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Moving forward with animal power for transport: how people, governments and welfare organisations can make an impact: examples from Africa and Madagascar

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Summary

Animal power assists transport in all regions of the world. A wide variety of animals can be used, although cattle, horses and donkeys are the animals most commonly employed. Animals are used for riding, pack transport and pulling carts, wagons and sledges. Animal transport boosts sustainable crop-livestock integration and market prospects. Work animals provide on-farm transport, marketing of produce and some informal hiring. Commercial transport services for freight and passengers are found in peri-urban areas. Specialist animal power uses include forestry, urban waste transport and rural road maintenance

This paper discusses some issues relating to animal power for transport, including the need for a critical mass of users and related support services. Specific reference is made to sub-Saharan Africa where the use of animals for transport is generally increasing and will continue to do so for the foreseeable future. In Africa, donkeys and horses are mainly used in semi-arid areas and highlands; the range of donkeys is expanding. Ox carts are increasing in many parts of Africa, with the speed of adoption limited by poor rural availability of axles, wheels and credit.

An historical perspective is provided of the evolution of animal transport in the Africa, and the roles played by governments and the private sector. During the twentieth century, extension services of government ministries, production companies and projects were important in introducing animal power, with further spread through farmer-to-farmer contacts. Development sector credit increased cart ownership and remains important to achieve further expansion. With economic liberalisation, the role of the state has declined in much of Africa and supporting services are now mainly provided by the informal private sector of farmers, artisans and private workshops. There is a continuing need for government and/or NGO support in areas where oxen or donkeys are being introduced.

Governments have crucial roles in facilitating the further expansion of animal power and regulating for improved uses. Liberalisation policies should encourage the complementarity of human, animal and motor transport, with suitable intermodal exchanges, where animal transport consolidates and distributes produce for motor vehicles. Weekly markets, spaced and timed to make optimal use of animal power for 'feeding' long distance trucks can increase transport profitability and rural livelihoods. Prohibiting animal transport is seldom appropriate. Governments have a role in developing and enforcing safety and animal welfare regulations, in collaboration with civil society (users, transport associations and NGOs). Together they should encourage good technologies, licensing, testing, insurance and suitable infrastructure for animal transport.

Animal welfare charities can help governments and authorities to plan strategically for animal powered transport. They can advise on suitable animal transport regulation, developed locally using participative processes. Welfare organisations can help the providers of animals, equipment, health care and training to provide better and more appropriate services. Animal welfare organisations can facilitate the sharing of ideas, information and experiences through national and international networking, cooperation and collaboration.

Introduction

Transport animals are used in all regions of the world for agriculture, trade, domestic transport and/or recreation. Cattle (oxen, bulls and cows), buffaloes, horses, mules, donkeys and dromedary camels are the most numerous work animals. Animals with localised transport roles include elephants, Bactrian camels, yaks, llamas, reindeer, goats, sheep and dogs. Motorised vehicles are increasingly important throughout the world, but animals can augment and complement motorised transport systems.

Human, animal and motor power can coexist at national, local and household level. Each system has different comparative advantages, and the choice depends on local circumstances. Animal power is a natural, renewable energy source. It is ecologically sustainable as animals consume locally available feed and reproduce themselves. Draft animals cause less pollution and environmental damage than motorised alternatives. Animal power is widely available and is generally affordable by rural communities. Work animals aid productive crop-livestock integration. They eat (and transport) crop residues and produce (and transport) organic manure. Compared with motorised systems, animal power is labour-intensive. Animal power may be the only viable option for inter-village transport in remote or hilly areas where road systems are not developed.

Motorised vehicles are particularly good for rapid, long-distance transport on good roads. Motors are expensive, and animal power is often more affordable, particularly for on-farm transport (manure, forage, harvest) and household transport (collection of water and fuel). In many countries, it can be observed that people living along main roads use motor vehicles for their long-distance transport, but human and animal power for other needs such as carrying domestic water. Animals are often important for local trade and the first stage of agricultural marketing (field to farm, and farm to market or main road), feeding supplies into long-distance motor-based networks. Animal power may also be cost-effective for intermittent, short-distance transport, when waiting times are significant. Examples include the harvesting of produce and local collection and delivery services in peri-urban areas.

