

YOUTH AGRI-SKILLING FOR DECENT EMPLOYMENT (YADE)

ANIMAL TRACTION TECHNOLOGY



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ANIMAL TRACTION TECHNOLOGY
OPERATION GUIDE 2021

INCOME GENERATING ACTIVITY - SELECTION, PLANNING AND MANAGEMENT Training Manual

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About YADE Project

Uganda made impressive economic development in the last three decades. Poverty headcount declined from 56% in 1992 to 27% in 2018 and 33% of the total population belongs to the middle class. However, the rosy economic growth is marred by inequalities and social exclusion. Youth; majority of the total population have largely not benefited from the jobless economic growth. There are few employment opportunities for young people, who enter in thousands into the labour market every year. While in the last decades the labour force grew annually with 390,000 new job seekers, only 8,120 jobs were created each year. Two-thirds of all jobs created in 2001 - 2011 were confined to only six out of the 112 districts and mainly in central Uganda. Rural areas contribute 96% to national poverty. This has resulted into a steady increase in unemployment rates from 1.9% in 2009 to 9.4% in 2016. The majority (64%) of unemployed people is the youth and especially female youth. It is worrying, that at the current population growth rate and public-private sector absorption capacity, it will likely take one generation before the majority of the labour force has a non-farm salary job. This situation is due to: Lack of relevant and marketable skills and limited access to business finance. To address, AFARD secured a 3-year funding from Medicor Foundation and Dka Austria through HORIZONT3000 to implement Youth Agri-skilling for Decent Employment (YADE). YADE seeks to improve youth employment through “a holistic and bundled-package approach that improves youth employability with agri-skilling, business start-up kits, and business development services” so that the youth (15-30 years) can join the world of work in sustainable and viable agribusinesses (targeting the ready local markets) that can lift them out of poverty. Below is a summary of the project.

Duration 3 years (01.04.2021 – 31.03.2024)	Overall objective: To contribute to sustainable poverty reduction among youth through agri-enterprise development Specific objective: To increase access to gainful agricultural employment opportunities for 500 youth in Pakwach district through marketable non-formal vocational and complementary skills training by 2024 Expected results: R1: To establish and strengthen 24 agribusiness youth investment groups (a-YIGs) with functional VSLA by 2024 R2: To improve the employability of 500 youth through entrepreneurship, financial literacy, collective marketing and non-formal vocational skills training by 2024 R3: To increase the ownership and growth of 500 youth agribusinesses for self-employment by 2024 To achieve this goal, the project will: (i) Mobilize 500 youth (60% females) into 24 Agribusiness Youth Investment Groups (a-YIGs) using a youth-led Village Savings and Loan Associations (VSLAs); (ii) Improve youth employability skills through trainings in entrepreneurship and life skills, financial literacy and collective marketing together with non-formal agri-vocational skills training in niche agribusinesses (animal traction, horticulture, cage fish farming, bakery, catering, agroforestry, and food processing); (iii) Provide start-up kits together with training in good agricultural and agribusiness practices (GAAP); and (iv) Offer business coaching and market linkages with agro-input dealers and produce buyers. With increased productivity, the youth will achieve increased incomes to: a) grow their agribusinesses, b) increase their average savings and c) acquire and own more productive assets.
Geographical area Wadelai Sub county, Nebbi District, West Nile, Uganda	
Beneficiaries 5,100 people (500 youth direct and 4,600 indirect): 02 Sub county local governments will gain from produce tax; 3,000 smallholder farmers will use animal traction services; at least 05 market vendors will buy youth products; and at least 100 youth who will be wage employee	
Implementing entity Agency for Accelerated Regional Development (AFARD)	
Budget UGX1,123,688,000 (Euro 280,922)	
Funding Medicor Foundation and Dka Austria through HORIZONT3000	

INTRODUCTION

Majority of farmers in the West Nile region of Uganda are smallholder farmers who produce for subsistence use and only sell the surplus yet they have vast and productive land for farming. Use of rudimentary tools like the hand hoe that are labour-intensive is predominant. The use of animal traction is increasingly becoming a pro-farmer labour-saving intervention for scaling up agricultural production as it enables land opening in large acreage within a short time, leads to increased yields and quality of produce which in turn results into high income.

Animal traction has also proved to be an attractive source of employment and income to the youths and youth groups. This operation guideline, therefore, provides broad criteria on how a group can own, use, expand its business and keep the animal traction technology well.

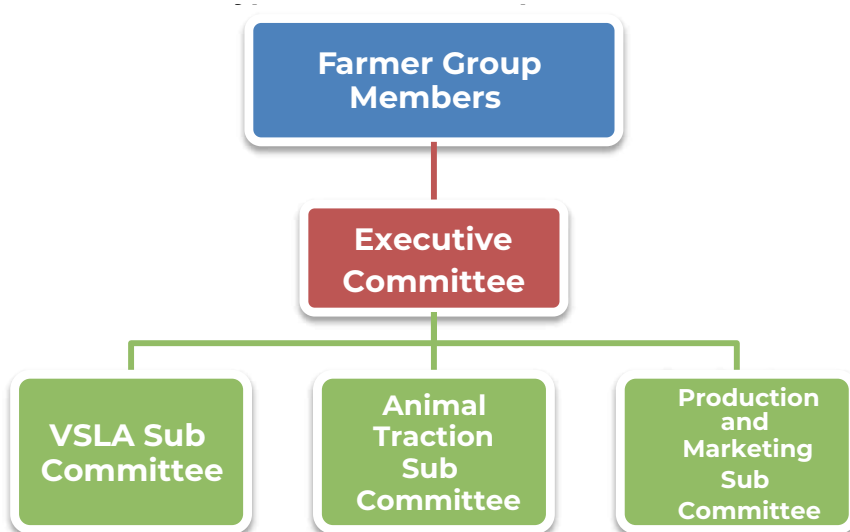
A youth group participating in the Animal Traction scheme must meet the following criteria:

- The group should be formally registered with the District or Sub County.
- The group should have a constitution with a component on the management of Animal Traction.
- The group should have a devoted member to keep the animals.
- Each group member should have contributed a one-time non-refundable fee of UGX 10,000; totalling to UGX 300,000 per group for the treatment of the animals in addition to buying a torch, a pair of gumboots, raincoat, and bow and arrow for use by the one who keeps the animals.
- The group should have at least 5 members with basic knowledge in animal management to constitute the Animal Traction Committee of the group.
- The group should provide at least one acre of land for AT training and demonstration as well as planting nappier grass for use in dry season.
- The group should make a kraal for keeping the animals.

GROUP STRUCTURE DESIGN

Each group shall consist of three Sub Committees with 5 members each: (i) VSLA Sub Committee; (ii) Animal Traction Sub Committee; and (iii) Production and Marketing Sub Committee.

A Typical Farmer Group Structure



Roles and Responsibilities of Group Members

The group members shall perform the following roles and responsibilities:

- a. Make decision on ploughing rates.
- b. Provide land for group activities.
- c. Elect the Executive Committee members.
- d. Pay for animal traction services.
- e. Contribute local materials for animal traction scheme.
- f. Make by-laws governing the scheme.
- g. Participate in group meetings and project activities.
- h. Monitor and evaluate progress of group activities.

Composition of Group Executive Committee Members

Each farmer group shall have an Executive Committee consisting of the following:

- i. Chairman
- ii. Secretary
- iii. Treasurer
- iv. Committee members – (2 of them)

Roles and Responsibilities of Executive Committee

The Executive Committee shall perform the following roles and responsibilities:

- a) Mobilize group members to actively participate in project activities.
- b) Supervise the function of all Sub Committees of the group.
- c) Propose rates for hiring oxen for ploughing.
- d) Draw business plans, development plans and work plans for the group.
- e) Monitor and report on group activities.
- f) Manage conflicts and resolutions within the group.
- g) Sign agreements
- h) Accountable to AFARD in regard to the animals and implements received from the Project
- i) Seek for permission from DVO to sell off oxen when they are old or due for replacement, and replace accordingly.

Composition of VSLA Sub Committee

Each farmer group shall have a VSLA Sub Committee consisting of the following:

- i. Chairman
- ii. Secretary
- iii. Treasurer
- iv. Committee members – (2 of them)

Roles and Responsibilities of the VSLA Sub Committee

The VSLA Sub Committee shall perform the following roles and responsibilities:

- a) Mobilize group members to actively participate in group savings.
- b) Ensure equitable distribution of loans to members.
- c) Advise the group members on productive ventures to invest loan.
- d) Ensure timely and full reimbursement of loans by members.
- e) Keep the following records:
 - Savings (agro-input; social fund; and main savings) register
 - Loan register
 - Meeting minutes
 - List of undertakings from use of loans taken

Composition of Animal Traction Sub Committee

Each farmer group shall have an Animal Traction Sub Committee consisting of the following:

- i. Chairman (who shall be a Lead Oxen Handler)
- ii. Secretary
- iii. Treasurer
- iv. Committee members – (2 of them)

Roles and Responsibilities of Animal Traction Sub Committee

The Animal Traction Sub Committee shall perform the following roles and responsibilities:

- a) Identify and select Lead Oxen Handlers.
- b) Participate in the identification of locally available animal and tools for traction where relevant (initial procurement).
- c) Verify the sizes, rates and suitability of land prior to ploughing.
- d) Look for ploughing business opportunities.
- e) Ensure that the Oxen Handlers are facilitated by groups that need training.
- f) Report major animal health related issues to the SC VET Officer to give advice.
- g) Periodically remit revenues from animal traction to the group main treasurer for proper custody
- h) Keep the following records:
 - Ploughing register
 - Animal traction cash books
 - Meeting minutes
 - Animal health records
 - Animal traction assets register

Roles and Responsibilities of Lead Oxen Handlers

The Lead Oxen Handlers shall perform the following roles and responsibilities:

- a) Prepare the bulls for training as oxen (castration, harnessing, etc.).
- b) Train the oxen and handlers according to the given guidelines and time schedules.
- c) Update the Animal Traction Committee and Project Officer on the progress of training and any challenges.
- d) Inspect the condition of the animals on a daily basis.
- e) Ensure proper feeding and watering for animals and safety/security.
- f) Ensure spraying of animals against ticks and other ecto-parasites on a weekly basis.
- g) Routine maintenance/servicing of plough and other tillage equipment.
- h) Report incidences of diseases, injuries to the Animal Traction Committee.
- i) Ploughing for the group members & those who have hired services.
- j) Report tool breakdown to the Animal Traction Committee.
- k) Ensure safety of animal traction equipment.

Composition of Production and Marketing Sub Committee

Each farmer group shall have a Production and Marketing Sub Committee consisting of the following:

- i. Chairman (who shall be a Lead Farmer)
- ii. Secretary
- iii. Treasurer
- iv. Committee members – (2 of them)

Roles and Responsibilities of Production and Marketing Sub Committee

The Production and Marketing Sub Committee shall perform the following roles and responsibilities:

- a) Mobilize group members to actively participate in production and marketing activities.

