

# Animal power in South Africa: some social and technological issues

by

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## **Abstract**

*This paper summarises the preliminary observations and conclusions of an eight-week appraisal survey carried out in rural South Africa in 1994. The survey was organised by the South Africa Network on Animal Traction (SANAT) and supported by several organisations.*

*Unlike most other sub-Saharan countries, South Africa has a long history of animal traction, and early this century most agricultural production in the country directly or indirectly involved work animals. Draft animals are now little used in the large-scale agricultural sector, nor in urban and peri-urban areas and the present importance of animal power is largely unrecognised. However, animal traction is both common and important in rural smallholder farming systems in the old "bantustan" areas, where 40-80% of the farming families benefit from animal power for transport and/or cultivation. It is estimated that over 500,000 oxen and 300,000 horses and donkeys are employed. These animals contribute to food production, rural marketing and drudgery reduction. Women can benefit greatly from animals transporting water.*

*For years, authorities have marginalised animal traction through (mis)education and legislation. Donkeys, in particular, have been blamed for veldt degradation and have been taxed, banned, removed or even massacred. In peri-urban and nearby rural areas, animal traction has declined. In many rural households, employment and pensions mean that agriculture is no longer the dominant source of income. Increased schooling has reduced labour availability within families.*

*Use of tractors by smallholder farmers is popular, having been stimulated by government subsidies, private investment of non-agricultural income and availability of second-hand tractors from the subsidised large-scale sector. Although smallholder farmers aspire to tractor use, ownership of tractors by smallholder farmers is generally uneconomical and provision of tractor-hire services to the remote smallholder sector is unsustainable except in rare cases where farms are irrigated, very fertile, large or consolidated or profitable crop markets exist.*

*Farmers have often regarded animal power and tractors as complementary. Tractors are mainly used for rapid, power-intensive plowing, leaving animals other tasks such as secondary cultivation, weeding, seeding and transport. This trend, evident in Transkei and the Cape, seems likely to continue.*

*There has been almost no formal education, training, extension or research relating to animal traction in South Africa for over forty years. There is an urgent need for training and capacity building. Animal traction issues should be included in school, college and university curricula. As animal traction is seldom seen by those living in urban and semi-urban areas, the technology is widely perceived as unwanted and backward. Efforts should be made to counteract this negative image, through TV programmes and associated videos, stressing the value and complementarity of draft animals.*

*Animal-powered technologies most likely to be accepted are those that address the issues of complementarity, convenience, modernisation and image-enhancement (including use on large farms), lower labour levels, low draft requirement and enhanced acceptability to young people and women.*

*Animal traction research-extension programmes should be farmer-centred, starting with detailed area-specific appraisal surveys. Among topics needing attention are: environmental impact of draft animals and measures to support the required animals; lighter implements and carts suitable for donkeys; weeding technology; harness making; prospects for mules; overcoming nutritional constraints and problems of stock-theft.*

*Animal traction can play an important role in meeting the Reconstruction and Development Programme objectives. National and provincial policies should encourage animal traction as an acceptable option that is economically sensible and technically realistic in many smallholder systems. The image of animal power needs improving, particularly amongst the young. Tractors and draft animal power are complementary technologies and subsidies should not be used to promote one at the expense of the other. National and international networking needs to be encouraged: South Africa has much to learn from other countries.*

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# Background

## *Historical perspective*

In many parts of the world, animal traction is seen by farmers and policy makers as an appropriate, affordable and sustainable technology, requiring few external inputs. Work animals can be used to reduce drudgery and intensify agricultural production, so raising living standards throughout rural communities, benefiting men and women, young and old. Cattle, donkeys, mules, horses and other working animals can provide smallholder farmers with vital power for crop cultivation and transport. Draft animals can also be used for logging, pond construction and road maintenance.

In Asia, Europe, North Africa and Ethiopia, animal power has been used for thousands of years, and it remains important for smallholder farmers. Parts of sub-Saharan Africa have had a long history of using animals for riding and pack transport, but it is generally believed that animal traction for tillage and wheeled transport was introduced during the colonial period.

In South Africa, the first European settlers landed to find the Khoi-khoi training cattle for packing, riding and war purposes. The Europeans started to use teams of oxen for pulling wagons. In 1656 the first imported horses and donkeys were landed, and European settlers were reportedly plowing with teams of oxen in 1657. For the next 200-300 years, animal power increased and spread, and became extremely important throughout South Africa. Oxen pulled the trek wagons and cultivation implements of the settlers. Donkeys worked in the mines and horses and mules pulled inter-city coach services. In many parts of the country, smallholder farming systems became dependent on the use of oxen, donkeys, ponies or mules for cultivation and transport. During the twentieth century, mechanical power became increasingly important for long-distance transport, mining operations and for the large-scale (generally “white”) farming systems. However animal power remained crucial to smallholder farming and rural transport.

