The use of animal traction in Pinar del Río Province, Cuba

by

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Summary

In Pinar del Río, the most westerly province of Cuba, there are about 81 000 working oxen representing 22% of the 365 000 oxen used nationally. A diagnostic survey was undertaken to understand the existing use of animal power, the potential for developing the technology and the agro-ecological and socio-economic conditions that influence the use of work animals. The study covered the whole of the Province including the northern Guaniguanico mountain range and the southern plains of Pinar del Río.

Information was acquired through surveys, workshops, meetings, seminars, interviews and meetings. People contacted included small-scale farmers, cooperatives and large farms, agriculturalists, civil servants, students and academic staff.

The study showed that animal traction constitutes an important energy source that is widely used. Small farmers (campesinos) like to use oxen for tillage operations and for transport. Larger farms use oxen for secondary tillage and for transport. Horses are used for both urban and rural transport. A high proportion of people interviewed considered that animal traction would continue being an important option for the foreseeable future.

Introduction and context

The use of work animals in Pinar del Río Province (as in all Cuban regions) dates from the early European colonisation of the island. Animal power in this most westerly region of the country remains a vital option for agricultural production and transport, and is widely used by both large-scale and small-scale farmers, and in the daily round of rural and urban life. The renewable bio-energy source provided by work animals is very important for mechanised cropping in the agricultural production systems of Pinar del Río Province. Animal traction plays a vital role in the production of tobacco, which is grown by individuals and cooperatives and is the most important crop of the Province.

Pinar del Río has 81 000 work oxen, which represents 22% of the reported 365 000 oxen used for animal traction in Cuba. The most frequently used animals in Pinar del Río are bovines (oxen and bulls and some cows) and equids (horses and mules). Oxen are mainly used for field work and transport (sledges and carts). Horses are mainly used for riding and pulling carts and buses. Mules are mainly used in the mountains for pack transport and riding.

The 1990s brought an increase in the use of animal power, not only in agriculture sector, but also in the transport of people, merchandise and materials. Increasing the efficiency of animal power in several sectors is therefore important to the economic and social progress of Pinar del Río Province.

Agro-ecological characteristics

The Republic of Cuba consists of an archipelago with an area of 110 860 km^2 and a population of 11 million. The relief is generally flat, with 77% of the country less than 100 metres above sea level. Twenty-two percent of the country is in the range 100 m to 200 m and only 1.3% is over 500 m. Cuba has a tropical climate with average temperatures around 25-26 ^oC. Annual rainfall varies between 1200 and 1500 mm. The tropical climate influences many aspects of animal power, including animal breed and disposition, management systems, working hours, feed quality and quantity and farm production systems.

Pinar del Río Province is located in the west of the island of Cuba. The Province can be divided into two broad agro-ecological zones. The Guaniguanico range of mountains, with altitudes ranging from 100 to 800 metres, dominates the northern zone. Curious limestone *mogotes* are found in this zone. The southern zone is characterised by flat plains, with slopes of 0 to 15%. In both zones, the topography of areas under agricultural crops is relatively flat or gently rolling, although farmers in the mountainous regions may work on slopes of between 12 and 30%.

The region studied presents a marked diversity of soils, with generally light, sandy soils predominating. They are soils at high risk from erosion due to their physical characteristics and low organic matter content. Soil erosion is significant in the region, and it is estimated that approximately 75% of agricultural soils show important levels of erosion.

Land use

Pinar del Río Province is largely agricultural and most of its gross domestic product derives from agriculture and forestry. The principal crops grown are tobacco, sugar cane, coffee, rice, citrus and various vegetable crops (which in Cuba are collectively called *cultivos varios*). Forestry is also important, as is pastureland. Tobacco, forestry, coffee and citrus have the greatest economic importance in the Province. Generally in the southern zone there are abundant irrigation systems, and practically all producers have access to water. In the mountain zone, the broken terrain and the limited access to suitable water supplies limit irrigation systems.

Farming systems

The organisation of agricultural production is characterised by a combination of private and state farms, with agricultural production cooperatives (CPAs), service and credit cooperatives (CCSs), individual producers (*campesinos)* and the new Basic Units of Cooperative Production (UBPCs). In all cases the State offers assistance in the supply of important inputs, fuel, fertiliser, draft animals, machinery hire and technical assistance. For tobacco, and some other crops, the planning of cropping programs and sowing and harvest dates are managed centrally.

The size of the farms or *vegas* of the *campesinos* varies according to the principal crop, the condition of the land and particular characteristics of the region. A tobacco farmer may commonly have 5 ha to 67 ha and there are cases of farmers with more than 130 ha. Amongst farmers of horticultural and vegetable crops, the property sizes range from 5 ha to 67 ha. In the mountain areas, the size of *campesino* production holdings is subject to greater limitations and varies between 2.5 ha and 20 ha.

