

Experience in the promotion of animal-powered weeding in Tanga Region, Tanzania

by

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Abstract

In Tanga Region in the extreme north-east of Tanzania animal traction use has been very limited. The Tanga Draft Animal Project started in 1981 with the aim of promoting agricultural production and easing transport problems in rural areas. The project did this by educating farmers about the advantages of using draft animals, supplying animals and implements, and creating the infrastructure for extension and support of draft animal technology. Animal traction was used initially for plowing and transport, and later for planting and weeding.

The first weeding training was conducted on individual farmer's fields. Field days and demonstrations on draft animal weeding, conducted at village level, were attended by all family members. Field days, demonstrations and training were intensified to attract new farmers and to improve existing farmers.

The extension approaches in the promotion of draft animal power achieved much and increased the number of trained farmers. Many implements were bought by farmers. The farmer-to-farmer exchange concept was initiated and developed. Farmers' clubs for self reliance were established. Farmers lacking cash to buy implements paid 50% in advance and received a loan for the remaining 50%.

Women carry a heavy burden in agricultural production and household activities. Involving them in animal-powered weeding reduces their work load and drudgery, and saves time for other activities. Inviting whole families to demonstrations of animal-powered technology is an effective way of ensuring women's attendance and involvement.

The promotion of animal-powered weeding will help to increase production and the area under cultivation. Adoption is expected to increase rapidly in the next few years.

Introduction

Agriculture is the main occupation of the people of Tanzania, employing more than 80% of its 24 million population. Agriculture contributes about 61% of the gross domestic product and 75% of the country's foreign earnings. Tanzania's agriculture is carried out mainly by small-scale farmers: 86% of land is cultivated by smallholders and only 14% is under large-scale cultivation (Mrema, 1984). In 1980, it was estimated that of 6.5 million hectares of arable land, 80% was cultivated by hand, 14% was cultivated using animal power and 6% with mechanical power (Shawel et al, 1987; Mrema and Hatibu, 1989).

The change from an extensive long-fallow to an intensive short-fallow farming system has offered the possibility of ox mechanisation (which is not possible in fallow rotations because of the development of networks of roots). In spite of a favourable situation for animal traction (large numbers of cattle, surplus land for expansion, government support, presence of cash crops), mechanisation levels in Tanzania are still low. Where animal traction is used it is mainly for plowing and transport, with minimal use in planting and weeding.

This paper explains how animal traction was introduced to Tanga Region, in the north east of Tanzania by the Tanga Draft Animal Project, and describes experiences with weeding using draft animals.

Draft Animal Project overview

The Tanga Draft Animal Project started in 1981 with the general aim of raising agricultural productivity and easing transport burdens in rural areas by introducing draft animals. In its first phase, the project began educating the community about the advantages and benefits of draft animals, and bought suitable animals and implements and distributed them to farmers

very cheaply. The farmers were given technical advice and training, the farmer-to-farmer exchange concept was initiated and maintained, farmers' clubs were established for self-reliance, and cooperation with Ministry of Agriculture (Kilimo) staff was formalised and maintained.

Animal traction was used initially for plowing and transport, but later for planting and weeding. Animal-powered weed control overcame weeding constraints and enabled farmers to expand fields, resulting in timely and efficient weeding and high yields.

Animal-powered weeding is likely to increase rapidly in the next few years.

Women play a major part in agricultural production and household activities, and so were involved in the use of draft animals in plowing, transport and, later, weeding. Their involvement in the use of draft animals reduced their workload and saved time for other activities (Makwanda, 1994).

Animal-powered weeding

Weeds reduce crop yields because they deprive crops of nutrients, water and light. In intensive production systems hand-hoe weeding is slow and inefficient, needs high labour inputs, and results in poor yields. On the other hand, animal-powered weeding is quicker and more efficient, and overcomes weeding constraints. It allows more land to be planted than with hand weeding, is less expensive than tractors, and results in higher yields.

