Animal traction in South Africa: the way forward

A synthesis of workshop discussions, conclusions and recommendations reported by

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Introduction

The results of the nation-wide rapid rural appraisal survey as highlighted in the preceding overview paper were presented to a workshop held 19–21 October 1994 at Halfway House, Gauteng. The 70 participants, from many parts of the country, included heads of agricultural departments, academics, representatives of development agencies, animal welfare officials, extensionists and farmers. The following pages contain a summary of the key issues discussed and the main workshop conclusions. Due to the nature of workshop groups and the reporting system, some points are made more than once.

Animal traction in perspective

Although the following recommendations relate to animal traction, it must be stressed that animal traction is just one component of rural systems. Human power, animal power and motor power are complementary. Animal traction can empower rural communities, but so also can electricity, education and rural transport networks. The recommendations given here do not imply animal traction is of over-riding importance in the new South Africa nor that animal traction should be the main focus of agricultural research and development, nor that other agricultural and transport technologies should be ignored.

Given the basic premise that animal power must be seen within its broad context, participants accepted that both the animal traction survey and the workshop were entitled to focus on animal power issues. Animal traction has been a very neglected area and is now in need of detailed attention.

In the following pages some recommendations are made concerning policy formulation, education, training, research and infrastructural support. Again, while these focus on animal traction, they should be interpreted within the broad context of rural farming systems.

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Animal traction is alive and working

One of the main conclusions of the survey and the workshop was that, despite years of neglect, animal traction was actually widely used in rural South Africa—much more so than most people realised. Certainly town-dwellers have to go past the peri-urban areas and off the main tar roads to see it, but it is there. In recent decades it has been `invisible', just as the great majority of South African rural households have been unseen and unheard.

With the changing national situation, animal traction is no longer invisible, and many people will be surprised at how many rural households presently benefit from animal power. The workshop stressed that this continuing importance of animal power should be portrayed with pride. There is no reason for anyone to be `against' animal traction.

Animal traction needs

The animal traction survey and workshop identified several important needs, which will be elaborated in the following pages.

- Need to incorporate animal traction into government policy in general and the Reconstruction and Development Programme (RDP) in particular;
- Need for awareness creation and training for many people involved in decision-making, policy formulation, research, training and education.
- Need to include animal traction in a range of education and training curricula;
- Need for action-orientated animal traction research to overcome the backlog of technical and operational constraints resulting from years of neglect;
- Need for a multidisciplinary approach to animal traction research, training and development, based on holistic, farming systems perspectives, participatory methods and networking collaboration;
- Need to make people aware of the many useful ways in which animal traction can empower rural communities in the new South Africa.

Animal traction and the Reconstruction and Development Programme (RDP)

General

Animal traction should be considered as one realistic option in the development of the new South Africa. Animals can greatly reduce drudgery, compared with human-powered alternatives. This is particularly true for soil cultivation and for transporting water and goods. Compared with motorised alternatives, animal traction tends to be more affordable, sustainable and more readily available. The units of power (the animals) are mobile, multipurpose and can be owned and managed by individual households. Trucks, tractors, cars and work animals all have their place in the RDP and the land reform programme—they are all complementary technologies appropriate to different circumstances.

Empowerment of women

Women are increasingly the major beneficiaries of animal power. Historically, work animals tended to be owned and controlled by men for agricultural production and transport. Work animals (often donkeys) are increasingly controlled by women. The animals reduce the drudgery of cultivating fields and food gardens and of transporting water, produce or shopping. Women entrepreneurs can benefit from animals for production, trading and hiring arrangements. Nevertheless many rural women do not have access to work animals and carts, leaving them dependent on men and/or their own strength. Technical support and rural credit programmes to assist women to purchase animals, implements and carts could do much to reduce rural drudgery and raise the standard of living for many households.

Water distribution

It will take several years until all homes in rural areas have tapped water. Animal traction can provide a simple, cheap and dependable option for supplying water to rural households. The drudgery of transporting water in wheelbarrows by women and children can be relieved by using animal-drawn carts and pack-drums or water bags. Some research is required on lightweight, low-cost carts and humane pack systems. Infrastructural support to cart production workshops and credit for cart purchase would increase access to carts. Some entrepreneurs could be encouraged to start water distribution systems based on animal power.

Transport

Animal power can provide a simple, cheap, dependable and constantly-available option for rural transport, that can improve the quality of life of users. Carts can transport water, firewood, building materials and shopping for domestic use. They assist crop-livestock integration by transporting compost and manure, forage for animals and crop harvests. They help promote rural trade and stimulate economic activity. They transport people to schools, clinics, pension centres and shops.

Heavy wagons are effective for entrepreneurial trading and work on large farms. Small, light carts are better for regular use by women and young people. Light household carts are in short supply and their manufacture and sale could be stimulated by improved supply of axles in rural areas and credit to purchasers.

In remote rural areas, animal power can assist labour-intensive rural road maintenance, providing employment. Income earned by contractors with animal-drawn carts can justify credit to pay for the carts, which can also be used for socially-beneficial domestic purposes.

The design of rural road networks needs to take account of local animal-drawn transport systems, with possible provision of `cart lanes' (or parallel cart tracks) on some stretches where interaction of carts and motor vehicles can be problematic.

Food security and agricultural production

Draft animals can greatly assist smallholder agricultural production and transport. Animal traction and tractors should be seen as complementary power sources and technologies. Animal traction and tractors should be allowed to co-exist on a `level playing field', without any distorting subsidies to tractor purchasers, operators or users. Any agricultural subsidies or support should encourage long-term economic viability.

Even in situations where plowing by tractor is profitable, draft animals may still have an important role. Animal traction can be efficient and cost-effective for weeding and on-farm transport (even on large-scale farms). Where fields are small and remote, animal power will probably be most appropriate for all operations including plowing.