If animal powered transport is to be used, it has to be appropriate to the local environment, which means not only the local infrastructure, but also the social, political and economic context. Animal transport requires a range of support services, relating to the supply, training and welfare of the animals and the supply and maintenance of associated equipment. Such local support services develop over time, and are often provided by small-scale private enterprises (the ‘informal sector’ of artisans, small farmers and loan providers). However, in areas of introduction, local services may not be available, and organisations promoting development (government agencies and/or non-governmental organisations) may provide assistance. In all areas, local governments or national authorities may decide to regulate for, or against, animal power. This may be to improve the efficiency and socio-economic impact of animal power, to increase safety and improve animal welfare, or to remove an ‘old fashioned’ technology from modern cities.

Animal welfare organisations, including UK-based charities, aim to promote better animal welfare practices, through education, direct assistance to animals and the development and enforcement of relevant legislation. In the past, they have generally concentrated on relieving animal suffering in a small number of locations, where the problems of animal welfare have been very visible. If they are to have a greater impact, in more locations and in more countries, they will have to think and act strategically, in collaboration with local authorities and civil society.

The aim of this paper is to provide an overview of present day uses of animal-powered transport, the support services they needed and the different roles of governments and civil society, and where animal welfare charities can assist. While the analysis should be relevant to situations throughout the world, the examples will be taken mainly from sub-Saharan Africa and Madagascar, stressing the historical context. This region is particularly interesting as animal power for transport is generally expanding in importance. Some animal power technologies are very old, some were introduced in the last century and others have been introduced for the first time to the present generation. In some places, animal powered transport systems are now in the process of spreading to new areas, and will continue to do so in the coming years. The different situations and contexts illustrate the actual and potential roles the various roles of governments, local civil society and international animal welfare organisations in improving animal power for transport.

The development of animal powered transport systems in Africa

Historical perspective

The use of animals for riding and pack transport has a very long history (Starkey, 2000). Several pastoralist groups in eastern, western and southern Africa have traditionally used cattle for riding and transporting goods. Work oxen and transport donkeys have been used in northeast Africa for about 4000 years (Blench, 2000). Donkeys spread into West Africa about 1500 years ago, and were introduced to southern Africa about 500 years ago. Camels have been used for riding and pack transport in the countries surrounding the Sahara for over 2000 years (Muzzolini, 2000). About one thousand years ago, horses became part of many cultures close to the Sahara, from Sudan to Senegal, but their high social status meant that they were seldom used for transporting goods.

The use of animal-powered wheeled transport was first introduced in coastal and river ports of the region in the seventeenth, eighteenth or nineteenth centuries. Where social, economic and ecological conditions proved favourable, the technology gradually spread inland in Southern Africa, French West Africa and East Africa, through the activities of traders, settlers, missionaries and the administering authorities. Equids (horses, donkeys and mules) and oxen were employed. Although equids were preferred for their speed of work, they only thrived in highland or semi-arid areas, and ox-drawn carts and wagons were more widespread.

In colonial times, wooden cartwheels with spokes were made in several African countries, including South Africa. In Madagascar, they were important for trade in the nineteenth century, and there are about 300,000 carts of similar design in use today. The technology was also established in Zanzibar and Pemba. However there was little transfer of this technology within Africa, and wooden wheels are now rare on the African mainland. Though colonialists constructed key access roads, the spread of animal drawn carts was quite slow. At the beginning of the twentieth century, animal traction for either cultivation or wheeled transport was still largely absent from the farming systems of sub-Saharan Africa (Starkey, 2000).

Twentieth century

During the colonial period of the twentieth century, the introduction of animal-drawn plows to smallholder farmers by government authorities and export-led companies (cotton and groundnuts) prepared the way for subsequent use of animal power for transport. The spread of animal drawn carts occurred after independence in the second half of the twentieth century. It was made possible by improvements in the supply of components and greatly assisted by public sector credit schemes, promoted through agricultural programmes, cotton companies and integrated development projects. In francophone West Africa, several 'formal sector' factories and workshops, notably Siscoma/Sismar in Senegal, assisted a rapid increase in the use of animal-drawn carts (Havard and Faye, 1988; Fall, 2002). In Nigeria, Ghana and in Eastern and Southern Africa, ox carts were made by the artisanal sector using scrapped vehicles. The poor supply of wheel and axles in rural areas, poor linkages between credit (formal sector) and production (informal sector) meant that the spread of animal drawn carts was slower in the anglohone countries, except where small workshops (formal-sector or project-created) were linked to public-sector credit schemes, (eg, specific areas of Malawi, Zambia and Tanzania).

