

Challenges to animal draft technologies in North Western Province, Zambia

by

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Abstract

North Western Province of Zambia is not a traditional cattle-keeping area. Over the last 10 years two donor-supported projects, the Integrated Rural Development Project (IRDP) and the Agricultural Development Project (ADP), have supported animal traction development by providing credit to farmers through established lending institutions within the province.

The use of animal-drawn technology became common within the IRDP Area. However, this project came to an end in December 1990. The ADP, sponsored by the International Fund for Agricultural Development (IFAD) continues. This paper discusses the approach of the ADP and suggests how it could become more effective.

Although there are many extension workers in the area, only a small proportion are trained in animal traction technology and even these can find it difficult to extend their knowledge to farmers. Extension workers should be sent on specialised courses to improve their knowledge.

There is a shortage of draft animals in the project area. Importing animals is a temporary solution. The project has set up a programme to promote small-scale privately-owned cattle-breeding centres to increase the number of animals available. The provision of credit to support these centres should be speeded-up: the IRDP succeeded because credit was an integral part of its scheme.

Tick-borne diseases are very common in the area and trypanosome infection is also widespread. A comprehensive control campaign targeting both parasites and vectors is required. This should use low-cost integrated pest management.

Recent increases in the price of seed and fertiliser have made maize less attractive as a cash crop. Farmers should be encouraged to diversify to more profitable crops such as mixed beans and groundnuts.

Introduction

The North Western Province Agricultural Development Project has been in operation since 1984. It is sponsored by International Fund for Agricultural Development (IFAD). The project area comprises the districts of Kasempa (21,100 km²), Mwinilunga (21,070 km²) and Solwezi (29,800 km²). These districts constitute 67% of the total area of the province. The project area is one of the high rainfall areas in Zambia with an annual precipitation of over 1200 mm October–April. The heavy rainfall causes considerable leaching of nutrients from the top soil. Consequently, soil acidity is an important factor limiting productivity both in the project area and the province as a whole.

In the Agricultural Development Project (ADP) area there are three major farming systems: a sorghum-based traditional subsistence shifting-cultivation system, a cassava-based traditional subsistence system and a semi-commercial farming system. All these systems depend on human labour as a source of farm power and shortage of labour was identified as a factor limiting crop production. However, increased and efficient use of animal traction may increase crop production.

During the first phase of the project that ended in 1991, there was a pilot programme to promote animal traction. However, prior to the commencement of the second phase in 1992, there were strong recommendations that animal traction should be supported fully by making credit facilities available through an existing financial institution. It was also recommended that a livestock development component of the project be established with the objective of improving livestock production in the project area.

Project approach

The role of the project is to stimulate the establishment of a viable animal traction programme in the project area. Thus conditions favouring animal traction technology will be instituted while constraints militating against the success of animal traction would be eliminated. It is envisaged that shortage of steers would be eliminated through encouraging establishment of privately-owned cattle-breeding herds.

Generally, the number of steers available for draft may not increase without improvement in the productivity of cattle. Thus effort will be made for overall improvement of cattle in the project area. To ensure survival of work oxen, an efficient animal health-care scheme will be established. For this purpose, the ADP has set up a rural veterinary drug centre and veterinary drug kits for camp extension workers through which farmers would have greater accessibility to drugs for their work oxen.

Farmer and animal training will be done by the extension wing of the Department of Agriculture. The present system of centralised training is being re-evaluated and the possibility of decentralising to the district farmer training centres or trainees' farms is being considered.

Dissemination of animal traction technologies

Extension service

Extension is defined as a professional communication intervention done by extension workers to obtain a voluntary change in the behaviour of farmers. Its role is vital to enhance adoption of animal traction technologies.

A majority of the small-scale farmers in the Province said they adopted new technology because they heard from the extension workers (Mwila, 1990). The extension worker disseminates information to increase knowledge level about an innovation and exerts influence to alter or strengthen beliefs to the point where farmers adopt the recommendations (Rodgers, 1983). Therefore, the project area needs competent extension workers who will exert their influence to cause changes in favour of animal traction technology.

There are close to 100 Camp Extension Workers in the project area but only 17 have acquired

in-service training in animal traction. Moreover, most of the extension workers find it difficult to communicate technical messages on crop production that they have been doing for a long time. Therefore, communicating technical messages on animal traction technologies which are relatively new would even be more difficult. The training background of extension workers has a bearing on their performance when they come into the field. Hence inadequate knowledge and skills in animal traction have affected the dissemination of animal traction technology in the project area.

