

Final Technical Report

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USE AND MANAGEMENT OF DONKEYS BY POOR SOCIETIES IN PERI-URBAN AREAS OF ETHIOPIA



Compiled by
Dr D Smith
Centre for Tropical Veterinary Medicine
Easter Bush
Roslin
Midlothian
Edinburgh
EH25 9RG

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Executive Summary

The purpose of the project was to improve the livelihoods of peri-urban donkey users by identifying appropriate interventions and dissemination pathways that would increase donkey ownership and work performance.

A multidisciplinary group of scientists worked with donkey users and development agents in peri-urban areas of Ethiopia. They investigated means of tackling the husbandry problems (identified by donkey users in phase I of the project) that limit the earning capacity of donkey owners. Longitudinal monitoring of seasonal changes in earning capacity, parasite burden, sores, body condition, and reproductive wastage were carried out. This helped identify the need for, and timing of, interventions to reduce the incidence of the major problems (thin animals, sores and poor reproductive capacity) in different areas. Quantitative effects of interventions including strategic use of local feed supplements, anthelmintic treatment and modified harness designs were tested, and extension messages developed.

Key findings from the anthelmintic and feeding studies were:

1. A body condition score of 4 (on a scale of one to nine) was identified as practical threshold value for therapeutic treatment with anthelmintic. Worm egg counts were strongly negatively correlated with body condition score.
2. In all three agro-ecological zones in which studies took place there were seasonal peaks of worm egg production; infestation only reached severe levels (>1500 epg) in late July, August and September.
3. Most donkeys had moderate worm burdens and were capable of sustaining normal blood parameters at these levels.
4. When applied singly intensive prophylactic anthelmintic treatment or feed supplementation of in-foal female donkeys and their offspring had no significant effect on dam live weight gain, foal live weight at weaning or foal survival to weaning.
5. When combined together intensive anthelmintic treatment and feed supplementation resulted in significant increases live weight gains of dams and their offspring, and foal survival.
6. Intensive anthelmintic treatment succeeded in depressing worm egg production for at least six months after the final treatment in at least one of the areas studied.
7. Occasional anthelmintic treatment may promote resilience of donkeys to worm infections (i.e. some repair of the pathophysiological consequences of parasites), but for animals in moderate condition there is likely to be little visible impact in terms of live weight or body condition; the same is true for occasional feed supplementation. This has important consequences when extension services are promoting the use of anthelmintic or feed supplementation.

Harnesses were developed from locally available materials. Donkey owners expressed enthusiasm for the innovative harnesses but studies to measure the quantitative impact of saddle sores in donkeys were not complete at the time of writing this report.

The impact of donkey ownership and the effect of access to donkey health care on household livelihoods were investigated in cooperation with local non-government organisations and a set of locally validated livelihood indicators was developed from these studies. Target groups for extension messages were identified along with donkey user's attitudes with regard to source and form of extension message. Bilingual comic (Wambui type) booklets were produced which formed part of an awareness raising package. The pictures in these booklets incorporated the locally validated livelihood indicators developed in previous studies, providing illiterate users with subliminal cues to the potential livelihood benefits of improved donkey husbandry. Work in Kenya was carried out in collaboration with KENDAT, a local NGO, to produce magazine type radio programmes in a local language (Kikuyu). These programmes were tailored to appeal to young male donkey users who were found to be the main perpetrators of donkey abuse. Radio programmes were not developed in Ethiopia because currently there are no private local radio stations.

The project contributed to DFID's development goals by generating applications of new knowledge on the marketing and processing of livestock products in peri-urban production systems that would directly benefit poor people. In particular, the project generated knowledge on pathways-out-of-poverty for the poorest sectors of peri-urban communities. The project demonstrated that increased ownership or improved work output of donkeys had at least five potential impacts on household livelihoods:

1. Increased marketing opportunity for perishable, high value products such as milk or vegetables, in terms of load capacity, access to more distant markets and timeliness of delivery.
2. Reduction in household expenditure because large quantities of staple foodstuffs and farm inputs could be bought and transported at a lower unit cost.
3. Diversification or intensification of household activities, providing extra income.
4. Reduction in the work burden of women and girls because tasks that utilise intermediate means of transport (such as donkeys) are usually allocated to males.
5. Reduction in workloads within female-headed households, because greater loads can be carried by donkeys than by head-loading, reducing both the physical and time demands of daily household chores such as water carrying, collecting fire wood or shopping at markets.

Further work is required to consolidate research findings and to develop dissemination materials from this project's outputs. At the time that project activities were finalised in Ethiopia considerable momentum within the senior management team of the Ethiopian Agricultural Research Organisations had been generated. In order to capitalise on this new found enthusiasm for working equines it is important that the work of the Ethiopian collaborators on this project continue to benefit from the support of DFID.

Background

The results from Phase 1 of the project confirmed the initial premise of the project, that use of donkeys for transport provides a means by which poorer members of society can generate income to support or improve their livelihoods. In urban areas income from four working donkeys was reported to be the same as that from one taxi. Many livestock owners in the rural fringes, when asked to rank their animals in order of economic importance, regarded donkeys as second only to oxen.

The main husbandry problems identified were a high incidence of harness and saddle sores, a low production of 'follower' replacements by female donkeys in rural areas and donkeys were too thin and lightweight. Donkeys showed wide variation in body condition and some users reported their animals did not respond to extra feeding when it was available, suggesting a need for anthelmintic treatment.

Project Purpose

The purpose of this project was to identify, test and promote practical recommendations to improve income generation of donkey users and the health and welfare of donkeys in peri-urban areas.

Phase II of the project addressed the constraints to increased donkey ownership and improved work output by carrying out participatory research in three peri-urban communities of Ethiopia. This process resulted in the development of locally validated interventions, the production of appropriate extension materials and the identification pathways-out-of-poverty that could be adopted by locally based NGOs.

Research Activities

Activity 1. Longitudinal monitoring of seasonal changes to establish the need for and timing of practical management interventions

Rationale

Saddle sores and harness sores besides being painful to the animal can reduce work performance, predispose animals to secondary infections, and reduce working life. Longitudinal monitoring of seasonal changes in earning capacity, management, body condition, parasite burden and incidence of sores and injuries in pack donkeys helped identify the need for and timing of practical management interventions.

Facilities, expertise and special resources

Laboratory facilities at Holetta Research Station were used to analyse the faecal samples. International Donkey Protection Trust (IDPT) facilities were used to help train a veterinary graduate in helminthological techniques. Two Ethiopian veterinarians were trained in advanced helminthological and post-mortem techniques at the Mordun Research Institute, Scotland and the Donkey Sanctuary, Devon.

Modification of proposed research activities

No major modifications of the originally planned research activities took place.

Achievement of planned inputs

Activity 1 was completed in January 2003 approximately 6 months behind schedule. The reason for this delay was due to administrative delays in employing a veterinary graduate.

The planned inputs for Activity 1 were eventually achieved despite one of the newly trained senior veterinarians absconding on the way back to Ethiopia and the untimely death of the project leader at the Debra Zeit research station.

Activity 1.1

Produce and disseminate charts showing seasonal changes in earning capacity, burden of selected parasites, sores and body condition (Annex 1.1).

Objectives

Donkey owners can often not afford to routinely worm their animals every 6 – 8 weeks as recommended by the manufacturers of anthelmintics. The aim of this activity was to identify periods of the year when donkeys were most at risk of developing clinically significant worm burdens in three agro-ecological zones of Ethiopia. Furthermore, the study set out to identify periods of the year when donkey owners were most likely to be able to afford to buy anthelmintics.

Methodology

The study was conducted in three regions of central Ethiopia representing different agro-ecological zones (Holetta – mixed cropping-livestock, high altitude, high rain fall; Debre Zeit – mixed cropping-livestock, moderate altitude, medium rainfall; and Adami Tulu – agro-pastoral, low altitude, low rain fall). Data was collected from donkeys and their owners at weekly markets held at three woredas (equivalent to parishes or wards) within each agro-ecological zone. Systematic random sampling was used to select survey participants; every tenth donkey owner that arrived at the market was invited to participate. A total of 937 donkey owners were interviewed (28%, 38%, and 34% from Holetta, Debra Zeit and Admi Tulu respectively).

Donkey owners were interviewed to determine their animal's age, sex and the distance it had travelled. Socio-economic data of the owner (family details, employment livelihood indicators) were also collected. Enumerators recorded the weight and type of load each donkey was carrying along with body condition score (according to the method described by Pearson and Ouassat, 2000), body length and height. Animal health professionals carried out a brief clinical examination of each animal.

After assessing the physical condition of each donkey faecal samples were collected directly from the rectum. Gross examination of the faecal samples was carried out in the field and the incidence of adult parasites such as *Anoplocephala spp.*, *Trichonema spp.*, *Gastrophilus spp.* and *Oxyuris equi* was recorded. On return to the laboratory quantitative and qualitative faecal egg examinations were done employing the modified Mc-Master method (Kassai, 1999). A modified Baermann technique was used to ascertain the occurrence of lungworm infection in a fresh sample (Margaret *et al.*, 1994). In addition ova culture was carried out during the wet season for specific identification and quantification of gut helminths. Identification of larvae (L3) was based on specific morphological traits set by Poynter, (1969). The helminth study was supported by standard and thorough post-mortem examination of two young and two adult donkeys from each agro ecological zone. Post-mortem worm examination was conducted in accordance with standard procedures and techniques.

Activity 1.2

Identify the need for and timing of practical management interventions (Annex 1.2).

Objectives

- i. Analysis data from Activity 1.1 and develop strategic sustainable health and management interventions
- ii. Produce dissemination materials according to stakeholder preference for extension messages derived from Activity 5.

Methodology

Longitudinal distribution of worm egg counts and seasonal variation in body condition score were correlated to identify the periods in the year when anthelmintic treatment of donkeys would be most efficacious, in order to minimise household expenditure on drugs but still to have a significant impact on donkey health.