Simple triangular sledges of a variety of local designs are widely used in eastern and southern Africa and in Madagascar. However, they are seldom, if ever, seen in West Africa, where they should be similarly useful as basic and cheap means of transporting materials. In recent years governments in Eastern and Southern Africa have tended to discourage their use for environmental reasons.

Twenty-first century

At the beginning of the twenty-first century, the situation relating to animal transport in sub-Saharan Africa is was follows:

- Oxen: 2-wheel carts, mainly with pneumatic tyres, ***increasing***, especially in semi-humid areas sledges: widespread and ***stable*** use in Eastern and Southern Africa
- Donkeys: increasing population and range, ***increasing*** use of carts and ***stable*** use of pack donkeys
- Horses: ***stable*** use in semi-arid and highland areas, for riding, carts, wagons and taxis

- Mules: ***stable but small*** use in semi-arid and highland areas, for pack, carts, wagons and riding
- Camels: limited use for pack and riding around Sahara: generally ***declining*** importance
- With the exception of Madagascar, animal-drawn carts generally use pneumatic tyres
- Four-wheel wagons are rare (in a few countries they are used for peri-urban deliveries).

Systems of using transport animals

Economic and social benefits of multipurpose animals within farming systems

In sub-Saharan Africa and Madagascar, small-scale farmers are the owners of most work animals and carts. Work oxen and equids are mainly used for on-farm and personal transport, for the marketing of produce and for the collection of water, fuel wood and construction materials. Smallholder farmers obtain many benefits from the use of animal transport. Transport to storage facilities and markets is often a crucial limiting factor, so that carts may encourage greater crop production, the stocking of crop residues and the utilisation of animal manure. Carts can therefore increase crop-livestock integration, leading to better animal nutrition. Transport enlarges the circles of interaction of farmers, increasing local trade, marketing and information flows. Households may start to use animal transport to collect water and fuel wood, and in Africa, this often provides particular benefits for women (Fernando and Starkey, 2004).

The use of animal-transport may be essential to fully justify a farmer's investment in animal traction. Transport and trade are often more profitable than agricultural production. Although farm transport has seasonal peaks, transport can be a year-round activity (unlike plowing). This spreads the investment cost of the animals, and keeps them in training.

Almost all work animals benefit more than one family, through informal systems of hire or transport assistance (which may, or may, not involve financial transactions). This benefits communities as poorer families can access the transport of neighbours, while the owners of transport may gain revenue or social benefits to justify their investment. In many remote areas, where there are no ambulance services, people requiring urgent medical treatment are carried to health centres in the animal-drawn cart of the family or a neighbour.

Commercial transport services

Commercial transport services for goods (such as water, construction materials, charcoal and fuel wood, agricultural produce and retail freight) are mainly found in urban and peri-urban areas and near important rural markets. Some transport entrepreneurs use 2-wheel carts pulled by donkeys, oxen or horses, 4-wheel wagons pulled by horses (eg, South Africa, Mali) or pack donkeys (eg, Ethiopia). Camels, sledges, ox wagons are other technologies that can be used but they are seldom 'mainstream' for small-scale transporters. Mules are popular with transporters in countries where they are common, but their numbers are quite small. Some commercial transport operators own their animals and carts. Other carts and animals are the property of local entrepreneurs, who put them in the charge of a relative, an employee or a daily transport contractor.

The distance travelled by professional transport animals is often quite short (1-15 km), with one-way travel times seldom exceeding five hours. Long-distance transport with animals is now quite rare. However, long-distance transporters using ox-carts in Madagascar, pack donkeys and mules in Ethiopia, and camels in Saharan countries may take several days to reach their destinations.

Commercial passenger services using animal power are mainly restricted to horse-drawn taxis in urban and peri-urban areas. Four-wheel horse-drawn wagons that carry people as well as freight are used around Mopti in Mali. However, scheduled public transport services using horse-drawn buses, such as those found in Cuba and Nicaragua, are not found in Africa. However, in many countries, people travel to and from markets in carts that carry both passengers and goods. In southern Madagascar, where passengers commonly travel in ox carts, springs have been fitted to carts and the animals are trained to trot, rather than to walk.