Animal traction should be seriously considered as an option in all new agricultural development initiatives (such as new irrigation schemes).

Research is required to update and upgrade animal traction technology for smallholder farmers. Participatory and farming systems research methods, combined with technological inputs and international networking are needed to improve the implements, the animals and the systems of utilisation.

Energy

Draft animals represent a renewable source of energy. Unlike fossil fuel systems, money spent on animal energy stays within South Africa, in general, and within the rural areas, in particular.

Research is required on animal-powered tillage systems, implements and cropping methods which reduce energy requirements.

Rural employment

Some animal-powered options in small-scale agriculture, large-scale agriculture, forestry, rural road maintenance and local transport can be both profitable and cost-effective, relative to alternative systems using motors. Moreover, they are generally more labour-intensive. This not only provides more direct rural employment, it also provides work in rural support services (eg, harness and cart makers). Motorised alternatives in agriculture, forestry, road maintenance and transport not only tend to reduce direct rural employment, but also their manufacturing and service industries are generally urban-based and often foreign.

Education and training

Although animal power is part of the cultural heritage of South Africa, it has tended to be marginalised by negative attitudes. It is now missing from the educational curriculum and people generally lack relevant understanding and knowledge. Young people at school need a sensitive introduction to the topic, and agricultural students require technical training. For this to be satisfactorily achieved, the educators and trainers will first have to be trained and the public provided with more positive images of the value of animal power.

Perspective and prospects

The RDP is an enormous undertaking, with numerous elements. Animal power is only a very small part of this, but it is one that could have great value to rural people. It is also an element that could easily be overlooked.

Despite the almost infinite scope for rural development initiatives, it is inevitable that the RDP will be constrained by finite funding. RDP support for animal traction can be affordable, rapid and people-friendly. Developing farming systems incorporating animal traction can be an attractive, low-cost alternative which can complement other more expensive and sophisticated approaches.

One small measure of the success of the RDP will be whether animal power is not only used more efficiently by rural people, but also widely accepted by society as an integral component of the new South Africa.

Knowledge, attitudes, training and education

Key problems to be addressed

Although animal traction has had a very long history in South Africa, it has been badly neglected for the past thirty years, or more. The topic has not been included in educational curricula for many years, so there is a serious lack of knowledge on the issue among those responsible for decision making, training and education. Officials generally do not adequately appreciate the present value of animal power to rural communities. These factors, combined with the long-standing (`old-fashioned') nature of the technology have caused many South Africans, notably the youth, to consider animal traction as irrelevant to the present day. Such attitudes are hindering the flow of information within communities and between generations and there is a risk that experience and technologies of great value to rural communities could be lost.

It is likely to be quite difficult to re-introduce animal traction as an important topic into education and training institutes. Existing staff will tend to consider that the `economically important' large-scale commercial farming industry should remain the clear focus for agricultural colleges and faculties. Other topics and technologies are unlikely to be given serious attention unless a major change of emphasis in education takes place. Even if the `educators' were to be convinced, the learners and trainees themselves are likely to prefer the more sophisticated `wonders of modern technology' connected with mechanised agriculture.

Nevertheless it is of critical importance that animal traction does receive greater attention. A socially-acceptable animal traction approach (complementary to appropriate mechanisation) is likely to be necessary to maintain and expand smallholder production and establish prosperous communities in rural areas which were devastated by previous `homeland' policies.

The key issues appear to be:

- Preserving and transmitting traditional knowledge on animal traction
- Changing the attitude of officialdom to animal traction
- Changing the attitudes of youth to animal traction
- Bringing animal traction into formal education
- Training in animal traction
- Improving public awareness.

Preservation of existing knowledge

Much valuable knowledge exists in South Africa which could be lost if it is not preserved. There is therefore a need to:

- Record the memories of old people relating to animal traction before they are lost (this applies to people of all ethnic groups and localities)
- Record all present systems of using animal traction (using audio-visual methods, videos, photos)
- Make collections of current and old implements and harnesses for study and for exhibition at agricultural colleges and museums
- Undertake, or encourage students to undertake, literature searches relating to animal traction (including information from historical sources such as old paintings, photos, journals of travellers and missionaries).

Transmission of animal traction knowledge

- Immediate incorporation of animal traction topics and issues into the relevant parts of the curricula of schools and colleges.
- Prepare and make available audio-visual materials on animal traction (notably videos).
- Creation of `living' displays at museums with animals, harnesses and various implements.
- Actively use the audio-visuals and displays in a campaign to reorientate agricultural officials, researchers and extension staff and the agricultural community.
- Emphasise the probable relevance of some animal traction in `modern' farming systems.
- Initiate specialised training courses at colleges of agriculture.
- Initiate training courses for farmers and other users of animal traction.

- Promote farmer-to-farmer visits and training.

Changing the attitude of officialdom

The attitude of `officialdom' is unlikely to be changed merely by promoting the subjective beliefs of individuals. There is a need to obtain scientifically-valid reasons why animal traction should enjoy priority in the new South Africa. This requires an assessment of the needs at grass-roots level to determine the role animal traction has played, does play and could play. Such a needs-assessment at small farm level will be in line with the government's policy of `bottom-up' and `people-centred' approaches.

Through this appraisal survey, the South African Network of Animal Traction (SANAT) has already provided a unique assessment of the present situation and the needs of communities concerning animal traction. SANAT should coordinate future research projects in this field of study. From the outcome of this present rapid rural appraisal and planned follow-up surveys, SANAT should play a leading role in changing the attitude of officialdom regarding the importance of animal traction.