The findings were disseminated to the extension department of the Ethiopian Ministry of Agriculture and to the International Donkey Protection Trust in order that they could be incorporated into future publications. The findings were also incorporated into the Wambui bilingual comic strips (Annex 1.2) and into radio magazine programmes. The scientific findings were submitted for publication in International Scientific Journals.

Activity 2. Assess potential impact of harness and saddle design improvements on donkey health and welfare.

Rationale

A key constraint to improved work performance in donkeys identified by donkey users in phase I, was the prevalence of back wounds and harness sores. The cause of these wounds results from overloading and poor harnessing equipment¹ but is exacerbated by poor body condition of the donkeys resulting from poor feeding and ill health.

Activity 2 addressed this concern of stakeholders firstly by surveying the existing systems of harness design in an attempt to identify best indigenous practice then developing improved harnesses using locally available and affordable materials. Also incorporated in this activity was an attempt to raise awareness of the principals of good harness design so that stakeholders could use these ideas when carrying out harness repairs or producing their own tack.

This activity went on to investigate the best way of delivering improved technology and knowledge to the stakeholders, comparing technology transfer models with more participatory awareness raising models.

Dissemination materials were developed that were aimed at illiterate donkey owners. These formed part of an extension package that included farmer workshops, printed support material and follow-up extension visits by village based extension agents.

Facilities, expertise and special resources

Workshop activities were carried out at Holetta and Adami Tulu. Saddle making was carried out by the IDPT and the Kenya Society for the Protection and Care of Animals (KSPCA).

Fred Ochieng from Kenyan Draft Animal Technology (KENDAT) was employed as a regional consultant to provide technical advice on community based development to senior staff in Ethiopia. Two ILPH trained saddlers from KSPCA were employed to teach basic saddling skills to donkey users at the two workshops.

Modification of proposed research activities

No major modification took place since the final project memorandum was agreed with NR International in October 2001 after the completion of the Phase I workshop.

Achievement of planned inputs

Activity 2 was not completed at the time of writing in June 2004. Workshops and training days had been delayed because of the late delivery of harnesses. Further delays occurred after the workshops because

¹ The term harnessing in this document refers to any equipment that is used to apply or secure a load to an animal, whether it is being used to pull a cart or carry a pack.

the design of IDPT saddles did not suit donkey owners in Adami Tulu. Saddles made by KSPCA, which were delivered in May 2003, replaced the original design of saddles. These new saddles were reported 'lost' by local personnel in August 2003, at this stage project funds were exhausted and replacement stock could not be ordered. A request for further funds was made by the Project Leader in Ethiopia during June 2004, the outcome of this request is still pending. If further funding is not provided it is unlikely that the monitoring phase of this activity will be completed.

The planned inputs for Activity 2 have not been achieved in any of the three study sites. Workshops and training were held in Holetta and Adami Tulu, but these exercises were cancelled at Debra Zeit because of the untimely death of the project leader there.

Activity 2.1

To identify existing best practice in indigenous harness technology (Annex 2.1)

Objectives

- i. Identify best practice in indigenous harness technology through informal surveys, extension delivery agents and NGOs
- ii. Quantify the effectiveness and acceptability of best practice in indigenous technology in study areas.
- iii. Develop and promote generic principles of harness design for use in conjunction with local materials.

Methodology

In order to identify examples of good practice in indigenous harness design Fred Ochieng carried out a rapid preliminary survey of the three project areas in Ethiopia (Holetta, Debra Zeit and Adami Tulu). Markets were also surveyed in order to determine the availability and affordability of harnessing materials in each of the three study areas. These rapid surveys provided an overview of existing donkey harnessing technology and were specifically undertaken to answer the following questions:

- What are the differences in local practise between the three sites? What are the reasons behind these differences?
- How has various extension methodologies have contributed to the differences?
- What are the general pre-requisites for effective use of harnesses in each of the areas?
- What are the factors that account for use of certain harnesses in some areas and not others?

The preliminary survey results were used to devise a set of guidelines for the main survey, which aimed to provide quantitative data about harnessing practices in these areas of Ethiopia. The main survey guidelines were discussed with various project stakeholders, and tested in Ethiopia in order to fine-tune them to local conditions. Once revised the main survey was carried out in the same three regions as described in Activity 1.1. Interviewers in the three zones used the survey guidelines to constructed semi-structured interviews designed to elicit relevant information and allow participants to freely express their own ideas and knowledge. Focus group discussions and interviews were also conducted among the different stakeholders. The following stakeholders took part in focus group discussions:

- Farmers, artisans, transporters, donkey owners, harness makers in all project areas.
- Research and development agencies, community-based organisations and financial trusts.
- Personnel from the Ministry of Trade and Industry specialising in micro-finance, credit and savings, and extension personnel of the Ministry of Agriculture.
- Draught animal technology and donkey welfare organisations and networks.

Activity 2.2

Quantify the effectiveness of improved harness technology in study areas (Annex 2.2)

Objectives

- i. With-in community testing of designs identified in 2.1 along with promotion of generic principals.
- ii. Harnessing and saddlery workshops to train key research staff in generic principals

Methodology

In order to improve donkey harnesses, workshops were conducted in July 2002 at Holetta and Adami Tulu. The workshops were conducted at EARO research stations. Twenty donkey owners from each location were invited to attend the 2-day events.

The objective of the workshops was to train donkey owners and artisans in the underlying principles of good harnessing design and participate in the production of demonstration harnesses. The participants in the workshop were drawn from a wide range of age groups. Community-based organisations, banks, micro financing companies and research centres were represented. Other participants included experts from CTVM, KENDAT, KSPCA, IDPT and Donkey Sanctuary, UK.

In order to monitor the impact of training of donkey owners on donkey health, participants and non-participants were monitored during the 12 months following the workshop. The primary aim of the monitoring phase was to test the hypothesis that awareness raising and skills transfer were a more sustainable way to bring about improvements in harness design and donkey health than simply giving donkey owners free improved harnesses. Four treatment groups of 10 donkey owners were identified within each of the communities from which the workshop participants were drawn. Two of these treatment groups comprised of workshop participants and the other two treatment groups of people that did not participated in the workshop. Of the two treatment groups that had participated in the workshop, one group were given improved harnesses that had been made by the IDPT and the other group received only the training given in the workshop. Similarly, of the two treatment groups that did not participate in the workshop, one group were given the improved harnesses and the other did not receive either the harnesses or the workshop training.

In each of the twelve months following the workshop, enumerators interviewed all the participants in the study. The health status of the donkeys was recorded, including the body condition score, live weight and the presence of any harness sores. The condition of the harness being used was also recorded along with a record of the work done by the donkey in the previous month. The current livelihood status of the study participants was also recorded using key livelihood indicators such as the number of children that were attending school and the number of people in the household that were in paid employment. Results were collated after 12 months.

Activity 2.3

Develop and promote generic principles of harness design for use in conjunction with local materials.

Objective

- i. Produce dissemination materials according to stakeholder preference for extension messages derived from Output 5.

Methodology

The findings were disseminated to the extension department of the Ethiopian Ministry of Agriculture and to the International Donkey Protection Trust in order that they could be incorporated into future publications. The findings were also incorporated into the Wambui bilingual comic strips and into radio magazine programmes.

Activity 3. Supply of donkeys to the peri-urban sector.*Rationale*

Peri-urban donkey owners prefer male donkeys to females because work output is not interrupted by pregnancy, parturition and lactation. Few peri-urban donkey owners breed their own replacement donkeys preferring to buy animals at donkeys markets or from farmers in rural areas. The supply of donkeys from rural areas is limited partly because of high mortality of foals in the first six months of life.

Short supply of donkeys allows vendors to demand high prices for their young foals or yearlings, the poorest peri-urban dwellers are then priced-out of the market and cannot afford to buy a donkey. High prices also force donkey owners to compromise animal welfare by extending the working life of unfit, injured or geriatric donkeys. One key element to improving supply of donkeys to peri-urban areas is to improve the survival of foals so that more survive to a saleable age.

Facilities, expertise and special resources

Laboratory facilities at Holetta Research Station were used to analyse the faecal samples. IDPT facilities were used to help train a veterinary graduate in helminthological techniques.

Modification of proposed research activities

No major modification took place since the final project memorandum was agreed with NR International in October 2001 after the completion of the Phase I workshop.

Achievement of planned inputs

Activity 3 was completed in January 2003 approximately 6 months behind schedule. The reason for this delay was because partly due to the unseasonably wet foaling period, which resulted in a very high pre-weaning mortality rate.

Activity 3.1

Evaluation of the impact on young donkeys (growth rate and survival) of improved management (feed and anthelmintics) of pregnant jennies and young donkeys (Annex 3.1).

Objectives

- i. On-farm studies of the impact of anthelmintics treatment and improved dam nutrition on the survival of young donkeys

Methodologies

The study was conducted in the central parts of Ethiopia covering three different agro-ecological zones. The location of the study areas and their general descriptions are presented in Figure 1 and Table 1. The study areas covered the most densely population of donkeys in Ethiopia and also representing different agro-ecological zones that ranging from rugged highland plateau to the mid-rift valley plains. Representatives of the peasant associations of the study areas were initially consulted about their general attitude to the intended study and were involved in extensive discussion about the purpose of this study, its implication to the future management and utilization of donkeys by the farmers of the respective areas. After these discussions, farmers that agreed to cooperate in hosting the study were selected to participate in the study.

A total of 166 donkey-owning farmers were involved in the study (66 farmers from Holetta areas, 54 farmers from Adami Tulu areas and 46 farmers from Debre Zeit areas). Pregnant donkeys in their late pregnancy (2-3 months from parturition) were selected for use in each study and placed at random in one of four treatment groups. Animals in each group received one of the following treatments:

- a) Anthelmintic treatment only (A)
- b) Feed supplementation only (F)
- c) Anthelmintics treatment plus feed supplementation (A+F)
- d) Control / traditional practice (C)

Jennies and foals in treatment groups A and FA received anthelmintic treatment in the form of Eqvalan paste (1.87% Ivermectin) at a dose of ~0.2 mg / kg live weight. Jennies received their first dose of anthelmintic in the 9 – 10 month of pregnancy, followed by a second dose immediately following parturition and then a final dose 12 weeks after parturition. Foals received their first dose of anthelmintic at 4 weeks postpartum followed by a final dose at 12 weeks of age. The final dose of anthelmintic was administered to foal and dam simultaneously.