- b) Guide in proper identification of group member fields.
- c) Ensure timely and proper individual and group field operations.
- d) Provide quality control measure during procurement and distribution of inputs to group members.
- e) Monitor individual and group field activities to ensure adherence to recommended agricultural practices.
- f) Report any major pest and disease damage issues SC Production Officer for advice.
- g) Look for markets and marketing opportunities for group produce.
- h) Ensure collective bulking and marketing of produce from group members.
- i) Keep the following records:
 - Individual and group field register
 - Production records
 - Marketing records

SELECTION OF LEAD OXEN HANDLERS

A member of a farmer group to be selected as a Lead Oxen Handler must meet the following criteria:

- Be one of the two members per group trained in Animal Traction
- Be a registered member of the farmer group
- Be a typical farmer, not having other jobs that occupy his time
- Have a basic knowledge on animal handling
- Be committed in what he/she does
- Be energetic enough to handle animals
- Be able to read and write
- Be passionate about farming
- Be apt to adopt technologies

Training Oxen Handlers and Oxen Objectives

At the end of the training the participants should be able to:

- a) Select a good animal for traction
- b) Make yokes and harnesses for ploughing
- c) Choose and buy good animal traction implements
- d) Plough using trained oxen
- e) Properly feed, manage and care for work animals
- f) Care and maintain animal drawn Implements
- g) Train other farmers and their animals in ploughing

Topics

- Selecting a good animal for traction
- Making of assorted yokes (ploughing /transport yokes) and harnesses
- Harnessing and Step-wise training of work animals & operators
- Selection of good animal traction implements
- Actual training of selected animals and their operators in ploughing
- Plough setting, adjustment and proper handling during field operation
- Stripping and re-assembling of ox-plough, harrow etc.
- Maintenance and replacement of broken and worn-out parts of DAP implements
- Practice harrowing using work animals
- Practice transporting farm produce using work animals
- Feeding, management and care for work animals
- Care and maintenance of animal drawn implements

INTRODUCTION TO ANIMAL TRACTION TECHNOLOGY

Definition

Animal traction is the use of animals [cattle (bulls, oxen and cows), donkeys, mules, horses, goats, camels, water buffaloes, etc.], to assist farmers in carrying out the following tasks:

- In agriculture, for ploughing, harrowing, planting, ridging, weeding, mowing and harvesting.
- In transport, for pulling carts and loads over a surface, logging and carrying
- Loads (pack animals).
 - In irrigation, for driving water-pumps and pulling water from wells.
 - In the building industry, for assisting in earth moving for roadworks, for
 - Carrying bricks, etc.
- To provide power for the operation of stationary implements such as threshing machines, grain mills and food-processing machines.
- Oxen can be used to draw transport wagons, for ploughing and crop cultivation.

Benefits of animal traction

The benefits of animal traction are:

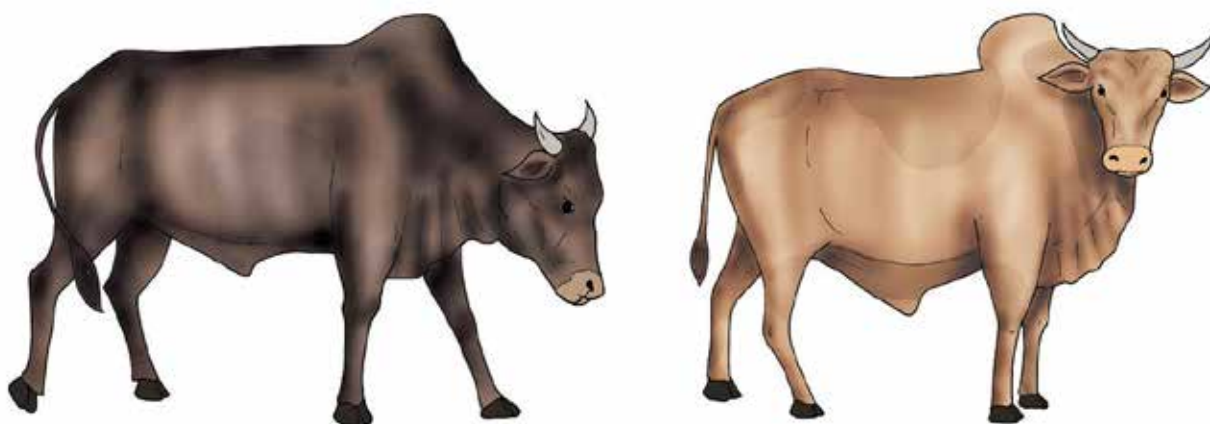
- Providing smallholder farmers with vital power for cultivation and transport .
- Empowering rural communities and providing an alternative but complementary power option.
- Providing employment and transport, and promoting food production and security, thereby leading to a higher standard of living.
- Making marketing and trading easier.
- Relieving women of the burden of transporting water by hand, head or wheel barrow. Animals are easy to use and donkeys, specifically, can be handled by children and women.

Selection of suitable Animals for Traction

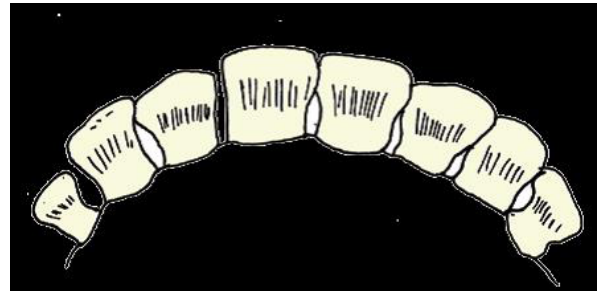
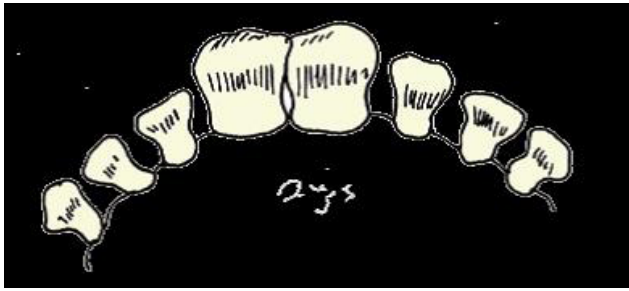
Not all animals available or sold in cattle markets are suitable for traction. Animals intended for traction should be selected.

Criteria for selecting animals

Animal breed; Choose local breeds: used to local conditions, disease, pests and feed. Local Zebu or Boran (Zebu- Boran crossed is most preferred)



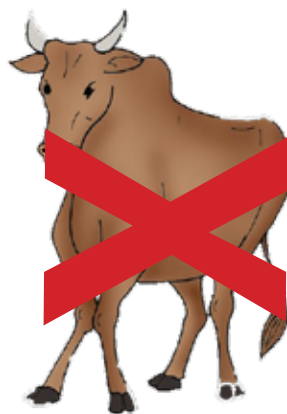
1. Age; select young energetic oxen or bullocks between 2 – 3 years old. Young animals are light, cheap, easy to train, easily accept messages, have good potential to grow



2. Weight; select a young local Zebu weighing between 200 - 300kgs. Select only those animals with a potential to gain weight. Thus eliminate an animal which falls below or goes above the recommended weight limit because the animal will either be too light to pull the draft during the training or too heavy to manoeuvre the training.
3. Health; Choose healthy animals (well feed, alert & not sick).
4. Body conformation; The animals should have,
 - Straight back
 - Straight legs with strong thick closed hooves,
 - Well-developed hump
 - Medium sized neck (not long or short)
 - Deep and wide chest
 - Good eye sight
 - Good sense of hearing

Do not choose or buy animals with

- Bow legs, Knock legs, Narrow chest and Arched back or sagging backs



5. Temperament; select animals that are alert and respond very first (not docile) and with good temper. (Calm & not aggressive animal and are easy to train). Eliminate very nervous animals that get easily frightened and those that are aggressive to other animals and to people.

Reasons for training work animals

Trained animals:

- Trained oxen are fearful
- Trained oxen listen & obey commands/instructions
- Easy to work and use
- Can do heavy work for longer hours
- Do more work in shorter time,
- Pull best as a team with well-co-ordinated movement, hence complementing each other,

Principles in the training of work animals

Name and create relationship with the animal

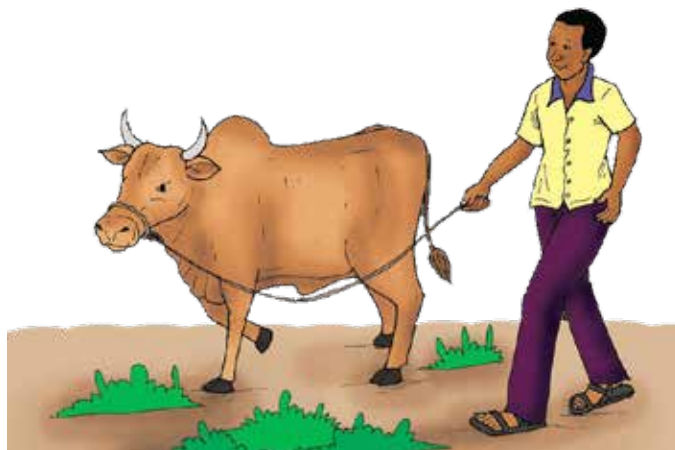
- Avoid harassment and unnecessary whipping
- Reward and encourage ones they do well
- Be calm, patient and consistence in training
- Direct and control using reins
- Ensure correct harnesses and equipment
- Avoid drugs and alcohol when training
- Ensure that daily steps are repeated
- Training best initiated at the beginning of season
- Each step includes a small number of commands and behaviours taught through repetition.
- The trainer moves to the next step only when the animals have fully mastered the previous one.
- Training should follow a strict schedule until all the animals become accustomed to routine.
- Rewarding the animals when they accomplish a task encourages them to repeat good behaviour.

Five steps in DAP (Draft Animal Power)-training

1. Get the animals used to you (Give it a name, Talking to it and touching it Lovely- domesticating the oxen)



2. Roping and walking oxen. Tie the oxen with ropes and walk them without yokes every day for 2 hours for 3 days



3. Introduce a yoke. Yoke the oxen and walk them without any load for 2 hours each day for 3 days.



4. Introduce a load of about 30 – 60 kgs and let the oxen pull for 2 hours each day for 6 days, slightly be increasing the load as they get used to.



5. Finally introduce the plough; attach a plough and begin with shallow cuts and increase gradually the dept as they get used to each step teaches specific behavioural code. This can be done 3-4 hours per day for 9 days.



Note:

- i) Frequent rest should be allowed for the animal on training
- ii) In all these stages animals should be made to walk and pull weight in straight lines.

Summary of training steps

- Roping and walking- 3 days
- Yoking without weight – 3 days
- Introduction of weight – 6 days
- Introduction of implements such as ploughs, weeders, harrows, planters etc- 9 days

By the end of the 21 days the animals should be able to:

- Listen to their names
- Know their handlers
- Take command from handlers
- Plough consistently for at least 3 hours a day and be able to plough at least a quarter of an acre a day.

Tips to follow during ox-training

1. Don't show the mood of fearfulness to the oxen
2. Don't be rude/aggressive when training
3. Keep repeating the instructions till they get used to
4. Reward the oxen after the training for good job done
5. Don't beat the oxen when they miss a command
6. Follow the steps when training, don't miss some
7. Name your oxen and use one, cheap language; only train the oxen during morning or evening hours not during hot hours of the day

Tips to follow after ox-training

1. Never leave your oxen to be redundant after the training for they may forget the instructions
2. Keep your oxen well
3. Give good and enough food
4. Give clean and enough water
5. Keep your oxen away from,
6. Ticks (spray at least once a month)
7. Worms/deworm them once a month
8. Checking your oxen every day

Harnessing of oxen

Harnessing is a process of managing oxen (animal) or making an animal become calm therefore making it easy to use or work with.