During the 1960s to 1970s, animal traction received almost no attention in South Africa, and very little in the other African countries. This was a period when many people in the world thought that the rapid tractorisation recently seen in Europe, North America and in the large-scale farms in South Africa, would take place in smallholder systems in Africa. Animal traction had dropped out of the curriculum in Europe

and in most African countries. A whole generation of agricultural students graduated with no formal training relating to animal traction. These agriculturalists with little knowledge of animal traction became responsible for planning and implementing agricultural policies and programmes.

Elsewhere in sub-Saharan Africa, by the late seventies, higher oil prices, foreign exchange shortages and experiences of numerous failed tractor schemes suggested that rapid motorisation was not, after all, economically viable or practicable for smallholder farming systems. Animal traction started to be perceived by African governments as an economically and environmentally appropriate development option which had been neglected but which should be taken seriously, complementing both mechanical power and human power. Even oil-rich countries like Nigeria and Cameroon started to take animal traction seriously, and politicians and agriculturalists promoted animal power as a realistic option for smallholder farmers. It was recognised that the use of work animals for smallholder farming and rural transport was actually *increasing* in most countries in sub-Saharan Africa, yet the available technology had not changed for more than a generation. There was need for relevant research, development and extension. International networks were formed to promote international information exchange, including the Animal Traction Network for Eastern and Southern Africa (ATNESA).

In South Africa, not only had animal traction been largely ignored by the authorities since the 1960s, it was actually scorned or criticised in the curricula of some educational institutions. Thus by the 1990s, many people in South Africa had quite negative views on the subject, and failed to perceive its relevance to the new South Africa. In order to overcome this, the South African Network of Animal Traction (SANAT) was formed in 1993, to promote relevant research, development, training and policies concerning the use of animals, and to learn from the experiences of other African countries.

Information on animal traction in South Africa was difficult to obtain, and so SANAT commissioned an eight-week animal traction appraisal survey in 1994 in which a multidisciplinary, multiracial team visited most areas of the country where smallholder farming is important, including Northern Transvaal (Lebowa, Gazankulu, Venda), Eastern Transvaal (KwaNdebele, KaNgwane), North West Province (Boputhatswana),

KwaZulu-Natal (KwaZulu), Orange Free State (Boputhatswana and Qwaqwa), Eastern Cape (Transkei, Ciskei), Western Cape and Northern Cape. Over 500 relevant people were consulted, including male and female farmers, policy makers, educationalists, extensionists and manufacturers.

This paper summarises the observations of this appraisal survey which was logistically or financially supported by several organisations including the Development Bank of Southern Africa, the Directorate of Agricultural Engineering, the Land and Agriculture Policy Centre (LAPC), the University of Fort Hare, the Land Development Unit of the University of Western Cape, Tracor, Agricolor, Tsolo Agricultural College and the British Overseas Development Administration.

### ***Overview of the present situation***

South Africa presently has a dual agricultural economy. Although work animals were widely used in the large-scale agricultural sector earlier this century, this is now uncommon. A small number of large-scale farmers use heavy horses for on-farm transport, and argue it is a highly profitable option that has been overlooked by others. A few large spans of oxen are employed by enthusiasts.

In the urban and peri-urban areas, work animals are no longer common, but they are still used for some local deliveries and scrap collection (eg, Soweto, Thaba Tchu, Bellville, Cape Flats).

However, animal power remains both common and important in rural smallholder farming systems (generally the old “Bantustan” areas). Reliable statistical data are unavailable but in the more remote rural areas of South Africa, 40-80% of farming families presently make use of animal power for transport and/or cultivation.

Historically oxen were the main work animals, and they remain the most popular and important work animals in several areas, notably in KwaZulu, Transkei, Ciskei and KaNgwane. However, in most smallholder farming areas, the use of work cattle has been reduced by drought, inadequate grazing land and pasture degradation. This has led to increasing use of donkeys throughout the country but particularly in the northern provinces. Donkey carts have major social and economic roles in many rural communities. Local horse breeds are popular in highland areas (around Lesotho, Thaba Nchu, Ciskei) and in the Western Cape. Small numbers of mules are used, but they are seldom bred by smallholders and are generally difficult to obtain.

## **Social and economic issues**

### ***Social roles of animal traction***

Animal power in South Africa can be seen to reduce drudgery and increase speed of operations for both men and women. This applies to both tillage and transport operations, when considered in relation to manual alternatives, such as hand hoeing or head loading. Animals are also seen to enhance rural mobility and improve local marketing systems, for both men and women. Until water reticulation is widespread, there will be a continued need for drudgery reduction relating to water transport. Motorised systems of tillage and transport can provide even more drudgery reduction, but compared with these, animal power has the advantage to rural families of being available, timely and affordable.

