

Animal traction in Arua District, Uganda, with particular reference to weeding

by

Alastair Taylor

Ringili Demonstration Farm, Church of Uganda, PO Box 424, Arua, Uganda

Abstract

At various times in the past animal traction, particularly the use of oxen, has been encouraged in Arua District of Uganda. Most of these efforts failed because of poor extension work and the troubles Uganda went through during the late 1970s and early 1980s. As people have returned from exile and begun to settle, many have realised that tractors are too expensive and hoes too slow. So ox plowing offers the way forward.

A review is made of agencies promoting animal traction in the district. All programmes are young but have been encouraged by interest shown by farmers. Some good training programmes have been established.

Blacksmithing workshops exist which have begun to manufacture the necessary implements from scrap motor vehicle parts. These have given the development of ox traction a good foundation. However, all of these agencies have taken plowing and/or carting as the limit of their involvement, neglecting weeding and other operations.

Barriers to the adoption of ox weeding fall into four groups: traditional crop husbandry methods, gender issues, supply of equipment and training of animals. Each of these is reviewed and possible answers given.

Some general recommendations for the development of ox weeding are made. First, the people involved in encouraging ox traction should have proper knowledge of and experience of weeding. Second, farmers need to be educated about the advantages of row cropping. Third, the promoting agencies should agree on a common design so that costs to the farmer are kept to a minimum and the equipment should be readily available and made locally.

* Subsequent address
Alastair Taylor, Kulika Trust, Warren Farm
Reading Royal, Streatley RG8 9QE, UK

Background

Arua district is situated in the far north-west corner of Uganda. With Lake Albert and the Nile cutting it off from the rest of East Africa, it can genuinely be considered central Africa—a transition zone between west and east. The border with Zaire in the west is along the watershed of the Nile and Zaire rivers, so the district is undulating, but dropping eastward to the plain of the Nile. In the higher areas the soil is fertile, generally a black or red loam, but to the east the soil becomes more sandy and less fertile. The population and agriculture are reflected in this changing soil. In the west, where Arua town is situated, the population is high and crop cultivation is the main source of food and income. Moving towards the Nile basin serious crop husbandry gives way to cattle and goat keeping, with a sparse population, until the river is reached, where fishing is the main occupation and there is much apathy about any agriculture that includes digging.

During the war years of 1980 and 1985 many cattle were shot and in upper Arua most people lost their cattle herds which were kept in the forested areas and traditional grazing grounds. In the lower areas they suffered less as the people retreated deep into the bush, thus saving their cattle.

Currently the situation is changing, with the crowded people of upper Arua leasing and cultivating lands in the lower areas, eg, round Rhino Camp; some are even making a permanent migration. Many of the native lower Arua people are now beginning to take cultivation more seriously due to economic problems and better education about a balanced diet. The number of cattle in the upper area is beginning to increase again, allowing the people to consider animal traction.

Arua district is one of the main areas in Uganda for growing tobacco and at various

times in the past British American Tobacco and the Ministry of Agriculture tried to encourage the use of oxen. Both gave ox plows as prizes to local farmers, but the majority of these have remained in farmers' stores in mint condition. The major factor for this appears to have been the absence of a proper education or follow-up programme to the recipient farmers.

The animal traction situation

During the late 1980s many Ugandans returned from exile to find their property destroyed and only mangoes and banana trees growing out of the bush to show where their homesteads were. The people were desperate and the government and relief agencies responded to help in resettlement: the bush soon yielded to *panga* knives and hoes and the naturally fertile land began to produce once more.

In the early 1990s the emphasis on relief began to decrease, a more developmental approach was needed and the government and non-governmental organisations adjusted their programmes to reflect this need. The emphasis was then on better crop husbandry, soil conservation and the use of oxen to speed and ease the tedious task of digging by hand.

Without exception, all animal traction programmes in Arua took plowing as their starting point probably due to the potential for increasing production if more land can be tilled, and the comparative cheapness of plows. All these plows were imported into the district and a light Italian type was found to be the best for the soil types and animals of the area. Within the past year some blacksmithing schools have been established and they are now producing copies of this plow using local scrap materials. Carts are also being made by these workshops. However, virtually no serious consideration was given to weeding.

Oxen are referred to because these were the only animals available for animal traction, and they are still the main focus of attention because people own cattle and know about them. In the early 1990s the Lutheran World Federation (LWF) working in the north of West Nile Region, in Moyo District, started to introduce donkeys from Karamoja. It is likely to be a major task to establish a new species in the area.

