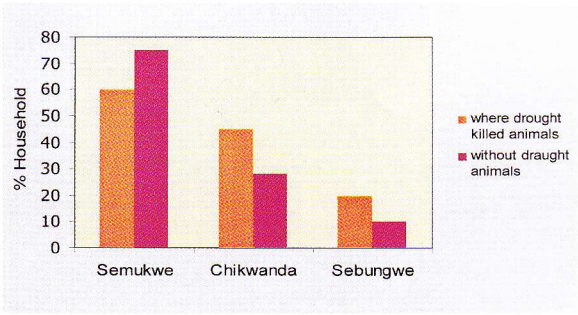
Appropriate Tillage Implements for Donkeys – Beasts of Burden for the Poor

As well as highlighting the importance of the donkey to the poor and outlining best practice guidelines for donkey management, a modified plough for use specifically by donkeys and lightweight cattle was developed. Information and practical techniques on alleviating constraints limiting the use of draught animals in semi-arid areas are especially useful for smallholders, extension workers and researchers.

Background

A shortage of draught animal power (DAP) is recognised as one of the principal constraints to increased crop production in communal areas farmed by the poor in sub-Saharan Africa. This situation was made more acute by the serious droughts in southern Africa between 1992 and 1994 when many cattle and donkeys died. DAP shortages impact upon livelihoods because the area of land which can be cultivated is reduced. The scope for intervention to alleviate these constraints is either through increased supply of DAP (more animals, improved nutrition and health, and management and use of alternative animals) or reduced demand for draught power (use of improved implements and reduced tillage practices).

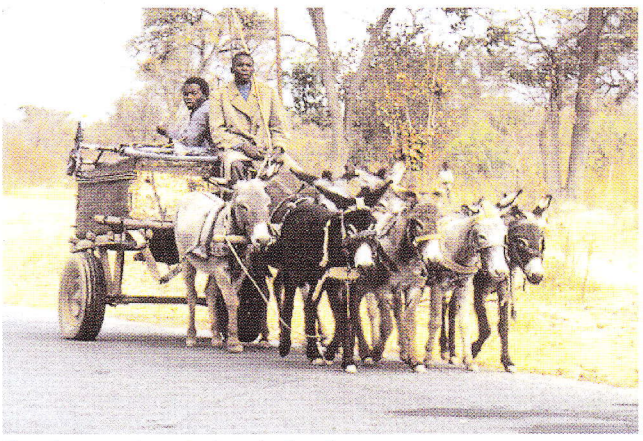


In Semukwe in Zimbabwe, where donkeys provide most of the draught power, 60% of households lost animals in the drought, but even more (75%) were left without access to work animals

Research highlights

This research project identified and characterised target groups of farmers. Female-headed households, poor households and young farming families invariably have inadequate access to DAP – animals become available only after owners have completed their own field operations. This delay in access to DAP means the poor are often late in ploughing and planting, leading to reduced yields. The crucial importance of donkeys to the livelihood of the poor communities in semi-arid areas has been highlighted in this project. Donkeys are already used for transport and secondary tillage. However, high mortality rates amongst cattle during the droughts have resulted in increased use of donkeys for heavier tillage operations such as ploughing – a task previously assumed to be the exclusive domain of draught cattle.

Donkeys are capable of ploughing a number of different soil types providing there are at least four animals to make up a team. The heavier the combined weight of the team the better. Where farmers cannot make up teams of all donkeys or all cattle, mixed-species teams can also function effectively. Donkeys can cope well with work requiring a sustained draught force of 13–16% of their live weight. A single donkey used for tillage operations, such as ridging, harrowing, cultivating and ripping, is required to pull with an average draught force equivalent to 20–37% of live weight. This amount of effort can be maintained for only short



Poor farmers rely on donkeys for draught power.