The initial drive for changes in attitude should be aimed at the policy makers in the Department of Education and the Department of Agriculture (sections concerned with training). This will bring SANAT's approach in line with the government's policy of integrating education and training programmes.

As one means of promoting changing attitudes among the officials in the Departments of Education and Agriculture, it would be helpful if the more senior officials were exposed to the reality of the animal traction situation at ground level. If such officials had participated in the present survey for even one afternoon, their attitudes might well have been modified. The lessons of this survey must be disseminated and officials encouraged themselves to engage in participatory discussions with smallholder farmers.

Educating youth about animal power

The `role models' in the communities and the schools need to be educated first concerning the role and importance of animal traction. If these people are not convinced of the future of animal traction, educational or outreach programmes aimed at youth on this topic will be scorned. Potential `role models' and change agents should be identified, and encouraged to publicly `endorse' animal traction. Examples could be celebrities, entertainers, teachers, youth leaders, missionaries, extensionists and commercial farmers.

There should be clear government policy on animal traction. In this way, animal traction can been seen as being part of the new South Africa and not a historical vestige to be abandoned.

In order to educate and sensitise the role models and the youth, a wide-ranging programme should be developed, which could include the following:

- Media exposure and interest, including television, radio, agricultural publications and popular magazines
- For urban and peri-urban youth, field trips into areas using animal traction
- Youth projects related to animal traction
- Promotion of cultural ceremonies which involve animal traction
- Inclusion of draft animal competitions in agricultural shows
- Formation of SANAT young persons' clubs (a `youth wing').

First priority: training the trainers

In the medium-term, animal traction training of differing types is required in primary and secondary schools, at agricultural colleges and universities, within rural communities and at the farms or transport depots of existing users.

The first priority must be to educate the educators themselves, including teachers, lecturers and agricultural extension officers. This may involve educating or sensitising their `bosses' and supervisors and their junior staff. The majority of teaching staff and extensionists concerned are likely to require some theoretical and practical training relevant to animal traction issues in South Africa.

In addition to factual information, most trainers are likely to benefit from training in the use of participatory methods. In primary schools this might be achieved through broadly-based project approaches to animal traction, including interviews with members of the community. In colleges and universities this would help the development of research-development training, with students identifying on-farm problems through discussion with farmers. This methodology would also benefit extension

programmes to evolve from `top-down' training to `learning from farmers' and participatory problem-solving with members of rural communities.

Animal traction education

Primary education

The value and use of animals for work should be *implicit* within any primary school topic dealing with agriculture and rural life. Animal traction could also be *explicitly* introduced as a topic of interest. One possibility, particularly relevant for urban schools, would be for it to be covered within the context of cultural heritage and history. Ideally, `hands-on' multidisciplinary projects should be developed, in which pupils are exposed to work animals themselves, people benefiting from them and the value of work animals in societies.

Secondary education

Animal traction should be included as part of the agricultural science course in secondary schools. Agriculture teachers will require `refresher' courses for this to be effective.

Tertiary education

At colleges and universities, animal traction should be included within agricultural curricula. Such institutions should also undertake detailed studies of farmers' situations and needs in relevant fields (socio-economics, engineering, animal health). In this way training and research would overlap constructively. The animal traction components of the curricula should be of a similar standard and status to that of mechanised agriculture at both the pre-tertiary and tertiary level.

Methodologies

The curriculum for animal traction should not be considered in isolation but should become an integral part of the curriculum for farming systems and agricultural production processes. Although it is important to include animal traction as a topic, it must be considered from a systems perspective, not least because draft animals influence other elements of the system such as natural grazing.

Whenever possible, emphasis should be on community-based participatory approaches. Students should be exposed to a wide range of situations in which animal are used. `Hands-on' demonstrations are to be encouraged, so that students are accustomed to the feel of working with animals.

Animal traction training

In-service training

Many teaching staff and extensionists require theoretical and practical training relevant to animal traction issues in South Africa. They also need training in the use of participatory methods, to help them learn from farmers.

Training methodologies

Whenever possible, emphasis should be on community-based participatory approaches. Trainees should be exposed to a wide range of situations in which animals are used. `Hands-on' demonstrations are to be encouraged.

Training in neighbouring countries

To benefit from the expertise of neighbouring countries and to rapidly create a cadre of trainers with international experience, some carefully-selected, highly-motivated trainers (extension officials or even leading farmers) should be sent for training at centres in Zimbabwe and Zambia. Their training, including field visits, should be carefully structured for the needs of South Africa. On return, these people should be assigned to work with a regional animal traction centre.

Animal traction centres

A series of animal traction centres should be established in the country, of which there could be either one per province, or 3-4 nationally. These should be closely associated with (or be part of) existing agricultural educational institutions. They should also be very closely associated with local farmers. These would be centres of knowledge with expertise and resource materials. They would have working animals for use in training and research, and also mobile training units that could serve farmers and other educational institutions.

Farmer training

At present, most farmers know more about animal traction than the potential trainers. There are few animal traction `extension messages' available in the country, although some advice relating to animal welfare may be of immediate relevance. There may also be immediate scope for farmer-to-farmer training, eg, in relation to harnessing skills or the use animal types new to a particular area. Weeding with animal power is well-known in some provinces and unusual elsewhere, and farmer-farmer training, combined with participatory

research-action could be initiated as soon as a team of researchers and/or extensionists can be trained.

The extension situation should evolve rapidly, as information from other countries is obtained through international `networking'. Collaboration between farmers, researchers and extensionists is likely to lead rapidly to innovations for local testing (eg, donkey plows and weeders, single-animal carts). Through national networking, successful local experiences can be recommended for evaluation in other areas, and so form the basis of further farmer training.

