



that they are continuously working with a relatively inexperienced pair of oxen. This may adversely affect ease of handling as well as the quality and speed of working of the oxen.

Feeding draught animals is generally the responsibility of male family members in the communities – women and children feed the small livestock. Forage oats are commonly grown by farmers that own livestock and may be fed to oxen during the working period. However, for the remainder of the year, animals feed only on the available natural pasture or on crop residues from cereal and legume crops.

Although severe health problems in work animals are not common in any of the communities that were studied, change from drier to wetter seasons occasionally brings outbreaks of foot-and-mouth disease in cattle, and angina and colic in equids. Internal parasites, seasonal mineral deficiencies, foot rot and excessive hoof growth are also reported. Most of these problems respond to improvements in general management. Sporadic vaccination campaigns are carried out by NGOs but veterinary care is virtually non-existent due to a general lack of knowledge of medications and treatments, difficult access to sources and high costs. Recent importations of draught oxen from the Bolivian tropical lowlands are worrying as they may lead to exotic pathogens and vectors becoming established in the mild climates of the lower-altitude valleys.

### Uptake

The current study was essentially a diagnostic exercise. Its main impacts

are, therefore, likely to be realised through the implementation of further project work based on its recommendations (see below). However, project findings have already been actively disseminated to, and have been well received by, other workers interested in the development of DAP at an applied level. This has included workshop presentations in Latin America and beyond. The findings of the study are likely to influence a wide range of future activities, in research and in development, including much that lies beyond the direct scope of the DFID-sponsored research.

### Linkages

The findings of this preparatory project led to the development of Livestock Production Programme Project R6970: Management and use of draught equines by poor crop/livestock farmers which started in April 1997. Another project on a practical decision support tool to improve the feed management of ruminant work animals: helping extension services to deliver science to farmers (R7376) began two years later. Thus, participatory methodologies are being used to select and evaluate appropriate technologies and management strategies to alleviate constraints related to: (a) husbandry of work animals (animal health, feeding, diversification of animal use and animal housing); (b) implements (transport, soil cultivation, seeding, weeding and harvesting); and (c) soil and water conservation (equipment and practices linked to fodder production). These follow-up projects are using the collaborative institutional framework that was established during the preparatory phase described here.

### Relevance to sustainable livelihoods

Draught animals continue to make a significant contribution to the livelihoods of the poor in many rural and urban economies. In fields that are difficult for tractors, such as terraced or steep hillsides, and on farms where the scale of the enterprise and incomes from it do not justify the purchase of a tractor, animal power is the only alternative to laborious hand cultivation. Moreover, animals that are used to provide DAP can be used flexibly to generate income at times of year when they are not required for draught purposes.

### Selected project publications

- Dijkman, J.T., Sims, B.G. and Zambrana, L. (1999) Availability and use of work animals in the middle Andean hill-farming systems of Bolivia. *Livestock Research for Rural Development*, 11: 13 pp.
- Dijkman, J.T. and Sims, B.G. (2000) From beast of burden to multi-purpose power source: challenges for the use of donkeys in Bolivia. pp. 228–232. In *Donkeys, people and development*. Strakey, P. and Fielding, D. (Eds.) available through the website <http://www.atnesa.org>. It is available as resource book of Animal Traction Network for Eastern and Southern Africa (ATNESA) published by ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands.

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