Specialised transport operations

There are a few specialised commercial transport services that may use animal power. The transport of waste in urban areas may be contracted to entrepreneurs using carts. Forestry enterprises find that animals provide affordable and ecologically appropriate means of log extraction: oxen are used for logging in Malawi (and other countries), while mules and horses are preferred in South Africa. Animals can be used for the construction and maintenance of rural roads, for the transport of gravel, stones and water, and also for levelling and grading work. In the Tanga Province in Tanzania, the transport of gravel provided farmers with sufficient revenue to invest in animal drawn carts. Through seasonal road contract work, farmers could repay the credit required to buy the carts, while gaining from the agricultural and social benefits of the carts for the whole year (Fischer, 1994). In the Seychelles, ox carts provide attractive taxi services for tourists, with a price premium over motorised transport

Diverse support services

Animal traction requires a wide range of services to support the technology, including the provision and maintenance of the animals, the supply and repair of harnessing and equipment, the training of animals and operators and financial and regulatory services.

Critical mass

The concept of 'critical mass' is crucial to understanding how animal traction transport has spread, and will continue to spread. It is difficult for a critical mass of adopters to develop without the support services (manufacture, sales, repairs) to supply and maintain the technologies, while sustainable services do not develop without a critical mass of users. At the initial stages of adoption there is a 'vicious circle' of limited supply, limited demand and lack of public acceptance. Once a 'critical mass' of users exists, a 'virtuous circle' may start, allowing the technology to expand rapidly. Promoters of technologies have to concentrate their resources, publicise their products, and perhaps use discounts, credit or subsidies to launch the market. Once the product has reached 'critical mass', economies of scale and competition between service providers should reduce the price, making subsequent adoption easier.

In areas where animal traction was introduced in the twentieth century (including most of West Africa), governments, development projects, NGOs and parastatal organisations were often directly involved in the provision of the supporting services needed to establish a 'critical mass' of animal traction users. This has included (in various countries), the provision of animals, the provision of equipment, the provision of credit and the training of animals and equipment. However, once a 'critical mass' of users has been established, the private sector has increasingly provided such services. In most of the world, including Africa and Madagascar, the private sector now provides the necessary services to the operators of animal power for transport and the state has a very small, if any, role.

The importance of a 'critical mass' is further illustrated by the case of a promotional project in Sierra Leone that placed ten ox carts with pneumatic tyres in ten villages, and found after a few weeks that there were ten punctured ox carts not being used. Had all the carts been placed in the same village, there would have been more chance of a 'critical mass' of users, and the start of a puncture repair service (Starkey, 2002).

Training

In many countries, when animal power was being introduced into a new area, government training and extension services helped farmers acquire and train their animals. In some countries, state farms were used to breed animals. Agricultural ministries sometimes arranged training course for farmers and animals lasting several months. In The Gambia, initial courses in the 1950s lasted six to nine months (Mettrick, 1978). This was reduced to two months in the 1960s, and ox-training centres became unnecessary once animal traction became a normal part of agriculture. In Southern Mali, during the 1980s, animal traction training courses lasted 21 days, with emphasis on in-village training (Mungroop, 1989).

Training is still required in areas of on-going introduction. In Guinea, the non-governmental organisation RGTA, has developed a training system based on in-village training, where temporary training facilities are established for between one and three weeks. This service is gradually being 'privatised', as the trainers themselves arrange the courses and charge the farmers modest fees (RGTA, 2002). The RGTA experience could be sustainable as the trainers are village-based and have realistic economic aspirations. Other attempts to 'privatise' extension services relating to animal traction, including Oxenization Extension Training Services (OXETS), formed by staff of the Mbeya Oxenisation Project in Tanzania, have proved difficult because of the levels of salary and equipment associated with donor-supported projects.

Supply and maintenance of carts and harnessing

In West Africa, much of the initial promotion of animal-drawn carts involved parastatal factories, or private sector workshops established with the support of development agencies. The Siscoma/Sismar factory in Senegal was the largest, and others included Cnea (Burkina Faso), Smecma (Mali), Ucoma (Niger) and Uproma (Togo). These went through various stages of privatisation and product diversification, and now almost all carts produced in West Africa are by private sector workshops, large and small. The sale of axle and tyre sets in Sahelian West Africa has been a major achievement. It has allowed small artisanal workshops to produce cart bodies fitted to axles with standardised wearing components, and greatly assisted the spread of animal-drawn carts (Fall, 2002). The limiting factor for further expansion of carts remains the supply, in remote locations, of affordable cart axles and wheels.

In much of eastern and southern Africa, the lack of availability of axle sets has meant that most animal-drawn carts have been made from second-hand automotive components. The shortage of supplies and the lack of standardisation have restricted the growth of potential markets. In Tanzania, animal traction projects imported wheels and axles from Canada and Germany to provide a cheap source to make carts. However bearings and tyres were of unusual sizes, so replacements were not available. Once the projects had ended, farmers in remote rural areas had no way of maintaining their carts (Starkey, 2001).