The supplementary feeding was a concentrate that consisted of a mixture of 69% wheat bran (91% DM, 8% CP, 9.6 MJ/kg ME), 30% noug cake (*Guizotia abyssinica*) (91% DM, 35% CP, 11.4 MJ/kg ME) and 1% salt.

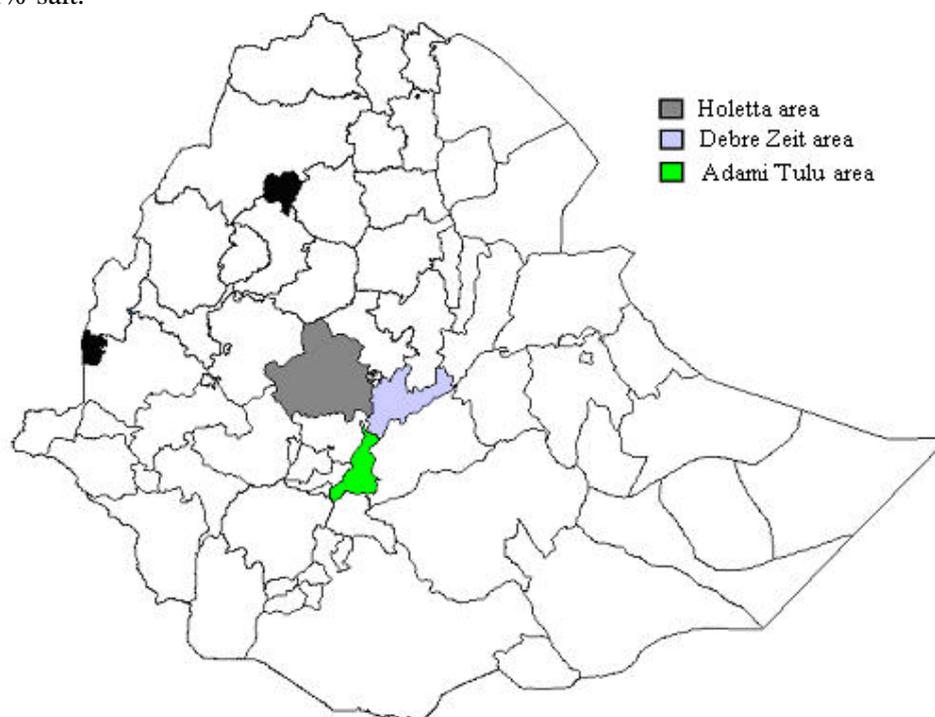


Figure 1. Locations of the study areas in reference to the map of the administrative regions of Ethiopia

Table 1. The physical characteristics of the study areas

Characteristics	Holetta area	Debre Zeit area	Adami Tulu area
Altitude (m)	2400	1900	1650
Average minimum ambient temp. (°c)	6	12	14
Average maximum ambient temp. (°c)	22	24	27
Annual rainfall (mm)	1100	845	716
Short rainy season	March – April	March – April	Mid February – April
Main rainy season	June – September	June – September	June – September
Topography	Rugged	Gentle slopes	Plane
Dominant agricultural system	Mixed crop-livestock farming	Mixed crop-livestock farming	Agro-pastoral farming

Jennies in treatment groups F and FA were offered 0.5kg (4.5 MJ ME and 0.07 g CP) of the supplementary feed every day for the last 23 months at pregnancy which continued until the 6 - 8 month postpartum when the foals were suckling. Initially, foals in group F and FA were offered 0.1 kg (0.9 MJ ME and 0.014 g CP) of concentrate feed supplement, which was increased to 0.5 kg from 6 months of age (4.5 MJ ME and 0.07 g CP).

Donkeys in all groups received a basal diet of either poor quality hay (92% DM, 6% CP, 7.5 MJ/kg ME) or crop residues (93% DM, 5% CP, 7.2 MJ/kg ME) according to what the farmer had available. Donkeys also had access to pasture during the day when not being worked by farmers

Enumerators were trained then stationed at the study sites to ensure close supervision of the experimental procedures administered by farmers. Birth weight of foals were measured using a spring balance and then both foals and jennies were weighed monthly during the experimental period using an electronic portable weighing bridge (Ruddweigh 1200, International Scales Ltd, Guyra, New South Wales, Australia). The daily feeding practice of households and the time the donkeys spent grazing were monitored daily for one week per month. The kind of feed supplemented, the amount offered and refused were measured and recorded. Samples from the varieties of feeds offered to the foals and jennies during the course of the experimental period were collected for laboratory analysis to determine the nutritional value of each feed items in order to estimate the nutrient intake of foals and jennies from the supplementary feeding. The kind of work performed by the donkeys, the amounts of load carried and the time spent working were also monitored.

The data were subject to statistical analysis fitting to a model of a 2x2 factorial arrangement using GLM procedures of Statistical Analysis Systems (SAS, 1988). Ftest was employed to test the difference between two means for its statistical significance.

Activity 3.2**Produce and promote practical recommendations.***Objectives*

- i. Produce dissemination materials according to stakeholder preference for extension messages derived from Output 5.

Methodology

The findings were disseminated to the extension department of the Ethiopian Ministry of Agriculture and to the International Donkey Protection Trust in order that they could be incorporated into future publications. The findings were also incorporated into the Wambui bilingual comic strips and into radio magazine programmes. Articles were submitted to International Scientific Journals.

Activity 4. The role of donkeys in the alleviation of poverty within peri-urban areas.***Rationale***

The surveys in Phase I of the project showed that people who own donkeys were better off than those that did not. The socio-economic studies carried out in Activity 4 investigated whether donkey ownership was a cause or an effect of more secure livelihoods. The effect on livelihoods of access to transport both in terms of an ability to pay and the proximity of infrastructure was also investigated.

Access to animal health care for donkeys was shown in Phase I to be a major limiting factor for improved donkey welfare. A study was carried out to compare the livelihoods of communities that had access to free animal care and those that did not.

In order that the relative prosperity of households could be compared a study was carried out to develop locally validated livelihood indicators. These were used within the survey to provide participants with appropriate descriptors of their own and their neighbours' wealth.

Facilities, expertise and special resources

Computing facilities at CTVM were used to analyse the survey data. Collaborative links were developed between the project and two Ethiopian NGOs (Donkeys for Development and IDPT). ILRI provided logistical support for a UK graduate fellow. One senior socio-economist was trained at Wye College and Reading University in advanced analytical and statistical techniques.

No major modification took place since the final project memorandum was agreed with NR International in October 2001 after the completion of the Phase I workshop.

Achievement of planned inputs

Activity 4 was completed in May 2002 on schedule.

Activity 4.1**Identify and address where possible the prevailing conditions affecting people's access to donkeys for transport (Annex 4.1)***Objectives*

- i. Analysis of Phase I survey data to identify constraints to access to transport in urban and rural areas
- ii. Analysis of Phase I survey data to identify contribution of donkeys to livelihoods of poor people

Methodology

This desk-based study aimed to draw strategic conclusions from the socio-economic studies that were carried out during Phase I, in order to provide guidance to policy makers about the role donkeys play in alleviating poverty. The Objectives-oriented project planning (ZOPP) (<http://www.worldbank.com/wbi/sourcebook/sbxo02.htm>) technique was adapted to provide an analytical framework for a team of two socio-economists and one livestock specialist to carry out the analysis.

Objectives-oriented project planning (ZOPP) consists of the four distinct analytical processes listed below:

- *Problem analysis.* Made visually clear through a "problem tree," through which key problems the 'project' is meant to address are identified, grouped, and prioritised and their causes and effects brought to light.
- *Objective identification.* In a corresponding objectives tree, the desired solutions are articulated, clustered and prioritised.
- *Alternative strategies.* A 'project' strategy is created by understanding the range of means for meeting objectives.
- *Assumptions.* These conditions are necessary for successful transformation of problems into secured objectives.

The poor peri-urban householders that were interviewed in Phase I fell into two categories; those who already owned donkeys and those that did not own donkeys. It was postulated that whilst policies designed to support donkey ownership could have a positive effect on the livelihoods of both these groups, the problems each group faced and hence the support they required were distinct from one another. Therefore, separate analyses were carried out for donkey owning and non-donkey owning households.

During a series of meetings the team developed a problem tree that identified and prioritised the transport related problems faced by both donkey owning and non-donkey owning households. For each type of household, problems were clustered under the key headings of economic, technical, social and policy. Causes of the problems and the consequences to livelihoods were then added to problem tree diagram. Once complete the problem tree was used constructed a corresponding objectives tree that gave specific positive responses to problems identified in the surveys. Lists of potential interventions, possible stakeholders and likely promotional pathways were then assembled to address the objectives that had been formulated.

Activity 4.2

To identify appropriate indicators for livelihood impact assessment (Annex 4.2).

Activity 4.3

To identify the impact of increased donkey ownership on the livelihoods of the peri-urban poor (Annex 4.3).

Objectives

- i. Evaluate the potential role of donkeys in alleviating the poverty of the very poorest sectors of Ethiopian society, using the developed livelihood indicators.
- ii. Test if donkey ownership is a route out of poverty.
- iii. Identify indicators of livelihoods used by local people to compare the relative wealth of households.

Methodology

In Addis Ababa, an Ethiopian NGO called “Donkeys for Development Organisation” (DDO), funded by Cordaid in the Netherlands, selected over 380 female-headed households around the city to receive a donkey free of charge.

The households were selected because they met the following criteria. They were female-headed and the household’s principal income was from gathering and carrying firewood from the eucalyptus woodland on the edge of the city to market. Households wishing to participate in the scheme had to be able to provide shelter for the donkey at their homes, had to pledge to keep the donkey for at least 2 years and to take part in a conservation project (involving planting eucalyptus tree seedlings in their compound).