Oxen have been the major draft animals, with cattle fulfilling diverse social and economic functions. Cattle are generally considered within the male domain, and the inspanning of oxen has usually been

performed by men and boys. Within traditional societies, horses also tend to be male-domain animals, but donkeys are much more gender-neutral.

### ***“Bantustans” made animal traction difficult***

In many parts of the country, smallholder farmers spoke with pride about their long-standing animal traction traditions, but had found that the use of animals had become increasingly difficult since the 1960s for reasons directly or indirectly associated with the formation of “Bantustans”. They lacked sufficient land to graze their animals, and pasture was degraded on available communal land. This was exacerbated by droughts (some Bantustans were in relatively poor and high-risk farming areas, and there had not been the same investment in irrigation as was found in the “white” farming systems).

The authorities had not approached the associated problems of high stocking density, erosion and inadequate pasture by allocating more land, but

rather they attempted to regulate animal numbers. Thus families that required perhaps ten cattle to form a span, were limited to four, making it difficult or impossible to continue to use animal power. As cattle no longer thrived as they had in the past, farmers in the northern communal areas tended to turn to donkey power, but the authorities actively discouraged or prohibited donkey ownership, so making continued animal power use unfeasible.

Within “Bantustans” the police (according to farmer interviews) took a laissez-faire attitude to the “internal” problems of stock theft (in marked contrast to police reaction to cattle-rustling elsewhere in South Africa) so that the risk of animal loss became (and remains) a key constraint to animal power use. The authorities were often prepared to promote policies that led to reduced local employment and the underdevelopment of rural economies. Effective marketing (vital for income generation and farm capital accumulation) was generally ignored while smallholder tractorisation was sometimes encouraged, even though when used on small land areas this effectively exported work and money from the rural areas to the urban areas and overseas (in the case of fossil fuel).

#### ***Changing economic circumstances***

Smallholder farming families in South Africa used to meet most of their subsistence needs from their own production, with income from surpluses being vital for the household economies. Animal power allowed greater and more timely production, and consequently a higher standard of living. However only in the more remote areas is agriculture quite so dominant. For many South Africans, economic survival on the small plots of land available (often less than three hectares) is virtually impossible. Remittances from urban wage-earners, pensions and other non-agricultural income have become increasingly important for rural households, and so agricultural technologies no longer have such over-riding importance.

Traditionally children were responsible for looking after animals, but with increased schooling, labour-intensive farming systems have become impracticable. Furthermore, female-headed or managed households are increasingly common. In some families, the men who traditionally undertook work with draft animals are now working in towns, and those remaining in the rural areas are women or old people for whom inspanning of cattle would be difficult or culturally unacceptable. (Some villages reported that the recent recession had increased local labour as it was now more difficult for male workers to leave and obtain employment).

#### ***Changing images, attitudes and aspirations***

In the more remote areas, farmers still have great pride in their traditional systems of using animal power and in the work animals themselves (whether oxen, donkeys or horses). However, in the urban and peri-urban areas, animal power is often perceived as an old-fashioned, backward and outmoded technology, particularly among the young. Farm families increasingly aspire to “modern”, TV-illustrated, lifestyles, and animal traction is not portrayed as part of “modern” systems, nor is it associated with the obviously affluent and successful groups in South Africa (eg, urban elites and large-scale, “white” farmers). The negative image has been reinforced by the authorities who have actively discouraged the use of animal power.

Probably all farmers, whatever their scale, would like to own or use tractors and motor cars; the only farmers who expressed some doubts about this were those who had suffered financially from the attempted ownership of such technology. Because of the poor public image, some farmers interviewed were reluctant to admit to using animal power. Widespread concern was expressed that the young were not interested in taking up the technology, and that existing knowledge was not being passed on within villages.

#### ***Education, knowledge and perceptions***

For more than a generation, there has been an almost complete neglect of animal traction technology in the curricula of schools, agricultural colleges and universities. Nevertheless, some misinformation appears to have been disseminated, so that students and agricultural staff often have incorrect concerns about animal traction in general and the role of donkeys in particular (eg, it is widely believed that donkeys eat more than cattle). Agricultural extension workers graduating this year will have had no instruction in either old or new ways of employing draft animals, even though the technology may well be used by the majority of their clients.