During the early stages of introduction of animal traction, projects were involved in the production of yokes and harnesses, but this technology was very quickly transferred to local artisans. While yokes seldom cause problems, harnesses that are of poor design or are made from inappropriate materials can cause injury and suffering to donkeys and horses. There is therefore scope for organisations concerned with animal welfare (extension services, projects, NGOs) to work with artisans to find ways of improving harness quality at an acceptable price.

The supply, management, health and welfare of animals

Nowadays, most supply of animals is arranged privately, and organisations only become involved in areas of introduction. Donkeys have recently been introduced into new areas with project support: some introductions have been associated with high mortality (eg, donkeys transferred to Sierra Leone), but others, such as importations into Malawi and Zambia have been more successful (Mwenya and Chisembele, 2004). Public sector professionals sometimes advocate the introduction of new or 'improved' breeds or types of work animals. This is seldom justified, as most farmers require multipurpose work animals that are readily available and affordable and that require few resources to maintain them: the local breeds are most likely to meet these criteria.

Apart from harness sores and inadequate nutrition, there are few health problems closely associated with animal traction. This is just as well as few veterinarians have been taught about animal power in general, or donkeys in particular. The need for specific management and veterinary advice is mainly required in areas of introduction, where farmers who have not traditionally kept large livestock start to use animal traction. For this reason, some veterinary departments have been actively involved in the promotion of animal power (eg, Togo, Guinea, Sierra Leone). Elsewhere the main roles of veterinary departments have been to promote disease control measures and regulate livestock movements (which affects animal traction indirectly).

Funding, credit, subsidies, income generation

During the promotion of animal traction, the provision of subsidies and credit has been extremely important. Some technologies have developed without such support (eg, ox carts in Madagascar, low-cost wooden wagons in Zimbabwe and simple donkey carts in Ethiopia). However, animal-drawn carts are expensive and the rapid growth in the adoption of carts has often been associated with some form of credit or subsidy. Credit is the more important as subsidies for particular technologies tend to distort choices and may slow the development of sustainable markets. Evidence from Senegal, and many other countries, suggests that animal-powered transport will continue to spread slowly even if credit is unavailable: however the process can be speeded up through the provision of rural credit, whether by government agencies, projects, NGOs, savings-and-loan associations or the private sector.

The financial success of credit schemes has varied greatly, depending on many factors such as interest rates, inflation and corruption as well as farmers' perceptions of the need for repayments. Many of the more successful schemes have been associated with income-generation possibilities, such as crop marketing (cotton, groundnuts, maize) or road-maintenance.

Zambia case history

An example from a remote area in the North-Western Province of Zambia illustrates how the combination of agricultural marketing, credit and cart supply can stimulate a local economy (Starkey, 2001; Löffler, 1994). In an area where animal traction was almost unknown, a project established a small workshop to make ox carts that could be used to transport maize to marketing depots. The adoption of ox carts, assisted by extension and credit, was quite rapid, and income from maize sales and cart hire facilitated loan repayment. A 'critical mass' of users and support services developed, and the target of one cart per ten households was reached, and passed. The project was initially afraid it would saturate the market with ox carts. However, it was realised that the transport provision had stimulated economic development and growth, which stimulated further transport demand. With the transport constraint of headloading removed, more maize, vegetables and fruits were being grown, providing more work for the ox carts. The carts were also transporting a wide variety of other goods, including water, fuel wood and construction materials. Some farmers started trading between villages. Today, there is still much scope for expansion, as nearly all farmers now aspire to own an ox cart and more than one if they have a large farm and/or family. Although several workshops now make and repair carts, axles are still in short supply and the market is constrained by the present scarcity of credit.

This example is entirely in line with experiences in West Africa (eg, Senegal and Mali) where the combination a good rural supply of carts and access to credit, allowed animal-drawn carts to become a standard component of farming systems and rural trade. It also illustrates the huge growth potential in the 'market' for carts that still exists in many African countries.

Future roles of governments and civil society

Most of the spread of animal traction in sub-Saharan Africa and Madagascar has occurred among smallholder farmers with support services provided by the small-scale private sector. Where animal traction is firmly established, the reduction of state intervention in the sector will have little impact on its use. Governments' role will be to provide an enabling environment that encourages the efficient, appropriate and sustainable use of animal power for transport.