Harnessing helps a farmer to control the animal easily.

Harnesses help the operator to tap and use power from the animals.

- Harnesses comprise of:
- Yokes, neck loops and sizable chains.
- Halters.
- Nose rings.
- The coupling
- Steering rope.
- Muzzles: Used for preventing oxen from eating the crops during weeding
- Nose rope after punching: makes the animal docile and for easy control.

Record keeping

Definition:

Is the maintenance of history of ones activities in the farm.

- It involves entering information/data in record books or in a file
- The activity of organizing and storing all the documents, files, invoices e.t.c. relating to a company's or farm's activities

Importance of record keeping

- Good records provide the financial data that help you operate more efficiently, thus increasing your profitability. Accurate records enable you, to identify all your business assets, liabilities, income and expenses.
- Good records help you to prepare financial statements, such as the income statement (profit & loss).
- Proper record keeping helps to plan your business' future.
- Good records are critical at tax time. Poor records could cause you to underpay or overpay your taxes.
- Good record keeping helps you to make sound decisions
- Records help one in acquiring a loan from a credit institution such as a bank
- Records help in comparing the efficiency of the business with other similar businesses in the area
- Records help a farmer to plan and make farm budgets
- Helps a farmer to recall events or history of the farm
- It is easy to spot any weaknesses in running of the farm and possibly improve on them
- Good farm records give information which will show whether farm plans are being operated correctly

Types of records that should be kept by an animal traction group.

- Register of group members and their contribution
- Asset register
- Ploughing records
- Minutes of group meetings
- Animal Health Records
- Visitors' records (visitors book)
- Register of oxen handlers

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Plan for Hiring Out The Ox-Plough Services														
Ploughing	No	Acres per day	Acres per month							Total acres	Price per acre	Amount (shs)		
			J	F	M	A	M	J	J	A	S	O	N	D
Members														
Non- members														
Total														

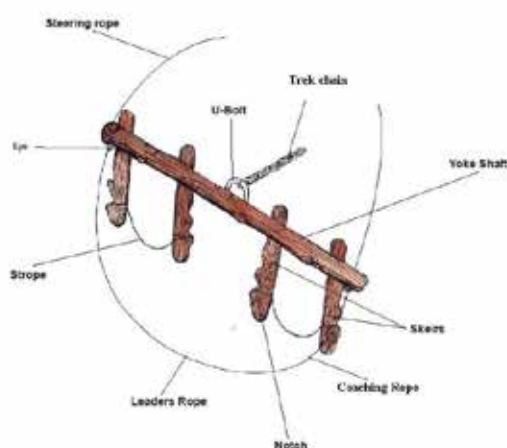
Daily ploughing register.									
Date	Name	Number of acres ploughed	Member	Non- member	Amount (shs)	Balance (shs)	expenditures	savings	

S/n	Item	Units	Qty per month	Unit Price	Amount	Months of the year												Comments
1	Handlers wage	Acres																
2	Maintenance labour – Oxplough	No																
3	Spares – nuts & bolts	No																
4	Spares – plough shares	No																
5	Grease	Kg																
6	Acaricides	Litres																
7	De-wormers	Litres																
8	Vet services	No																
9	Communication	No																
10	Promotions	No																
11	Others	L/sum																

[illegible]

Yoke making

A yoke is a wooden frame which connects oxen and links them to the implement.



Simple structure of a standard Yoke

Types of yokes:

- Single neck yoke- Connects only one ox (not common)
- Double neck yoke-Connects two oxen (Very popular)

Main parts of a standard double neck yoke

A standard double neck yoke consists of: Yoke shaft, skeis , strops, clamps, eyes that hold steering rope, trek chain and trens

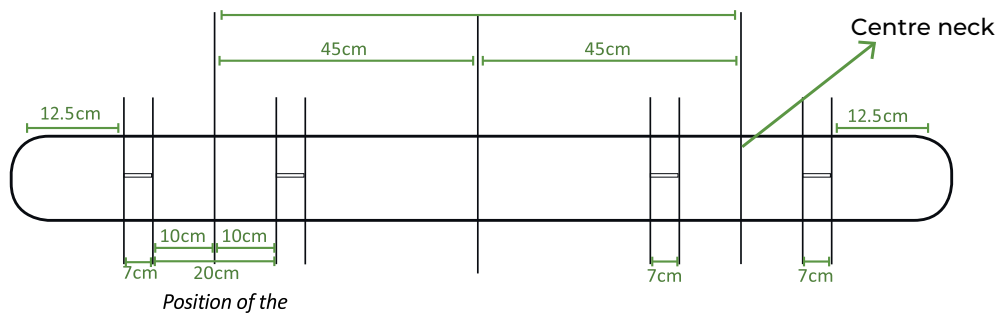
No	Yoke Part	Function
1	Yoke shaft	Straight smooth wood that connects two oxen
2	Skeis	Shaped wooden pieces that fit into the yoke shaft to space animals & stop the yoke from moving sideways
3	Strops	Piece of rope that prevent the yoke to slip back over the oxen humps
4	Clamps	Metallic U-bolt for fixing trek chain
5	Eyes	Eye shaped metal rods fixed at both ends of the yoke to hold and guide the steering rope.
6	Trek chain	Links oxen to the implement (2.1-2.5metres)
7	Trens	Rope that attach the trek chain to the clamps

Making Standard ploughing yoke.

1. Cut a piece of wood a little over 150cm in length
2. Shape and smooth the wood, removing any knots that could injure the animal's skin. Reduce the diameter of the wood to about 10cm
3. Draw a centre line along the length of the pole and put a mark in the middle
4. From the middle mark, measure 45cm to either side. These 2 marks will be exactly over the animal's shoulders. The distance between them is known as the "yoke length". The actual full length of the yoke will be longer than this yoke length.
5. The 45cm mark on both sides is called the centre neck of the animal

6. From each centre neck, measure 10cm length on either side (to make 20 cm) where the neck of the animal will be.
7. Then measure skie holes of 7 cm on both sides of the position where the neck of the animal will be
8. From the last skie on each side of the wood measure 12.5 cm and make a mark.

Yoke Lenght



UBOLT



The length is twice the crop spacing

NB

- The distance from the animal to the end of the yoke is 12.5cm
- The distance from the centre of the yoke to the centre neck of the animal is known as “yoke length”

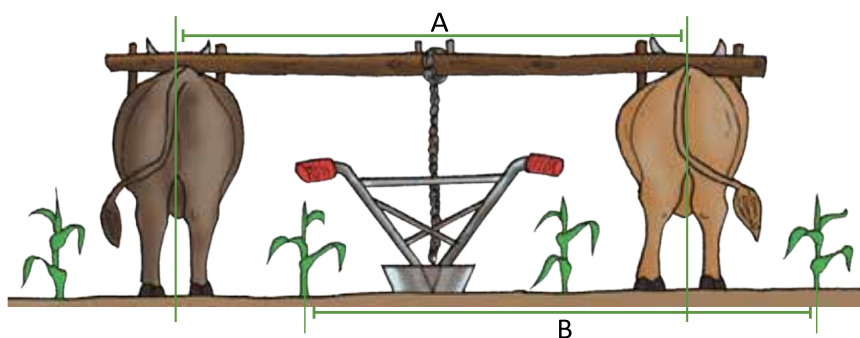
Weeding Yoke

There is no standard size for a weeding yoke. The length depends on the crop spacing

Steps in making a weeding yoke

- Follow steps 1 to 3 as they are for the ploughing yoke but the wood length should be a little over 200 cm
- Place the yoke in front of your planted crops
- The yoke length should be twice the distance between your crop rows (from the centre of one animal to the centre of the other there will be a distance of two planting rows). Taking an example of maize with crop spacing 75 cm apart between rows and 60 cm between plants in a row.

The yoke length is 150 cm



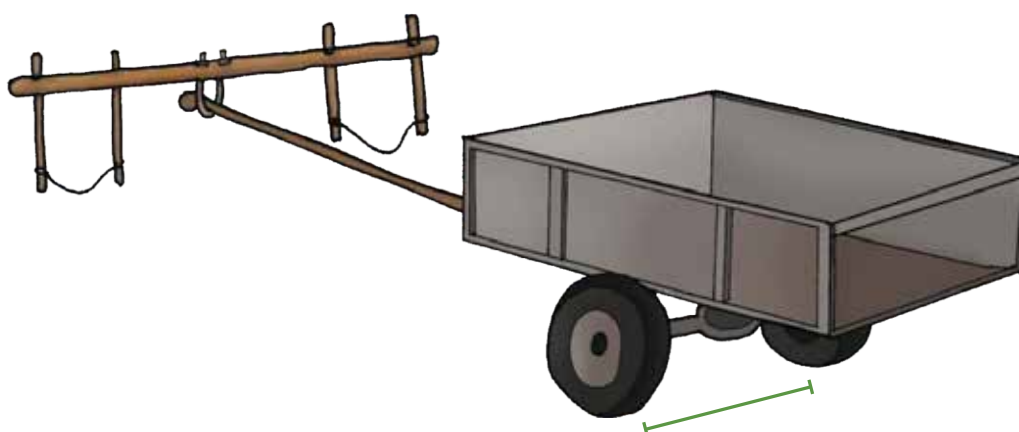
- Follow steps 6 to 8 as they are for the ploughing yoke

NOTE

As shown in the previous illustration, make sure that the yoke length is twice the crop inter-row distance. In other words, that distance $A = 2 \times B$ (150)

Transport yoke

There is no standard size for a transport yoke. The yoke length is usually twice the distance between the two wheels



Tools for making yoke

- | | |
|---------------------------------|------------------------------|
| • Axe (for felling wood) | • Chisel (for making a hole) |
| • Panga (for clearing the bark) | • Hammer (for hammering) |
| • Bow-saw (for cutting wood) | • Braze |
| • Adzee (for shaping) | • Augur bits |
| • Spoke shave (for smoothening) | • Pliers |
| • Tape-measure (for measuring) | |