Approaches to agricultural development have tended to be centralised and paternalistic, ignoring the social complexity of rural communities and neglecting the importance of indigenous knowledge and skills. Senior agricultural staff, based in urban or peri-urban locations, have seldom had practice in listening to the concerns and needs of smallholder farming families. They have generally equated development with adoption of the labour-saving practices used in large-scale farming, seldom considering the implications for small-scale farmers. This partly explains why in some areas, senior agricultural staff have dismissed animal traction as negligible, even when the majority

of farmers in their remoter rural areas were actually depending on it.

### ***Changing policies and perceptions***

Official perceptions about animal traction are not all negative, and with the momentous political and social changes of past months, rapid changes can be expected. The Reconstruction and Development Programme (RDP) makes many references relevant to animal traction concerning farmer-driven extension, appropriate technology, sustainable agricultural, rural transport and assistance to rural women. Officials in some areas, notably Transkei and

Ciskei were very positive about animal traction, and at least one ANC politician in Eastern Cape has publicly spoken about encouraging animal traction.

The survey team found that in many areas, simply by visiting agricultural institutions, posing questions and discussing issues, the survey had been creating a new awareness concerning the extent of animal power use and the present lack of training, extension advice or backup services. Recent workshops, arranged by the Foundation for Research Development (FRD) and SANAT, have suggested there is now considerable interest among some professionals for investigating and developing animal traction technologies.

## **Animal issues**

### ***Choice of draft animals***

Farmers expressed many views concerning their past, present and future choices of draft animals. In some areas, one type of animal was strongly preferred (eg, oxen in much of KwaZulu, donkeys in Namaqualand, horses in Ebenhauser, Western Cape). In many societies, the ownership of cattle is desirable for several agricultural, economic and social purposes, and so cattle tend to be the most available and preferred work animals. Oxen, mules and horses were often considered animals of high status, and often had strong masculine connections within communities. Much depended on the land and capital resources available to the farmer, larger and more numerous draft animals allow greater work, but they cost more money. Increasingly important for farmers were the characteristics of survivability and low labour and management requirements.

### ***Cattle***

Oxen have been, and remain, the main draft animals in South Africa. While reliable statistics on the numbers of work oxen are not available, it may be estimated that over 500,000 draft oxen are used each year (this figure is 10% of the cattle owned in the former "Bantustan" areas). They are perceived as powerful draft animals for plowing, but quite slow and labour-intensive. Some cows are used for work when there are not sufficient oxen and bulls may sometimes be worked as part of a team. Cattle have many different functions, of which work is but one. Thus reduction in the use of oxen does not necessarily mean reduction in the numbers of animals

owned or grazed. The survey found little evidence of increasing use of oxen. In some areas farmers reported the numbers of work oxen were decreasing, although in Transkei the use of work cattle appears very persistent. Reasons given for present and future decline included lack of grazing, lack of labour and lack of interest by the young generation.

### ***Donkeys***

Until recently donkeys have mainly been used in the drier areas (Northern Cape, North-Western Province, Northern Transvaal) for transport purposes (packing in hill areas, carting in flat regions). Farmers reported their range is expanding and they are increasingly being used for plowing and weeding as well. There are probably over 150,000 donkeys in use in the country. They are renowned for their exceptional survivability, longevity, low cost and low management requirements. They are used by men, women and children - in some areas over half the donkey carts are used by women. In many areas, farmers reported cattle were replaced by donkeys due to drought and veldt degradation (starting in the late 1950s); farmers insisted that increased donkey adoption **followed** the problems of drought and poor cattle survival (and were not the cause, as implied by some government agencies).

In most South African societies, donkeys are mildly ridiculed in conversation and through traditional words and phrases, even though many farmers find them invaluable. Donkeys have a particularly bad image among agricultural staff, which may be partly the result of educational misinformation. The great

value of donkeys to rural communities has been largely ignored, and they are often seen as pests by urban and peri-urban people, a view shared by some affluent rural residents (degrading the veldt for *their* cattle, causing accidents to *their* cars, stealing from *their* gardens, etc).

Donkeys have been officially discouraged and/or culled in almost all former "Bantustans". The worst case was in Boputhatswana where in 1981/82 donkeys were systematically massacred in large numbers (the farmers reported they were "still crying" about this). In other areas they have been taxed (more than cattle) or rounded up for disposal in lion parks, crocodile farms and circuses. This means that farmers may now be reluctant to acknowledge donkey ownership, although (despite the claims of agricultural authorities) all donkeys are owned and have names. Farmers often reported there was a shortage of donkeys. In all areas, farmers expected the use of donkeys would increase in the coming years.