Private services and credit provision

Though most supporting services for animal transport can be provided by the private sector, strategic support may be required to help create a 'critical mass' of affordable carts. The importance of credit to enable the acquisition of carts has been stressed. If governments recognise the importance of animal power for transport in reducing poverty they should actively support the development of suitable rural credit systems. The formal banking sector seldom offers affordable credit facilities to farmers in remote rural areas, and so NGOs, savings-and-loan associations and development projects still have a very important role to play. Frequently, these organisations have credit products suitable for seasonal loans, trading loans and small enterprise development. They often do not have loans suited to the purchase of a cart (where a two year loan period is probably required). Governments should facilitate

the activities of credit-providers, and encourage them to review their products in relation to local transport needs.

Security

If there is war, work animals risk being requisitioned, stolen or slaughtered. The wars in Sierra Leone and Mozambique greatly reduced the number of working animals (Bangura, 1999; von keyserlingk 1999). However, even in peaceful countries, animal theft is a serious problem. Farmers frequently cite cattle theft as a key constraint to the use of work oxen (and one of the reasons why donkeys are popular). While local communities can address many security issues, governments have a key role in tackling the problems of lawlessness, theft and corruption.

Disease control

Another area of government intervention relates to disease prevention. While day-to-day animal care can be provided by the farmers themselves and by private animal health services (formal or informal), strategic disease control in animal populations has to be planned by governments (even if it is implemented by the private sector). This is not a specific animal traction issue (as it affects all livestock), but the risks of losing animals greatly influences whether animal power is used in an area.

Safety and welfare regulations

There are several ways in which animal transport can endanger the health, safety or welfare of the users, of other road users or the animals. Carts crossing or turning on main roads can endanger fast-moving vehicles. Motorised vehicles may hit free-ranging livestock on main roads: in a recent survey in Namibia established that although donkeys were perceived as the main problem, cattle were more likely to be involved in accidents (Mudamburi *et al.*, 2003). Overloaded or unstable carts or pack animals may cause physical injuries to humans or animals. Panicking animals and/or inadequate brakes may cause accidents. Poorly designed harnesses and packsaddles can injure animals. Nighttime movement with inadequate lights and/or lack of reflectors can be a danger for all concerned.

Animal transport users are often poor and disadvantaged people trying to maximise income for minimum expenditure. Income is often maximised by loading to physical limits (rather than safe limits). Expenditure is minimised if money is saved on maintenance and ‘inessential’ items such as lights and reflectors. Such people’s lives often contain many risks and dangers, so they see little point in reducing loads or spending money just to increase safety.

The government has a key role in developing positive and realistic regulations that do not hinder the free-market development of transport services and technologies. To date, most regulations relating to animal transport in Africa are negative. Local authorities may prohibit carts on fast or congested roads. Some town authorities, including those in Addis Ababa and Islamabad, banned transport animals because they were perceived as ‘old-fashioned’. People responsible for such legislation almost invariably travel in cars, and fail to see the value and importance of carts. A more positive approach would be to create separate lanes and/or routes for small or slow moving vehicles such as animal-drawn carts. While some African towns now have cycle lanes, few have routes designed for carts. Such infrastructure has important planning and cost implications, as well as social and economic benefits, including poverty reduction.

In all countries, examples can be seen of cruelly treated animals, that may be beaten, overloaded or injured by poor harnessing, unsuitable pack saddles or dangerous carts. Regulations can be used to enhance the welfare of animals and the safety of the public by placing limits on loading weight or prohibiting cruel practices. Regulations may also require certain safety devices such as reflectors, braking systems or insurance. In some countries, including South Africa, there are regulations relating to animal-drawn transport in terms of both road safety and animal welfare. However, experience from many countries suggests that regulation by itself is unlikely to improve either safety or animal welfare. People need to be convinced of the value of welfare and safety, with some consistent enforcement to ensure compliance. This may be achieved by collaboration between local authorities and interested NGOs (eg, transporter associations and animal welfare organisations).

Licensing and insurance

Systems of local licensing of animal transport are sometimes used to gain revenue, control numbers and maintaining standards. In Cuba, the animals and the vehicles have to be inspected annually prior to the renewal of licenses, and conditions also stipulate that operators must have appropriate insurance and tax receipts (Starkey, Ríos, Valdés and Sotto, 2003). Licensing systems can be used to raise standards, but public officials may try to gain from the bureaucracy. In Morocco, animal welfare NGOs have been mandated to assist with licensing inspections (Jones, 2003).