Additionally, the women received training from DDO in the management of donkeys (feeding, husbandry, basic healthcare) and occasionally had access to a free mobile clinic provided by the IDPT (based in Debre Zeit, one hour from the capital).

DDO agreed to take part in this survey. They were responsible for recruiting and organising liaisons between their Support Committee in each Kebeles² and the investigation team. Each Support Committee provided a guide and was given a list of informants to contact ahead of time to insure that they would be home on the day that they were to be interviewed.

DDO have distributed donkeys in 15 Kebeles over the last two and a half years. Four of these Kebele only received the donkeys within the last 5 months and were therefore excluded from the investigation. In total 11 Kebeles were selected for study.

There were on average 32 beneficiaries in each Kebele. Six beneficiaries and 2 non-beneficiaries were selected per Kebele. It was decided that a total of 89 informants from 11 Kebeles would yield a sample size that would be adequate for analysis. The selection of beneficiaries to be interviewed was random. Each beneficiary was listed in alphabetical order in the DDO records with a number assigned to each person. Six numbers were randomly pulled out of a bag, these corresponded to the beneficiary selected for interview. The decision to interview beneficiaries and non-beneficiaries in a ratio of 3:1 was based on the lack of information about non-beneficiaries. The beneficiaries interviewed made up approximately 18% of the total DDO beneficiaries.

The 11 Kebeles were covered over a period of 3 weeks; it was possible to interview most of the informants in a day. Only 1 Kebele required 2 visits. Each interview took between 20 and 30 minutes.

The questionnaire was designed in three parts. The first set of questions was aimed at identifying the indicators that people use to measure their own livelihoods (Activity 4.3), the second set of questions was aimed at assessing the impact that a donkey may have on the livelihood of a household and the third was to gain background information on the Kebele itself. (The three sets of questions are summarised in Annex 4.2).

Activity 4.4

To identify the impact of access to animal health services on the health and welfare of donkeys and the effect on household livelihoods (Annex 4.4).

Objectives

- i. Evaluate the effect of access to animal healthcare on the livelihood of donkey users
- ii. Evaluate the effect of access to animal health care on the health and welfare of donkeys

² A Kebele is an administrative area. Each Kebele has a Kebele office.

Methodology

The impact assessment was carried out by a livestock economics consultant (Marina Martin-Curran) and the IDPT using a questionnaire survey. The consultant and the IDPT staff drew up the questionnaire. It was tested in the field and revised before the official survey started. See Annex 4.4 for the questionnaire.

The IDPT works in Woredas that are divisible into Kebeles. Ten Kebeles were randomly selected as survey sites from the list of sites where the IDPT works. The sites are distributed over the 5 Woredas. Four control sites were selected based on their ecological similarity with the project sites and on ease of access by road. Donkey owners living in the control sites should in theory have no previous knowledge of the IDPT's activities. The reason why fewer control sites were chosen was because of the difficulties involved in working in an area where the IDPT is not known. The Kebele must grant permission and there is a certain amount of suspicion involved in allowing people to carry out surveys when little is known about the organisation.

At each of the 10 survey sites, 10 farmers were randomly selected to answer the questionnaire. At each of the 4 control sites, 25 farmers were randomly selected. The total number of responses totalled 200, divided equally between project and control sites. In lowland areas people were mostly interviewed at water-points, where donkey owners are gathered to collect water and load their animals. In the highland areas, where water is more abundant, interviews were held in open areas in the villages. All the interviews were carried out during the short rainy season in February and March 2002.

Activity 5. Selection of target groups and determination of preferred dissemination pathways.

Rationale

Effective dissemination of information generated by Phase II of the project required that appropriate target groups were identified. The role each of these target groups could play in promoting improved welfare required characterisation in order that the expected impact could be envisaged. These target groups also required characterisation in terms of the depth of the knowledge disseminated and their receptiveness to various promotional media.

Facilities, expertise and special resources

DevCom, a Nairobi based multimedia design company, were employed to produce dissemination materials for testing. Two members of the Ethiopian research team visited a Brooke Hospital for Animals funded project run by KENDAT, in order to observe working examples of non-formal dissemination pathways aimed at illiterate target groups.

Modification of proposed research activities

There was no major revision of research activities since October 2001, after the completion of the Phase I workshop. Activities described below are based on the outcome of that revision and no further modification took place.

Achievement of planned inputs

Activity 5 was completed in June 2002 on schedule.

Activity 5.1

Identify target groups (donkey users through to policy makers) for dissemination of information produced in Outputs 1-4 (Annex 5.1)

Objective

- i. Identify of target groups

Methodology

Regional working groups were set up to consider the appropriate target groups in their area. Sessions were summarised and presented at a national working group. Representatives of the identified groups were asked to participate in dissemination workshops or took part in on-going surveys.

Activity 5.2

Determine appropriate pathways of dissemination and people's preferences as to form of extension messages (Annex 5.2).

Objective

- i. Survey donkey users to determine preferred dissemination pathways

Methodology

This study was conducted in the same administrative zones of Oromiya Region as in activity 3.1 in central parts of Ethiopia: A four-stage sampling technique was adopted to select participating farmers for this study. Zones and districts were selected using purposive sampling technique (stage 1 and 2), derived from a large socio-economic survey that was conducted during Phase I, which characterised and assessed donkey use and management practices. In order to identify appropriate dissemination pathways and livelihood impact indicators, the present study had to be conducted in the same areas that interventions had been developed. In the third stage of the sampling process, peasant associations (PAs) were selected randomly from the lists of PAs in the districts. In the fourth stage, participating farmers were selected randomly using a systematic sampling technique from lists of farmers in the selected sample PAs. A report by Byerlee *et al.*, (1980) on survey procedures suggests that a representative sample must not only be random but also be large enough to reflect all farmers in the region. Hence, taking into consideration the variability in the study sites, a total of 522 sample farmers (222 from Holetta , 100 from Debra Zeit and 200 from Adami Tulu) were selected and interviewed for this study.

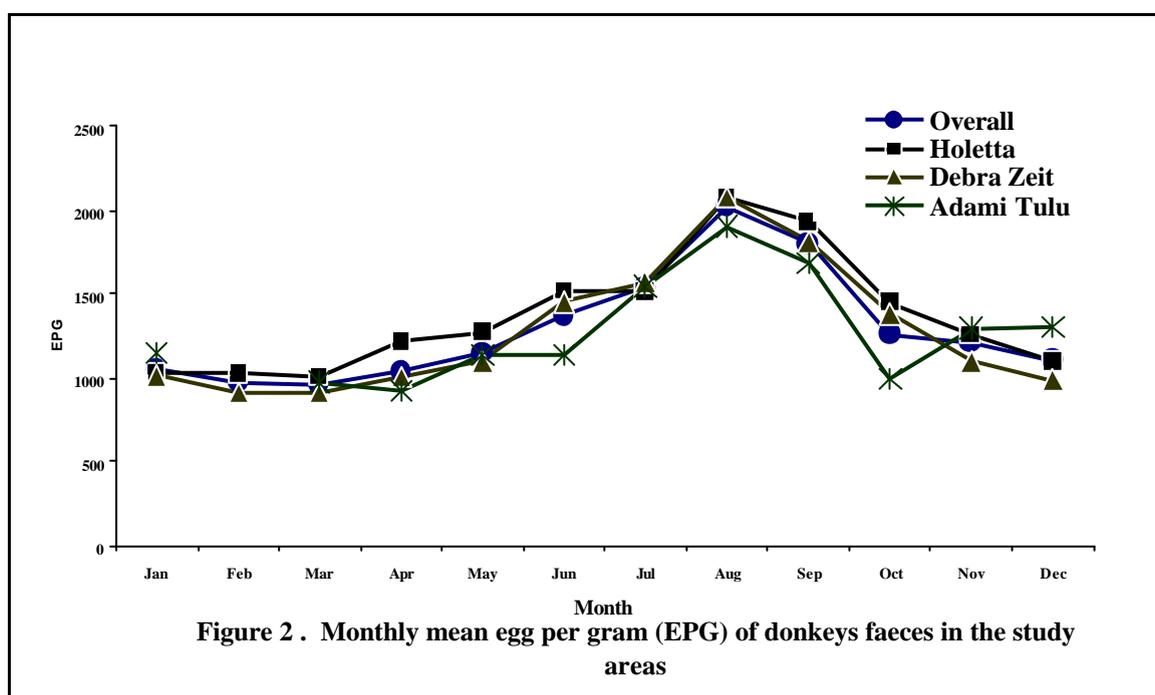
Secondary data was collected from various published and unpublished sources to gain a general understanding of the study areas. Since socio-economic surveys had been conducted earlier in the project in these study areas (Smith *et al.*, 2000; Pearson *et al.*, 2002), sufficient information was available to design a structured questionnaire. Uniform and representative data sets were obtained by the use of a formal written questionnaire and a random sample of farmers. The structured questionnaire was developed specifically for the study areas. The questions sets were organized in such a way so that they began with a specific questions which farmers could answer readily and then proceeded to more sensitive and thought provoking questions. Question sets were organized into sections to maintain the logical flow of the questionnaire. Bilingual enumerators (Amharic and local languages) were recruited and trained on how to approach and interview the respondents, and how to record the responses on the questionnaire. Regular and frequent field editing helped supervisors to discuss problems with the interviewer/enumerator while the interview is fresh in their minds. This also served to motivate enumerators since they knew their work would be quickly and thoroughly examined. After completion of data collection, the questionnaire was coded and the data was entered in to computers.

The data was cleaned and analysed using different statistical tools. SPSS statistical software was used to analyse the data because it has facilities that are particularly relevant for dealing with analysis of survey data (Allan, 2000). Descriptive statistics, customs tables, mean comparisons, General Linear Model (GLM), non-parametric tests and F-tests were used to summarize and present the data. To test the statistical significance of qualitative data, a 2X2 Chi-square test with continuity correction was used for 2-way tables while Pearson's Chi-square test was used for larger than 2way tables. Qualitative data were summarized in tables of counts and percentages. F-tests were used to test the statistical significance of continuous data while non-parametric tests were used to test the statistical significance of slightly skewed quantitative data. In cases when similar results are obtained through analysis of both non-parametric and F-tests for slightly skewed continuous data, F-tests were selected to present the results.