Groups promoting animal traction

Ringili Demonstration Farm

The Ringili Demonstration Farm, owned by the Church of Uganda, is a centre for practical training. Ox cultivation is one of the topics covered. It has four trained oxen and one donkey. The oxen are used to plow all farm land (about 1.5 ha) and do contract plowing for neighbouring farmers. They are also used for practical training of interested farmers. The oxen have also been used to harrow and weed, but only using borrowed machinery. There are six workers/trainers for the animals, one of whom works with the donkey.

Emphasis is put on training animals in the villages. Oxen belonging to interested farmers are castrated and nose punched and, while the animals are recovering, the farmers come to Ringili for a week of classroom and field training. After this they return to their village and begin the training. After two to three weeks the Ringili ox trainers (normally two) visit the farmer for a week to make sure the training is going well, especially as the transfer stage from pulling logs to plowing is reached.

As far as weeding is concerned, Ringili said it was very interested in developing the practice. It encourages row cropping as part of its teaching, and also realises that by increasing the amount of land cultivated using ox plows, more pressure will be placed on women to keep up with weeding.

Ringili has trained more than 30 farmers to plow. It also has nine pairs of trained oxen working in the villages, and seven pairs awaiting training. The week's course at Ringili costs 5000 Ugandan Shillings per farmer (around US\$ 5); the field training is free except for the hospitality for the trainers.

Abi District Farm Institute

Abi District Farm Institute is an experimental, demonstration and training facility of the Ministry of Agriculture. Its work has been helped by the Central Association for Voluntary Aid (ACAV), an Italian organisation doing some refurbishment and extension before embarking on a full training programme.

Being the District Farm Institute (DFI), the facility has a lot of ox equipment. Most of this was brought from England during colonial times, and has only recently been restored under the guidance of ACAV personnel. A two-row planter and the *Planet Junior*

Cultivator have been successfully tried, as has a locally made harrow.

To arouse interest in ox use, Abi DFI held an introductory course and 16 farmers who attended indicated an interest. There are six trained oxen and three more pairs on site undergoing training for local farmers. The animals normally stay at Abi for around three months while complete training is undertaken. This costs the farmer around 50 000 Ugandan Shillings (around US\$ 50) per pair if they attend only daily during the last month. If resident, the farmer has to pay more. The oxen are trained in plowing and transportation.

The farm has established a workshop to build plows for sale. Initially the workshop only produced carts with metal wheels which cost around 100 000 Ugandan Shillings (US\$ 100). The main problems is that the workshop cannot obtain enough car springs and other raw materials.

CARE

CARE is an international non-governmental organisation. A Canadian-supported programme has been operating in West Nile for a number of years. This has run a rehabilitation programme and has been operating a community self-reliance scheme. Ox use is just one of the things communities are encouraged to try. Five field officers were trained at Ringili Demonstration Farm, and farmers have been trained to plow.

Ocoko Rehabilitation Centre

The government-run Ocoko Rehabilitation Centre trains disabled people and receives some support from the Uganda Society for Disabled Children (USDC). Their interest lies in vocational training suitable for disabled people and therefore their involvement with oxen arose from carpentry and blacksmithing workshops.

Two trained oxen were obtained from Nebbi District so that they could test the equipment they were making. The animals and equipment were found useful and are now used full time. Visitors to the centre asked if they could have their animals trained, and a programme was put into operation. The animals are brought to the centre, castrated and trained intensively for five weeks. Nose nets are used in preference to ropes. The basic charges is 45 000 Ugandan Shillings (about US\$ 45). Training initially included plowing and transport, with weeding introduced in 1994.

The centre considers carts to be the easiest thing to introduce and they have many orders for these. This is because they are the easiest way to make money with the oxen. The centre charges 70 000 Ugandan Shillings (about US\$ 70) for a cart, but the buyer provides an axle. Wooden wheels and bearings can be made, but farmers appear to want car axles.

The centre's blacksmithing workshop is making copies of the Italian plow from old car springs using metal sheets for the mouldboard. The cost is 40 000 Ugandan Shillings (about US\$ 40). They are made by hand in about four days: no welding is involved.

A wooden hooked harrow with metal tines is also produced at a cost of 10 000 Ugandan Shillings (about US\$ 10). It is hoped to make a weeder that can fit on to the plow beam, to reduce the final cost to the farmer.