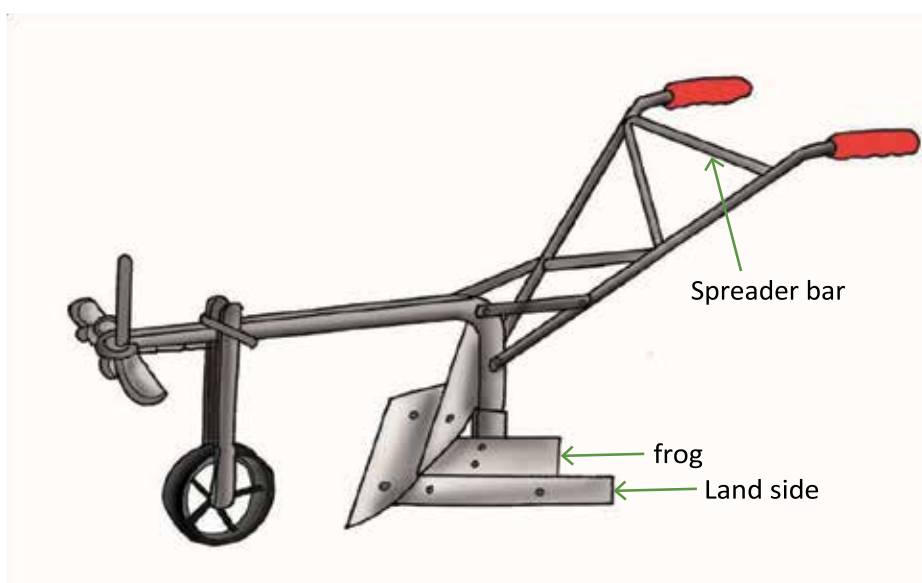
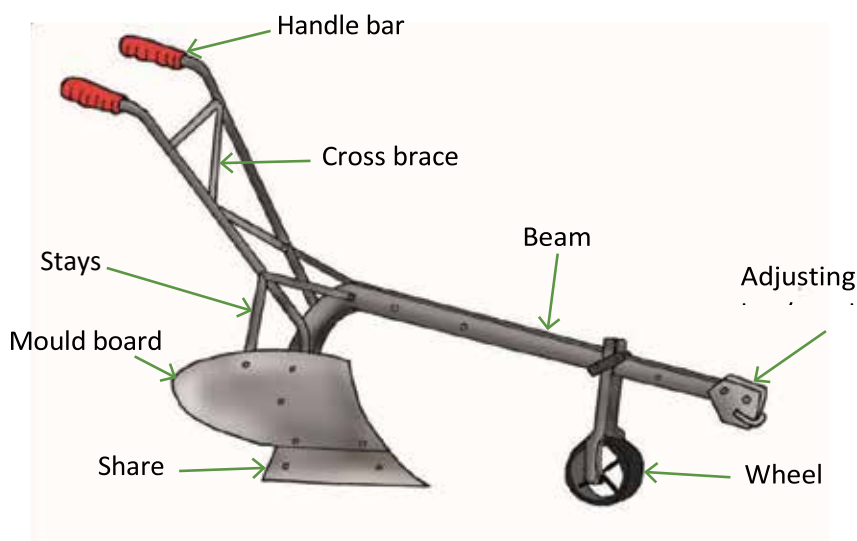
Ox-ploughs

Definition of ox ploughs

It is the oldest popular primary tillage ever used in the world after the hand tools. Ox-plough uses oxen or animals as its power source. There are also mould ploughs driven by tractors of different sizes. Ox ploughs generally work best in soft soils with less tree stumps and stones.

Examples of commonly used standard ploughs are the Cossul plough and Golden Maize plough.

Structure of a standard ox-plough.



Functions of a plough

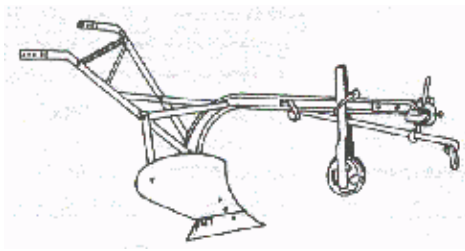
1. The main function is for first ploughing where it cuts and inverts the soil slice in order to bury weeds and crop residue.
2. Is to prepare a very good seedbed that:
 - allows rapid infiltration and retention of rain fall
 - provides adequate air capacity and exchange within the soil
 - minimizes resistance to root penetration
3. Other uses of ox-plough include:
 - Second ploughing
 - Mixing fertilizers both organic and in-organic
 - Ridging the seedbed for crops like sweet potato, tomatoes, tobacco, green paper, etc
 - Harvesting e.g. in groundnuts

Makes of ox-ploughs

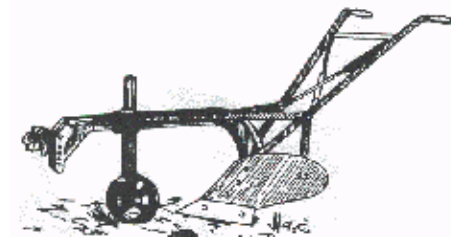
Ox-ploughs are classified into standard plough and modified plough.

- Examples of standard plough are Cossul plough and Milbrand plough
- Examples for modified plough are light weight plough and original SAIMMCO plough.

The difference between the standard and modified ploughs - modified plough does not have the lower depth adjustment bar (draw bar) which is below the beam



Standard plough



Modified plough

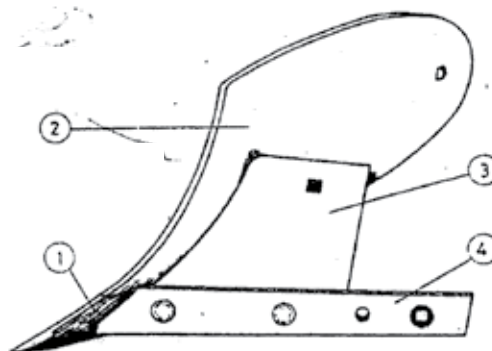
The modified plough is preferred to the standard one because it is easier to:

- Set depth of ploughing with the modified plough.
- To maintain the modified plough than the standard one.

Main parts of ox plough

Ox plough is divided into four sub-assemblies namely:

- plough body assembly,
- handle beam assembly,
- wheel arm assembly and
- hitch assembly

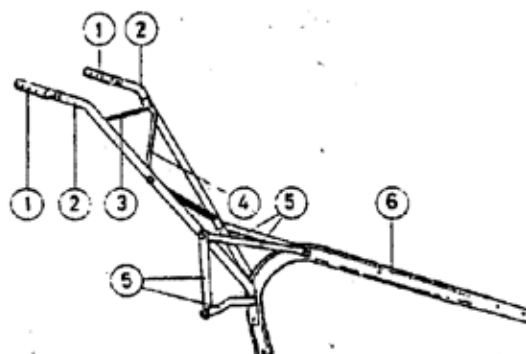


Plough body parts

1. Share
2. Mouldboard
3. Frog
4. Landside

- The plough body assembly is fixed to the plough beam using a big bolt called the kingbolt.
- When this bolt becomes loose or is broken, the plough becomes difficult to control and will not cut into the soil.

Handle beam assembly

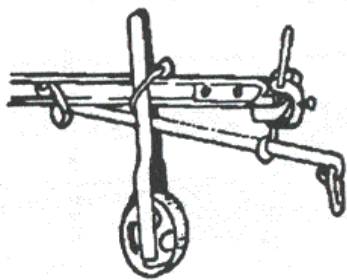


Handle beam parts

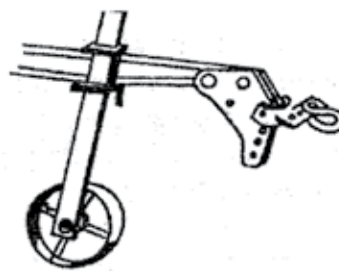
1. Handle grip
2. Handle bar
3. Spread bar
4. Cross brace
5. Stays
6. Beam

- One end of the beam carries the hitch assembly and the wheel arm assembly.
- The design of the beam is such that when the plough body is working, the front ends of the beam positions the hitch assembly in line of draft force from the animal.

Wheel arm assembly



Wheel



Wheel

Wheel arm assembly is used for:

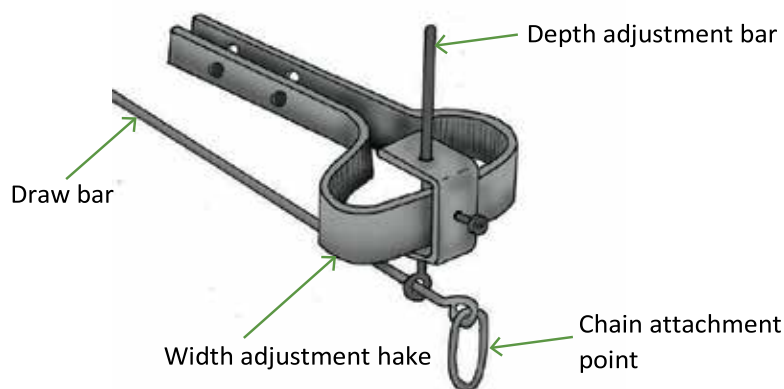
- Maintaining the set depth of ploughing
- Helping the operator to manipulate the plough when obstacles especially root stumps are met during the ploughing

Hitch assembly

It consists of depth clevis, adjustable hitch, width clevis and trek chain attachment point. The hitch assembly has the following functions:

- Connects the plough to the draft animals through the trek chain.
- Regulates the depth and width of ploughing. This is done by moving the hitching point up or down or sideways.

The hitching point is adjusted by moving the adjustable hitch. The modified plough has lower bar that is also used for adjusting the ploughing depth.



Design features of the plough body

There are two important design features, which affect the performance of the plough body.

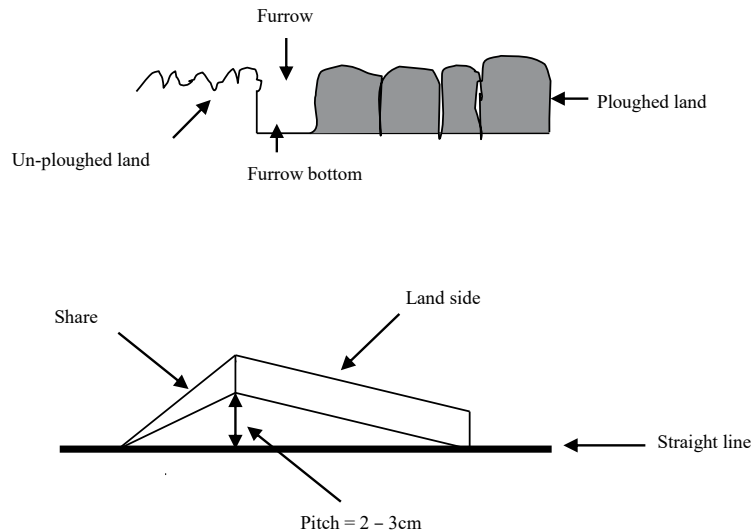
- These are known as the pitch and land suction.
- It is very important to check these features before using any plough or buying a new one

The pitch

- It is sometimes called pitch angle
- The plough can only penetrate the soil if the share protrudes over the bottom line of the landside.
- The landside will travel along the furrow bottom unless the share protrudes below the landside, otherwise the plough will not dig.

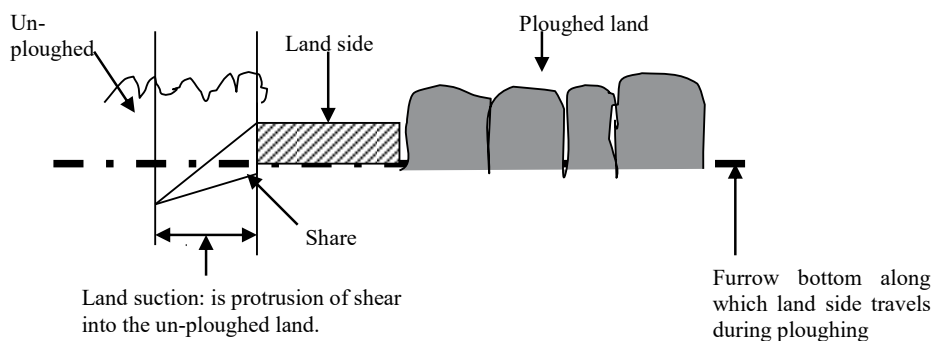
This protrusion of the share beyond the landside creates what we call the pitch

Explained using diagrams below



Land suction

- To enable the plough to cut into the soil and maintain a furrow slice of the required width, the share and the shin of the mould board must protrude into the un-ploughed land over the landside
- The land suction is the protrusion of the share into the un-ploughed land.
- The land suction affects width of cut and the draft force requirement of the plough.



Setting Ox-plough for ploughing

Before a plough is used, it is important for the operator to have full knowledge of how to set and handle it in order to achieve good ploughing in different soil conditions.