### ***Horses and ponies***

The use of horses and ponies is quite localised, they are mainly used for riding in highland areas (notably in the Eastern Cape). There are about 180,000 in the former "Bantustan" areas, mainly in Transkei. Some horses are used to pull carts in urban and peri-urban areas, as well in rural parts of the Eastern and Western Cape. Horses are perceived as strong, fast transport animals, but they do not have the hardiness of other draft animals. Horses maintained for transport may assist with agricultural operations, such as weeding. In parts of the Western Cape they are used for plowing. A few (perhaps 100) heavy horses (mainly Percheron, some Clydedales and Shires) are employed, mainly in the Eastern Cape for on-farm transport and some logging.

### ***Mules and hinnies***

Small numbers of mules (formed by crossing a female horse with a male donkey) are found in most areas of South Africa, amounting to perhaps 2000 in the whole country. They are perceived as strong and resilient work animals, requiring regular and profitable work. Their size and temperament means they are generally considered as animals suitable for use by men, rather than women or children. They are

very expensive relative to donkeys, but equal to the cost of an ox. The apparent demand for mules outstrips the very limited supply, and traders may travel long distances to obtain them. Until recently, mules were valued for logging operations. There is little evidence relating to the use or breeding of hinnies (female donkey and male horse), perhaps because this cross is more difficult to produce.

### ***Animal nutrition and health***

The combination of drought conditions and the linked problems of communal grazing, land hunger and pasture degradation have been a major factor in the recent reduction in the use of work animals, particularly oxen. Farmers reported that they had seen the pasture quality decline and the species of vegetation change. In some areas fire was a problem. Only some farmers conserved forage for their animals, and it was unusual to supplement the diet of animals other than horses. Farmers often responded to the problem of feeding cattle, by purchasing donkeys for their work needs.

During the survey, animal disease was seldom cited as a major constraint to the use of draft animals. Poor cattle survival was attributed to pasture problems rather than disease. The almost legendary ability of donkeys to survive (up to twenty-five years) without any veterinary intervention was often cited. Farmers sometimes regarded the veterinary services with great suspicion; in some areas veterinary agents admitted they had tried to discourage the use of animal traction.

### ***Animal supply and marketing***

Farmers frequently complained of the lack of availability of draft animals, partly associated with the problems of drought, inadequate grazing and limits on stock numbers. In some areas stock theft is serious. In other areas, the authorities have been promoting exotic breeds, less suited to multipurpose meat/work uses. Donkeys are often in short supply, partly due to the culling or shooting by authorities. In some areas it was reported that the veterinary authorities (in an attempt to reduce animal traction) had told farmers they would obtain lower prices for culled work animals.

# Technology and operational issues

## *Operations using animals*

In different parts of South Africa, draft animal are used for a very wide number of operations including plowing, harrowing, seeding, weeding, mowing, raking, crop lifting, fertiliser-spreading, pond excavation, logging and transport. However, the great majority of animals are used mainly for plowing and for transport. Animal-drawn planters are used to a small extent in most areas and animal-powered weeding is well-established in the Western and Eastern Cape (notably in Transkei).

There are probably about 200,000 animal-drawn plows in use (the figure was 330,000 in 1964). New plow sales are in the region of 6000-8000 units a year, with many plows having a working life of more than 20 years. There are also about 90,000 cultivators in use (annual sales about 6000) and 60,000 planters (annual sales of 6000).

Cattle are yoked in pairs, using wooden withers yokes. Few problems with yokes were reported or observed, except that in some areas farmers do not know about the longer yokes required for successful weeding. The number of animals worked together varies from single pairs (common for light carting and weeding), to spans of four or six (most common for plowing) to larger spans of up to 16 animals (now quite rare) used for pulling multi-furrow plows. Two or sometimes three people work with the oxen, whether there be two animals or eight. It is rare for one person to work with oxen alone.

Horses, donkeys and mules are harnessed with breastbands made from a variety of materials. Leather harnesses are made locally by farmers in Namaqualand. Professionally-made harnesses are available (at a high price) from some retail outlets. The use of synthetic webbing is becoming more common in the formal retail sector, but at village level industrial webbing, belting and tyre rubber are more common. Farmers often reported problems in obtaining good, cheap harnesses, and many existing harnesses are crudely repaired with wire, causing problems to the animals. Either one or two people work with horses and donkeys. Horses are generally worked singly. Donkeys are worked in pairs, with two to four animals being common for transport (up to ten for heavy loads) and four to fourteen for plowing.

## *Implement supply and suitability*

On a national scale, implements and spare parts of the long-established *Safim*-type designs are readily available, with over 20,000 implements sold each year. Most stocks are maintained in large towns, and in the more remote rural areas many implements are unused because farmers experience problems in obtaining spares. The *Safim*-type designs are well-proven (more than 50 years old) but are heavy and date back to the era when men worked with large teams of draft oxen. There is no modern or light equipment available, for example appropriate for being handled by women and pulled by donkeys.