The District agricultural engineers have been involved in dissemination through field demonstrations and the results have been very encouraging. Consequently the demand for extension has been increasing for the past four years. However, the section still needs the support of competent extension workers to do much more than has been done already. The agricultural engineering section has also been disseminating information about animal traction through publication of pamphlets and handouts to create awareness. This literature was mainly distributed during the agricultural shows at the provincial and district level. However, this method has had its limitations because of the literacy level of the majority of the target group. Effort was made to translate the literature into local languages but the impact was still very low because of the limited audience.

Communication skills

In diffusion of agricultural innovations where a change agent attempts to introduce improved technology through a particular social system such as a group or village, the communication strategies used are very important. When the Department of Agriculture introduced animal traction to the farmers, the objective was to increase labour productivity by using efficient production methods. The level of adoption that has been reached now is a result of communication methods that were used in disseminating the technology: the level of adoption is low because the message only reached a limited audience.

Operator and animal training

In the past, the majority of farmers in the project area plowed less than two hectares in a season.

Worse still, the quality of plowing was not good and this affected the crop yield because of poor root development. This can be attributed partly to poorly-trained farmers and animals. Subsequent operations like weeding were also affected because some farmers did not plant the crop in straight lines. There were incidences in the field where to carry out a weeding operation a farmer needed four helpers. This excess labour could have been better deployed elsewhere. The challenge that lies ahead is how to refine the training for both animals and farmers to improve productivity.

Adoption of animal traction technology

Adoption usually denotes the act of accepting an innovation and utilising it effectively. This is the ultimate goal of animal draft power extension activity in the project area.

The importance of the social and economic background of the farmers adopting technology cannot be underestimated. Several researchers in this field have affirmed that socio-economic problems associated with diffusion and adoption of new technology are not always inherent in the technology itself, but are a direct reflection of the social inequalities and economic disparities that already exist in the society.

Generally, in the project area wealthier farmers have been adopting the use of animal draft power more than the resource-poor farmers who have continued to use hoes in spite of their low labour output. Over the last four years there has been a rise in adoption rates of 20% and 11% in each group, respectively.

The use of animal-drawn technology became a traditional feature in the Integrated Rural Development Project (IRDP) area. This was attributed to the fact that the districts operated in a more or less homogeneous socio-economic environment. The majority of farmers in the project area at least knew the potential benefits of using animals. This is an indication that farmers in the Integrated Rural Development Project area appreciated the benefits of animal traction for their field operations. However, this has not been the case with the IFAD ADP that operates in a heterogeneous environment.

Shortage of steers

The province is generally deficient in draft animals. Worse still, for cultural reasons, the majority of farmers are unwilling to sell animals. Therefore, it has been difficult to acquire draft animals for new farmers and to replace old oxen given by IRDP project in the initial stages of the programme in 1985.

The herd that is found in Zambezi district alone may be able to meet the total animal traction requirements of the other two districts (Kabompo and Mufumbwe). Mwinilunga District also has the potential of meeting the required number of draft animals for Kasempa and Solwezi districts. However, lack of better animal husbandry practices among the farmers is another limiting factor. For instance, in Mwinilunga animals are not herded and are left alone to graze in the plains. Consequently, the majority have become semi-wild (Dipeoulu, 1994). However, farmers have begun to realise the importance of animal traction in crop production and the situation is slowly changing for the better.

Adoption may be speeded up by using the animals available within the province and supplementing with imported animals from other provinces. The ADP has set up a base to alleviate this problem by establishing a cattle breeding centre where small-scale farmers would procure breeding stock to start privately-owned breeding centres. It is envisaged that these small farms would provide a sustainable source of steers.

Animal health

Maintaining animal health requires an efficient veterinary service backed up with adequate drugs. The disease challenge posed by tick- and tsetse-borne pathogens is critical, especially for draft animals that are exposed to rigorous field conditions.

Areas infested with tsetse flies include parts of Kasempa, Mwinilunga and Mufumbwe Districts. During the livestock diagnostic study that was conducted in Kasempa and Mwinilunga it was established that tick-borne diseases are far more prevalent than trypanosomiasis. This was in complete contrast to earlier reports. With this background information, the Department of Agriculture will be better placed to advise the

lending institutions and farmers on what kind of drugs are suitable in these areas.