In view of these advantages, draft animal farmers introduced animal powered weeding in 1988. The rate of adoption was very slow due to lack of capital to buy weeding implements. Animals used for weeding were either pairs of oxen or single donkeys; cows were not used, but female donkeys were.

Prerequisites for successful weeding by draft animals

For animal-powered weeding to be successful, several preconditions should be met, including good field preparation, appropriate yokes and harnesses, well-trained animals, planting crops in lines and with correct spacing relative to weeding yokes and harness, and the use of appropriate implements.

Field preparation involves marking off headlands from the field to facilitate turning at weeding time. The field should be plowed and

harrowed without unplowed portions and clods which can hinder penetration and cutting of the weeding implement and reduce performance. Fields should be free of trash.

Unsuitable yokes and harnesses result in difficulties in controlling the animals, crop damage and poor weeding performance. Ox yokes should be twice the row width spacing; eg, a 150 cm yoke is appropriate for weeding in rows 75 cm apart. For donkeys, a suitable breast-band harness with a 60 cm-long swingle tree is suitable for weeding at 75 cm spacing.

For successful animal-powered weeding, animals need to be trained to walk in straight lines. Training, which takes about two weeks, begins by passing the animals between rows of sticks, and progresses to walking them between rows of a short crop while muzzled.

To facilitate weeding by draft animals, crops should be planted in correctly-spaced straight lines across the slope or parallel to contours. Planting lines can be measured with a marked rope. An alternative method involves spanning a pair of oxen with a weeding yoke and connecting the chain to a plow or ridger (with the wings removed). The first furrow is made manually or with the animals. To make a second planting furrow one animal is made to walk in the previous furrow while the farmer opens the new furrow using the plow or ridger.

Depending on growth stage of the crop, type of planting (flat, ridge), soil condition and weed growth stage, the appropriate weeding implement should be used for good performance. For Tanga Region, inter-row cultivators (Cossul from India, Zimbabwe cultivator), ridgers and plows were used for weeding. These performed well, although Cossul cultivators had weak cast-iron brackets and the hillers bent easily. This discouraged a few farmers.

Ridgers were used to re-form ridges on flat land for second and third weedings. However, they were too heavy for small oxen and donkeys. Plows were used by farmers who had no cultivators or ridgers but were inefficient because three passes were necessary per row.

Animal-powered weeding operations

Weeding or cultivation involves loosening the soil between two rows of a crop. During this action weeds are cut and left on the soil surface to dry. Before the implements are used for weeding they must be set to the required depth

and width for good performance. A space of 5–6 cm should be left between the implements and each crop row.

In the actual weeding operation a pair of oxen yoked to a 150-cm yoke (twice row-width spacing) and connected to the weeding implement (set to the required depth and width) by a chain, was walked between two rows of the crop. The oxen walked on the right and left of the row in which the weeding implement was working.

When a single donkey was used, it was harnessed with a breast band and connected to the weeding implement by two traces, one on each side. The donkey walked between two crop rows and the weeding implement followed behind. Using a single animal, weeding between two crop rows was possible even when the crop was too tall for a yoked pair of oxen. Draft-animal weeding was followed by hand weeding or hoeing around the crop.

For a pair of oxen the weeding pattern involved moving along alternate sets of five rows starting from one side and ending on the other side of the field. This avoided sharp turns at the headlands. A single harnessed donkey could turn sharply, enabling working in alternate rows of crop starting from one end and finishing at the other end of the field.

Efficiency of animal-powered weeding

The rate of weeding averaged 0.4 ha every three hours, but depended on the stage of crop and weeds, the experience of animals, the experience of operator, the adjustment of weeding implement and the condition of the soil. High yields resulted when animal weeding was followed by hand weeding around the crop.