Silsoe Research Institute
Silsoe, UK
J. Ellis-Jones, D.H. O'Neill

Centre for Tropical Veterinary Medicine, University of Edinburgh
Roslin, UK
R.A. Pearson

University of Zimbabwe
Harare, Zimbabwe
L.R. Ndlovu

Livestock Development Trust
Harare, Zimbabwe
F. Muvirimi

Department of Research and Specialist Services
Harare, Zimbabwe
E.M. Nengomasha

Institute of Agricultural Engineering (IAE)/AGRITEX Dept. of Agricultural Technical Services
Harare, Zimbabwe
E. Mbanje, P. Msara

Project completed in 1997

periods. It is recommended that at least a pair of donkeys be used for these tasks.

Tillage implement designs and practices that are more suitable for use by smaller draught animals, particularly donkeys, were developed. A wide range of Zimbabwean and 'imported' tillage implements was tested, and a database is now available holding design and performance data for all these implements. A traditional plough has been modified for use by teams of donkeys and small cattle following a need identified by the project. Farmers tested this modified design which is now in widespread use as a plough and cultivator.

Uptake

Partnerships between farmers, extensionists, researchers and a local agricultural engineering company were formed during the early stages of the project. Synergistic relations between the key stakeholders assisted rapid development of a lightweight plough that was in commercial manufacture within the lifetime of the project. Sales figures from Zimplow, the company making the plough, indicate successful uptake by sectors of the farming community that have access to donkeys or small cattle, i.e. poorer households.

The positive impact of this project can be attributed to adopting a systems approach to the research which resulted in precise definition of farmers' needs, and to link-ups with the private sector that ensured effective promotion of outputs beyond the life of the project.

Linkages

Continuity of activities in Zimbabwe has been achieved through training a cadre of national experts in DAP research, many of whom are active contributors to regional DAP scientific networks in Africa. Zimplow continues to manufacture and sell the lightweight plough with sales now occurring throughout southern Africa.

One of the most important achievements has been highlighting the importance of the donkey. Until recently, this much maligned but ubiquitous animal had received pitifully little attention as the preferred beast of burden of the poor. More work is required on nutrition, health and management – including harnessing – in order to improve the work potential and welfare of this neglected animal. Promotion of further donkey research will be achieved by channelling published findings through local and regional networks such as the Animal Power Network for Zimbabwe (APNEZ) and the Animal Traction Network for Eastern and Southern Africa (ATNESA).

The Livestock Production Programme continues to fund research on the contribution of the donkey and the horse to the livelihoods of the poor in Ethiopia (R7350) and Bolivia (R6970: *Improved management and use of draught animals in Bolivia*).

Relevance to sustainable livelihoods

Donkeys are the preferred draught animal especially in very low rainfall areas because they are hardy, versatile and survive drought situations better than cattle. As such they play a key role in supporting livelihoods through provision of draught (for transport of food, firewood, water) and cropping activities. While oxen may be preferred for ploughing, donkeys are preferred for transport. However, shortages of cattle mean that donkeys are also used for ploughing, with the poorest households often sharing animals to make up 'spans'. The lighter plough, developed by the project, is now being widely purchased by poorer households for use with both donkeys and small cattle. This light plough is helping to make more effective and humane use of donkeys for the benefit of poor rural communities.

Selected project publications

- Ellis-Jones, J., Ndlovu, L.R., Pearson, R.A. and O'Neill, D.H. (Eds.) (1997) Proceedings of a Workshop on Improving the Productivity of Draught Animal Power in Sub-Saharan Africa. 26–27 February, Harare, Zimbabwe. (unpublished).

- Nengomasha, E.M. (1997) The donkey (*Equus asinus*) as a draught animal in smallholder farming areas of the semi-arid regions of Zimbabwe. PhD Thesis, University of Edinburgh.

- Nengomasha, E.M., Pearson, R.A. and Smith, T. (1999) The donkey as a draught power resource in smallholder farming in semi-arid western Zimbabwe. 1. Liveweight and food and water requirements. 2. Performance compared with that of cattle when ploughing on different soil types using two plough types. *Animal Science,* **69**: 297–304; 305–312.

For further information on the Programme contact:
The Programme Manager
Livestock Production Programme
NR International Ltd., Pembroke
Chatham Maritime, Kent ME4 4NN
<j.i.richards@gre.ac.uk>

DFID Department for International Development

This Project Summary is an output from the Livestock Production Programme funded by the United Kingdom's Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

LPP