National and provincial structures

For the envisaged training programmes to be effective, there will be a need for effective coordination at provincial, national and international levels. This will also be true for the research programmes. It is envisaged that in each province an animal traction coordinating committee or `provincial network' will be established. If possible, within each provincial administration, an officer should be designated as an animal traction coordinator or liaison officer. While most training (and research) would be undertaken at provincial level, the provincial networks would be linked at the national level by SANAT and at the international level by the Animal Traction Network for Eastern and Southern Africa (ATNESA).

Time scales

In the short-term, emphasis should be on training of trainers, international information exchange through networking and preparing educational materials, including books and videos.

In the medium-term, a cadre of trained personnel should be developed, benefiting from training resources in neighbouring countries, such as Zambia and Zimbabwe.

In the longer-term, animal traction should be part of the revised curricula of primary and secondary schools and tertiary colleges. Participatory research-extension programmes should be undertaken to further improve animal traction technology on-farm and identify further research needs (eg, animal breeding, scientifically-improved implements).

Communication and public awareness

The workshop identified a need to improve public awareness of the present use and benefits of animal traction. A SANAT `media' group was formed to try to implement a programme.

Objectives

- To improve the `image' of animal traction
- To show the importance of animal traction to the livelihood of people
- To influence policies by creating greater awareness of the issues
- To improve and facilitate the exchange of ideas, information and technology
- To encourage networking between interested parties, including policy makers, researchers, manufacturers, trainers, educators, end-users, road users, and the general public.

Target audiences

- Policy makers
- Training and education institutions
- School children and young people
- Researchers
- Farmers, transporters and other end-users
- Farmers' unions and associations
- Animal welfare organisations
- Manufacturers
- Sponsors, businesses, financial backers
- Road users
- General public

Media: radio, TV and print

There is a need to make use of a variety of media to ensure different target audiences are to be informed. Radio channels are widely accessible to rural populations and have different language audiences. Information could be presented in different types of programmes such as listener forums and agricultural slots. Similarly the different channels and programmes on television meet different but highly relevant audiences (eg, 50/50, Agriforum).

In printed media, there is a role for popular newsletters and magazines. In addition to specialised publications (eg, SANAT Newsletter), small information articles and news of events should be offered to news media, and the newsletters of relevant organisations (farming systems, universities, research organisation, animal welfare, NGOs).

There is a need for a series of resource publications as well as simpler pamphlets (fliers).

SANAT publications

SANAT or SANAT members should prepare or commission the following types of information and organise their dissemination:

- Technical publications and reports to policy makers and influential bodies
- Extension and training publications
- Posters and photo exhibitions
- Videos.

Museums and resource centres

Many members of the public visit museums (eg, Willem Prinsloo) and other resource and entertainment centres (eg, Old MacDonald Farm, KwaZulu-Natal). Animal traction should be portrayed at these, not just from the historic perspective, but showing links between the old and the new (present day use and innovations). Sets of photographs (as used to illustrate this book) should be made available to museums and resource centres.

Farmer competitions

SANAT or SANAT members should make an effort to hold publicity events such as farmer competitions (eg, plowing, weeding, animal condition and training). These have proved very effective in other countries, gaining the interest of farmers, politicians and the media. Even if major competitions are not initiated, farmers' field days, demonstrations and farmer workshops can be arranged.

Local politicians and policy makers should be invited to key farmer competitions, so see farmer enthusiasm for the technology.

Agricultural shows

SANAT or SANAT provincial members should have stands at local, regional and national agricultural shows. If possible these should include traction animals and equipment, copies of information resources and brochures provided by equipment manufacturers and dealers.

Research priorities related to draft animals

Direction and methodologies

Participatory and linked to training

The immediate need is for more participatory farmer-centred research that helps clarify the present situation and identify further needs. While the needs so identified might well include additional research, they are also likely to cover farmers' requirements for other services, infrastructure or policy changes.

Initial participatory research should be closely linked to extension, training and education. The trainers and educators have much to learn from farmers, and collaborative participatory research should greatly enhance the understanding of the practitioners, which could be rapidly translated into more effective education and training.

The `rapid rural appraisal' type of survey undertaken at a national level, now needs to be undertaken in more depth on a regional or provincial basis.

Multidisciplinary, holistic, on-farm

Priority should be given to animal traction research that takes a holistic, systems approach. This means it should be multidisciplinary, involving social scientists and agricultural economists, animal and veterinary scientists, agricultural engineers and agronomists, environmentalists, soil scientists and extension specialists.

The multidisciplinary approach is fundamental to the setting of priorities. Improvements in animal traction (eg, engineering designs or animal welfare procedures) will have to be undertaken in the context of the whole socio-economic and physical environment of rural households and communities. By not limiting research to individual farm production systems, crucial socio-economic factors may be identified relating to (say) marketing, rural crafts and employment, which may have policy implications.

Although the research should be clearly farm-based and farmer-centred, modelling may be employed as a tool to help researchers understand the whole integrated system. The University of Cape Town has modelling expertise which may prove of value.

Most testing and adaptation work should be undertaken with farmers on their farm. Complementary on-station work should be kept to a minimum, as exemplified in the valuable methodology developed by the Zambian national animal traction programme.

Although research is likely to be concentrated on rural production and transport systems, this should be linked to work relating to urban and peri-urban transport and drudgery reduction. Not only will some of the issues be similar (eg, animal welfare) but urban and peri-urban entrepreneurs could help support rural animal traction if appropriate links were created.

Empowering and demand-driven

Although animal traction research must be objective, it should be undertaken with a view to assisting the processes of empowering of rural communities. Research-action is needed in which constraint identification is combined with proposals (by farmers and/or researchers) for possible solutions. The proposed innovations should be evaluated by volunteer end-users within the research framework. The direction of research should follow the requirements expressed by the end-users (any differences between expressed `wants' and `needs' may be resolved with the end-users in the context of economic realism).