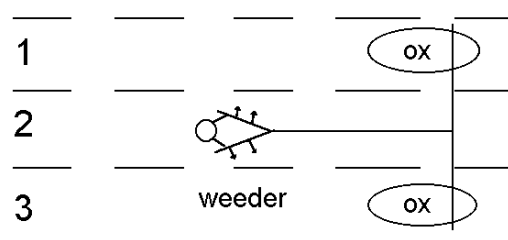
Weeding as the next stage in the development of animal traction

Although animal traction is still in its infancy in Arua District, there is interest from the farming community. Agencies involved saw weeding as a natural progression, but most had little experience in the subject, and were unsure about which methods or implements to use.

Most people seem to think weeding is a complicated, even dangerous, operation for animals. What if the animal goes off line and a whole row of crops is destroyed, or even if the animals eat the crops as they walk along? Actually, weeding is a very simple task, easy for a well-trained animal to carry out. It requires only a small amount of training.

The most important thing is that the yoke matches the crop spacing. The animals must walk down rows one and three (Figure 1), and the weeder operator in row two. One row is weeded at a time. For this to be the case the yoke width must vary according to the row spacing. Recommended row spacing varies considerably; to make things simpler, it is

Figure 1: Arrangement of oxen and weeding rows





Soya field at Ringili Demonstration Farm weeded using two oxen and a cultivator

recommended that row spacings are standardised so that only two yokes are required. These could correspond to the small and large yokes needed for plowing and carting, respectively. The recommended spacing could be, for example, 80 cm for maize, sunflowers and sorghum, and 40 cm for beans, soya bean, millet and groundnuts. This would require yokes of 220 and 140 cm, respectively.

The first weeding should be carried out when plants (maize) are 15–20 cm high, but if weeds are bad before this, weeding can be done using narrow cultivator blades at a shallow depth. If the plants are the recommended height, a weeder with wider (winged) tines can be used. These are used deeper and push some soil towards the base of the crop to smother weeds. The final stage weeding should be done when the crop is about 70 cm high and again a wider tine should be used. This acts more like a ridger and heaps soil along the base of the plants, smothering weeds, covering exposed roots, offering support against lodging and making channels to allow excess rain to run off.

With experience, animals that are used to walking in the furrow when plowing will naturally walk along the last cultivated row. They will also learn not to eat the crop, and muzzles or nose bags should not be needed.

The reasons weeding is taken up slowly is because it is totally linked to planting method. The crop must be planted in evenly spaced rows and it is this rather than the idea of weeding with animals that is the barrier to quick adoption. Weeding is often first adopted on larger more progressive farms, where the advantages of row cropping are already realised.

Ringili borrowed a *Planet Junior Cultivator* from the DFI to try out weeding. This is a fairly complicated piece of equipment, and has a variable width with a scissor-like action. The animals took to it easily and followed the rows, but because the yoke was not the correct width for the crop spacing it tended to pull towards one row. It was very quick, and the rather sceptical workers were eventually impressed with the work it did.

Problems and possible solutions

Traditional crop husbandry methods

Interest is being shown in ox plowing and transport, but weeding is more difficult to introduce as it also requires a change to row planting. Row cropping is not entirely new, as British American Tobacco and the cotton cooperatives are very careful on advising about spacing and other crop husbandry techniques.

These farmers use some of the income they generate to hire the 'union' tractor to plow their land and so far none seems to have considered using oxen.

Maize and other 'tall' crops are often planted seven or eight seeds in a pocket, with about 1.5 m between pockets. The space between is invariably filled with groundnuts or beans. Such a system is difficult to weed using oxen, but it could be a starting point to introduce row cropping and then ox weeding. The time taken to plant maize in rows would not be longer than the local method because the spacing is wider, and the intercrop could be planted after the first weeding, as maize is often planted in a rough seedbed.

For the majority of 'short' or smaller seeded crops, broadcasting is used, with the exception of groundnuts which tend to be planted in lines and dropped into pockets two at a time. This is probably due to their high value and therefore the wish to not waste seed. With some refinements, groundnut weeding may be another opportunity to start using oxen.

