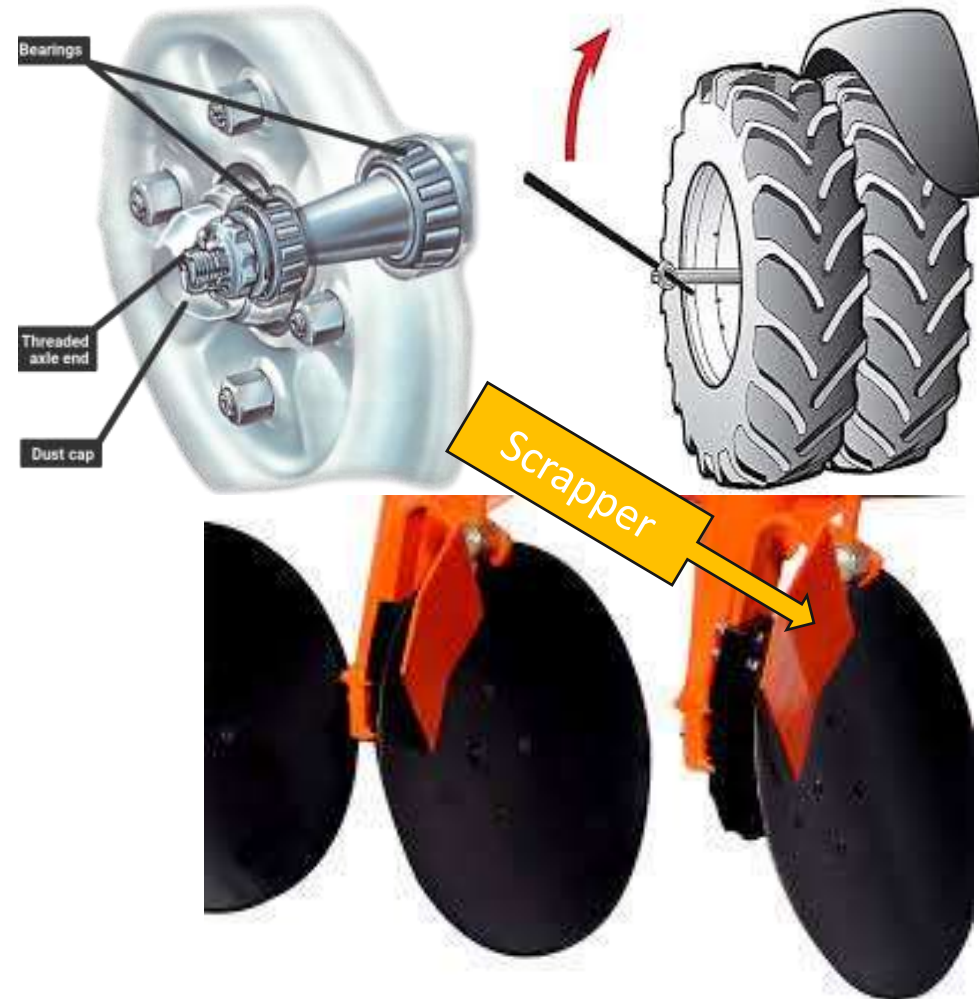
17.4 Levelling adjustments example of 3 point link

- Levelling of the plough is controlled by the tractor top link. Before ploughing one can either;
 - Lengthen the top link if the back of the plough beam is higher than the front end of the beam.
 - Shorten the top link if the back end of the plough beam is lower than the front end.
 - To adjust levelling sideways adjust the length of the tractor right lower link.



17.5 Tightening bearings and scrapper adjustments

- Bearing has to be maintained tight by tightening the nuts until the implement binds the hub and for tires until it is well placed/binded.
- Some ploughs have scrappers for removing soil when ploughing operation are being carried out.
- The scrappers are low to be able to catch and turn furrow slices and when working with sticky soils scrapper should be set closer to the disc.
- When ploughing at a higher depth the scrapper has to be moved higher.



