

# A note on improving the profitability of a large-scale commercial farm in Zambia through the use of oxen

by

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## Abstract

*This brief paper gives information on the use of oxen on a commercial farm in Zambia. About 40 pairs of oxen are profitably employed and provide year-round, low-cost on-farm transport for little management effort. By using oxen, the farm saves at least 15 000 litres of diesel fuel each year. Although oxen have been used for various cultivation operations, lack of suitable equipment and need for speed and timeliness hinder the prospects for expanding these areas. Personal observations are presented concerning limiting factors and areas that can be expanded.*

## Introduction

My father farmed in Zimbabwe, and until 1960 he used oxen for the majority of his farm work there. During the period 1960 to 1964 he had one tractor but continued to use oxen. In 1965 he bought the farm in the Southern Province of Zambia that I am now managing. At that time the farm was tractor-oriented and had no working teams of oxen. It had always been my father's intention to reintroduce oxen but his deportation in 1975 put a stop to his plans. Partly as a result of his wishes and partly through the interest in appropriate technology that I acquired at university, I was determined to restart using oxen on the farm.

In 1978, I used my father's idea of an animal-drawn wheeled toolbar or forecart to act as the drawbar to which a four-wheel four-tonne tractor trailer could be attached. This would allow a quick interchange between oxen and tractors should the need arise. In my ignorance we started with a team of six raw oxen and inexperienced ox drivers. It was a near disaster, for the inexperienced oxen destroyed several gates. Steering six oxen was difficult on the curved reaping roads in the tobacco fields and in the narrow alleyways between barns. Since then we have made some progress and now use about 40 pairs of oxen on the farm.

## Appropriate technologies

New Venture Farm has many appropriate technologies, some simple, some complicated. For example, this paper was prepared on one computer

while a second computer processed farm data. The farm has tractors, mains electricity, sprinkler irrigation, a workshop and lathe and a continuous tobacco curing process using forced-air. Thus the farm may be considered a "high technology" one by Zambian standards. Some people think it strange to see oxen working on such a farm.

The main and most successful use of oxen has been for transport. Two labourers are used with each set of oxen, one to drive and one to lead (the leader is useful when negotiating tight turns or when walking among valuable tobacco plants). Pairs of oxen pull a disselboom (shaft) that fits into a socket on the four-wheel trailers. They generally manage loads of 3 tonnes for distances of up to 15 km. On slopes steeper than about 4%, a second team may be connected to help them up the hill.

Smaller, two-wheel "scotch carts" are used to transport molasses to cattle, sand to builders and water to sprayers operating in the fields. Other animal-powered farm operations tried have included:

- raking hay using a four-wheel Vicon side-delivery rake
- heaping hay using a buck rake
- cultivating tobacco using a single-row "pot-holer" which leaves tied ridges to catch the rain
- spraying herbicide when the land was too wet for tractors. The oxen pulled a four-row boom on wheels, a pressurised 200 litre drum and a foot pump to boost pressure at each headland
- plowing fireguard strips
- pulling logs off newly cleared land.

However, the problem is that all these jobs tend to be very seasonal, and they require a great deal of investment in time, oxen and equipment in order to get the jobs done. On the other hand, ox use for transport is quite constant during the year.

Another large job for oxen is likely to be the levelling of termite mounds using scoops. With irrigation, the soil can be made suitably soft throughout the year, and the farm has enough mounds to keep several teams working every day for many years.



Photo: Bruce Danckwerts

*Tied-ridging tobacco on New Venture Farm using an ox-drawn implement developed by Bruce Danckwerts*



Photo: Bruce Danckwerts

*Tobacco field with tied-ridges or "pot-holes" made by draft animals on New Venture Farm, Zambia*

## Economic considerations

Farm analyses show that a large proportion (40%) of farm fuel is used on transport. In 1991, the farm spent 3045 labour days on ox use (mainly for transport) which at about 80 Kwacha per labour day came to 243 600 Kwacha (US\$ 1 ≈ 90 Kwacha in 1991).

A team of oxen saves the farm at least 10 litres of diesel fuel per day. For example, at harvest the teams each carry four 3-tonne loads of tobacco a day. They travel 7 km laden and 7 km empty. Most tractors would use at least 10 litres for such haulage work. At 70 Kwacha per litre saved (costed by the farm at double purchase price to cover wear and tear on tractors) farm fuel savings of 10 litres per team work day add up to just over one million Kwacha a year. As two people are used per team day, this represents about 800 000 Kwacha net savings.

Productivity is quite high as the ox team workers are more prepared to assist with cart loading than are tractor drivers. They also cause less equipment wear and tear and damage (unlike tractors and pick-ups, ox carts generally stop when there is a flat tyre or other problem).

Furthermore, the oxen appreciate in value: old oxen that are retired have a resale value higher (in real terms) than they had when they started training.

*Tied-ridging tobacco on New Venture Farm using an ox-drawn implement developed by Bruce Danckwerts*



Photo: Bruce Danckwerts

Oxen are easily available and require very little management. The farm would probably not gain a lot by improving the harnessing system (using simple yokes) or feeding system (which is basic grazing plus some molasses in the winter when the breeding cows are supplemented). Donkeys, mules and horses are not readily available in southern Zambia and it is unlikely to be worth the effort to breed animals specifically for draft purposes.

## Conclusions

Oxen can and should play a part on most large-scale commercial farms in Africa. Transport is the easiest job to allocate to oxen as the tractor implements (four-wheel trailers) are easily adapted to oxen. Transport is also a job which does not require any auxiliary drives from a power source and is in fairly constant demand throughout the year. Ox-pulled carts are the nearest thing available to reliable, low-cost, low-management transport for commercial farmers in Zambia.

Many other jobs can be given to oxen but the implements would have to be specially bought (or made) and would have to be bought in sufficient quantities to allow the job to be done within the time available. Finding suitable equipment is a problem for commercial farmers: the ox plows most commonly available in Zambia would not be able to plow to the standard normally required for commercial tobacco production.

It is not realistic for a commercial farm to train and maintain oxen unless they can be used regularly during the year. It is not sufficient to identify one short-term cultivation operation a year that could be carried out by oxen: it is better to select several jobs that can keep the oxen occupied during much of the year. However, if oxen can be used mainly for transport, it may be possible to give them some additional short-duration jobs.