## *Rural transport*

Most carts are locally made by artisans, using materials derived from road vehicles. They carry both goods and people. There are no standard designs (or standard spares) and prices vary greatly, depending on the supply of, and demand for, scrap axles. Carts tend to be strong but heavy. Two-wheel carts are generally pulled by two or four animals (increasingly the animals are donkeys). The weight of the dissel-boom is taken by a yoke with cattle, but with donkeys and horses, the weight is taken by narrow straps, which can cause problems for the animals. Lightweight carts with two shafts that are suitable for single donkeys are absent or very rare (elsewhere in Africa and the world such carts are very common). Four-wheel wagons pulled by two to eight animals are used for heavier rural loads and peri-urban contracted transport. In some areas, notably Transkei, KwaZulu and KaNgwane, sledges drawn by two to eight animals are common. These have the advantage of being very cheap and in hilly areas they do not have the same braking problems experienced by carts. However, their load capacity is low and they may accelerate erosion on hillsides (as would other vehicles).

## *Tractor issues*

Tractors are increasingly used in South Africa, for they are extremely effective at plowing large areas in a short time. They are economically justified on most large-scale farms. Although they are popular and of high status, unfortunately they are not well-suited to those smallholder farming systems where small and dispersed fields have to be cultivated in remote areas. This causes a disproportionate amount of tractor time to be spent on travelling, turning and awaiting inputs.



This is unlikely to be economically justified where crops yields are low or risky.

The lack of intrinsic profitability of smallholder tractorisation is illustrated by the failure of South Africa to come up with a cadre of tractor entrepreneurs operating in the smallholder sector (in marked contrast to the entrepreneurial successes in taxis, road transport, retailing, etc). Most private tractors in the smallholder sector have been bought with non-agricultural capital (employment savings, pension or retailing profit). They tend to be unsustainable and capital depleting, for fleets of tractors do not build up (as do taxis, buses and trucks). Where there have been some successes with private tractor hire, there appear to be specific economic conditions including profitable cropping systems with good rainfall and/or irrigation on fertile soils, large individual farm areas (eg sugar cane farms) or land that is consolidated/not badly fragmented and nearby infrastructural backup. Such conditions are actually rare in smallholder farming areas. For a farmer with a small land area or for a tractor entrepreneur, the risk of financial failure through tractorisation is high (although many have been protected against bankruptcy by taking public sector soft loans).

Most government-supplied tractors in use have been, and still are highly subsidised, so that subsidised tractors have been competing against non-subsidised animal traction. Government tractor hire schemes have proved popular while they were working, but

generally have also been expensive and unsustainable.

Tractors can plow when soil conditions are hard, and they are certainly faster and more timely for those individuals for whom they are available at the right time (for those later in the queue, animals might have proved to be more timely and less risky). Tractors allow larger areas to be cultivated (an advantage only for those with adequate land). There appear no conclusive advantages or disadvantages of tractors and animals in relating to yields, as so much depends on the soils, rainfall, spacing, timing and the operators. Tractors may have adverse ecological effects, relative to draft animals. For every R100 spent on tractor hire, most is exported from the rural area. For every R100 spent on the hire of draft animals, most remains within the community.

### *Complementarity*

The adoption of tractors for plowing does not preclude use of draft animals for other operations (eg seeding, weeding, transport). Indeed if farmers totally abandon animal traction because of tractor plowing services, their families may lose a very important cultivation and transport resource. In several parts of South Africa, notably Transkei, farmers consider tractors and work animals to be complementary, with tractors (if available) used for rapid power-intensive plowing and animals for subsequent control-intensive seeding and weeding and year-round transport.

## Research, development and extension needs

Based on the information obtained from the field observations, discussions with farming families, literature analysis and the views expressed by students and professionals involved in education, research and agricultural development, the following areas now appear to require attention.

### *Approaches*

In the past, top-down approaches to research, development and extension have been (and remain) widespread. Many of the professionals contacted were unfamiliar with participatory methodologies involving farming systems perspectives, social

understanding and recognition of the importance of indigenous knowledge and skills. Due to lack of discussion with farmers, knowledge about animal traction and its role in rural communities is extremely limited. Farmers (and farming families) should be consulted at all stages in future work relating to animal traction research, development and extension. Where practicable, animal traction research and development should be multidisciplinary, multiracial and multigender.

In order to maximise benefits, and avoid errors, future research, development and training relating to

animal traction should be based on a networking approach: sharing experiences and ideas between institutions (both nationally and internationally). South Africa has much to benefit from the experiences of other African countries, and much to contribute as well.

