

1

Draught Animals in Perspective

1.1 INTRODUCTION

Throughout the tropics, a major source of power for food crop production is provided by draught animals, including horses, donkeys, camels, buffaloes and cattle. The international significance of draught animals may be illustrated by a recent estimate that 300 million animals are currently employed in developing countries (Ramaswamy, 1981).

In most African countries work animals play some role in crop production systems and farm transport, and in West Africa the use of draught animals has expanded considerably in the past 30 years with consequential benefits for the farmers and the countries (CCEMAT/FAO, 1972). However, while in Sierra Leone the use of animal power has been shown to be practicable, the potential benefits of using work animals have been realised only to a very limited extent, and nearly all the agricultural energy is supplied by human labour. With national and local demands to increase the output of food crops in Sierra Leone, methods of increasing the efficiency of agricultural production are considered vital, and therefore the considerable potential of draught animals to reduce drudgery and increase the effectiveness of human labour in the country should be studied.

It is in the context of the developmental requirements of Sierra Leone's agriculture, the success of draught animal projects in other West African countries and the present international interest in the development of appropriate technologies that use renewable sources of energy, that this report has been prepared. Its aim is to provide general information on the present and the potential use of draught animals in Sierra Leone, with details of appropriate equipment and management techniques. It is considered, therefore, that it will be primarily of value to the country's agricultural policy makers, development projects and extension staff, but it may also be of interest to organisations outside of Sierra Leone.

1.2 GEOGRAPHY AND CLIMATE

Sierra Leone is one of the smaller countries of Africa, and its 73 326 sq km (27 925 sq miles)

which lie between 6°55' and 10°N and between 10°16' and 13°18'W, represent just under 0.25% of the African continent (Clark, 1969). The tropical climate is characterised by a seven month wet season from May to November, with heavy rains from July to September. Although some rain continues to fall during the predominantly dry season from December to April, and the humidity remains relatively high, the drought is sufficiently severe to leave dead vegetation tinder dry to allow hot bush fires which, both controlled and uncontrolled, are a typical feature of the country's agriculture. The rainfall of about 3000 mm (120") a year on the coastal plain drops to 2300 mm (90") a year in the north of the country, where the dominant forest regrowth gives way to some savanna woodland.

1.3 BUSH-FALLOW AGRICULTURE

The agriculture of Sierra Leone is mainly based on a bush-fallow system of upland cultivation, with the intercropping of the staple food crop, upland rice, with a variety of other crops including sorghum, millet, maize, pigeon peas, groundnuts, cowpeas and cassava. In addition to upland crops, farmers frequently cultivate an area of valley bottom for swamp rice and, as the swamp or boli dries, the paddy may be followed by crops such as sweet potatoes and vegetables. A boli is a particular type of broad depression and its seasonal flooding or high water table generally leaves it free from bush regrowth that is characteristic of upland farms, whilst its drainage characteristics restrict its potential for full swamp development.

The bush-fallow system of upland farming may be ecologically efficient where land is plentiful, for stumps remain in the soil and bush regrowth quickly restores soil cover after cropping. However, the overall population density in Sierra Leone is one of the highest in Africa. With a population of over three million, land pressures will soon become serious and already, in some areas, fallow periods are down to three years and steeply sloping soils are being cultivated despite the inevitable erosion.

There is clearly an urgent need to develop an ecologically acceptable system of integrated farming that can be recommended as an alternative to the traditional bush-fallow system of upland farming. The use of draught animals, therefore, together with appropriate crop rotations, is one possibility worthy of serious investigation.

While the development of alternative systems for upland farming may be a long-term prospect, there already exist large areas of swamp lands, bolilands, natural grasslands and cleared bush where attempts could reasonably be made to increase food crop production per unit of land or of labour. The effectiveness of the farmer's labour in these areas might well be increased by mechanical cultivation with tractors, minimum tillage systems and animal traction, although these are certainly not mutually exclusive.

1.4 MECHANICAL CULTIVATION PROGRAMMES

A recent FAO report has stressed that draught animal programmes and mechanical cultivation programmes are complementary and that both should be encouraged in appropriate circumstances (Ramaswamy, 1981). In recent years, various costly attempts have been made to introduce mechanical cultivation in many areas of Sierra Leone, while very little has been done to develop animal powered farming. The constraints in the development of wide-spread mechanical cultivation are daunting, with high capital costs involving foreign exchange, increasing costs of imported fuel, as well as very severe organisational problems involved in servicing and repairing complicated mechanical equipment widely dispersed around the country.

The long-term impact of previous mechanical cultivation schemes has been small, for the vast majority of farmers in the country have never had access to the tractor ploughing schemes. The limited number of those who have at one time benefited, however, have observed the short-term nature of the various projects which have generally stopped when the tractors broke down and have been abandoned altogether after a few years.

This contrasts with the longer term benefits arising from ox-ploughing projects. For example, in Chapter 2, it will be shown how, in villages in the Bombali and Koinadugu Districts, ox ploughing continued successfully 10, 20 and even 30 years after specific ox ploughing schemes had ended. Not only can ox ploughing persist, but it has been seen to spread to other villages where farmers have been able to make their own investment in this technology; on the other hand, the capital involved in mechanical cultivation, without Government subsidy, is well beyond the private means of the small farmer.