18. Calibrating depth variation; seed drill/planter

- For planters depth adjustment influences how deep a seed will be placed in soil, this is influenced by seeds type and soil condition influences seed depth.
- Planters have an important role when it come to depth and spacing of seeds this dictates the plant population.
- Depth adjustment is done manually by a farmers using gears(check manual) before seeds are placed inside the back of a planter as per preference.
- It changes the edge depth of the gauging wheel and the bottom edge where the seeds appear by the double disc seed opener, this influences the rate of seeds being used per area.



Watch: <https://youtu.be/BZsmJw5D4GE>

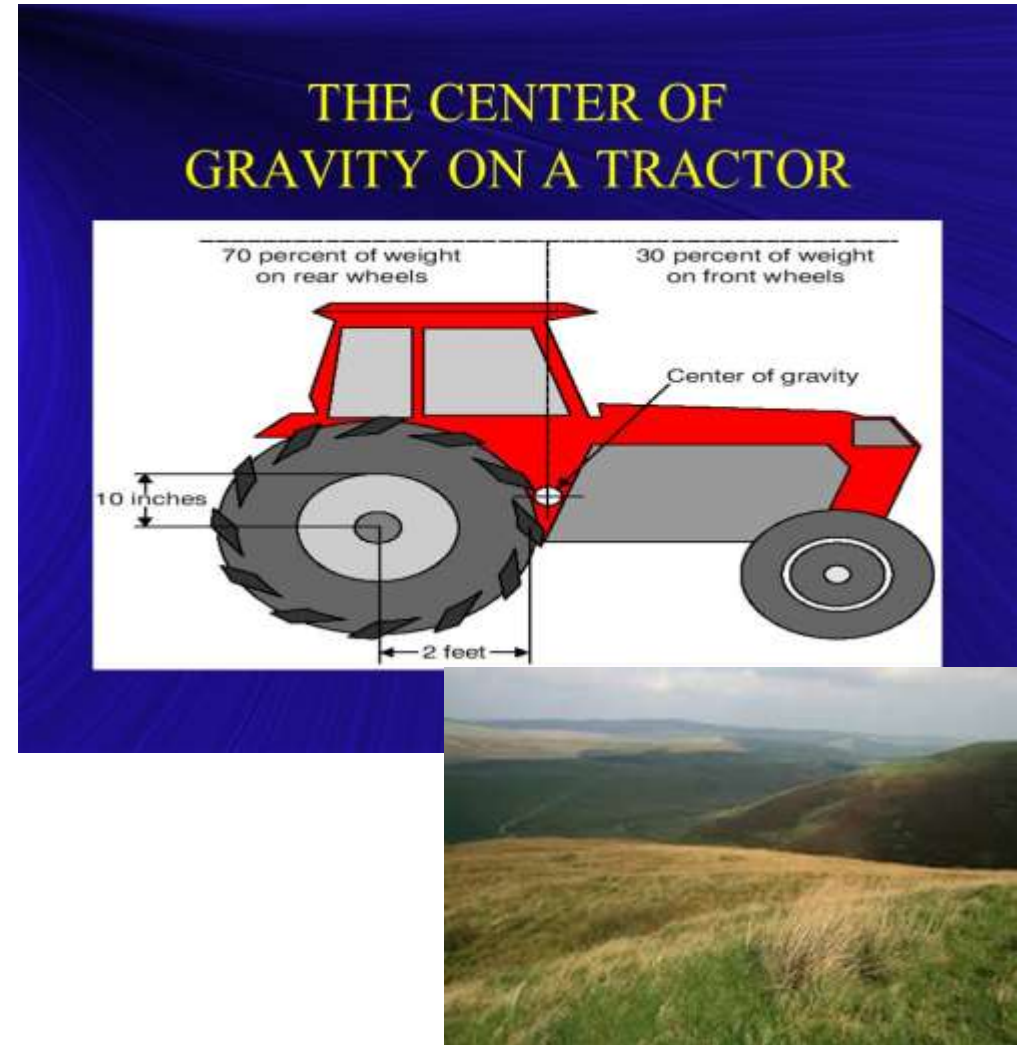
19. Safety for workers around machinery in the field

- Never allow other people on the tractor unless there is an additional seat this avoids falling off injuries
- Avoid moving/transporting implements at night due to poor visibility, this avoids accidents.
- People should not stand between the implement on attachment and the tractor when machine is ready for use.
- Avoid turning ploughs when being used in the soil.