A correctly set plough is judged from:

- Even ploughing.
- Adequate depth of ploughing.
- Proper burial of weeds.

There are three settings done on the plough, namely:

- Plough depth setting.
- Width of cut setting (not commonly done by farmers).

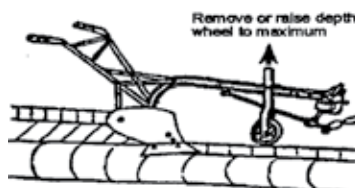
Setting of the plough depth for both standard and modified plough

To achieve good burial of weeds, packing (slice lies on the previous slice without leaving hollows and gaps), and good soil aeration, the depth of ploughing should never be greater than the width of cut

Depth adjustment for standard plough

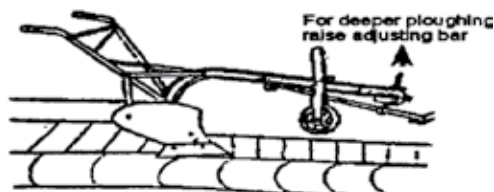
Step 1:

- Raise the wheel to maximum



Step 2:

- For deeper ploughing, raise the adjusting bar



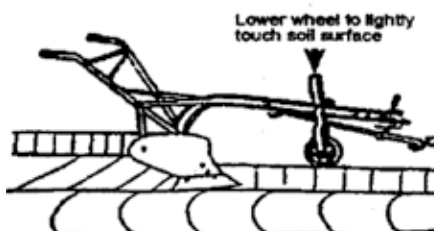
Step 3:

- Make few runs and repeat Step 2 above until the required depth is achieved



Step 4:

- Lower wheel until it touches the soil for uniform ploughing
- For shallow ploughing repeat step 1 and then lower the adjusting bar and lastly lower the land wheel.



Depth adjustment for a modified Plough

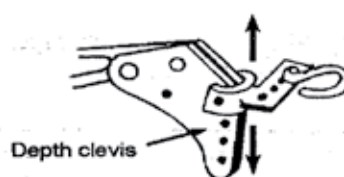
Step 1:

- Raise the wheel to maximum



Step 2:

- Raise (for deeper ploughing) or lower (for shallower ploughing), the width regulator on depth clevis to preferred depth

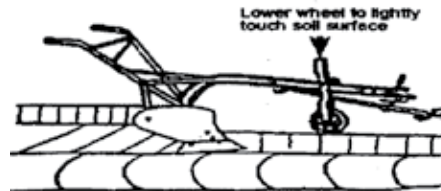


Step 3:

- Make few runs and repeat Step 2 above until the required depth is achieved

**Step 4:**

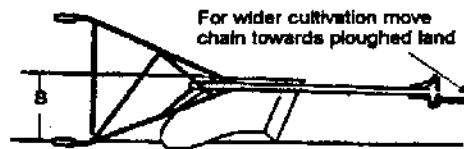
- Lower wheel until it touches the soil for uniform ploughing
- For shallow ploughing repeat step 1 and then lower the adjusting bar and lastly lower the land wheel.

**Adjusting the width of cut for standard plough****Step 1:**

- After setting plough depth adjust the width of cut.

**Step 2:**

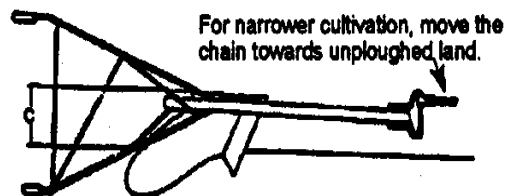
- For wider cultivation move the chain towards the ploughed land. This will make beam front to move towards the unploughed land enabling the share to cut a wider portion i.e. B is greater than A



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Step 3:

- For narrower cultivation move the chain towards the unploughed land. This will cause beam front to move towards the ploughed land enabling the share to cut a smaller portion i.e. C is less than A

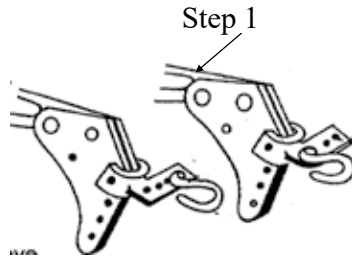
**Step 4:**

- Make a few runs and repeat either step 2 or step 3 until the required width of cut is achieved.



Adjusting the width of cut for modified plough

- **Step 1:** To increase the width of cut, move the chain hook to the inner hole.
- **Step 2:** To narrow the width of cut, move the chain hook to the outer hole.



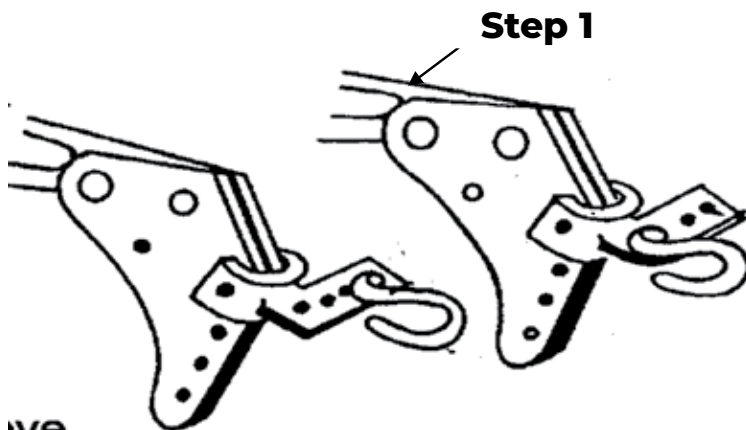
Step 3:

- Make a few runs and repeat either step 1 or step 2 until the required width of cut is achieved.



Step 1: To increase the width of cut, move the chain hook to the inner hole.

Step 2: To narrow the width of cut, move the chain hook to the outer hole.



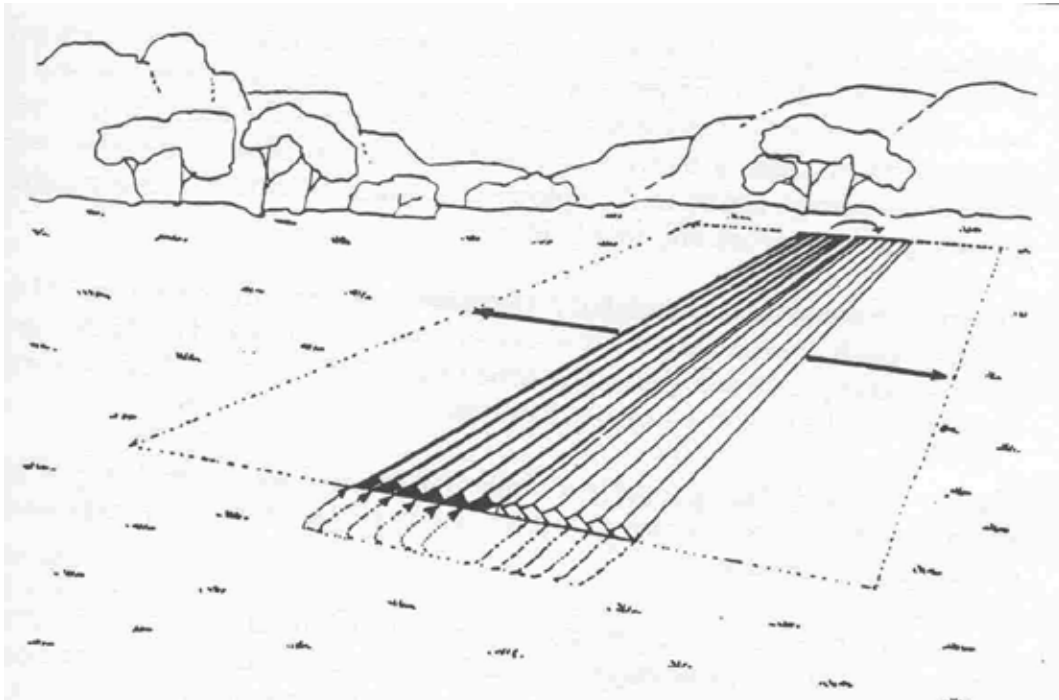
Step 3: Make a few runs and repeat either step 1 or step 2 until the required width of cut is achieved.

Ploughing techniques

- Before starting to plough:
- Understand the direction of slope of the garden
 - You can know this easily by observing the direction of flow of rain water
 - The general gradient of the field
- Always plough across the slope. Never plough down the slope. Ploughing along/down the slope accelerates soil erosion.
- There are two methods of ploughing:
 - Gathering
 - Casting

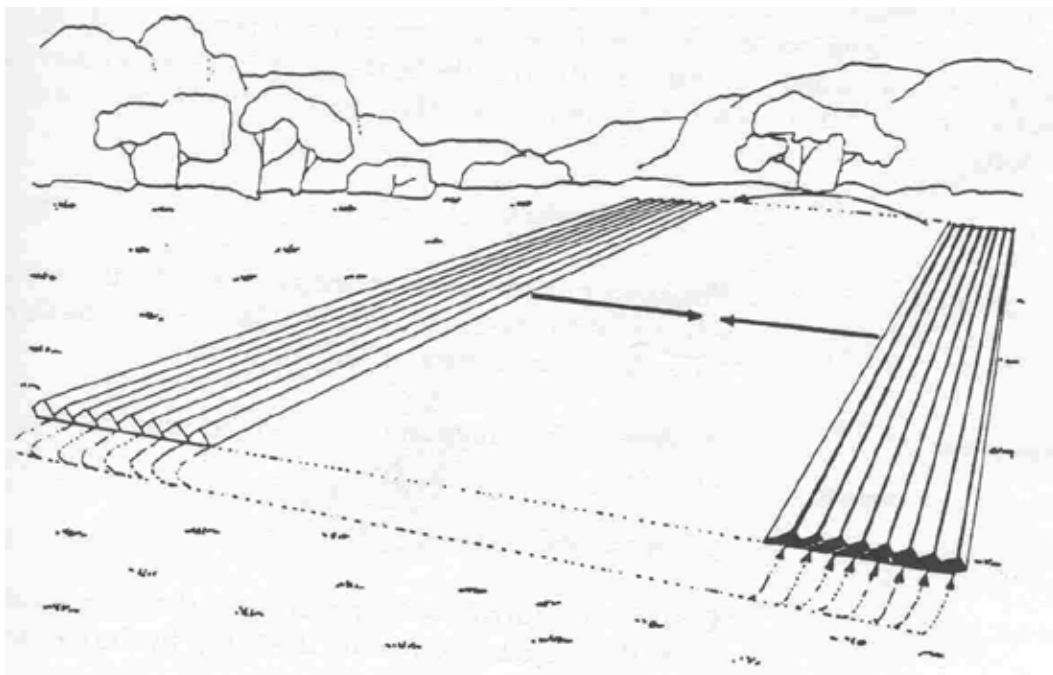
Gathering

- Ploughing starts in the middle and goes outwards finishing on the sides with two furrows. This moves the soil the centre of the garden



Casting

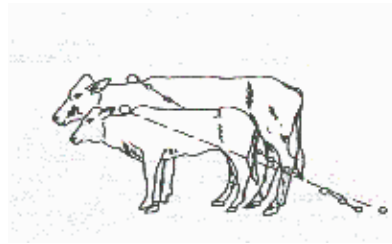
- Ploughing starts on the sides and progresses inwards leaving a furrow in the middle of the land. The soil is moved to the sides of the garden



These methods must be used concurrently to minimize soil erosion. Alternate from season to season. E.g. Constant ploughing using casting creates a deep valley in the middle of the garden while gathering creates a small hill in the middle of the garden thus soil erosion to take place

Influence of Chain length, size of Animals and yoke length on Plough Setting

- *Effect of Trek chain and size of animals on depth setting:*
- The standard trek chain is 2.1m long
- This allows the plough to be set for the required depth under normal soil conditions and using average sized local animals.