Outputs

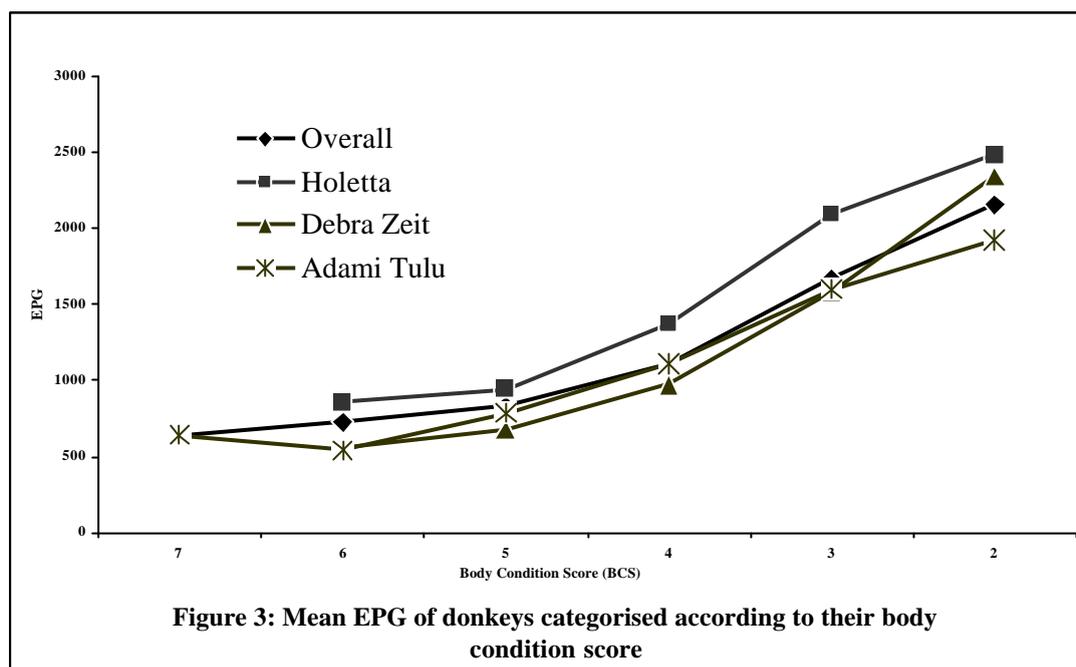
1. Longitudinal monitoring of seasonal changes to establish the need for and timing of practical management interventions

The distribution and degree of infection in different months of the year 2002 were estimated using group mean on a logarithm transformed data set. In the dry season (October – February) the level of infection was significantly lower ($p < 0.001$) than during the long wet season (June – September) in all study areas, although the worm egg per gram count (EPG) of donkeys remained high throughout the year (Figure 2). Unlike the temperate zone where helminth parasites experience hypobiosis especially in winter season, the parasites in the place where this study was conducted did not show such trend. Parasites were there all year round infecting host animals.



Body condition of each sampled donkeys were scored using a pictorial booklet developed by Pearson and Ouassat (2000). The association between body condition score (BCS) of donkeys in each study area and degree of gastrointestinal parasitic infections were assessed. There was highly significant association ($p < 0.001$) between the body condition of donkeys and degree of infection. Overall, there was highly significant difference ($p < 0.001$) in EPG count among BCS categories of donkeys. Donkeys with relatively good body condition score of four and above had lower infection as

compared to donkeys with lower BCS as it was evidenced from quantitative faecal egg analysis (Figure 3).



Donkeys with body condition score 4 and below had relatively the highest EPG count as compared to donkeys above body condition score 4 that had the lowest EPG count. It is suggested that a body condition of 4 is used as a treatment threshold for worms and farmers should be advised to worm their donkeys whenever their body condition drops below that level. The farmers should also be taught how to body condition score their donkeys.

This study has shown that 100% of donkeys from all the study areas were positive for gastrointestinal parasites. There was an overall similarity in the type and burden of parasites observed. Donkeys were suffering from poly-parasitism and have been proven to harbour gastrointestinal parasites such as large and small strongyle, ascarids, pinworms, bots, stomach worms, lungworms, tapeworms and fluke. However, the predominant large strongyle and small strongyle were *Strongylus vulgaris* and *Cyathostomes*, respectively accounting for 100%. *Trichostrongylus axei* was also found in 100% of donkeys.

2. Assess potential impact of harness and saddle design improvements on donkey health and welfare.



Figure 4. Donkey Sanctuary designed harnesses

Many of the wounds and sores caused by harnesses (including saddles and panniers) are not due to defects in the basic design of the harnessing systems but are associated with poor finishing, adjustment and management. Many other injuries are caused by the rough edges and surfaces of dirty sweat encrusted padding. In other cases, harnesses are unnecessarily heavy for their required task.

The Donkey Sanctuary has provided the project with saddles made at their Debra Zeit centre (Figure 4). The capacity to make good harnesses was identified at local level. A lot of artisans interviewed showed enthusiasm for adopting new designs of harness or incorporating innovative elements into their own designs. This

inventiveness was also shown by farmers who modify both harnesses and carts to fit their own needs and resources. Generally in both communities, there were examples of well-designed and correctly fitted harnesses, and poorly designed, ill-fitting harnesses that were uncomfortable and harmful to the donkeys. Nonetheless, the potential for improvements is enormous.

The different requirements for successful transfer of modified or improved harness designs were ranked in order of their importance as perceived by the users as follows:

- 1 - Clientele development (needs and preferences addressed)
- 2 - Capital (materials and resources available)
- 3 - Culture (flexibility to accept new ideas)
- 4 - Technology (manufactured using local skills and material)
- 5 - Extension (training and involvement of local people in the transfer).

After the survey of harnessing practices a workshop took place in January 2003, to which 20 donkey owners in each location were invited. The effect of owner attendance of these workshops on the health and welfare of their donkeys was to be monitored over the following year once every two months. However, two months after the workshops the harnesses still had not been modified for distribution to participating farmers. The activities that were planned to lead to satisfying the output on farmer knowledge transfer have therefore, been delayed. Further funding was requested from LPP to further this study.

3. Supply of donkeys to the peri-urban sector.

Providing anthelmintic treatment and feed supplementation to jennies (in the last trimester of pregnancy and during lactation) and to their foals, was shown to significantly ($p > 0.05$) increase foal survival and their growth rate. Single treatment with either anthelmintics or feed supplementation did not have a statistically significant effect.

The mortality rate of foals between birth and six months of age ranged between 7-17% in all the study areas. Foals born to jennies that received both supplementation and anthelmintic treatment survived significantly ($p > 0.05$) better than the traditional management across all the study areas (Figure 5). The main reasons that accounted for mortality of the foals included foals born weak and they received minimum care at early age. Other foals were trampled to death by other livestock in the kraal.

All foals regardless of management treatments increased in live weight up to 6 months after. However the rate varied between months and locations. When the treatment effect was considered, the separate provision of either the feed supplement or the anthelmintic did not significantly affect growth rate of the foals when compared to the control. Nevertheless, the combination of supplement and anthelmintics significantly ($P < 0.05$) improved the growth rate and welfare of foals as this has clearly been seen after 6 months of age in Holetta and Adami Tulu areas (Figure 6).

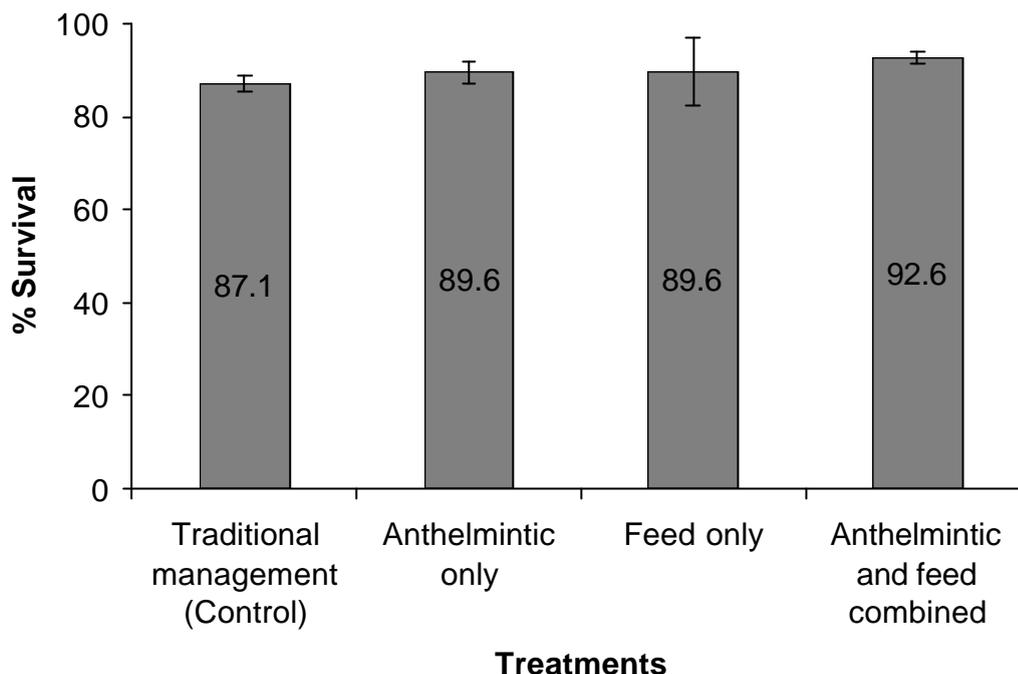


Figure 5. Survival rate (%) of foals at six months post partum when their dams had (in the last trimester of pregnancy and during lactation) either received a) no anthelmintic treatment or feed supplementation (traditional management – control), b) anthelmintic treatment only, c) feed supplementation, or d) both anthelmintic and feed supplementation - (error bars indicate 95% confidence intervals)

A follow up study carried out at Holetta, six months after the final treatment with anthelmintic was administered, showed that worm egg counts of wormed donkeys were half that of donkeys that had not received wormer during the study. This indicated that there is some long-term benefit of intermittent prophylactic treatment of donkeys with anthelmintic at least in terms of suppressing parasite activity. In some areas of Ethiopia anthelmintic treatment can be obtained free from mobile clinics funded by animal welfare charities such as the Donkey Sanctuary. In these areas it is recommended that donkey owners are encouraged to supplement their donkeys and visit the mobile clinics at least twice per year. Donkey owners that do not have access to free animal health care should be encouraged to combine both anthelmintic treatment and feed supplementation in order that the full benefits of both interventions can be obtained.