### ***Technology research and development***

Animal traction technology research and development programmes should be based on local problem identification, and should be planned and implemented in conjunction with local farmers.

In general, the technologies most likely to be appropriate are those which emphasise one or more of the following:

- Low draft requirements (suitable for donkeys or small numbers of oxen)
- Lower labour levels (eg, one person working with animals)
- Acceptability to young people and to women
- Convenience and ease of use
- Complementarity (eg, planting and secondary-tillage technologies that complement tractor plowing)
- A modern image (eg, use of new techniques, materials and colours), perhaps including systems in which animals can be seen to work profitably in large-scale farming systems.

Three of these areas may warrant specific studies.

- Ways in which animal traction can further benefit women, through drudgery reduction, income generation or the avoidance of further marginalisation.
- Ways in which young people can be creatively and beneficially involved in animal traction technologies.
- Ways in which large-scale farming systems could profitably benefit from animal power.

### ***Training and curriculum development***

To ensure that the future generation of South Africa is aware of animal traction issues and technologies, there is an urgent need to ensure that the topic of animal power is adequately covered within the South African primary, secondary and tertiary educational systems. A detailed analysis of curricula needs is required. Priority should be given to ensuring that draft animal technologies are covered within agricultural colleges and universities.

Given the lack of training in animal traction in the past, there is great need for appropriate in-service training among agricultural extension staff and the staff of agricultural training institutions. To cater for different levels of staff, training courses or workshops may have to be organised at national,

provincial and district levels, with initial emphasis on the training of trainers.

In order to assist the training programme envisaged, animal traction resource centres should be established (or further developed) within national (eg, University of Fort Hare, University of Pretoria) and provincial institutions. While such centres should have appropriate training materials, wherever practicable, emphasis should be on on-farm training and interaction with farmers.

In order that young people are encouraged to value draft animals, SANAT, or an associated body, should develop and disseminate a package of training materials suitable for schools and young farmers' clubs.

One or more high quality animal traction video should be prepared at the earliest opportunity, and perhaps initially screened as television programmes. The main aim should be to make people aware of different animal traction uses and options. This should include images of draft animals being employed in different areas of South Africa (and perhaps elsewhere) with interviews with farmers (of both genders) and with different professionals (socio-economist, animal husbandry, agricultural engineer, etc). Such a general, awareness raising video, would have value in schools and agricultural colleges.

### ***Environmental impact of draft animals***

In the past, some agricultural authorities within South Africa have claimed that animal traction should be discouraged due to pasture degradation and limited carrying capacity. Donkeys, in particular, have been blamed for over-grazing and environmental damage (a view often rejected by farmers). There appears no objective, authoritative evidence to either support or reject such contentions. A thorough and reliable research study would be valuable, particularly if it were approached in a constructive, development-orientated way, looking (among other things) at different ways in which the number of animals that farmers require can be maintained.

An associated study (but one not limited to draft animal issues) might review existing research knowledge and farmer observations concerning the changes in pasture quality on communal land. Such a study, would be wide-ranging and multi-institutional, with recognition of the importance of indigenous knowledge in this field.

### ***Animal feeding and pasture***

The poor condition of draft animals at the start of the plowing season was cited as a constraint. To overcome this, a detailed study of feeding, feed conservation systems and low-cost feed supplements

would be valuable, based on present practices and resource limitations. The study should be farmer-centred and multidisciplinary, with a strong socio-economic component.

### ***Prospects for mules and hinnies***

Mules are not widely used, partly because of limited supply. The mule breeding centres in Lebowa and Transkei are unlikely to either meet local demand or be economically viable in the near future. They should not be further developed, nor abandoned, without a detailed technical and economic study of the prospects for mules and/or hinnies within South African farming systems.

### ***Stock theft and fencing***

Stock theft is a major problem that affects draft animals (cattle, donkeys and horses) and it sometimes influences whether animal traction is used at all. Associated problems relate to effective animal identification and the adequate fencing of communal lands (and the roads that pass through them). Case histories of successes and failures should be collected and reviewed, to enable an analysis with recommendations to be published.

### ***Weeding technology***

In several parts of South Africa, draft animals are used very little for weeding, even though animals often have a distinct comparative advantage over alternative systems (hand, tractor, chemical). This is partly because of lack of suitable implements (or yokes) or lack of training/extension. Lightweight weeders suitable for use with donkeys could prove valuable, as could weeding ridgers. A farming systems research-extension programme would be valuable, particularly in the north of the country.