However, if:

- The soil conditions are not normal or the work animals are not average size, and the range of adjustments on the hitch does not allow for the required depth setting, then a different length of trek chain may be necessary.
- The soil is very hard or work animals are taller than average, a longer chain will be needed.
- The soil is very soft or animals are very short, then a shorter trek chain will be needed.

Effect of yoke length on Width of cut setting

The standard plough yoke (80-90 cm) distance between centres of skies allows ploughing up to full width of cut within the range of settings on the hitch assembly. This is why farmers using such standard yoke do not carry out width of cut adjustment.

Trouble shooting

Trouble 1:

The ox-plough is difficult to control and does not cut into the soil;

Possible causes

- The kingbolt used for fixing the plough body assembly to the plough beam is either loose or broken
- The pitch (pitch angle) is zero and land suction is zero. The share and landside are worn off.

Trouble 2:

Plough does not dig to the required depth

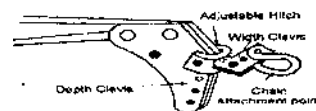
Possible causes:

- Plough depth setting is not properly done
- Share and landside have almost worn off.

Solution:

- Check to see if share and landside have almost worn off. If true replace both of them. If not true carry out fresh plough depth setting.

- **Trouble 3:** One bull or bulls one side get tied much faster than the other side.
- **Cause:** the chain attachment point is hooked to the most outer hole of width clevis. This applies especially when the width clevis of poor design.
- **Solution:** Move chain attachment point to the inner holes to allow the line of draft force to pass directly over the beam.



Trouble 4:

The oxen need a lot of energy to pull the plough even in very soft soils

Cause:

The bolt or bushing of the land wheel is worn.

Solution:

Replace the bushing, bolt or both the bolt and bushing.

Other Ox-drawn equipment

Animal drawn harrows and harrowing

Ploughed fields are normally rough comprising of clods, soil furrow slices and buried crop residues.

Harrowing is done to:

- breaks clods and soil furrows slices to fine tilth ready for planting
- remove surface trash from the field
- Level the ploughed field ready for planting

Types of harrows

There are two main types

- Rigid tooth harrows; Have a rigid wood or metal frame to which spikes or teeth are fixed
- Flexible harrows; Flexible harrow consists of small metal frames linked together by flexible links enabling it to follow uneven terrain

Harrowing using oxen

- Harrowing is done along or perpendicular to the ploughed field
- Weights can be added to make the spikes enter the soil

Ridger and Ridging using animals

- What is Ridging and why is it done
- Main Parts of a Ridger
- Dismantling & Assembling of a Ridger
- Training work animals for Ridging
- Ridging using work animals

Main Parts of a ridger

Similar to the mould board plough; Consists of:

- Beam
- Frog
- Share
- Two symmetrical mould boards
- Breastplate
- Depth wheel
- vertical regulator and
- Handles

Planters and Planting using Oxen

Advantages of planting in rows

- Minimizes wastage of seeds during planting
- Allows subsequent operations to be mechanized thus reducing labour costs.
- Well-prepared seed bed (ploughed, re-ploughed and harrowed)
- Good seeds for planting
- Trained oxen (able to walk in a straight line)
- Right planting yoke for a given crop seeds.
- Good planter
- Know recommended inter-row crop spacing
- Right planting time
- Proper use of the planter (adjustment & selection of right seed plate)

Methods of planting using work animals

- Planting behind plough system
- Planting using a ripper planter system
- Planting using a planter system

Planting behind plough system

Planting is often done behind the plough. Seeds/stems are dropped in each set furrow made after ploughing

Advantages

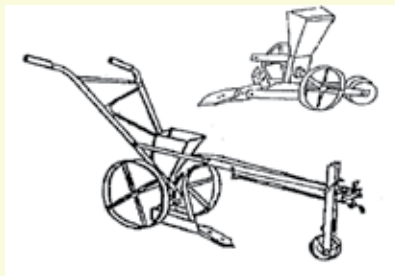
- Planting is done in a clean field
- The crop is planted immediately

Disadvantages

- Planting is only done during rainy season
- Seeds are planted deep & un-even crop to crop spacing
- Line not perfectly straight
- Late & un-even germination
- Hinders DAP animal weeding

Planting using a ripper planter system

Involves breaking up of soil to make a planting furrow
This method gives the farmer a possibility to do dry planting
It is an attachment fitted onto a plough beam
Seed is put in a container
Inter-row spacing is set by the suitable yoke
Can plant maize, beans and upland rice



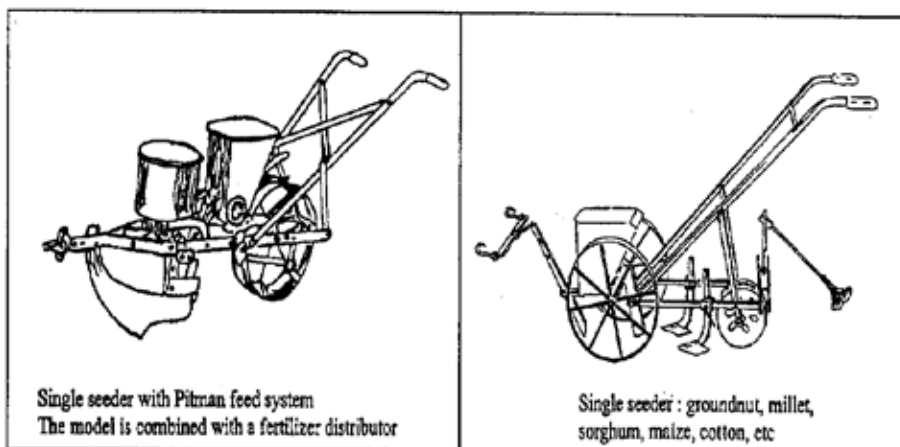
Planting using a planter

Types of planter; Single row planter and Mult-row planter

Main parts of a Planter

- Main frame
- Seed hopper
- Seed plate(s)
- Fertilizer hopper
- Drive mechanism

Animal-drawn sowing equipment



Weeders& Weeding with Work Animals

Prerequisites to weeding using animals

- Crops should be planted in standard & recommended straight rows
- Timing for weeding should be right
- Right length of yoke
- Use trained Oxen/animal
- Animals should be fitted with mouth guards
- Should have a good and right weeding implement

Features of a good animal weeding implement

- Strong and light to be pulled by Oxen
- Should be easily expandable to weed different crops

- Should have depth adjustment mechanism
- Its weeding tines or sweeps should be set to have an angle of attack to penetrate the soil.

Training animals for weeding

- Making weeding yokes
- Identifying a nearby field and pegging
- Yoking and walking animals between pegs
- Training animals to pull progressive loads
- Training animals to pull implements between pegs
- Actual weeding of crops using animals

Care & maintenance of DAP implements

About 90% of troubles with Draught Animal Power (DAP) implements that occur are due to lack of care and maintenance, this leads to wasteful spending of hard earned cash on repair. A farmer can reduce repair costs by taking great care and doing the repairs by himself. This section exposes you to techniques of caring and repairing of animal drawn implements; these are ploughs, harrows, planters, Ridgers and weeders,

Stripping and Re-assembling a plough

Purpose: To check and clean all the parts. It also makes it easier to paint all parts	
Necessary tools	Use
Spanner	Spanners 13, 17, 19, 20, 22 & 24 mm or an adjustable for opening and locking bolts and nuts without damaging corners
Flat screwdriver	To wedge bolts when removing the nuts.
Pliers	For holding bolts/nuts
Wire Brush	Removing rust and dirt from parts and bolts.
Oil can	Oiling cleaned parts to prevent rust
Cloth	Wipe dust off parts of the implement
Paint	Improve appearance and Protect parts against rust

Steps in stripping the Plough

1. Put plough upside down.
2. Remove king bolt & next bolt from beam,
3. Remove stay beam bolt from the mould board
4. Push the plough body from beam
5. Remove share , mould board & landside from frog
6. Remove drawbar assembly bolt
7. Remove two hake bolts from beam
8. Remove adjusting bracket from regulating hake.
9. Remove U-bolt and clamp plate.
10. Remove nut from wheel axle and pull out the axle.
11. After stripping clean all bolts with a brush and oil the threads.
12. Remove all the dust and dirt to expose any cracks
13. Replace any damaged or worn part so as to minimize time wastage during next ploughing season
14. Paint or oil all parts to protect them against rust.

Assembling the Plough

1. Fit share to frog
2. Fit mould board to frog
3. Place king bolt into the frog hole
4. Fit landside to frog
5. Fit plough body to beam handle assembly.
6. Fit the next bolt from the king bolt to the beam.
7. Fit stay beam and bolt to mould board,
8. Turn plough upside down
9. Fix wheel axle and arms.
10. Fit U-bolt and clamp onto the beam.
11. Fit regulator hake and bolts onto the beam.
12. Fit drawbar assembly to beam.
13. Fit adjusting bracket onto regulating hake.
14. Tighten all bolts and nuts

Care for Animal drawn implements

- Do not drag your implement to the field. This cause rapid wear of parts and handles.
- Transport your implement to the field using a wooden sledge or on cart.
- When in the field, move your implement using its depth wheel

CARE AND MANAGEMENT OF WORK OXEN (ANIMALS)

INTRODUCTION

Working animals (oxen) are a valuable asset to a farmer and therefore should be cared well (more attention must be given to them than other animals). The prevention of injuries and disease and pests is better than cure. Proper management, with daily inspection, good handling, feeding (nutrition), giving enough drinking water and proper housing will reduce health problems. Therefore, simple attention to animal condition, feeding and providing adequate water will go a long way in maintaining animals in a healthy state so they can work well.

DAILY CARE

- Keep to a regular schedule for grooming, health checks, watering, feeding and grazing. Animals should be adequately fed and watered daily.
- At the beginning of the working day, call the oxen if they are outside, or go up to them if they are in their stable. Greet them by name, and do not be afraid to talk to them - throughout the day.
- world farmers talk to their working animals and develop close relationships with them. If animals are being fed supplements, now is a good time to give them some. Even if there is no supplement, try to give a small amount of salt on the palm of the hand, some grass, grain or fruit. This will encourage the oxen to enjoy human company.
- Daily grooming (using some sort of brush) of animals will not only keep them clean, it also promotes a good working relationship between the handler and the animals. It allows the handler to observe any problems, such signs of sickness, or any injuries, sores, wounds, eye irritation or damaged horns. The animals can be lightly brushed in the direction of the hair (ie, head to tail) with a suitable hand brush (a scrubbing brush with plastic or fibre bristles can be used). This removes dirt and promotes close contact with the animals.
- Hooves should be regularly cleaned and checked for cracking or rot. Foot problems can lead to lameness and cause the animal to be unable to work. Foot problems can be prevented if where the animals (oxen) stayed in (stables and sheds) are kept clean and dry surfaces. Surrounding areas outside the shed should be well drained.
- Animals should be checked for ticks each morning and remove any ticks found. Any sores or wounds should be cleaned with a solution of salt and water or with a wound cream or antiseptic, if available. Wounds should be kept free of flies and cleaned daily until they become sealed and dry.