In terms of potential impact on the household economy, the provision of both anthelmintic treatment and supplemental feed is likely to be more effective than if these interventions were applied singly. Indeed the provision of the single interventions in economic terms is negative because the additional cost is not offset to any significant degree by additional productivity. This study was carried out in a year when rains were good and there were plenty of available pasture to feed the pregnant and lactating jennies. In other years when feed resources are in short supply the effect of the treatments may well have been more pronounced.

These findings support the case made in output 1 for only administering anthelmintic to adult donkeys that have a body condition score below the threshold of 4. Treatment of animals above this threshold has no production advantage unless it is accompanied by other improvements in husbandry.

In terms of improving supply of donkeys to peri-urban areas, the twin treatments of anthelmintics and feed supplementation are likely to lead to a small but significant improvement in the number of fit,

healthy donkeys available for sale. Further studies are required to investigate whether Jennies that receive these twin treatments return to service more promptly than traditionally managed animals, thereby increasing the number of weaned foals reared over their life time.

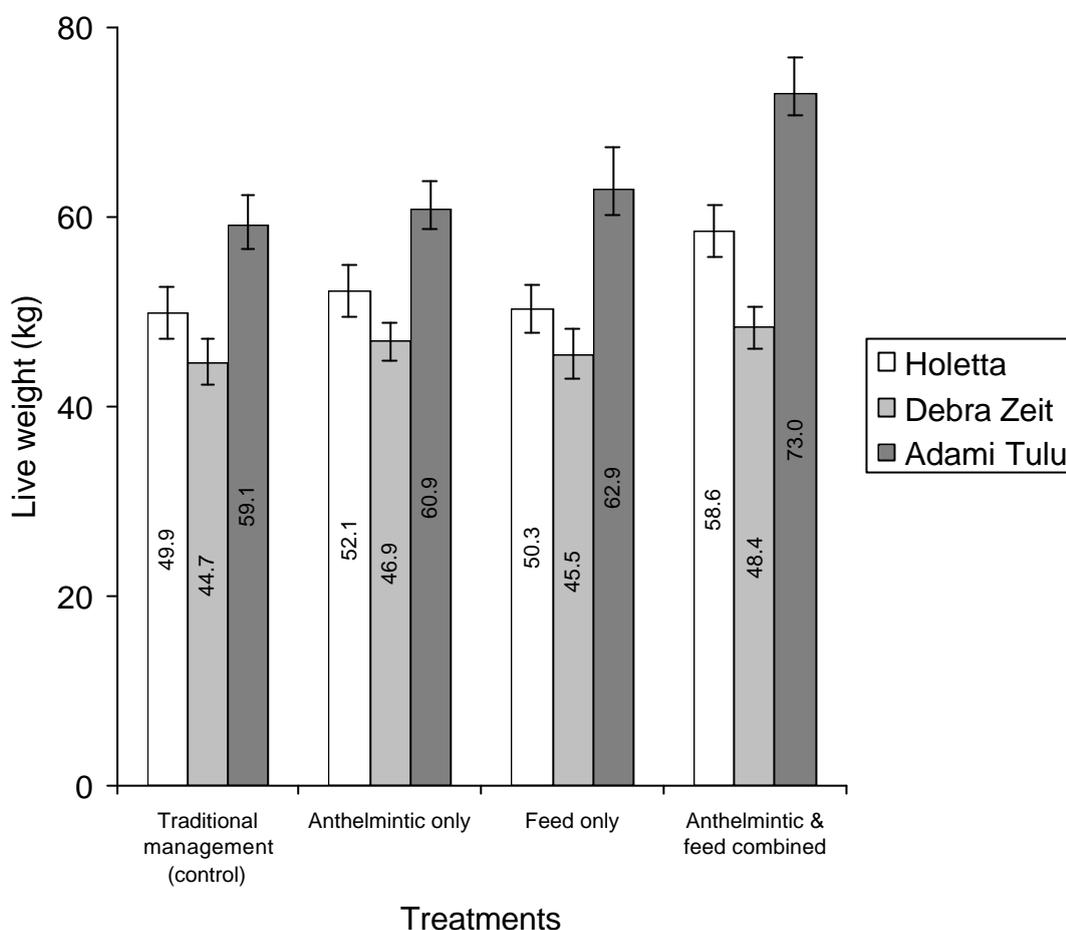


Figure 6. Live weight (kg) of foals in the three study areas at six months post partum when their dams had (in the last trimester of pregnancy and during lactation) either received a) no anthelmintic treatment or feed supplementation (traditional management – control), b) anthelmintic treatment only, c) feed supplementation, or d) both anthelmintic and feed supplementation - (error bars indicate 95% confidence intervals)

4. The role of donkeys in the alleviation of poverty within peri-urban areas.

Output 4.1 Identify and address where possible the prevailing conditions affecting people's access to donkeys for transport

Constraints to donkey owners

The most important technical constraints that impair the effective use of donkeys are mainly related to feeding and health care. Poor harnessing and saddle designs, and poor management of pregnant donkeys and their foals were also identified to be important problems of donkey owners. About 25% of male-headed households reported that feed availability was low at various times of the year. Feed shortages give rise to declining productivity of donkeys that in turn leads to other interrelated problems. Poor harnessing and saddling designs are the main causes of sore incidence. Most households put heavy loads (about 100 kg) on the back of donkeys to be transported for a long distance (about 3 - 5 hours of walking distance) with the use of poorly designed saddles. If the load is to be transported a short distance, a saddle or harness may not even be used at all.

Female donkeys provide double benefits for the household. They contribute by transporting a range of goods and by providing foals for replacement or sale. The economic benefit that can be attained from a jenny in her lifetime is impaired by poor management.

Households require cash to intensify their activities and improve incomes. Credit from formal financial markets, such as banks, is not easily accessible due to complex formalities and unaffordable pre-conditions. Credit secured from informal sources, such as friends, relatives and local institutes is inadequate to meet the required demand. Village moneylenders charge very high rates of interest (about 120% per annum) that are unaffordable.

One of the important problems donkey owners faced is that there is no separate route for donkeys in urban areas and as a result they share the roads with vehicles. Existing regulations of the Municipality does not support the victim's household to get compensation for any accident. In general, the Municipality has a negative attitude towards donkeys in urban areas due to the traffic jams and increased accidents. Hence, separate routes and standing courts may be one of the options for the Municipality to minimize the problems.

Constraints to donkey ownership

The results of the study indicate that about 54% of the non-donkey owners had previously owned a donkey (40% in Holetta, 70% in Debra Zeit and 58% in Adami Tulu), but had for some reason lost it (sale, illness or theft). Approximately 24% of the donkey losses were due to disease, and about 19% were sold to meet acute cash shortages. There are also households who have never owned donkeys; informal assessments indicated that these are the poorest households. This category of household does not own land, livestock and any other assets.

When the non-owning households were asked if they want to own donkeys in the future, almost all said yes if they had sufficient money to cover the purchase price. Possible solutions suggested by non-donkey owners were long-term credit schemes. Participants pointed out that if adequate amounts of credit were given they could supplement household income by engaging in supplemental activities such as petty trading.

Output 4.2 To identify appropriate indicators for livelihood impact assessment.

Interviews to determine livelihood indicators were carried out with donkey owners who had acquired their animals within the last two years through the DDO scheme and non-donkey owners (Table 3). Overwhelmingly the most important indicator (by 49% of respondents) of livelihood security was that at least one of the household members had secure employment. Other indicators such as if children were able to contribute to the household income and the condition of the family's clothes and shoes were also frequently mentioned by respondents as providing a good guide to how well off the family were. Less important indicators were included the number of children that were sent to school and the type of materials used to build the house (for example metal roofs).

Some indicators are more useful as an objective method of estimating livelihood status than others. A number of the indicators identified were culturally sensitive (e.g. the number of livestock owned) and rely on an honest response from the participant, who may believe they have a vested interest in either understating or overstating their livelihood status (e.g. if they believe the result may be reported back to the government) or they may be simply unwilling to answer the question. Others indicators such the condition of clothes and the type of building materials used to build the house are more useful objective indicators because a visual assessment by the enumerator is only required and do not rely on the participants response.

Table 3. Livelihood indicators identified by DDO participants and non-donkey owners.

Indicator	Cases (%)
Permanent job/salaries	49.0
Children contribute to household income	15.3
Clothes/shoes etc	11.9
Own land	11.9
Livestock	11.9
Children at school	8.5
Own their own house/rent out rooms	6.8
House aspect/roof material	6.8
Always have food	6.8
What they eat/eat meat	5.1
Both parents work	5.1
Own shop/business	3.4
House facilities	3.4
Furniture/bed	3.4
Smaller families	3.4
Can buy bigger bags of tef	1.7
Several sources of income	1.7
Money to spend /more money	1.7
Savings	1.7
Can help out (lend money, things)	1.7

Output 4.3 To identify the impact of increased donkey ownership on the livelihoods of the peri-urban poor.

The impact of donkey ownership and having access to donkey health care was evaluated by carrying out two surveys. The first survey evaluated the impact on a family's livelihood of been gifted a donkey from the DDO. The second survey evaluated the impact on donkey health of having access to free donkey health care.

