

# Use of Animal-Drawn Implements & Equipment by Small Scale Farmers in Bauchi State, Nigeria

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## Abstract

*This paper describes animal drawn implements and equipment which could be used by smallholders with reasonably low financial investments to achieve increased agricultural production.*

## Introduction

Over the years, agricultural practices in Bauchi State, and indeed in Nigeria in general, have been carried out by small-holders cultivating between 2 to 3 ha, using human labour and traditional tools such as machetes, cutlasses, hoes etc. These tools are used in land preparation, for sowing of seeds, weeding and harvesting. In most places, little use is made of mechanised techniques and other modern inputs such as improved seeds and fertiliser. Modern agricultural techniques and inputs are not used by smallholders because these inputs are too expensive and too difficult to acquire.

From the beginning of this century, the Federal Government of Nigeria, and the Bauchi State Government in particular, have made constant efforts to assist smallholders in increasing their agricultural production by replacing traditional tools with ox- drawn ploughs and tractors.

Animal traction (AT) was demonstrated in Bauchi State and other northern areas as far back as the 1920s. The rationale for using oxen-drawn tools for cultivation and transportation is that it increases agricultural work output, reduces drudgery and improves life in rural areas. Compared to other means of modern agricultural production, AT is the one that a smallholder can think of eventually possessing.

## Strategies for Development

The World Bank has been assisting Nigeria in her agricultural development programmes to restore

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self-sufficiency in food since 1975. Besides attracting farmers to the use of improved seeds, fertiliser and pesticides, attention has been focused on introducing irrigation through shallow tubewells in fadama areas in the northern states. Attention has also been given to better animal- drawn implements and equipment according to the availability of land and climatic conditions and the fact that the vast majority of the agricultural land in Nigeria is owned by small farmers using traditional manual technology.

Before the establishment of Bauchi State Agricultural Development Programme (BSADP) in 1981, the use of AT for cultivation was practised but not on a large scale. The introduction of tractor hiring schemes by the Ministry of Agriculture and the credit facilities to purchase/hire tractors, further discouraged AT, even though some smallholders used credit to purchase oxen for cultivation purposes.

Availability of fuel and lubricants in Nigeria notwithstanding, the use of tractors is limited because of high cost, inadequate spares and repair services. Thus the use of AT in the cultivation of crops, water lifts for irrigation and transportation of the harvest needs to be encouraged. There is evidence that increased numbers of smallholders are adopting this method from the number of oxen-drawn ridgers purchased from Bauchi State Agricultural Supply Company (BASAC), 5455 in 1988 against 1652 purchased in 1982.

## Animal-Drawn Agricultural Implements and Equipment

Presently, farmers use workbulls mostly for land preparation. Their use can be increased and made more economical by using them for other farm

operations such as harrowing, puddling, inter-cultivation, threshing, transportation and water-lifting. Improved hand tools will also facilitate farm work.

## **Agricultural Implements**

### **Animal Drawn Ridger**

An average small farmer in Nigeria uses short handle hoe, an axe, cutlasses, a slatted spade and some other local tools. With these tools the land is prepared and cultivated. Where available, ox-drawn ridgers are used. Sowing of millet and other crops on the ridges is done immediately after the rains start. Even though the ridger is fairly costly (N1,200), it has been making an impact in Northern Nigeria. The Bauchi State Agricultural Supply Company sold 21,107 ridgers to smallholders during the period 1982 to 1989.

The ridger commonly in use was designed with the soils, climatic conditions, cropping pattern, prevailing farming practices, etc. in mind. It is pulled through a chain by a pair of draught animals, oxen, mules and at times donkeys. The handle has 4 positions to take care of the height of the operator.

It produces rounded top ridges, and the furrow width can be adjusted by a simple mechanism. A depth adjustment wheel of 20 cm diameter is adjusted by sliding stalk mechanism, which can be fixed by a lock pin at any desired position. It has a robust share and a reversible doubled-edged share point made of high carbon steel, hardened and tempered for long life.

### **Animal Drawn Plough**

This implement is broadly used for clay loam and clay soils with more than 45% clay content, which are commonly known as vertisols or Black Cotton Soils. This implement can be used with a pair of oxen. It has a single bottom mouldboard plough and in most working conditions the depth of ploughing is 15 cm.

The hitching point can be adjusted height-wise and sideways to control the working depth and stabilises the plough while in operation.

### **Disc Harrow**

The disc harrow is extremely useful in pulverising clay soil, chopping weeds and trash besides wet land puddling. It is available in half tandem (6 discs, single action) and offset design (8 discs double action). These are useful for wheat and rice growing and have scope for use in Nigeria's fadama areas especially for growing rice and crops following rice.

### **Cultivator(3 tined with sweep shovels)**

This implement is useful for general tillage in sandy and sandy loam soil and interculture of wide row crops like cotton and millet, ensuring conservation of moisture with soil mulch formed. It has scope for use in Nigeria.

### **Bund Former**

It makes bunds for efficient use of irrigation water. It may be adopted in Nigeria as irrigation expands.

### **Single Row Cotton Drill**

It can sow cotton and other wide crops in lines with the help of the marker attached to it. The seed and fertiliser are metered manually (by 2 persons) and in band placement through a single furrow.