HEALTH CHECK

As the animals are greeted, inspected and groomed, the following ten points should be checked, just to make sure each animal is normal and healthy.

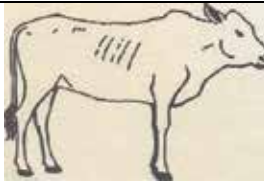
- Breathing normally and chewing the cud
- On raising itself, stretches legs and passes dung
- Dung piles up (is not liquid) and urine is normal (clear or colourless)
- Walks normally
- Coat is smooth and shiny

- Ears are alert, moving to and fro
- Eyes are bright and clear
- Muzzle is cool and moist, not watery
- No fresh wounds or swellings; no ticks
- Good appetite, no rapid loss of condition

WORK COWS

If one or more of the working animals are cows (females) they should receive a little extra attention, particularly if they are expected to combine reproduction with work. Work cows can provide milk, calves and work provided they are well fed. The daily requirements of working oxen and working cows may be similar as far as work goes, but the working cow needs extra feed for milk production and during pregnancy. In order that the cow can work and reproduce, it requires more, and better quality, feed supplements than those given to oxen. If a farmer cannot satisfy these requirements, then he should not use cows to plough or pull loads.

Fig. 1 Body condition of cattle

		A) Much too thin - this animal may die if worked. It needs feed supplements urgently.
		B) Thin - this animal should be able to work, but supplementary feeding is advisable
		C) Reasonable condition - this animal should work well even if it is not given extra feed

GETTING READY FOR WORK

Check that the yoke is in good condition (smooth without scratches), and make sure the yoke is comfortably fitted, and that it does not rub excessively and cause blisters or sores. The implement to be used must be set properly.

WORKING SCHEDULE (PROPER TIME FOR WORK)

Work should be carried out in the cooler hours of the day, that is the early morning and/or late afternoon. Cattle seldom work well between the hours of 10 am and 3 pm when the sun is hottest. It is best for the animals to start working by moonlight, so that they finish work before the sun is too hot. Cattle should not be worked for more than 6 hours a day and 4 hours is the best. While working, animals should be rested if they show signs of distress (excessive salivation, panting, staring eyes). In any case, animals (and handlers) should be allowed a regular five minutes break every 30 minutes.

GRAZING

Animals need at least six hours a day for grazing, if they are to obtain enough food. Even six hours may not be enough if the pasture is poor or scarce, or when the oxen have worked hard during the day. Animals should be given enough time to chew their cud.

FEEDING WORK CATTLE

Proper feeding, watering and sound management are required to keep animals in good working condition. All animals have basic daily needs to keep them healthy and at constant weight (these are called maintenance requirements). In general, the larger the animal, the greater their daily requirements for maintenance. An animal in very poor condition tends to be weak and susceptible to illness and disease attack.

FEED COMPONENTS

Pastures given to oxen contain different amounts of energy, protein, minerals, vitamins and water. The amounts are affected by plant species, growth stage, time of year, date of cutting, storage methods etc. These factors also influence the ease of the animal to digest the food to obtain the nutrients. New grass growth is relatively rich in nutrients and easy to digest, while rice straw contains coarse fibre in a form that is quite difficult to digest.

For work, animals require energy-giving foods, and the most common energy-foods for oxen are grass, stover, hay and straw. Cereal grains are rich in energy and they can make good feeds, although they are often too expensive and valuable for this. Fats and oils are not essential for work, but oil-rich seeds (eg, cotton seed or groundnuts) make good high-energy feeds. Protein-rich feeds such as legume hay (eg, groundnut, bean and cowpea hay) are easy to digest. Proteins are also found in cereal grains and the leaves of some fodder trees. Minerals (eg, calcium, iron and phosphorous) and vitamins are needed in very small quantities. They are generally found in most mixed grazing, but can also be provided by mineral blocks and licks.

FEED REQUIREMENTS OF WORKING ANIMALS

The main requirement for work is energy. Additional protein, vitamins and minerals are not normally needed just for work. In any case most energy-giving feeds will provide some extra nutrients besides energy. A possible exception is salt, and some extra salt may be needed to replace that lost during sweating. Hand feeding of small quantities of salt is a management technique that favours good human-animal relations. Salt and mineral licks can also be used.

The total nutritional requirements of draught animals depends on their work and on their stage of growth (immature or mature). Mature oxen have requirements only for maintenance and work. A young male work animal (2.5 to 4 years old) has feed requirements for its body growth, as well as for maintenance and work.

THE MAIN FEEDING PROBLEM

Oxen have limited time to graze since they spend a greater part of the morning working. The best time for grazing is in the cooler part of the day (morning). During the heat of the day animals tend to seek shade. Furthermore the grazing that is available tends to be of poor quality, and difficult to digest. For these reasons, farmers should give extra feed to their animals immediately before and during the working period.

POSSIBLE FEED RESOURCES

Natural grazing is by far the most common feed. Animals feed themselves, getting what they can from available pastures. Crop residues are the next most common feed. Farmers should give work animals maize stover, groundnut hay and other crop residues after the harvest. These should be

stored in or on the roof of the oxen shed to prevent it from being wasted or trampled on. Oxen can also be given forage tree branches such as caliantra, especially during dry season. The leaves of many legume trees are good feedstuffs. Examples are Acacia, Sesbania or Leucaena species. Farmers should be encouraged to harvest grass when they are still in their tender stage, dried and stored. This can be used during dry season when pasture is in short supply. Oxen can be fed on household and milling residues (maize bran, cotton seed, rice bran) and other feed supplements such as cotton seed cake and molasses. Where there is ample land, rotational grazing should be practised. Planting multipurpose fodder trees can provide feed supplements at little cost. Specific areas can be left for the late dry season grazing.

HOUSING FOR WORKING CATTLE

In many traditional farming systems, cattle are kept overnight in open enclosures. Although cattle are hardy, working animals respond well to special treatment. Thus, owners of working oxen/animals should be encouraged to construct a special shed for their draught oxen. This can be used to house the animals at night and to provide shelter against the sun, rain and wind when they are not out working or grazing. It should be located on a well-drained site.

The design of the shed should be as simple as possible. Local materials - such as wood, grass, maize stover and mud bricks - can be used to keep costs to a minimum. In warm, and dry environments, a thatched roof supported by four poles is adequate (Fig. 1).

Where temperatures are cooler it may be necessary to construct half or three-quarter side walls to provide greater animal comfort.

The size of the shed will depend on the number and size of the oxen being kept. If the sides of the shed are partially or fully closed, leave enough space for an adult person to stand along side the animal when it is tied in the stall. In general, a shed having the dimensions of 2 to 3 m square and 2 to 2.5 m high is adequate to house two adult oxen and allow a person easy access.

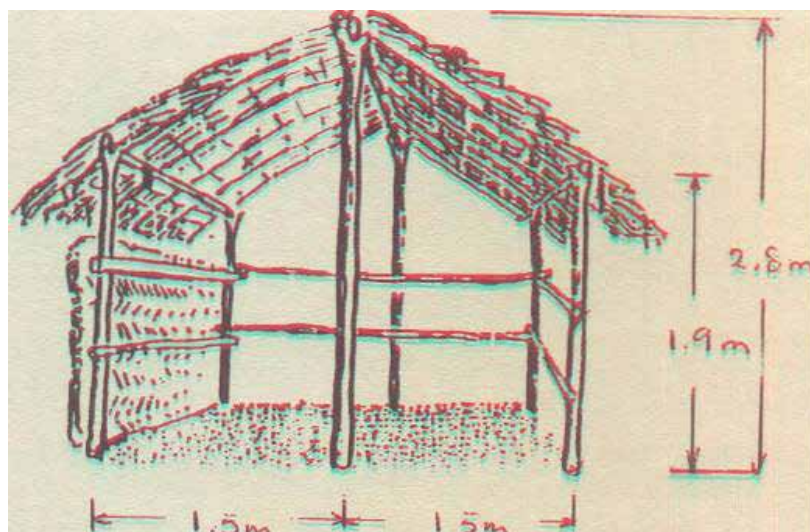


Fig. 1 A simple shed for working cattle (with dimensions in meters).

If individual stalls are constructed then they should be wide enough to allow the animals to stand and lie down comfortably. Stalls should be 1.5 to 2 m wide and have a "yoking bar" fixed at a height of 90 to 100 cm from the ground (Fig.3). The yoking bar can be used to tie animals for feeding and watering, during harnessing and when carrying out routine health care, such as removing ticks. If several stalls are constructed in a row they can be separated by a horizontal bar attached between posts at the same height as the yoking bar.

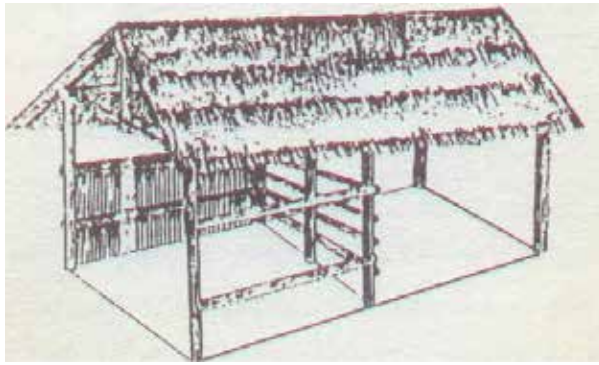


Fig. 2 Simple stall showing equipment area and yoking bar.

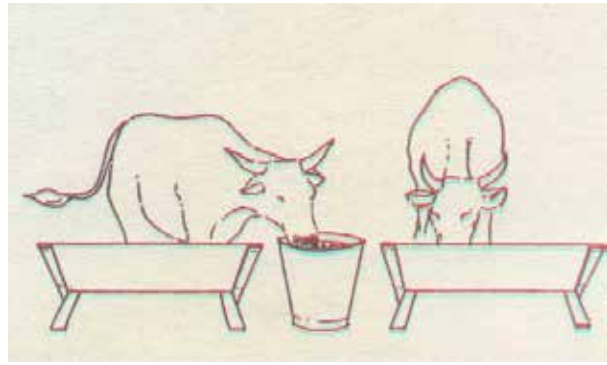


Fig. 3 Working cattle provided with food trough and water.

Regardless of the design or size of the shed, it is important that it has good ventilation. It is important that there are no exposed sharp edges - for example splintered or broken rails or nails - inside the shed which could injure the animals. Planting a tree in the paddock/shed will provide additional shade in which the animals may lie. A simple crush may be built for holding the animals when being sprayed or treated. The paddock/shed should be well-drained. Mud and manure should not be allowed to accumulate.

FEED STORAGE

To make the feeding of supplements easy, an additional room may be constructed for storing feed supplies, such as concentrates and mineral supplements. Stored feeds should be kept clean and dry as mouldy feeds can cause digestive problems and make the animals sick.

A feeding trough can be made from a metal drum cut in half or sometimes it is cheaper to make it from wood. A drum cut in half can also be used for storing water. Both can be placed in front of the animals behind the yoking bar. The trough can be used to feed concentrates or hay and crop residues. A feeding trough or feeding rack if located in the paddock/shed should be firmly anchored so that the animals cannot knock them over. The trough and feeding rack should be readily accessible for daily cleaning.