Participants who had received a donkey from DDO were asked how their life had changed since owning the animal. The results were overwhelming positive with only 17.4% of recipients claiming their lives had not changed at all (Table 4). Participants were asked to rate their life on a scale from very good through to good, OK, better, worse. The answers were aggregated into those whose lives were better and those whose lives were not better than 1 or 2 years ago (the average length of time that the beneficiaries had the donkeys for in that Kebele). Sixty-seven people out of the 83 interviewed gave a rating for their life. Amongst donkey owners 84% said that their lives were better than 1 – 2 years ago, compared with 16% of non-donkey owners; this difference is significant ($p < 0.05$).

Table 4: Indicators of changes in beneficiaries' lives since owning a donkey

Change cited by respondent	Number	Percent
Income increase	20	39.2
Don't have to carry things myself, relief	11	21.6
No change	9	17.6
Able to save*	3	5.9
Always have food*	3	5.9
Child can go to school – (don't have to help me)*	2	3.9
Less tired, better health	3	5.9
House repairs/expansion*	1	2
Can buy coffee	2	3.9
Doesn't gather wood anymore	1	2
Used to go to forest twice a week, now only once	1	2
More time at home/to do other things	1	2
Cover expenses	1	2
More secure	1	2
Built donkey shelter	1	2
Buy clothes*	1	2
Own work	1	2
Do things faster	1	2
Doesn't have to do daily labour	1	2

* Measures of change that are similar to respondent elicited indicators

Figure 7 shows that there was a trend for donkey owners to buy in larger quantities of tef than non-donkey owners. The purchase of larger quantities of tef has several benefits within the household; people were able to negotiate a better price per kilo, reduce the number of times they had to go the market each month and had better food security. Moreover, the quantity of tef that a household buys in a single purchase is indicative of its purchasing power. The ability to save is also an important indicator of household income. Of the 65 donkey owners interviewed 46% were able to make some sort of saving whilst only 33% of the 18 non-donkey owners made any sort of saving.

Figure 7: Weight of tef bought in a single purchase by donkey owning and non-donkey owning respondents in the 11 surveyed Kebeles (n=41)

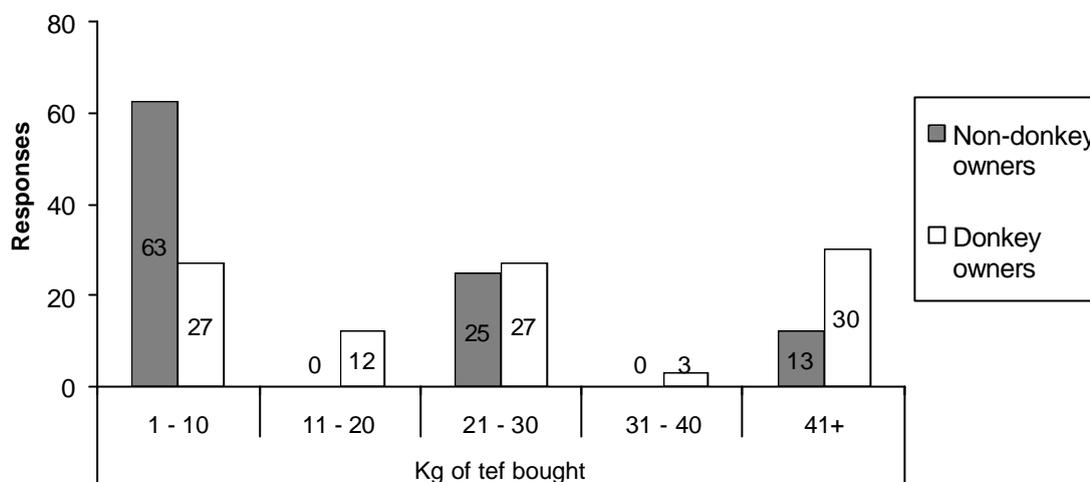


Table 5: Working life of donkeys in project and control areas

	1-10 yrs	11-15 yrs	16-20 yrs	21-30yrs	Total
Project area	3	21	68	8	100
Control area	15	62	20	2	99
Total	18	83	88	10	199

The second survey investigated how having access to donkey health care affected the health of donkeys. Two areas were studied. The first (project area) were given free access to donkey health care once a month organised through the International Donkey Protection Trust (Donkey Sanctuary). The second area (control) did not have access to the IDPT health service. Donkeys in the project area (modal age 16-20 years) had a much longer working life than donkeys in the control area (modal age 11 – 15 years) (Table 5). The health problems encountered by donkeys in the project areas were less severe than those in the control area. Significant differences were found between the two sites for the level of wounds, colic, sarcoids and sudden deaths. There was no significant difference for the number of animals with coughs or teeth problems (Table 6).

Table 6: Types of health problems found in the two sites over the previous year

Health problems in last year	Project (n=100)	Control (n=100)	Significance
Wound	60	95	*
Cough	82	90	NS
Colic	44	75	*
Sarcoids	5	19	*
Sudden death	20	46	*
Teeth	6	7	NS

Results from these two surveys indicate that donkey ownership can have a significant effect on household livelihood and that having access to donkey health care can increase the working life of donkeys and reduce ill health. The conclusion can be drawn that increasing donkey ownership amongst poor peri-urban dwellers will have a direct impact on their livelihoods, enabling households to diversify their activities and reduce the labour and time burdens of daily chores. Furthermore, by promoting better donkey health household livelihoods can be secured by reducing the frequency that donkeys need to be replaced through death or ill health.

5. Selection of target groups and determination of preferred dissemination pathways.

Analyses of existing and potential routes of technologies have been presented in earlier sections of this report. This section suggests some of the specific pathways taking account of the nature of the technology and the adoption process. The following approaches might be important to facilitate dissemination of improved donkey husbandry technologies.

Stage I: The first interventions need to produce attitudinal change in donkey owners in respect to their perceived contribution that donkeys make to household economies. This requires a group extension approach, such as group discussions, meetings, trainings and posters. Existing farmers' groups, such as informally organized social institutions, could be used for awareness raising. After the farmers' attitudes have improved and recognized the benefits of donkeys, the next step needs to raise awareness of improved donkey husbandry technologies. Again this could be implemented through a group extension approach to facilitate fast dissemination. Individual approaches could also be used when specific interests come from the individual farmers.

Stage II: Once the farmers have gained knowledge on the improved donkey husbandry technologies, they may show interest in it and start seeking out more information about the technologies. At this stage, available approaches, such as training sessions and field days at demonstration sites need to be conducted for the farmers. Detailed explanation may also have to be given to individual farmers who came up with special interests. For those who are able to read and write, leaflets with detailed technical information can be printed and circulated.

Stage III: After the farmers have shown interest and gained adequate information about improved donkey husbandry technologies, the third stage is decision making. In this stage, the farmers may need to evaluate the technologies properly and they may require specific skills in the use of the new techniques, so that they can make a full evaluation of it. Hence, extension methods such as additional demonstrations and training how to prepare the technologies may be used to help them obtain adequate exposure and information. This stage helps the farmer to decide either to try the technologies or not.

Stage IV: At this stage, the farmer might have decided to try the technologies on a small scale. Hence, he may require support from extension staff or researchers when trying a new technology for the first time. Individual approach may be used to help the farmer start using the technology. A group approach could also be used to initiate discussions on practical use of the technologies, and show them how to set and use the technologies.

Stage V: After trying the technology on a small scale or village level, the farmers might decide to adopt it and use the new methods comprehensively in preference to old methods. At this stage, the beneficiaries may continue using the technology and favourable conditions, such as availability of the technology, input distribution, and market access need to be fulfilled. If there are problems arising at intermediate stages, technical backup could be given either to individual or groups of farmers.

Stage VI: At this very important stage comes adoption rate and livelihood impact study of the households who hosted the technologies. A time factor is involved at this stage. This means that there should be an elapse of time between using the technologies and initiating livelihood impact studies. Implementation of such studies requires both group and individual approaches. In the first instance, it is important to initiate

group discussions with the beneficiaries on the general attitudes towards the technologies that were distributed to them. This group discussion helps to collect wide ranges of information on several common issues to the society. Next to this, individual households will be approached to investigate the impacts on their livelihoods. At the end, timely corrective measures will be taken to amend the problems that arose in the utilization of the technologies. The packages that brought positive impacts to the livelihoods of the households might need to be scaled-up to be extended to similar agro-ecologies in the country. Then the cycle of technology generation and transfer systems can continue in its synergic motion.

In the study areas, previous experiences of technology dissemination practices focused on individual approaches. In principle, a combination of different approaches, either individual or group extension methods, should be adopted according to the nature of the intervention and stage of adoption processes. However, more emphasis should be given to a group extension approach. It was also observed that existing dissemination roles were shouldered almost entirely on one organization, that is the Ministry of Agriculture. The approach of dependence on a single organisation has to be changed and more institutions and stakeholders need to work together to attain a common goal. Involvement of several relevant stakeholders in the dissemination of agricultural interventions facilitates awareness creation and utilization of technologies on time. When information about a technology is conveyed to the beneficiaries, the three key important factors accuracy/reliability, timeliness and accessibility need to be taken into consideration. Information to be disseminated has to be accurate/reliable, it has to reach to the users timely and the source of information has to be easily accessible to the users so as to gain continuous technical backup. In addition to this, a complete package of information about a technology has to be conveyed to the users. This has a direct impact on the decision either to adopt the intervention or not.

In transferring improved donkey husbandry technologies to the users, the first stage should be changing the attitude of the users in recognising the contribution of donkeys to the household economy. This can be attained through group extension approaches. This could be followed by awareness creation of the users on the improved donkey husbandry technologies that could increase the working efficiency of donkeys. A group extension approach is again important at this stage. The farmers may show interest and may seek more information about the technologies following awareness raising. An individual approach may be important at this stage to demonstrate the technologies to users. After getting adequate information they will evaluate the interventions properly and make decisions either to try the technologies at a small scale or not. If the decision is to try and use the technologies, technical back up should be given continuously to users and enabling conditions need to be fulfilled. After some time, an impact is expected to be observed on the livelihoods of the users. Hence, impact assessment studies need to be conducted using the most important impact indicators identified in this study, such as quantitative (farm size and number of cattle) and qualitative (house type i.e roofing material, number of houses, consumption pattern, clothing style) livelihood impact indicators.