Methodologies and mechanisms should emphasise the empowerment of animal traction users. Such processes will simultaneously empower the researchers and trainers in a different way, through greater knowledge and understanding of the smallholder situation.

Reviews and networking

It is of utmost importance that researchers should collect, study and collate relevant literature and unpublished experiences relating to draft animals. This will ensure that subsequent research is based on existing experience in South Africa and elsewhere. The `cart-wheel' should not be `re-invented'.

Although some information can be traced through conventional literature searches, most useful information is likely to be obtained through `networking' with animal traction colleagues in other countries. It is to be assumed that a combination of literature search and networking contacts will be at the forefront of all subsequent research proposals.

Early training and capacity building

For the research programme to be effective, a considerable amount of training is required from the outset. Many researchers have not yet had the experience of working with a systems perspective in multidisciplinary teams. Very few people connected with animal traction in South Africa have had any experience of participatory techniques such as rapid rural appraisal. It takes practice for researchers to understand who their end-user clients are and to talk ***with*** farmers, not ***at*** farmers. Appropriate and adequate training will be extremely important, if research time and money are not to be wasted.

Multidisciplinary teams in other countries in the region have much to offer South African researchers and contact with these through international networking is likely to be extremely beneficial. Field visits with other research teams and participation in workshops of the Animal Traction Network for Eastern and Southern Africa (ATNESA) are likely to be highly cost-effective.

Training is not simply required by the researchers—their `bosses' and decision makers also need to be educated. The idea of open-ended, participatory, on-farm research can appear quite threatening to those used only to on-station work or `top-down' approaches. Administrative regulations have to be more flexible if researchers are to spend much time in the field.

Research staffing and funding

In the first instance animal traction research is likely to be undertaken by several different institutions, collaborating through networking and joint programmes. Those involved are likely to include universities, research services, national directorates (eg, agriculture, agricultural engineering, agricultural economics, animal health and production), non-governmental organisations and provincial agricultural development services. In the long-term a permanent multidisciplinary team with its own centre could be proposed, but multi-institutional collaboration can begin almost immediately.

It is important that, from the outset, researchers plan and implement their programmes in consultation with both extension personnel and farmers. Not only will this ensure action-orientated programmes, it will also help remove any historical barriers between researchers, extensionists and farmers.

The participatory research envisaged involves mostly personnel costs and travel expenses. The budgets of the Department of Agriculture and similar organisations are mainly for salaries, with few funds available for purchases. There may be a case to request some supplementary external funding for specific programmes.

Translation of research findings

It is imperative that research findings are adequately disseminated and translated into recommendations appropriate to different clients, including farmers, policy makers, agricultural development agencies and/or the commercial sector supplying support services.

By working closely with farmers and extension officers, individual research programmes should have little difficulty in translating research results into local extension recommendations. Further diffusion can be facilitated by networking (newsletters, meetings, symposia, etc), formal publications and the media.

Research on general and economic issues

Policies and their impact

There is need for research relating to the impact of previous policies and the likely results of present or proposed policies. This study would consider the need for policies and related legislation in support of animal traction.

In the past, it has appeared that some officials have wanted to discourage animal traction. If this is still the case, it is necessary to understand who might still be against animal traction and why this might be.

Socio-economic issues

Little is known about the economics of animal traction at household level. This includes factors such as the affordability of animals and the labour implications of owning and/or using draft animals.

It is important to study who are the present users of animal traction, by age, gender and social position. A greater understanding of this could influence a range of other animal traction research relating to implements, animals, support services and policies.

Women have many functions in society, including child care and participation in decision making and development planning.

The use of animal power to relieve the women who presently have to hoe by hand, to ferry harvest from the fields to the granaries and from there to the mills and/or local markets may well remain. This topic has to be investigated in order to make recommendations.

Factors affecting present decision-making by animal traction users are not well understood. Which household members make decisions and what criteria do they use? (Examples cited included the decision to plow and why farmers often use sledges rather than carts, donkeys rather than oxen, hand-planting rather than seeders—are these primarily financial decisions that might be solved with improved credit?).

Animal issues

General and policy

Which will be the draft animals of the future in South Africa? What characteristics will they require? At what should people be aiming? Closely related to these questions will be the following studies.

Draft animal comparisons

How do different draft animals (eg, oxen, cows, bulls, donkeys, mules, horses) compare in terms of draft output, cost of inputs, and value of output per unit of input?

How do animals compare in `user friendliness' and what are the implications of this for use by different people and for different operations? Among the characteristics would be animal temperament, willingness to work and ease of handling (for men, women and children) for the different animal species, breeds and genders.

Profitability

How can work animals be used and managed most profitably? Is meat quality affected by work and can marketing be improved so farmers are not penalised by real or imagined consumer resistance to meat from work animals? Can cows be economically utilised, and if so, how is milk production affected? Are hides damaged by work, and is this economically significant? Is there an optimum retirement age, that combines production and socio-economic parameters?

Reproduction

How does draft work affect reproduction and what are the implications of this for smallholder farmers using work cows?

Donkeys

Donkeys are widely used in South Africa and there are many myths about them (see chapter on donkeys) but little factual information is known. A wide-ranging study on donkeys in South Africa is required, covering their nutritional requirements and environmental impact, the economics of using donkeys, their origins and breeding, and their health and management needs. This programme might well start with a national/international workshop to pool information and orientate the research.

Hinnies

Hinnies are produced by crossing male horses with female donkeys. They are larger and stronger than donkeys, but not a big as mules. Given the large number of female donkeys in South Africa, it would seem theoretically possible to produce hinnies in large numbers and they should be much cheaper than mules. Although hinnies have been used in parts of the world for over two thousand years, relatively little is known about them in any country. It appears that the hinny cross may be more difficult to make than that leading to mules (mating and fertilisation problems). Whether any difficulties could be overcome by using new techniques or processes is not known.