20. SOPs of a working machinery in the field

- Ensure and beware of the stability of the machinery in the field. If the centre of gravity becomes higher the machine will be prone to tipping.
- Tractors have a high centre of gravity and are unstable on sloping ground, extending the height of the machine for example; a grain tank high speed and turns increases ability of machine to tip over **'reduce speed when turning'**.
- In East African where the terrain is sometimes hilly, make wide turns.
- No person should stand near a working machinery in the field.



20.1 SOPs of a working machinery in the field Cont'd...

- Have a communication device for emergency use only and also learn and use hand signals appropriately.
- Avoid operating tractor near holes, ditches and beware of areas prone to stones and tree stumps.
- When going downhill use a lower gear and when going uphill use highest gear to increase stability.
- Only hitch implements to the drawbar and hitch points.



20.2 SOPs of a working machinery in the field Cont'd...

- In cases of stopping ensure that you set the brakes securely.
- Do not try unsafe manoeuvres while driving.
- Do not get off a moving tractor and when doing so use the hand railing and steps do not jump to avoid injuries.
- In case the tractor gets stuck get help from another tractor and avoid attaching the rear wheels to posts or trees.



<https://youtu.be/qh4TG216mQY>

21. SOPs for trailer loading

- Ensure no person is in the grain trailer, this avoid a person from being trapped or suffocated by grain.
- Adjust and maintain the trailer's steering components to prevent weaving and risk component failure.
- Do not load trailer beyond the towing capacity of the machinery by checking manufacturer's recommended total weight.
- Ensure to place visible warning signs like flags, lights or reflective tape when using public road and in situations where work goes to the night.



21.1 SOPs for trailer loading Cont'd...

- Always leave enough room for stopping and between another machinery for example a trailer following a silage chopper in the farm.
- Secure the trailer using locking pins and in public roads use safety chains.
- Do not exceed the recommended towing speed for the trailer as per manufacturer.
- Ensure to lower speed when weight exceeds weight of the tow vehicle, hilly terrain and muddy soils.



Lock pin

22. Avoiding machinery emergency situations

- Tires should be in good condition especially tires used for running the gear.
- Check bearings (bolts and nuts) regularly during operations.
- Frequently remove soil, build up on machinery.
- Always use locking pins when securing wagons and in public roads or in case of towing safety chains must be used.
- Ensure extra caution when working down hill or during wet conditions (rainy season) since control is more difficult.
- Never remove the radiator cap from an engine that is hot as it causes serious burns due to pressurised hot coolant.



23. SOPs for unhitching implements

- Make sure there is adequate tongue weight to stabilize the implement when unhitching.
- When unhitching in slopy are, choke the wheels of the implement to avoid unwanted movement.
- Remove all additional connections prior to moving away from an equipment.
- Before connecting or disconnecting hydraulic lines, ensure the pressure has been released from the system



24. SOPs for servicing machinery; General

- Equipment should be made ready for operation in the off season/when it is not being used.
- Always have the tractor in park or neutral gear before performing a service, set the brake, turn off the engine and remove the keys.
- For farm implements always make sure the implement is detached from the tractor, well secured, no turning parts.
- Switch off electrical power or detach the electrical cable from the socket before performing service/maintenance on farmstead equipment.



24.1 SOPs for servicing machinery;

Forage chopper

- For forage choppers make sure the engine/motor is turned off before doing any maintenance/repair and follow manufacturers precautions and guidelines.
- Always clear a clogged harvester with the machine turned off.
- Ensure knives stop rotating on their own before opening the access doors to work on them.
- Always follow the manufacturer's recommendation when sharpening/replacing knives, forage blower blades or combine cylinder bars.
- Be sure to torque the knife, blade or bar attachment bolts to specifications.