Most operators of animal transport work entirely within the informal sector, where insurance is rarely available and seldom affordable. Until insurance companies have the capacity to provide affordable cover to operators, it is unrealistic to legislate for compulsory insurance for animal transport, particularly in rural areas.

Environmental concerns

Some people consider this unsightly or unhygienic (although the manure is often collected and used). In some urban areas, the users of work animals are required to dispose of dung, and a variety of simple collection devices are available: for example, donkeys in Lamu on the coast of Kenya may be fitted with 'bun bags' when working in urban areas.

Associations

Where transport devices are used as public services, the operators often form associations. Taxi drivers almost invariably do this (whether the taxis are motorised or horse-drawn). The most common reasons are for fixing prices and for solidarity (lobbying the authorities). They may also be used to maintain (or raise) standards. In Ethiopia, transporters that use pack donkeys have formed associations (Sisay and Tilahun, 2004). These have lobbied for appropriate 'parking' facilities for donkeys to be provided at freight terminals, where produce arriving in lorries is transferred to donkeys for subsequent distribution. The users of animal transport seldom form associations, but user-groups could help lobby to improve standards, facilities, regulation and the image of animal power for transport.

Integration of transport modes (human, animal, motor)

Government ministries responsible for transport, almost invariably concentrate on motorised transport systems, and neglect the development of animal power. However, more efficient transport systems can develop by combining the different comparative advantages of various transport modes (human, animal, motor). Motor vehicles (trucks, buses, bush taxis) will continue to expand in the services they provide, particularly for long-distance, inter-urban transport. In rural areas, the growth of motorised transport can be assisted through the increased use of animal transport to bring goods and people to and from the rural transport 'hubs'. If animal transport is used to consolidate and distribute the loads for large motorised, the entire transport market becomes more efficient and can grow in size and profitability, mutually benefiting the large and the small transporters, and the users. This is well illustrated by the system of weekly markets that occurs in many Sahelian countries, where animal-drawn carts now supply and distribute goods from a large rural catchment area, so justifying greater volumes of motorised transport to serve these markets.

Such integration of animal power and motorised services is based on a series of local hubs with suitable intermodal exchanges (markets, depots or passenger terminals) where transfers can be easily made between the large and the small transport (Starkey, Ellis, Hine and Ternell, 2003). Some transport planners and local authorities have missed the point entirely, by banning animal power around markets and transport terminals, and so have failed to maximise transport efficiency. Instead the authorities should encourage complementary technologies, and plan for greater complementarity. Ideally, rural transport terminals and markets should be planned in space and time to make optimal use of animal power for 'feeding' long distance trucks.

Road maintenance

Rural road maintenance is a problem throughout Africa and Madagascar. Governments (central or devolved) still generally pay the maintenance cost of rural roads, although work is increasingly contracted to the private sector or local associations. There is growing interest in the use of affordable and sustainable labour-based systems. Animals can be used for the transport of gravel, stones and water, and also for levelling and grading work. The whole topic of using animals efficiently to

maintain roads has been neglected in recent years and requires more attention. Networking collaboration with experienced road maintenance projects in Central America could prove fruitful (Montiel, 2002).

Education and training

In Africa, animal traction has been neglected in syllabuses at primary, secondary and tertiary levels, and this is primarily the responsibility of governments. A wide variety of professionals, including veterinarians and transport planners learned nothing about animal traction during their education. These people now require appropriate in-service training to ensure their work is relevant to the needs of the users of animal traction for transport.

International animal welfare organisations

The above analysis has focussed on sub-Saharan Africa and Madagascar, where animal power for transport is generally increasing. However, the respective roles of government and civil society will be broadly the same in other continents. It generally for the private sector (formal and informal) to provide the actual support services, while governments should provide an enabling environment, and a regulatory framework, developed in consultation with the various stakeholders.

In areas of introduction of transport technologies, there may not sufficient services or a critical mass of users to make adoption easy. In such circumstances, development organisations (government projects and/or non governmental organisations) may speed up the processes of service provision and the development of a critical mass of users. The strategy should be to support the development of sustainable local services, rather than creating any dependence on unsustainable temporary interventions. The aim should be a sustainable equilibrium in which various service providers and users mutually benefit each other, with competition, choice and selection refining the various services.

International animal welfare organisations can assist the various processes, working with governments and/or with civil society, to improve the efficiency and value of animal powered transport, for the benefit of the users and the animals themselves.