There is almost no information about the production and employment of hinnies in South Africa, and it is not clear whether farmers would consider hinnies desirable. There is ample scope for a potentially valuable research investigation. A related, but more long-term and esoteric, study might consider the value of donkey-zebra hybrids which have been produced in small numbers over the years.

Mules

Mules are prized by some farmers but are generally in short supply. Most mules are produced in small numbers on large (`white') farms. There is a government-owned mule breeding station in Northern Transvaal with excellent facilities and genetic stock, but no clear mission. There is a much smaller mule breeding programme in Eastern Cape (Transkei). A study is required on the potential of, and the requirements for, mules in South Africa, and means of supplying the demand in a sustainable way. This study would comment on options for the two publicly-owned mule-breeding centres.

Heavy horses

Several large-scale farmers use heavy horses, as do a few small-scale ones and some forestry operators. There are some breeding studs of heavy horses, notably at Elsenburg Agricultural College near Stellenbosch, but these have not recently been involved in animal traction training, research or extension. It would be useful if a study were to be undertaken on the future role of heavy horses in South Africa, and ways in which the publicly-owned breeding centres can participate in future animal traction work.

Farriery

There has been little tradition of farriery among donkey owners in South Africa. Most donkeys survive with little or no care of their hoofs, but welfare organisations have reported problems, particularly with donkeys used on roads. An investigation is required into the extent of the problem, and ways of improving the situation. In addition to survey work there may be scope for literature review and international networking with regard to the functional anatomy of donkey hoofs and whether there would be scope to selectively breed for desirable hoof characteristics.

Animal health, management and welfare

What is the effect of diseases and parasites on the work of animals? If problems exist, can these be solved by management, or do they need chemicals? Are there cost-effective means of making available management information and/or chemicals?

One of the biggest problems cited by farmers was the condition of their work oxen at the beginning of the plowing season. How can the nutrition of oxen be improved in a sustainable and affordable way?

Farmers reported problems of stock theft and agricultural officers reported problems of animals (notably donkeys) walking unsupervised on roads. What can be done to improve animal security in the rural areas?

Technology issues

Harnessing

There is an urgent need to identify harnessing systems that are efficient, comfortable and affordable. Existing materials and designs used in South Africa and elsewhere should be reviewed, in collaboration with farmers (and/or transporters). Emphasis should be on good but low-cost systems for donkeys as cost-effective solutions exist for other animals. From the outset, one research-action objective should be to identify designs and materials that can be easily obtained, manufactured, marketed and repaired, with a strong preference for local production in rural areas. The possibility of recycling seat-belt materials from cars could be investigated.

Implement design

Another important requirement is for a research-action programme to incorporate farmers' needs into implement design. The first stage would be a thorough identification of real needs, but the present survey has indicated that farmers appeared interested in some low-draft implements suitable for use with donkeys or small teams of oxen. Lightweight, acceptable, affordable and durable plows and weeders appear to be of highest priority. Examples of such implements should be obtained from other countries (in the first instance) and tested by farmers to gauge reaction. The Department of Agricultural Engineering, extension staff and non-governmental development organisations should collaborate in this work, which would have a strong element of farmer participation.

Animal traction implement collection

Related to the the previous research, is the need for an accessible collection of animal traction implements within South Africa. The collection should encompass animal power implements from around the world, with emphasis on African implements. They should be maintained at one (or more) animal traction centre that has draft animals and available land, so that researchers from anywhere in the country can come to view and try out different implements. Literature review and correspondence will be required to identify and obtain suitable implements (eg, Senegalese donkey plow, Indian blade weeder).

Cart design and axle supply

Associated with the implement research should be a programme to develop more efficient and cost-effective animal-powered transport systems. Priority should be given to evaluating carts for single donkeys, and developing systems for improving the supply of suitable cart axles and wheels in rural areas.

Pack systems for water

Simple, cheap and humane systems for carrying water in drums or water bags on the backs of donkeys need to be investigated.

Spare parts needs

In some parts of the country farmers are using implements for which there are no obvious sources of spare parts (eg, three-furrow plows in Namaqualand, mowers and rakes in Ebenhaeser). A simple study is required as to the spare parts needs of the farmers, and possible means of supplying them.

Environmental issues

In the past, one reason given by agricultural authorities for discouraging animal traction was that fragile rural environments were being `overgrazed' and that they could not support large numbers of `unproductive' work oxen and donkeys. A new approach is required that is more in keeping with the policies of the new South Africa. If rural communities want or need to use draft animals, how can rural areas support the number of draft animals these communities require? This has several important research elements, which need to be tackled by one, or more, multidisciplinary teams. The questions to be addressed include:

- What is the true carrying capacity of the land, and how can it be improved?
- How can land sufficient to the needs of the rural communities be made available?

Although these questions relating to overall land availability and carrying capacity affect animal traction users, such major issues need to be tackled by broadly-based high-level research and policy groups. It is crucial that animal traction `interests' are represented within such groups. It will be particularly important to ensure there is adequate recognition of the broad social and economic values of draft animals to communities (there are still senior researchers and agriculturalists who dismiss oxen and donkeys as undesirable since they are classified as `non-productive' animals).

General environmental issues

Among the issues likely to be considered by more general research teams are:

- Current system of rural planning
- Land tenure systems
- Competition over land by people and animals (`invasion' of agricultural land by `non-farmers')
- Non-utilisation of land by `owners'
- Effects of `betterment' schemes
- Optimal systems for land utilisation and management ensuring adequate grazing land
- Communal grazing systems
- Herding and management of animals
- Soil erosion and environmental degradation.