Contribution of Outputs

This project contributes to DFID's developmental goals by identifying pathways from poverty for the very poorest sectors of society. In particular the promotion of donkey ownership amongst the landless has been shown to have demonstrable impact on the income and diversity of economic activities within these households. Furthermore, the identification of low input interventions to prolong the working life of donkeys and to improve their work output will secure the livelihoods of households that are one step away from destitution.

Different promotional pathways have been identified; in particular using indigenous self-help groups to deliver extension messages is an important extension route. An important emphasis has been placed on the need to change attitudes of people towards their donkeys in terms of social status and animal welfare. Social status can be enhanced by highlighting the contribution that donkeys make to household economies and better donkey welfare can be prompted through low or preferably zero cost to the end users. End users are unlikely to adopt any interventions unless there is a significant benefit over cost,

little or no opportunity cost and no perceivable impact on risk. Interventions identified include providing training in harness maintenance and promoting better feeding practices which, if implemented, should lead to a significant improvement in the working life and work output of donkeys.

Non-government organisations are already promoting better donkey welfare in Ethiopia. This project can provide these institutions with information they require to improve the efficiency of their operations so that more people can benefit from their activities. For example this project has identified a means of visually determining a threshold body condition score in donkeys above which no anthelmintic treatment should normally be necessary.

Further work is required to quantify the impact of low cost interventions on the welfare of donkeys and household livelihoods. Funds have been requested from LPP for this work.

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Improving the productivity of donkeys in Ethiopia

F. Ochieng¹, M. Alemayahu² and D. Smith³

¹Kenya Network for Draught Animal Technology (KENDAT), P.O. Box 2859, 00200, Nairobi, Kenya

²Ethiopian Agricultural Research Organisation (EARO), P.O. Box 2003, Addis Ababa, Ethiopia

³Centre for Tropical Veterinary Medicine, University of Edinburgh (CTVM), Easter Bush, Edinburgh, UK

Introduction In Ethiopia, animal traction contributes significantly in supporting both rural and urban livelihoods. Draught animals provide smallholder farmers and transport operators with vital power for agricultural and transport work, and is a major player in peri-urban economies. According to FAO (1995), 85 % of the Ethiopian population is engaged in agriculture and 90 percent of rural population use draught animals for various purposes. Production systems vary in which 19.6 % grow pure crops, 2 % keep livestock and 78 % are involved in mixed livestock production. Ethiopia has the largest livestock population in Africa, accounting for over 40 % of the GDP. Whether as pack animals or in pulling carts, animals are preferred and dominate the transport services sector. The choice of animals and systems of use in particular areas for transport is mainly based on socio-economic and environmental factors. In Ethiopia, there are over 5.2 million donkeys (FAOSTAT 2002) and they are increasingly becoming a means of livelihood, playing a crucial role in transport services in peri-urban households. Unfortunately, ownership, utilization and management of donkeys are at a very low level in most resource-poor areas.

In aiding peri-urban societies to take charge of transport and marketing services provision, a study was commissioned by the Centre for Tropical Veterinary Medicine, University of Edinburgh (CTVM) in collaboration with the Ethiopian Agricultural Research Organization (EARO). The objective of the survey was to reduce incidence of sores in donkeys by modification of harness and saddle designs. The survey focused on three regions and assessed how best donkeys can be utilized to optimize their work potential. The research examined study area-specific harnessing characteristics and assets that may constrain or offer opportunities for better donkey management, aimed at sustained peri-urban transport provision.

Material and methods A preliminary research guideline for fieldwork was developed for gathering information, and data collection. The livelihoods approach was adopted in the questionnaire in order to study how donkey use affects the lives of people. However, the focus was on harnessing, around which systems and factors impacting and affecting the lives of farmers, transporters and blacksmiths (cart and harness manufacturers) were examined. Three regions (Holetta, Debra Zeit and Adami Tulu) were studied using formal surveys and semi-structured conversations, including a free exchange of ideas and information. Information was gathered through interviews and observations. Focus group discussions and interviews were conducted with different stakeholders to draw out their experiences and knowledge of issues under study. A vital factor was the donkey owners/ users' ideas of what improvements were necessary in harness and pannier design. The absorption parameters were ranked in order of the importance that the community attaches to each of them, and weighed against criteria requirements for harness and saddles (dependability, affordability, availability, adaptability and accessibility). As a result, analysis of measures of adoption potential for different harness designs provided a basis for evaluating feasibility of the transfer process.

Results There are a total of 143,147 bulls, 55,375 donkeys, 6,546 horses and 1,704 mules in use in the three areas studied. Bulls are mainly used for ploughing while equines are for transport. In agriculture on-farm transport (within the farm and/or home) and off-farm transport (from farm to collection centres and to market) is carried out using pack donkeys, hand and donkey carts. Milk is often transported to an outlet point by donkeys. The same donkeys transport farm inputs from market centres to farms. Collection of firewood and water by women absorbs much of the work output of donkeys. Similarly, marketing of farm produce by women at roadside often depends on donkeys to transport produce. With donkeys they are able to carry up to 200 kg. All communities have their own survival tactics. In Adami Tulu, people cope with dry season feed deficiencies by selling their animals and moving from place to place. In Holetta, where male donkeys are preferred, many donkeys are bought from outside the district. Rugged terrain in some regions of Holetta and Adami Tulu makes it impossible to use carts. Where available, carts also serve as ambulances particularly in getting women in labour to hospitals.

Many of the donkeys in use are overloaded and the discomfort caused in their movements includes raising the neck to lower the backbone against the weight. In Holetta, most donkeys exhibit *lordosis*, or bent spine as a result of the continuous excessive load on the back. Harnessing is inefficient and results in most donkeys having wounds. Heavy and poorly designed carts and saddles are common in Adami Tulu, where as in Debra Zeit most donkey users claim that their animals are highly infested with parasites. In Holetta and Debra Zeit, the water containers, sacks of grains and firewood are tied directly onto the padding fitted on the body, using straps cut from tyres. The padding is generally a sack or pieces of rags put on the donkey's back. There are cases, however where wooden panniers are used to transport water. Often there are wounds where the load rubs against the skin, particularly on the back, and cuts along strap contacts. The sacks used for padding are fertilizer packs because they are cheap. Some of the bags are stuffed with teff. Wooden saddles are made to sit on some

padding. Panniers in the three areas are generally made by the users and are very simple, taking the form of padding (sacks and rags) and leather straps that are used for tying goods onto the donkey. The padding and straps are replaced when they get worn out. At the same time, farmers use either plastic sacks or canvas as padding, which prevent sweating and collect dirt, causing chaffing. In Adami Tulu, saddles are either made of crooked wooden hooks or poorly bent metallic frames. In all areas, the donkey spine bears the same load as the back muscles. Most donkeys have sagging backs (*lordosis*), a condition resulting from overloading donkeys at an early age.

In Adami Tulu, donkey carts are common and harness varies, but consists mainly of wooden or metallic saddles. For village transporters, wooden saddles are preferred and are made locally. They tend to be rough. However, town transporters get the metallic frame for their harnesses from the local blacksmiths, and consist of tubes that are bent into A-shape. In all cases, the materials are readily available and harnesses can be repaired speedily and easily. Padding is of rags or sacks. The carts are wooden with either solid or pneumatic wheel rims. They are light and simple in design and are locally manufactured and maintained. Single donkeys pull most carts in Adami Tulu and Debra Zeit, but usually other donkeys are tied by the sides.

Conclusions Many of the wounds and sores caused by harnesses are not due to defects in the basic design, but by poor finishing, incorrect positioning or adjustment and poor management. Many sores and abrasion are caused by rough edges and surfaces, and dirty padding (old hardened sweat) and ill-fitting materials. In other cases, harnesses are too heavy for their required task. Lack of, or inadequate knowledge and skills among extension workers may have slowed down and sometimes misdirected efforts aimed at promoting dissemination of technology. Learning is most likely to change behaviour substantially when people try to improve situations that are relevant and important to them.

Locally, the capacity to make harnesses exists. Most artisans interviewed showed enthusiasm. Some of them have been able to improvise their own tools and equipment, such as transformers. Farmers also improvise by modifying both harnesses and carts to fit their needs and resources. Examples of well-designed and correctly fitted harnesses, and poorly designed, ill-fitting harnesses were seen. However, the potential for improvements is enormous. The first step is to tackle the inadequacies of the existing pannier and harnessing systems. This may involve only minor modifications to re-orient the harnesses and panniers. Suitable materials need to be used in harness manufacture and should always be kept clean. The design should be simple and fit well, to ensure the best line of pull and, thus, recognize the importance of protecting the spine.

Many workshops and conferences have been organized in Ethiopia on animal traction. However, few recommendations have been adopted because a lot of them require input from other disciplines and stakeholders. Networking at both local, regional and international levels would be an important way of improving delivery of services, thus enhancing peri-urban livelihoods and empowering resource poor communities country-wide. Many organizations in the region have obligingly produced affordable, dependable and adaptable technologies, which could easily be tried in Ethiopia.

In Ethiopia, where women play a vital role in the decision making process, their participation is also needed in producing suitable training materials.

Choosing a harness begins with information. An informed choice demands an understanding of the requirements the harness is intended to serve, knowledge of the options available and of techniques, skills and resources entailed in the user's decision. Dissemination of such information may either be carried out by change agents or through electronics systems, using various extension methodologies. For Ethiopia, it is necessary to use a variety of systems for dissemination, but radio messages may reach the most people in the shortest time, and the effectiveness may be enhanced if pamphlets or magazines are available, especially for the younger members of the society.

Overall, to adequately tap donkey power, an integrated approach is necessary, requiring enhanced donkey utilization and better management, - selection and training (choice, breeding, handling, husbandry, etc.), nutrition (feeding practices, scheduling, quantity, quality, etc.), health (disease prevention and control), equipment and accessories (carts, harnesses, panniers, etc.). The transfer must be participatory at research, development and extension levels.

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