Other broadcast crops are planted after two diggings by hoe. The field is then harrowed by women, removing weeds and at the same time burying the seed. Before harrowing, cassava stalks may be interplanted so that the cassava continues to grow after the short-term crop. Ox weeding would be difficult in this system: it would require a complete change to the traditional method, and the desire to intercrop complicates the issue further. It is common for up to four crops to be grown together. There are advantages to this (dietary variation, pest and disease inhibition, guarantee of a harvest) but it does not lend itself to ox weeding.

Gender issues

Amongst the Lugbara people of Arua District it is normally the men who do the primary tillage. Planting is often a combined effort and then weeding and harvesting are the responsibility of the women. All animal keeping is the responsibility of men, or children, and the decision to train animals for draft use is normally the man's. Although one group sent a girl to Ringili for ox training, and other women have tried the plow, when it comes to the village situation, the men generally take over.

To change this will be difficult, and the way forward seems to be to allow men to use the oxen but to show them the need to consider weeding as well as plowing and carting. Men

generally do not weed because weeding is not done with tools. Where a hoe may be used, such as for cassava or cotton, a man may weed, but not where broadcast crops need hand weeding. Farmers who have changed to row cropping have been seen to use men for weeding with hoes, and the transition to ox weeding may not be difficult. The main change needed may be to encourage whole family participation in sowing, to enable quick row planting.

Supply of equipment

Implement supply has been a serious problem but now some local blacksmiths are able to make ox implements. The main problem is lack of a good design for a weeder. The *Planet Junior Cultivator* is adaptable and effective, but the design is difficult to copy, and would be expensive.

A simpler design with the same beam as locally-made plows would be ideal. Costs need to be kept to a minimum and a farmer could unbolt the plow frog and replace this with cultivator blades. No welding is used in these local workshops; this keeps costs down, but makes designing more difficult if a lot of extra bolts and bars are to be avoided.

All groups involved in animal traction agree that a united approach is needed for equipment design, so that standard spares can be made by local blacksmiths, who also know they have a market. Local supply is very important as outside supply is often unreliable.

Training of animals

Lack of knowledge of weeding techniques rather than lack of implements is the main reason why animal training is being ignored in Arua District. Progressive farmers who are interested in ox cultivation may be interested in other improvements to their farming, such as row cropping, and be willing to implement these changes together. This allows for easy introduction of weeding at the training sessions of the demonstration farms, after suitable experience is gained by the trainers. Animals trained to plow need little further training for weeding.

Recommendations for introducing animal-powered weeding

People involved in encouraging animal traction need to be confident about recommending animal weeding. Local people will not begin

something unless they see it demonstrated actively and can see the advantages. Training advisors need to seek training themselves, and organise a practical workshop for all trainers. Advantage should be taken of the knowledge available from experienced staff, such as those at Abi DFI.

Farmers need to be educated about the overall advantages of row cropping. They should be shown the higher yields and seed saving possibilities it offers, and also the option of mechanised weeding. It may be necessary to start with the more progressive farmers and use them as practical examples in the field. To make things simpler for all, standard row spacings of 40 and 80 cm could be recommended.

Other farmers may need encouragement to plant in rows, such as making nylon ropes available, and helping them to start with crops such as maize and groundnuts. Animal cultivation should make it possible for the land to be opened earlier so that there is plenty of time to plant the crop. If tillage does not start until the rains come, growing time may be lost and the tendency is for planting to be done in the quickest possible manner. Wealthier farmers may be able to use ox-drawn row planters. Intercropping can be done in rows and investigations should be carried out to see which crops and timings could allow for ox weeding.

Promoting agencies need to ensure there is a ready supply of attractively priced weeders available. This needs cooperation and a common design. Workshops at Ocoko and Abi DFI should then be able to produce weeders.

Different tine blades are ideal for the different stages of weeding, but in the first instance it may be best to concentrate on a single-blade type. This could be intermediate in width with short wings to be used for first and second weedings, although it may not produce as much ridging as may be desired in the second weeding. It would be unsuitable for very early weeding, as the soil cast aside may smother the small crop. A single-blade design would be simple and cheap in the first place for farmers and blacksmiths.

Conclusion

Animal traction is still in its infancy in Arua District and weeding is rarely considered. Interest in training animals is growing rapidly which will lead to more land being cultivated. This could take weeding beyond the capabilities of the women of any given family, and hired labour is not cheap. To make increased production through ox traction realistic, therefore, ox weeding cannot be ignored.

A united approach using simple, cheap machinery will be the way forward if farmers can be convinced to plant their crops in rows.