

Appropriate Animal Drawn Equipment for Sierra Leone

John Victor Bangura*

Abstract

This paper outlines requirements for and constraints on the selection of suitable animal-drawn implements for Sierra Leone, taking into consideration the farming system, repair and maintenance facilities, finance and psychological and physiological factors. It suggests ways of improving animal traction uptake among small farmers.

Introduction

Animal drawn equipment has been in use in Sierra Leone, starting as far back as the 1920s (Starkey, 1981). The first to be used was the Ransome 'Victory' plough (Agriculture 1929). Up to date equipment is still coming into the country either for use or test.

This paper suggests suitable equipment for the Sierra Leone situation taking into consideration, the farming system, the repair and maintenance facilities, the availability of spares, the finance and the physiological factors.

Requirements for Implement Selection

The structure of the Sierra Leone smallholding, limited financial potential and the inadequate training of the farmer impose numerous constraints on the choice of implements. Moreover, climatic conditions, location and soil properties together with the crop to be cultivated, impose requirements which must be borne in mind when selecting suitable implements. With a knowledge of which operation to mechanise and how to achieve the end result, the following should be considered:

Farming System

Poor land clearing hinders the use of implements. Although light implements are easier to handle and transport on poorly cleared land, they must be sturdy enough to withstand the increased stress imposed on them by obstacles in the soil.

Repair and Maintenance

The implements should be chosen so that their adjustment, maintenance and handling are geared to the knowledge and technical skills of the farmer.

Their design and construction should permit repair and maintenance work to be performed to a large extent by local craftsmen.

Spares

There must be proper guarantee on repair and supply of spare parts.

Finance

Economic aspects play a vital part. A high initial investment represents a substantial risk for the farmer who may find it difficult to bear on his own.

Psychological Factors

Psychological factors must also be considered when selecting implements. Implements already introduced are more likely to be accepted than those which are new in the system.

Types of Implements

Multipurpose Implements.

The name multipurpose includes implements which have a basic frame or toolbar to which a variety of tools or mechanical devices can be fixed for different work. Unbalanced component forces such as side draught should be controllable. The weight of the implement combination should not be so high as to make it difficult to handle in small fields or to transport over country without roads. The attachment and detachment of the devices for the tool carrier should be easy and fast and the method of attachment must be firm enough to stand tough conditions and treatment.

These implements can be equipped with plough bodies, ridger bodies, various cultivation tines, seed-spacing planters and various groundnut-lifting implements.

*Work Oxen Programme, P.O.Box 766, Tower Hill, Freetown,

In order to understand their performance, versatility and limitations it is worthwhile to divide them into 3 groups:

Light-weight, Simple Tool Carrier

These are manufactured from light gauge metal and can be constructed with a wheel, skid or none. They are pulled through a chain or solid beam by a single or pair of oxen. Pulling through a chain is helpful when operating in a field not adequately cleared of such obstacles as stumps or stones.

Wheel Tool Carrier

They have a rigid frame supported by 2 wheels. They are generally heavier than simple tool carriers. Most are also provided with a lifting mechanism to raise and lower the implements and a beam connecting the tool carrier with the yoke. They can be converted to a cart; some have wheel-track adjustment and a seat for the operator. These tool carriers can also be referred to as plot-cultivators.

Individual

Under this broad class falls the mouldboard plough whose method of work involves loosening, turning, crumbling and mixing the soil. The mouldboard can have high tractive resistance and low capacity. Various plough bodies are available depending on the conditions to be handled. They are semi-diggers, cylindrical and general purpose. In the Sierra Leone situation where the soil is fairly heavy and trash handling is necessary, the semi-digger is the most suitable. It breaks the soil into coarse clods and turns it over well, but does not mix it as well as the general purpose plough and leaves a ridged surface which reduces the risk of erosion. Particular attention should be paid to the shares. Plough shares are subjected to severe wear, depending on the nature of the soil.

Uses of Animal Drawn Equipment in Sierra Leone

The use of animal drawn equipment has been in the areas of:

- Transport
- Land preparation
- Planting
- Intercultivation
- Water-lifting
- Harvesting
- Powered Machines (processing)

Transport

This has always been an area of concern in the development of animal traction in developing countries. The use of ox-carts in Sierra Leone is not a popular practice in the village because of the high cost involved.