The following strategies, which are not mutually exclusive, may be considered for increasing overall fodder availability (and carrying capacity).

- Land management (soil conservation, water and veld management)
- Pasture management (eg, cultivated pastures and legume enrichment, optimal use of different veld compositions)
- Additional fodder utilisation (eg, fodder banks, roadside verge harvesting, inter-cropping maize with fodder beans)
- Animal management (eg, controlled winter grazing, empowering communities to control grazing).

Environmental issues and animal traction

In relation to specific interactions between traction animals and the environment, there are two crucial research questions.

- Where land availability and carrying capacity are critical constraints, can engineering technology reduce the need for draft animals in an affordable and socially-acceptable way (eg, carts and low draft implements designed for use with fewer animals and complementary use of motor power)?
- Where land availability and carrying capacity are critical constraints, can the selection and management of draft animals provide adequate power in affordable and socially-acceptable ways while reducing pressure on the environment (eg, use of mules or hinnies and/or greater use of cows rather than oxen)?

Among the related research topics would be:

- Evaluation of the advantages and disadvantages and costs and benefits for farming communities and the environment of employing oxen, work cows, donkeys,

mules and hinnies (see animal issues). The potential effects of optimal solutions on herd composition.
- Evaluation of various strategies for keeping animals in appropriate condition for their work at different times of year, including supplementary feeding.
- Evaluation of implements and carts with low draft power requirements.

Some of these issues are also mentioned in relation to technology and animal science research priorities.

Changing emphases

Short- to medium-term

In the short-term, research emphasis should be placed on identifying, assessing and prioritising present needs and obtaining any hard data required for use in the formulation of policy. As noted earlier, another important short-term priority is the training of researchers (and sensitising research hierarchies) in smallholder farming systems research techniques and participatory methods.

As the present situation becomes clearer, and crucial constraints to the systems are identified, emphasis should move towards action-research aimed at alleviating the problems and improving the efficiency and effectiveness of animal traction. As stressed earlier, this should be strongly participatory in methodology, and involve international networking to ensure South Africa builds on the experiences of other countries.

Medium- to long-term

As more is understood about animal traction in South Africa, so possible areas for more `upstream' scientific research may be identified.

As the Reconstruction and Development Programme is implemented, together with new economic development policies, future rural scenarios will become clearer. The future of animal traction will be affected by factors such as overall economic activity and labour availability in rural areas. As water reticulation and rural transport systems improve, the transport role of draft animals might change. Similarly, development of marketing systems in areas of smallholder farming could stimulate more intensive production systems (as has already been seen in areas of sugar production). This again might affect (positively or negatively) the demand for animal power. On the large-scale farms, changes in the costs of capital/credit, fuels and labour could stimulate greater complementary use of animal power. Thus long-term animal traction research will need to constantly monitor the evolutionary changes in rural areas.

Rural infrastructure to support animal traction

Introduction

For animal traction to be successful there has to be a supporting rural infrastructure providing (among other things) input supplies and back-up services. Workshop participants were aware of many infrastructural requirements that were fundamental but not specific to animal traction, including land availability and access to markets. Some other issues were touched on including animal breeding and supply, animal feeding possibilities and options, and rural fencing. Another set of issues concerned the acquisition and sharing of knowledge and the supply of technical information to rural areas. However, given limitations of time and participants' interests, it was decided to focus on rural production and artisanal crafts, credit systems and possible support from animal health and production services.

Local supply of implements, carts and harnesses

Animal traction implements must be available and affordable. In many parts of the world (eg, most Asian countries) the implements used by farmers are made by local entrepreneurs. In South Africa most farmers used factory-made implements imported from urban areas. The farmer may gain from good equipment quality (arguable). The farmer may also lose due to the high transport costs of finished products and the lack of opportunity for easy feedback to the manufacturer (requested modifications might lead to equipment improvement and evolution). Rural areas lose the employment opportunities associated with implement manufacture.

Given the industrial base of South Africa and nation-wide distribution systems, it is probably unrealistic to contemplate full manufacture of steel implements in rural areas. However local assembly from components is feasible, and would provide the possibility of certain local variations (design evolution). Rural workshops could provide such assembly services, repairs and spare parts services (widely acknowledged to be poor at present).

Carts should also be assembled in rural areas, using either local scrap or factory-made axles. Cart-making appears to be limited more by materials than by demand. Systems for improving the supply of second-hand materials (notably old axles) in rural areas should be investigated.

Implement assembly and cart manufacturing workshops might well be supported through small business development assistance, to provide employment and income generation within rural areas.

Feasibility studies are required to investigate the cost-effectiveness of such initiatives.

The manufacture of yokes and harnesses at village level should be encouraged. Research may be required on the choice and availability of suitable raw materials (wood, leather, rubber, industrial belting, seat belts, etc).

Village-based industries: blacksmithing and harness-making

The term rural artisans here refers to blacksmiths who manufacture or repair animal implements, carpenters and metal workers who make carts, leather workers, harness makers and farriers.

Most of the time animal traction users have to repair and maintain their own implements and harnesses. The recent survey found little or no evidence of blacksmiths who worked with hot metal. Farmers almost invariably talked of buying spare parts rather than having them made. A few rural artisans were visited (and others spoken of) who manufactured carts.

Indigenous knowledge and certain skilled individuals already exist in communities. Details of these could be recognised through more detailed participatory rural appraisals. In many cases a community may feel they would like to strengthen their village-based industries.

Where appropriate, training could be provided by farmers from other communities or by a training officer with specific harness-making or blacksmithing skills. The work of the `trainer' could be sponsored by a development agency, by the community, or through a system of advances/credit for the envisaged products. The training would be community-based and would aim to build on existing knowledge and skills. The trained artisans should be recognised by their neighbours as professionals able to manufacture and/or repair implements, carts, or harnesses.