The Crash Rice Programme instituted by Government in 1981 hopes to achieve the

ploughing of 12 200 ha (31 000 acres) with a Le114 per ha (Le45 per acre) subsidy (Johnson, 1981). Even if the long-term objective of ploughing 19 300 ha (49 000 ac) each year was met and sustained for many years (at a considerable cost) there would still be many farmers, particularly those in isolated areas, who would be unable to benefit from this programme. Organisational and financial constraints will inevitably lead to the concentration of tractor operations in specific areas where capital and skilled manpower resources can be most effectively concentrated and where an adequate supporting infrastructure and maintenance service can best apply. It would appear, therefore, that even though Government-funded mechanical cultivation schemes are likely to continue to play a role in agricultural development, they will be unable to meet the needs of all the country's farmers for some time to come. There would seem to be considerable scope for the complementary development of ox-traction programmes, particularly in the more remote areas of the country.

1.5 DEVELOPMENT OF ALTERNATIVES TO PLOUGHING

Much work has been carried out in the tropics on systems of minimum tillage in order to control weeds whilst avoiding the potential erosion hazards implicit in the tilling of soil. Very encouraging results obtained in Nigeria have led to the development of a technically efficient system of using herbicides to form a mulch through which seeds can be planted without any ploughing (IITA, 1978). However, imported herbicides are expensive and there have already been sufficient tragic examples in Sierra Leone to illustrate the terrible damage that can be caused to human life, crops and the environment through the improper use of dangerous agricultural chemicals.

1.6 BENEFITS ARISING FROM THE USE OF DRAUGHT OXEN

The use of animal power has a number of specific advantages over other systems of improving the efficiency of human labour.

a) *Value of the animal*

- Cattle already exist in the country and obtain their own renewable energy sources from grazing.
- They contribute valuable manure to the farms and, when they are finally sold, they contribute to the national supply of animal protein.
- Oxen grow during their working lives and, after five years of useful work, they are bigger and more valuable than they were before their work.

- Abattoir records suggest that most male animals are slaughtered below their mature weight (at about 180 kg/400 lb) with young males frequently being killed for meat as light as 90 kg/200 lb (Starkey, 1979b). If these animals were used for work purposes, their weight at slaughter could be over 300 kg/660 lb - a highly significant increase. Indeed, it has been estimated that if one quarter of male cattle were trained and used for work in Sierra Leone, the national output of beef could increase by as much as 10% (Starkey and Verhaeghe, 1980).

b) Use of appropriate equipment

While simple ploughing with oxen may enable farmers to increase the areas of their farms, or improve the timeliness of their operations, the use of appropriate equipment may significantly improve the efficiency of their other farming operations, ie,

- by the use of multi-purpose toolbars and ox carts;
- through the design of efficient weeding tools.

The latter has been one of the more important developments in work oxen technology in recent years and which has been effectively used elsewhere in West Africa. These tools could be particularly valuable in Sierra Leone where weeding is often one of the more critical and time-consuming operations.

Even where subsidised tractor ploughing operations are available to farmers, ownership of oxen may well be justified for their use in secondary cultivation operations as well as for farm transport.

1.7 POTENTIAL SCOPE FOR ANIMAL POWER

The large potential for work oxen in the country derives from the national herd, estimated at 333 000 (Hunting, 1979) which is sufficient to maintain 40 000 pairs of working animals. A further 34 000 head of cattle, including trained oxen, are imported from Guinea each year, making possible an even higher number of draught animals. Quite large ox-training schemes could thus be contemplated without unduly disrupting the existing cattle trade.

To put these figures in perspective, if 40 000 pairs of oxen were trained, and if they were to plough a conservative 4 ha (10 ac) a year, they could cultivate a total area over twelve times greater than the target set for the 1981 Crash Rice Programme of tractor cultivation. On the other hand, a modest

target of 1000 ox pairs in use could lead to the same area of ploughed cultivation as that achieved by the Crash Rice Programme in 1980, at only a fraction of the cost, but with benefits for the farmers sustained over a number of years.

1.8 CONSTRAINTS

While the potential benefits of ox cultivations seem encouraging, it is also necessary to consider the constraints likely to limit the development of draught animal power.

Cattle ownership is currently restricted to about 5% of the nation's farmers, although in the Northern Province, where about 90% of the national herd is found (CSO, 1972), the proportion of cattle owners is greater. In the Gambia, which has recently undergone a successful oxenisation programme, the situation was quite different, because about one-third of the country's family farming units owned cattle (Mettrick, 1978). Not only are cattle in Sierra Leone concentrated in one Province (see Fig 1), but the ownership of cattle is concentrated in one tribe - the Fulahs, who are the traditional cattle herding people of the region.

However, as will be discussed in subsequent chapters, the skills of ox training and farming with draught animals are not restricted to any specific tribal group; where crop farmers have had an opportunity to train and use animals, they have convincingly demonstrated that previous cattle ownership is not necessarily a prerequisite for successful farming with work oxen. It is, of course, easier for cattle owners to adopt ox traction techniques through their greater familiarity with animals and their reduced requirement for investment capital. But it would seem quite feasible for agricultural development projects to provide the necessary training and perhaps credit facilities for non-cattle owners to adopt ox-farming practices.

It must also be noted that the training and management of oxen is not necessarily without its problems. The Ndama cattle are small and very hardy, but they live in a delicate balance with the disease organisms of their environment. A high degree of stress caused by overwork, poor nutrition or mismanagement can upset this balance and cause illness. If illness does occur, the farmer may have a difficulty in obtaining reliable advice or medication. For the Veterinary Services of the Ministry of Natural Resources do not at present have the facilities to cover the whole country adequately.