### **Automatic Seed Fertiliser Drills**

The scope for automatic seed fertiliser drills (particularly the one with planter attached) in Nigeria seems to be limited (even though these would speed up the sowing operation and ensure maximum utilisation of fertiliser by the crop) due to their high cost, sophistication and problems with their repair and maintenance. There are 3 varieties:

#### **Three Row Fluted Roll Drill**

This is suitable for sowing medium sized grain crops like wheat, millets and rice on flat fields. Seed and fertiliser are placed in a bank which results in 15% increase in yield due to high utilisation of the fertiliser by the crop and the least by weeds. The row to row distance is adjustable.

#### **Three Row Fluted Seed Fertiliser Drill with Planter Attachment**

The abovementioned drill provided with an additional planter box to plant groundnut, maize, cotton and millets with predetermined seed to seed distance in a row. It places the seed and the fertiliser in band placement.

#### **Three Row Notched Disc Seed Fertiliser Drill**

It is suitable for medium and large seed crops like wheat, millet, groundnut and maize on flat fields. Also this machine places the fertiliser on the side of the seed so that its germination is not affected by direct contact. It has been suitably amended to drill on low ridges also.

### **Spike/Bar Harrow**

This implement is useful in taking out trash from the seed bed and breaking capillary action in soil after rain to conserve moisture thereby enabling a farmer to carry out tillage and sowing operation over a

stretch of time. It also breaks hard crust formed on soil due to rain after sowing and for initial weeding of wheat.

#### **Land Leveller**

This implement is quite useful in levelling fields for proper water application and has scope for adoption in Nigeria's fadama areas with the development of irrigation.

#### **Tropicultor**

It is a multipurpose animal-drawn wheeled tool carrier, on the market since 1978. It is capable of performing many types of farm operations under different soil conditions for dry crops, by attaching the required implement to the square tool bar like a tractor. The common operations done with the Tropicultor are ploughing, forming of ridges and furrows, seed bed preparation, sowing, fertiliser application and inter row weeding.

The Tropicultor has several unique features such as adjustable wheel track, lifting and lowering of implements like a tractor and easy conversion into an animal cart of 1 tonne capacity. The ground clearance is high (up to 76 cm) and the operator can ride the machine and not walk behind the implement.

### **Waterlifts for Irrigation**

#### **Chainwasher Pump**

This consists of a bullock-gear in the ratio of 1:7 or 1:6 with a chain gear round which goes a steel chain. The bullock-gear is rotated by a bullock/bullocks, which rotates the chain gear through a shaft. The steel chain consists of several lengths of 5 ft chain. Between 2 chains a rubber washer is securely fixed. Thus the long chain formed has several rubber washers in it.

The angle iron frame which holds the bullock-gear is mounted over the well with the help of girders either of wood or iron when operated by a small shaft. In this case the bullock or bullocks go round the well.

The other system is used with long shaft, in which the chain gear is mounted over the well and the bullock-gear is fixed at the desired distance from the well. The bullock/bullocks in this case move around the bullock-gear and not the well.

When the bullock/bullocks rotate the gear, the shaft rotates and the chain gear moves, lifting water into the pipe with the help of rubber washers because the chain with washers passes through this pipe and over the chain gear. This process is continuous. The

galvanised iron sheet pipe being 4" diameter, there is continuous flow of 4" thick water volume towards fields through the Panara.

### **Transportation**

#### **Ox Carts**

This means of transportation was developed long ago to meet the needs of small scale farmers for simple and cheap transportation. Ox-carts are pulled by a pair of draught animals. They are available in the pneumatic wheel type and with all metal flat wheels in 1000 kg and 1500 kg models.

Oxen can be used to pull a cart throughout the year which keeps them in training. Ploughs, ridgers, seeders and weeders are all seasonal implements. A farmer who uses oxen but has no cart is therefore under-utilising the potential of his animals.

In Nigeria that these carts are being manufactured in rural areas using axles, wheels and other iron parts from scrapped motor vehicles. They are sold at a very reasonable price, between N800 and N1200 depending upon the size of the cart. Kachako Village in Kano State is one place where such types of carts are sold in abundance.

#### **The Use of Ox Carts**

There are many uses to which an ox-cart can be put. A farmer spends a great proportion of his time in transport activities on his farm. An ox-cart revolutionises his farming system and also opens the potentials for additional income earned from off-farm transport activities, thus enhancing his socio-economic status within the rural setting.

### **Constraints to the Use of Animal Drawn Implements**

The infrastructure for propagating animal implements and equipment appears to be inadequate in Nigeria. Farmers adopt new ideas and tools only after seeing them successfully operating under their conditions, if not in their fields.

Implements and equipment may have to be imported to meet initial demand to complement local production. Soon after assessment of the demand, indigenous assembly and manufacture should be taken up. This will create employment in Nigeria.

Presently rural areas in Bauchi State are devoid of skilled and well-equipped artisans to carry out repair of improved agricultural implements. Training programmes need to be launched with financial

and other support for equipping their small workshops.

Farmers in fadama areas have small holdings and their investment capacity is weak. For chain

washer pumps and implements they will have to be provided with easy credit facilities.

## Résumé

*Cette étude décrit le matériel et les machines à traction animale utilisables par les petits exploitants agricoles moyennant des investissements relativement faibles, pour accroître la production agricole.*