### ***Tillage systems and implements***

Several engineering studies appear to be required. These should be carried out using a networking approach (benefiting from Zimbabwean and other experiences) and farmer-based testing procedures. They include:

- Identification and testing of lightweight tillage implements, including plows, suitable for use in garden plots with donkeys or paired oxen.
- The potential for conservation tillage with animal power
- The potential for winter tillage with animal power.

A more detailed study should be undertaken on the wide range of animal traction implements that were used in South Africa, and/or which are still being used in specific areas (eg, mowers and rakes in

Ebenhauser, three-furrow donkey plows in Namaqualand). Recommendations should be made on how to repair and/or replace such implements and whether they could be recommended in other areas.

### ***Harness making***

Existing harnesses for donkeys and horses are often poorly designed (and are sometime both inefficient and cruel). Farmers complained that repair and replacement is a problem. There is a need for good but inexpensive local supplies, preferably involving village-level production. Good harnessing skills do exist in the country (eg, in Namaqualand) and a very useful village-level training programme could be developed, using farmer-to-farmer exchanges.

### ***Animal-drawn carts***

In some areas the use of animal-drawn carts is presently restricted by limited supply and/or high costs. There was significant farmer-interest in some areas in the possibility of using lightweight donkey carts (as widely used in West Africa). Supplies of good yet cheap axle and wheel sets might well improve rural transport. Emphasis would be on local fabrication and/or assembly.

Horses, and occasionally donkeys, are used for urban transport in several areas. Animal welfare groups have expressed concern about the condition of animals and their short life-span in the PWV area, but in other locations, including Thabu Nchu and the Cape Flats, the technology appears economically viable. A detailed study of such transport systems, and the needs of the operators and animals could be valuable.

In rural areas, local animal-drawn transport is often very beneficial to communities, but problems are encountered in places where fast, inter-city roads traverse rural areas. One answer is to have graded cart-tracks running parallel to the main roads, so that the interests of the rural community and those of the vehicle drivers are both met. This option may require further feasibility studies, or promotion to local planning authorities.

### ***Forestry and logging***

In many parts of the world (including European countries) logging with animals is economically viable and ecologically desirable. Draft animals used to be important for logging in South Africa, and in some areas they are still used, but the technology has recently been neglected. The prospects for complementing mechanised systems with animal-powered logging could be a useful topic for study.

# Some policy implications

## *Animal traction within the RDP*

In 1994, the new government was elected and the Reconstruction and Development Programme (RDP) was introduced. This is to tackle many of the issues relating to draft animal power, including land reform and the general need to improve the quality of rural infrastructure and services in order to make people (including young people) happy to live in and develop the remote rural areas.

With a positive policy environment that recognises the past, present and future contribution of animal power within South Africa, draft animals will be able to serve rural communities in several of the key areas to be tackled by the RDP, including transport, food production and food security and women's needs. Many of the suggested research, development and extension programmes, including those relating to capacity building, animal-drawn transport and developing lighter animal-powered systems could well be implemented within the context of the RDP.

## *Overall policy approach*

Animal traction should be recognised as one valuable option for empowering rural communities, that should be promoted alongside other technologies.

## *Promotion of positive image*

Due to the rather negative perceptions that animal traction attained during the previous regime, there is need to redress the balance with some more positive images, with animal traction portrayed as one valuable component of the RDP.

## *Education and training*

To counteract the previous educational neglect in this area, there is need for capacity building, with in-service training of existing staff involved in agriculture and rural development. There is also need for curriculum development throughout the educational system to ensure future students are not biased against animal power technology, and they have appropriate knowledge commensurate with their courses and level of study.

## *Revoking past discrimination*

The previous policies or legislation designed to discourage the use of animal traction should be reversed (eg, discriminatory legislation or taxation against the ownership of donkeys or other draft animals should be revoked).

## *Complementary technologies*

Wherever possible, human, animal and mechanical power should be allowed to compete freely, allowing farmers to select the most appropriate technologies for each need. Thus any government subsidies relating to the provision of power sources, should, wherever possible, be **technology neutral**. (This should reduce the problem of subsidised tractor technology competing against non-subsidised power systems, so marginalising those people or family member relying on alternative manual or animal systems). Should direct or indirect government subsidies be made available for tractor services (which is **not** being advocated here), comparable subsidies should be available for those using animal power for cultivation. If there is any promotion of tractors as power sources, efforts should be made to see if complementary animal-based operations should be encouraged at the same time.

## *Resources*

If some, or all, of the suggested programmes are to be implemented, the relevant institutions, organisations or individuals will require appropriate resources and support, which may have budgetary implications.

## *Networking*

In implementing the programme, efforts should be made to build on indigenous knowledge and South Africa's agricultural past, while benefiting from the lessons and experience of other countries. This would be achieved through policies that support national and international networking activities.