The Work Oxen Project loaned out some carts to farmers for transporting implements to the farms, transport of produce to the villages and goods to the motor roads. Although the idea was welcomed, the carts were hardly used because of the hilly nature of the Karina area.

The major disadvantages of ox-carts are:

- Most farms are connected only by foot paths.
- They are too expensive for farmers to bear the cost alone.
- It is difficult to mend a pneumatic tyre in the villages.
- Tyres are deflated or stolen by the youths who compete with carts for the transport of produce to the main roads during the dry season.

Because of the last two problems a wooden ox-cart was built in 1985 which seems to reduce the cost of production as most of the materials used could be easily obtained in the country, except for the rolling of the steel wheel rims which is carried out by the National Workshop. The advantage of wooden carts is that they can easily be repaired and maintained by carpenters in the rural areas.

Land Preparation

The majority of oxen in Sierra Leone are used for ploughing and harrowing swamps and uplands, mostly by the mouldboard plough. Harrowing is done with the zig-zag or spike tooth harrow. Harrows are also used in swamps for levelling and puddling. Levelling is performed by inverting the triangular or spike tooth harrow.

Planting

Planting of cereals is mostly by broadcasting immediately before harrowing. Covering the seeds against birds is done with hoes. Some seeders have been used in Njala, Rolako, Musaia and in some village trials. The use of seeders has never been popular among farmers because of their high cost and the partial clearing of farms.

Intercultivation

This is only possible when crops are planted in rows. The major problem with intercultivation operations in the villages is that most animals are not well trained to walk in straight lines.

In the 1983 on-farm trials man-drawn makers were used. It was possible to obtain straight rows but weeding with oxen was only possible in a few villages where animals were well-trained and the farm was free from stumps and stones.

Water-lifting

Two animal power gears were set up at Rolako in 1986 with financial support from the German Appropriate Technology Exchange (GATE). These gears were intended to serve the programme as equipment for demonstrations and test. With further financial support there were plans to introduce them at village level. The gears were in the areas of water pumping, cassava grating, rice hulling and maize milling. Nothing has been done in this area at village level, although this could be a good idea especially during the dry season when there is water shortage. Another use is for irrigation of swamps during the dry season for the growing of vegetables. This is possible because the water table in such areas is shallow. There is an animal-gear water pump at Rolako under test. The problem with this pump is the high cost of construction at village level.

Harvesting

This is mostly done with knives and hoes, although reapers can be used. Animal-pulled reapers are not readily available and if they were they could be expensive.

Groundnut-lifting has been done in the research stations with varying success (Starkey 1981). The

major setbacks include the problem of not drilling in straight lines, uneven depth of nuts and roots and stones.

Powered Machines

Nothing has been done at village level to use oxen for processing. To utilise oxen fully right through the year they should be employed during the harvest period for threshing and the extraction of palm oil. The processing of palm kernels needs high pressure presses.

Conclusion

The single purpose plough is the most useful equipment in Sierra Leone at the moment because the only ox-operation done is ploughing of swamps and uplands. For this operation the 9" mouldboard plough is the most preferred. The 6" plough is only suitable during training when the animals are not ready to pull a 9" plough.

If more operations are to be done to maximise profit i.e. ridging, weeding etc, the lightweight multipurpose tool bar will be the most appropriate in Sierra Leone. For this to be possible better land preparation should be done and farm size increased to make up for the extra cost of the complete package. One method of achieving this is by introducing regulated lay farming. The wheel tool carrier is unlikely to be accepted by farmers because of the draught requirement which is too high for the small N'Dama cattle.

Résumé

Cette étude expose les exigences et les contraintes liées au choix du matériel de culture attelée adapté aux conditions qui prévalent en Sierra Leone, en tenant compte des systèmes de production en vigueur, des moyens d'entretien et de réparation existant, des fonds disponibles et des facteurs psychologiques et physiologiques. Divers modes de diffusion de la traction animale auprès des petits exploitants sont proposés.

References

Agriculture 1929-1960. Animal report of the Department for each year. Government Printer, Freetown, Sierra Leone.

Starkey, P. H. 1981. Farming with Work Oxen in Sierra Leone.