In Kasempa District the surveillance took place in selected livestock-producing areas which share borders with tsetse-infested areas (Dipeoulu, 1994). A sample of 144 cattle was examined and 139 had blood parasites. Of the infected cattle, 50% were infected with tick-borne parasites only, 48% had both tick-borne parasites and trypanosomes with the remaining 2% infected only with trypanosomes. In Mwinilunga District 103 cattle were examined and all were infested with blood parasites: 65% had tick-borne parasites only, 37% had both tick-borne parasites and trypanosomes, with 1% infected with trypanosomes only.

Going by these results, control of trypanosomes and tick-borne diseases is a priority. Animals which have trypanosomes in their blood and are in the pre-immunity state to tick-borne parasites are unhealthy, have low work output and ultimately low productivity. For oxen, because of the nature of their work they are more likely to suffer from exhaustion and injuries, which are inflicted during work. Furthermore, stress lowers their immunity and sub-clinical diseases are manifested. Consequently, farmers may be unable to plow their fields and transport any goods. Worse still, they will lose extra income from hiring services for plowing and transport operations.

For small-scale breeding, the long-term objective of establishing a base for making the project area self sufficient in draft animal may not be achieved, due to high calf mortality because of infections.

Farmers' use of animal traction technology

One major problem of adoption in the province and in the project area is partial- or non-adoption of the recommended technology.

Some farmers have adopted the technology for plowing, while other major operations like weeding are still done using hand hoes. Other farmers have not adopted animal-drawn technology at all because of the high initial capital investment. Still other farmers have the desire to adopt the technology but scarcity of animals and implements have prevented it. In extreme cases, some farmers lack knowledge or conviction of the benefits of using the new technology for crop production and transportation.

Farmers' use of animal traction is also affected by incompatibility of cultivation practices. Animal traction is not commonly used even in areas like Mwinilunga with a tradition of cattle keeping. This is a result of traditional cropping and land preparation methods such as mounding which is used in the cassava-based farming system. In mounding, a piece of land is cleared of its grass and small branches which are heaped together and covered with soil until a considerable heap is achieved. Sometimes the soil is upturned together with the grass and small shrubs to make a heap. The mounds are usually prepared randomly and are not usually in a straight line. Mounding is meant to improve soil fertility by incorporating organic matter. Mound-making may be difficult to achieve using animal-drawn implements.

Lack of profitable cash crops

Maize is the major cash crop cultivated in the project area. The crop has been promoted heavily through the extension system. Production of hybrid maize is reliant on use of fertiliser and certified seed. Recent increases in the price of seed and fertiliser, and liberalised marketing arrangements have made it less attractive economically hence the urgent need to diversify to more attractive cash crops that will help farmers to meet their credit obligations.

Lack of implements and spares

Since the North Western Cooperative Union (NWCU) started having liquidity problems, the lack of profitable cash crops has meant that availability of implements for various field operations and spares has been a problem. Zambia Cooperative Federation (ZCF) finance services assumed the responsibility with financial assistance from the German Agency for Technical Cooperation (GTZ), but has not been effective. The federation has concentrated more on fulfilling needs of their clients than providing services to develop animal traction technologies in the project area. As a result, scarcity of animal-drawn implements and spares has continued. It is therefore difficult to recommend implements to farmers as they are unobtainable locally in the province. This situation may have a negative effect on the adoption of the technology in the foreseeable future. The only hope is in the establishment of private hardware shops. However these are not developing rapidly.

It can therefore be said that institutional incapacity generally limits and hampers development and adoption of animal traction in the project area.

Inadequate credit

Agricultural credit, irrespective of the source, is a necessary input within the agricultural sector. Credit is often a key element in modernising agriculture. It does not only alleviate the financial constraints faced by farmers, but also accelerates the adoption of new technology, in this case animal traction, by enabling farmers to purchase inputs.

However, credit is not the only requirement for increasing agricultural output. For it to have the success desired, complementary services such as an effective extension system must be addressed adequately.

For animal traction to be adopted or enhanced requires that the risks of farming are reduced and essentials like input supply, credit and marketing should be in place.

For a long time, North Western Province has had a problem of late input delivery and very unreliable marketing. In this province there are five lending institutions namely Barclays, National Commercial Bank, Lima Bank, Credit Union and Savings Association (CUSA) and ZCF. However, only CUSA, Lima Bank and ZCF provide credit facilities for oxen. CUSA administers the credit facility on behalf of IFAD in the project area. This implies that only farmers in the project area have access to this loan facility.