Factors which caused problems and reduced weeding efficiency included:

- planting crops down slopes: this accelerated erosion and prevented farmers from using animal weeding
- incorrect yoking relative to crop spacing: this resulted in crop damage by animal trampling
- soil that was too dry and compact, and/or had too much trash and/or too many weeds: this prevented penetration and cutting action of weeding implements
- lack of pathways big enough to allow passage of draft animals to and from the field: this prevented farmers from using the animals for weeding at the correct time.

Extension and training for animal-powered weed control

Weeding training was initially conducted on individual farmer's fields. Village level field days and demonstrations on draft animal weeding were conducted on demonstration plots. These were attended by all family members, although husbands sometimes prevented their wives from attending.

These field days and demonstrations were followed by intensive week-long courses where farmers were taught planting using draft animals, assembling, setting and adjustment of weeding implements, and procedures for animal-powered weeding.

Participants at these courses included farmers (male and female), trainers, farmers' club members and extension personnel. The course took both single-sex and mixed groups. Mixing females and males in courses encouraged women to participate fully in the course, but very few female farmers attended the courses when they were invited individually because their husbands were concerned for their safety.

More women attended field days and demonstrations that were held in their own village because entire families attended. This suggests that for women to attend courses, seminars, field days and demonstrations, all family members should be invited. The husband and/or son attend both for training and as 'bodyguards' for the wife, daughter or sister.

After these intensive weeding courses many farmers have started to use animal-powered weeding. The adoption of the technology is expected to increase through formal extension and informal diffusion.

Project achievements

The extension approaches and training in the introduction and promotion of animal draft technology in Tanga Region have achieved the following. By 1993, there were 372 active farmers, 778 active draft animals (515 oxen, 263 donkeys), 351 plows, 29 harrows, 45 cultivators, 25 ridgers and 196 carts. Of the 372 farmers, 45 are practising animal-powered weeding (19 being women). This number is very small but is expected to rise rapidly over the next few years.

There are at present 45 trainer farmers who train other farmers under farmer-to-farmer exchange. This number is expected to rise.

There are 18 farmers' clubs (four active) at the initial stage; these are expected to take over the distribution of implements and spares, providing credit to farmers, arranging training for new farmers, conducting plowing and weeding competitions, field-days and demonstrations. Eight women's groups have been established to facilitate the spread of draft animal use to women. Some 124 resident extension workers trained in animal draft technology provide advice to farmers with draft animals. Thirty farmer-based demonstration plots have been established.

Implement marketing and credit

Throughout the programme implements were supplied by the project. Since 1992, two shops have been selling a few plows and spare parts. This approach is expected to be extended to all types of implements. Farmers' club shops are being promoted to take over implement supply activity, and have started providing credit to a few farmers.

Farmers are facing major economic problems due to the relatively low price received for their crops, non-payment for crops at delivery and lack of credit. They have insufficient money to buy a package of implements. In an attempt to reduce this problem the farmers paid 50% of the price of the implement in advance and the project accepted the 50% remaining as a loan; farmer repayment so far has been fair. Farmers' clubs are expected to give credit to draft-animal farmers under this system.

Proposals for future initiatives

Implements

- research on suitable weeding implements should be carried out in cooperation with the end users (farmers) on their farms
- the cast-iron brackets and hillers of the Cossul cultivator should be strengthened
- the ridger is too heavy for normal oxen and donkeys, so the weight should be reduced.

Land use laws

In areas with a concentration of fields, farmers cultivate all the land and do not keep access pathways around the fields. This prevents other farmers from walking with animals to their own fields. It is suggested that the government should make it a legal requirement that farmers maintain access pathways to and around their fields.

Extension of animal weeding

- Animal-powered weeding should be emphasised at all agricultural colleges
- existing extension personnel should be given intensive training on draft animal weeding to make them competent
- farmers and trainer farmers should be given intensive training.

Services to draft animal farmers

Farmers should be organised to establish draft animal farmers' clubs to provide training to new farmers.

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