Support to governments and authorities may include assisting:

- Development of policies and strategies for integrated animal powered transport
- Development and enforcement of appropriate regulatory frameworks
- Training, education, information exchange
- Improvement in the overall context (security, disease control, economic prospects)
- Planning and funding strategic support programmes.

Support to suppliers of services may include:

- Working with local organisations and associations to identify problems and solutions
- Training and education (for service providers, including training services for users)
- Participative assessment and development of alternative technologies
- Supporting local and international networking and information exchange.

Many animal welfare charities were started as an emotional response to the plight of individual animals, and they raised funds in order to relieve animal suffering, through treatment and euthanasia. This made a real difference to individual animals, but had little effect on the overall national and international situation. People began to question the value of providing short-term supplies of anthelminthics to a few treatment centres, if there were no long-term strategy for animal health and welfare in that country.

In recent years, more and more animal welfare organisations have been moving towards a strategic way of intervening. They have also funded information exchange workshops and professional publications that have had influence in a range of countries where there has never been any direct intervention. For example, Spana has been particularly active in supporting a series of international workshops on working equines and their publications, including the 1994 workshop in Morocco (Bakkoury and Prentis, 1994) and the 2002 workshop in Syria (Pearson, Fielding and Tabbaa, 2003).

Brooke Hospital for Animals has co-funded a handbook on horse care, designed for areas where veterinary care is not readily available (Hadrill, 2002). The International League for the Protection of Horses (ILPH) has funded small programmes to train support services, notably farriers and harness makers (MacGregor, 1994; Burch, 2003). The International Donkey Protection Trust (IDPT) has published a handbook on donkeys (Svendsen, 1997), and will be supporting the international workshop on working equines to be held in Ethiopia in 2006.

Animal welfare charities are increasingly working to support the strategic planning and the collaboration between authorities, service providers and user groups to create sustainable systems of using animal power for transport. For example, Spana and its local partners have also been attempting to develop a framework for transport animal welfare legislation and inspection in Morocco (Jones, 2003). The Brooke Hospital for Animals has been developing a strategic and participative methodology for targeting welfare interventions (Khan, 2003; Pritchard, 2003). In the long term, such strategy formulation, collaboration, participative planning, mutually agreed welfare practices and related training and education inputs are likely to improve the efficiency animal powered transport systems, benefiting the users and their animals.

Conclusions

In much of sub-Saharan Africa, the use of animals for transport is increasing, and will continue to do so for the foreseeable future. The population of donkeys, which are primarily transport animals, is growing and the range of donkeys is increasing. The use of work oxen is gradually spreading into the more humid areas, partly as a result of continued deforestation. In areas where oxen are already used for cultivation, increasing numbers of farmers are obtaining and using carts, as these assist sustainable crop-livestock integration, profitable marketing and social benefits for men, women and children. Lack of rural credit and insufficient availability of cart axles and wheels constrain the faster spread of carts.

During the twentieth century, the extension services of ministries, production companies and projects were important in introducing and expanding animal power for transport. There were also many attempts to assist farmers with support services, including procurement, training and provision of equipment. In most countries, these services are now being provided by the informal private sector. In new areas of introduction, where there is not yet a ‘critical mass’ of users to sustain private sector services, some development-support may be supplied to accelerate the process: such services can be efficiently provided by NGOs, working with local communities and the informal sector. Development assistance to animal traction should therefore be targeted towards rural credit, enhancing private-sector supplies of carts (wheels and axles) and committed NGOs. Greater use of animal power for rural road maintenance could be highly beneficial.

Governments should maintain an enabling environment, supporting the spread of animal power to provide efficient integrated transport systems, combining complementry and mutually supporting motorised (long-distance) and non-motorised (local) transport options. Prohibition should be avoided, and alternative, complementary infrastructure should be provided for animal transport, to facilitate access to markets. Legislation concerning licensing, insurance, safety and animal welfare will only be effective if the processes are transparent, the users understand the benefits and various stakeholders cooperate together to find acceptable ways of enforcing the regulations.

Animal welfare charities should assist these various processes in appropriate ways. They should support governments and authorities to plan strategically for animal powered transport. They may also facilitate the development of agreed animal transport regulations using participative processes, considering the interests of all stakeholders and the transport animals. Animal charities can assist the providers of animals, equipment, health care and training to provide better and more appropriate services that are sustainable and affordable meet the needs of users and animals. Organisations with an international perspective can promote and facilitate the sharing of ideas, information and experiences and assist national and international networking, cooperation and collaboration.

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