Although few farmers can afford to raise money to spend on this new technology, the organisation has 143 pending applications and every month additional enquiries are being received. This rise in demand is attributed to the fact that tractor mechanisation is completely out of their reach and animal traction has become economically attractive even with the high risk involved.

The IRDP succeeded because credit was an integral part of the scheme and played an important role in establishing a firm foundation for the programme where no animals existed, as in some areas of Mufumbwe and Kabompo districts.

The possibility of adding an insurance fee to the existing ox-loan package should be further

explored, so that farmers do not lose out when the animals die from disease.

Recommendations and conclusions

Farming systems

Introduction of animal traction into these farming systems requires thorough research, planning and a full understanding of the local farming system and its implications. The project should try to teach farmers how to incorporate draft animals into their farming system to raise and expand productivity.

Mechanical skills

Mechanical weeding saves time and money, but few farmers or ox owners have mastered the technique. This is because it requires more skill and training than plowing and, in most cases, farmers usually do not have appropriate implements. Another important fact is that if farmers expand their cultivated areas, more labour is required. Since acquiring labour for weeding is one of the most serious bottlenecks, farmers may not weed their expanded farms. It has thus become important to teach farmers mechanical weeding skills so that they will not have to depend on hired casual labour and will be able to manage larger farms. The project should also procure training equipment to enable agricultural engineering staff to teach mechanical skills to farmers.

Training for extension workers

Vigorous in-service training for village-level extension workers would enable them to address farmers' problems adequately in the field. The knowledge acquired from colleges gives them basic knowledge but not enough to be applied in real field situations. The agricultural sector, like any other industry is changing. Hence the need to have extension workers who are adequately prepared to meet new challenges in a changing working environment.

In order to disseminate this technology effectively in the project area, the project should send some extension workers to attend specially tailored courses at the Palabana Animal Draft Power Training Centre. Although the Palabana Animal Draft Power Project has been offering training to extension workers throughout Zambia it cannot train all of them as funds are limited. Hence the need for projects like the ADP to train the extension workers in the project area.

Animal health

The control of trypanosomes and tick-borne diseases

The control of trypanosomes and tick-borne diseases in both Kasempa and Mwinilunga should be based on a comprehensive control campaign comprising pre-control and control action. In pre-control campaigns, awareness meetings with livestock farmers where the surveillance survey was held should be conducted. This is meant to inform farmers on the current situation in their area. Control campaign activities would focus on the control of the blood parasites and the vectors.

Control of blood parasites

This would be effected through a one-time curative treatment. Emphasis would be on the oxen because of their movement to and from tsetse-infested areas for plowing and transportation. This approach will be multidisciplinary involving the rural veterinary drug centre, and the extension service through block and camp workers. Farmers will have to pay for the drugs.

Control of vectors

Tsetse control will be done by setting up traps and targets, while tick control will be achieved through use of low-cost integrated tick management.

Holding facilities

Concerted efforts should be made to domesticate the existing semi-wild animals in Mwinilunga by construction of paddocks because relying on imports from other provinces will not solve the shortage of steers in the project area.

Small-scale breeding

Speeding up provision of production loans for smallholder cattle breeding will, in the long term, reduce the shortage of draft animals. Otherwise, for the next ten years or so, the province will continue to rely on imports.

The current cost of draft animals from the breeding centre in Solwezi is high, and as a result

it has become difficult for resource-poor farmers to have access to this technology. Therefore, encouraging widespread breeding will lower the price of animals in the long term.

North Western Province (including the project area) is in a high rainfall area and this creates numerous perennial streams and *dambos* (wetlands) which are suitable for grazing almost the whole year, making it possible to produce livestock with little or no feed supplementation.

The fact that many farmers in the province, including the project area, are not cattle keepers is an advantage for livestock production, because in many traditional livestock farming communities of Africa, there has been strong resistance to change from traditional to improved livestock production methods. This resistance is likely to be weak in the project area, creating an opportunity to introduce improved production techniques to farmers who have no traditional alternatives. This also applies to utilisation of implements in areas where animal traction has a long history. In these areas farmers tend to remove the hitch assembly from plows to make it 'work better'.

Cash crops

The current cash crops being grown in the project area are not profitable in the present economic environment. Hence the urgent need to encourage farmers to diversify to more profitable cash crops like mixed beans and groundnuts. This may help farmers raise enough income to be able to meet credit obligations.

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