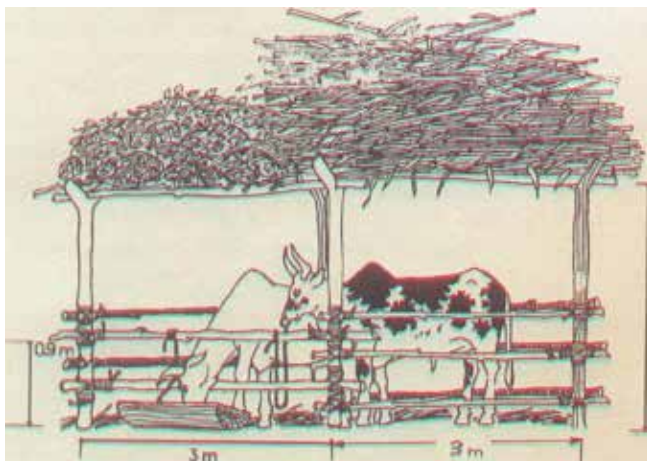


Fig. 4 Simple stall showing feed trough and food storage on roof

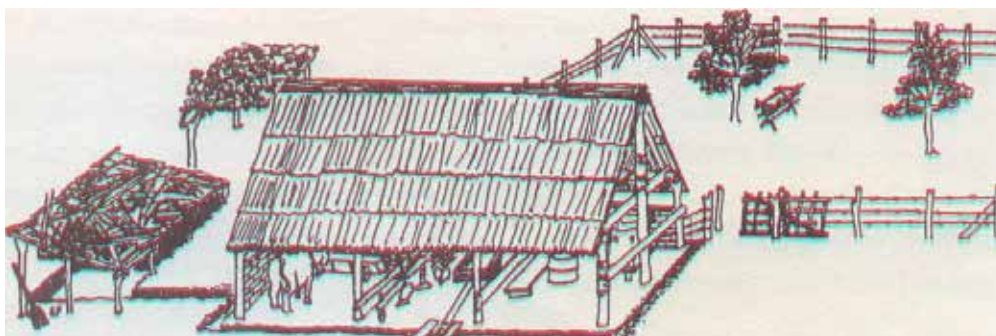


Fig. 5 Impression of simple shed with paddock, manure pit and food storage.

MANURE DISPOSAL

The shed should be cleaned daily and the manure piled outside to be distributed on the fields at a later date. The longer the manure lies out in the open the quicker the nitrogen is lost. This can be partially overcome by making a pile about 1.5 m high and keeping it covered and moist (Fig. 6). If flies become a problem, the manure should be removed from the area of the shed.

Where there are large supplies of straw, an alternative practice is to distribute clean bedding in the shed daily. The animal manure mixed with bedding is allowed to accumulate and is only cleaned out occasionally, depending on the supply of clean bedding and the acceptable depth of the resulting compost. This makes good compost, but if large quantities accumulate, it is heavy to clean it out. When availability of clean straw becomes scarce, the stall should be scraped clean daily to keep the floor dry for the animals to lie on and to prevent build-up of ammonia.



Fig.6 Schematic illustration of use of bedding straw, covered manure pit and cart for transport to the fields.

HEALTH CARE OF WORKING CATTLE

TICK CONTROL

Tick control is very important in order to reduce/prevent the occurrence of East Coast Fever (ECF) and/or Corridor Disease. Effective tick control is therefore vital. Ticks are controlled by spraying animals with acaricides. Avoid areas that are infested by ticks.

Weekly dipping, spraying or washing with an appropriate chemical (acaricide) should be carried out during times when tick incidence is high. If there is a danger of East Coast Fever and/or Corridor Disease, dipping or spraying every 4 to 5 days may be needed at critical times. Special attention should be given to those parts of the body prone to tick attack, such as the ears, tail and the inside of the legs.

HEALTH CARE

- Oxen should be vaccinated against blackquarter and anthrax. If trypanosomiasis is a problem, regular prophylaxis treatment with a drug such as Samorin may be advised. Internal parasites such as worms must be controlled. This can be done by deworming oxen regularly.
- If working animals are to grow and work to their full potential they must be healthy. Working animals are likely to resist illness if they are overworked. It is also important that they are given sufficient food and water and provided with a clean, well-ventilated shelter.
- The principle health problems requiring treatment in working animals are specific illnesses (due to disease-causing organisms), parasites, poisonings and wounds. These health problems vary from place to place, but the local veterinary services should be able to advise on the recommended routine treatments such as for deworming, vaccinations, tick control and cures for illnesses. Local veterinarians may be able to provide the necessary drugs or advise where they may be obtained.
- In addition to the local veterinarians, it is sensible to ask advice of local stock owners. In most cases, they can recommend certain management practices (areas to avoid, things to do) or traditional remedies that may help maintain the health of working cattle.

SIGNS OF GOOD HEALTH AND NORMALITY

The stockman who is able to recognize ill-health and abnormal behaviour can often prevent minor problems building up into major ones. As animals are greeted, inspected and groomed the following should be checked, so as to make sure each animal is normal and healthy:

- a healthy animal walks well on sound feet, feeds readily and breathes regularly;
- on raising itself, it stretches its legs and often passes dung which is firm in consistency.
- Dung piles up (not liquid).
- Faeces are normal and not discoloured or blood-stained;
- has a pair of clear bright and alert eyes in a clean head;
- has nose and mouth clear and free from discharges, the muzzle is usually cool and moist;
- has a smooth coat and shiny tail and flanks, free of faeces;
- healthy animals tend to flock together, feed together and rest together.
- They are curious and inquisitive;
- healthy animals have a good appetite, no rapid loss of condition.
- They have no fresh wounds or swellings, no ticks, no lice;
- a healthy animal has ears alert, moving to and fro, eyes bright and clear.

Time spent watching working animals is time well spent for it assists in developing the ability of the stockman to distinguish the normal from the abnormal.

SIGNS OF ILL HEALTH

They include the following:

- Animal not eating (Lack of appetite)
- Diarrhoea
- Emaciation/ loss of weight/ ill thrift
- Excessive salivation
- Sudden death
- Enlarged lymph nodes
- Lameness
- Reduced milk yield
- Abortion
- Lacrimation/ Bad eyes/ Blindness
- Skin changes (texture, colour)/ Swellings on the body
- Discoloration of urine
- Enlarged abdomen
- Abnormal / strange behaviour (Nervous signs)
- Anaemia (paleness of mucous membranes)
- Constipation

A working animal is likely to be sick if

- it is reluctant to work;
- it is often on its own, or leaves the main group if it is able to do so (although this is normal for cows during labour);
- it refuses to eat.
- Its eyes may often be dull and watering or even swollen;
- it has diarrhoea or constipation - a dirty tail can be a first sign of digestive upsets;
- it is seen limping, carrying a foot off the ground, or has swelling in the joints;
- it has a dry rough coat or skin;
- it breathes rapidly and often coughs, with running nose. For a rested ox, a breathing rate of over 15 respirations per minute is very high and is indicative of disease. If a working animal is ill, it must be rested and given food and plenty of water. It should be kept away from other cows. Assistance from a veterinarian should be sought if it does not improve.

INTERNAL PARASITES

Parasites are organisms which live in or on other animals. They obtain food from the host animal without contributing to the animal welfare. Parasites limit the growth of the animal and take nutrition away from the host. They reduce the condition of the animal and can cause death.

The main internal parasites of working animals are round worms that live in the stomachs, lungs and intestines, They also include flat worms such as tapeworms and liver flukes. Working animals eat worm eggs when grazing grass/forage which has been contaminated by manure. It is therefore advisable to keep pasture clear of droppings, Large numbers of worms reduce the animal's ability to work and can cause death particularly if the animal is underfed and/or overworked, Large numbers of worms make an animal skinny (emaciated) and weak. Other signs of worm infestation include:

- extended belly
- pale or yellow gums
- a rough coat
- Dull eyes.
- Worm can be seen as thin threads in the animal's droppings.

Worms are common and it is a good practice to give all working animals a dewormer once or twice a year. This prevents worm infestations from becoming life-threatening. It is good practice to deworm all newly introduced animals and all cattle before the rains.

One of the best kinds of dewormer contains the drug Mebendazole and may be sold with different trade names e.g. Albafars. It is important that the correct dosage is given after first estimating the weight of the animal. One can also use injectable dewormers like ivermectin in the control and treatment of worms.

EXTERNAL PARASITES

External parasites of working animals include ticks, lice, mites and flies. They cause discomfort, weight loss and sometimes death. They may carry disease or make the animals more susceptible to disease. Areas/parts of the animal where parasites concentrate include the inside of ears, top of legs, base of tails or the loose folds of skin, and around the horns. Daily brushing and grooming will remove most parasites before they cause trouble. Ticks suck blood and may spread diseases like East Coast Fever, Anaplasmosis, Babesiosis to mention but a few. They can often be picked by hand (bum them afterwards or kill by squashing but never drop them back in the field). Some external parasites can be treated by dusting with an appropriate insecticide powder. Therefore it is important animal keepers to always spray their animals using recommended acaricides like Syptertix and promptly follow spraying routines ie once a week during rainy season and once after two weeks.

FRACTURES

A limping ox cannot work properly. As soon as you realise that the animal is limping, try to find out the cause. Check which leg is causing the limping and examine it. If the ox lifts its head up and down while moving, it may be lame on the first leg which hits the ground as the head comes up. Look at the underside of the foot for stones, nails or abscesses. Feel the lower leg and pastern for wounds, heat or swelling. If there is a wound inside the hoof, soak the foot in a bucket of clean warm salty water for 15 minutes twice a day. For hot or swollen legs, try to apply cool water as often as possible. Do not make the animal work hard until the limping stops, otherwise the problem may become worse.

DISEASES

A disease is regarded as infectious if it is caused by an organism which may be transferred from one animal to another.

It is important to vaccinate routinely and regularly against Contagious Bovine Pleuro-Pneumonia (CBPP), Anthrax, Foot and Mouth Disease (FMD), Tetanus, Black Leg and Brucellosis. In areas where Trypanosomiasis is a problem, quarterly (prophylaxis) treatment with a suitable drug (eg Samorin) may be advisable. Most infectious diseases are treated by using antibiotics (eg. Penicillin).

FOREIGN BODIES OR HARDWARE DISEASE

Metal objects, especially those with a sharp point such as nails or pieces of barbed wire, are dangerous when swallowed by animal. Because the animal does not thoroughly masticate her feed before swallowing, these materials are sometimes taken in whilst eating. Cures can be complicated but prevention consists of strict vigilance in picking up all pieces of wire, nails or other metal objects that might get into the feed.

REMEDIES TO WOUNDS

Minor wounds are fairly common with working animals and may be treated on the farm. Clean the wound thoroughly first with a salt solution (brine) and then adopt one of the following curative measures:

- Apply Dettol if wound is fresh or preferably: apply an antibiotic spray (eg. Alamycin, Tetracyclin,
- Apply healing oil (which contains an antiseptic), this is cheaper but less effective.

BLOAT

Bloat may occur if cattle are pastured on damp, rapidly growing legume pastures shortly after rain storms have occurred at the end of the dry season. Gas pressure builds up inside the rumen of the animal which is found on the left side, breathes with difficulty and salivates profusely. The pressure has to be released by stabbing with a trochar and canula midway between the line of ribs and point of the hips. All animals should then be dosed with 3 oz of formalin.