Rural artisans will only succeed if the necessary materials (axles, metal, leather, belting, etc) are available, affordable and appropriate to the community. Additional support on input supplies is likely to be necessary.

Assisting rural artisans in this way will ensure that communities have valuable and accessible services and as artisans take on assistants and expand and diversify production, job creation will be stimulated.

Subsidies and credit provision

In general, subsidies on specific inputs should be discouraged, as these distort markets (this also applies to tractor subsidies which distort free-market competition). Subsidies relating to purchase of cattle or oxen are particularly dangerous, as they can tempt people to cash in their benefits early (through slaughter or faked insurance loss). People tend to value things more if they have paid a fair market price.

Farmers reported that lack of capital or credit could be a serious constraint to animal traction ownership. This was particularly true of carts.

Farmers who do not own animals, seeders or carts generally require credit in order to buy them. Systems for supplying such finance can be similar to other rural credit schemes.

Where there is a lack of credit-providing structures (banks, parastatals, cooperatives), community structures should be formed to assist community savings and capital formation. Such community savings should lead to community credit systems. Rural communities may require assistance in the development of such institutions.

If loans are provided to farmers' groups, social pressures encourage loan repayments. If loans are allocated to groups, individuals should own the draft animals and the equipment, to ensure dedicated management. If animal traction loans include the purchase of a cart, repayments may be facilitated by the income that can be obtained throughout the year from cart hire.

Support role of animal health and animal production services

Positive approach with constructive criticism

In the following paragraphs, some problems are highlighted concerning relationships between farmers and staff of animal health and production programmes in areas of smallholder farming. These arise from frank discussions but are presented with the very constructive aim of improving future understanding. The statement of illustrative problems should not detract from other examples of good understanding and working relationships between veterinary staff and farmers.

Farmer perceptions of veterinary services

In some rural areas, the veterinary services have been perceived quite negatively. Some of the reasons for this have been:

- `Top down' approaches have often been employed in the past. Farmers have not been informed of the value of veterinary services as a whole. They have sometimes been affected by enforced disease control procedures or schemes to `improve' production (see below).
- Veterinary and animal production services have often been responsible for implementing policies intended to `improve' meat production from cattle (de-stocking, `betterment' fencing, use of `exotic breeds', removal of donkeys, discouragement of animal traction, etc).
- The `herd health' approach to disease control has been important for the country as a whole, but individual farmers may not have seen obvious benefits. When inoculation schemes have been widely enforced, no praise has been given to the veterinary service for animal survival (animals were already alive) but blame has often been ascribed for any mortality in the weeks following inoculation (whatever the cause).
- In remote rural areas there has been little affordable veterinary care for individual clinical cases.

Veterinary services perceptions of farmers

Few, if any, members of the veterinary services have received training relating to smallholder farming systems, and the related aspects of risk avoidance, multipurpose uses of animals and non-monetary roles of livestock. Yet many aspects of smallholder livestock keeping and animal traction can only be understood from a `whole system' perspective, taking socio-economic criteria into account.

Thus many members of the veterinary services have failed to appreciate the importance of animal traction to rural communities.

Animal production and health staff have tended to think in terms of the production systems

used on large-scale `white' farms, where private pastures are fenced, animals have `exotic blood' and the objective is often to obtain maximum economic return through the high productivity of individuals. With such a perspective, some (but not all) veterinary staff have seen little value in maintaining work oxen, donkeys and indigenous breeds. In pursuance of their professional duty of improving animal production, they have often advised against animal traction and sometimes implemented policies to reduce it.

Animal traction

There do not appear to be veterinary problems specific to animal traction other than harness problems. However, the health and welfare of work animals is very important to maximise animal productivity and well-being. Users of draft animals have a vested interest in a good animal health infrastructure with disease control (including inoculation and dipping facilities).

Training requirements for veterinary staff

Members of the animal production and veterinary services need training regarding animal traction issues including:

- Systems approach to smallholder agriculture and the role of animal traction.
- Concepts of broadly-based production within the environment (total production is more important than meat production).
- Social and other values of animal traction.

The production and circulation of videos on these subjects could have great value.

Direct communication between the veterinary and animal production services and farming communities regarding issues of common interest would be mutually beneficial. Participatory processes should be emphasised, with veterinary staff expecting to learn from the encounters.

Training requirements for farmers

Direct communication between the veterinary and animal production services and farming communities regarding issues of common interest would be mutually beneficial. Farmers might begin to appreciate more fully the benefits of large-scale animal health systems.

People need to be informed of the advantages and disadvantages (in terms of animal production) of using animal traction as a power source. Animal traction should be presented as one option for rural power. Veterinary services and animal welfare organisations should be in support of this.

Ways of enhancing animal traction and animal welfare should also be presented. The value of the mass media, including radio and television programmes, in achieving this should be recognised. Teachers and pupils should also be targeted and well-made videos would be particularly helpful here.

Breeds

It is recognised that in smallholder farming systems the ability of animals to survive within a stressful environment (characteristics of indigenous breeds) may be more important than large individual size and fast rate of growth (characteristics of exotic breeds). Indigenous breeds often have high overall productivity (eg, as measured by kg of one-year-old calf per 100 kg of breeding female per year) and may also be more suited for work. Therefore any recommendations concerning the use exotic blood in breeding programmes should only be taken after a thorough investigation into the needs and wants of the farmers in their farming systems.

Research

Some suggestions relating to animal-based research have already been given. It is envisaged that these will be carried out by a number of different organisations working in collaboration. The University of Pretoria may well take a lead role. Even if government veterinary services do not initiate such research they should be closely involved in its planning, implementation and follow-up.