Similarly, the size of state farms depends on the principal crop and the topographical conditions. State farms dedicated to rice, sugar cane, cattle, coffee, tobacco and forestry are generally large. State farms for other food crops (*cultivos varios*) are smaller.

Slash and burn agriculture is not common in the territory, but crop rotation (often with fallow periods) is normal. Usually the *campesinos* rotate the cultivated areas around their homes or in nearby areas, according to their access to land.

Participatory rural diagnostic survey

Using participatory methods, a diagnostic survey was undertaken in Pinar del Río Province. The aim was to identify the diverse factors which affect animal traction and those aspects of animal traction that can be improved. The survey was designed to ascertain the level of use of animal power, to define critical characteristics of its use and to identify aspects that can realistically be improved. Such research should prove very important for the future development of the technology. The participatory methodology involved visits within the study areas, surveys of farmers, meetings with farmers and agriculturalists and workshops.

The following people participated in the implementation of this project:

- Students of the University of Pinar del Río (the Faculty of Agronomy and Forestry and the Faculty of Mountain Agronomy).
- Academic staff of the University of Pinar del Río.

- Agriculturalists from the Ministry of Agriculture.

Surveys in the Guaniguanico mountain zone were conducted by the Faculty of Mountain Agronomy. while those in the southern plain were the responsibility of Faculty of Agronomy and Forestry. The institutions covered by the study included:

- Agricultural Production Cooperatives (CPAs)
- Credit and Service Cooperatives (CCSs)
- Basic Units of Cooperative Production (UBPCs)
- State agricultural production farms
- Private farms
- Polytechnic Agronomy Institutes
- Agronomy faculties
- Agricultural training schools.

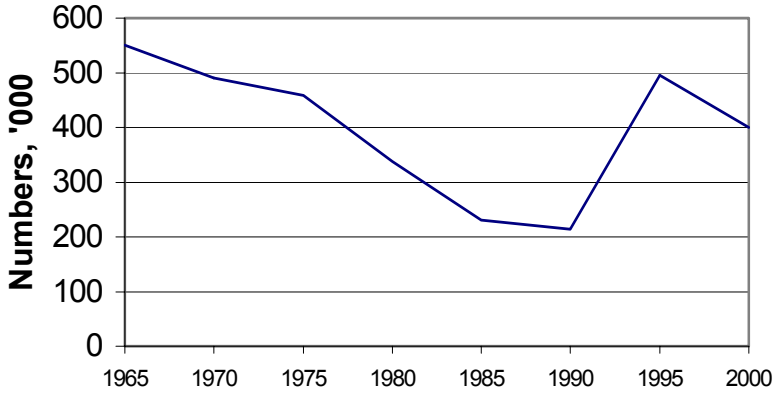
The following hierarchy of priorities was employed for the interviews, surveys, meetings and workshops:

1. Small-scale farmers *(campesinos)*
2. Agricultural workers, notably employed '*boyeros*' (ox-team operators)
3. Agronomy technicians
4. Production professionals
5. Directors and management teams of cooperatives and state farms
6. Agronomy students
7. Academic staff

Employment and management of draft animals

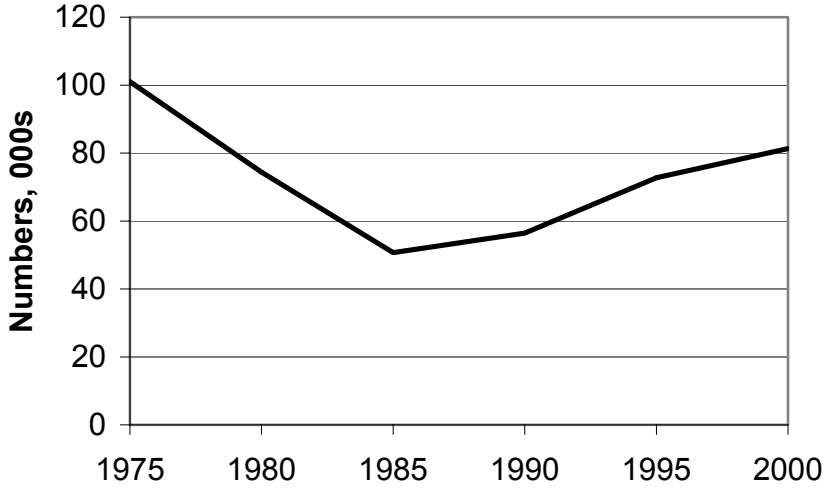
Campesinos commonly employ work animals for plowing, ridging, weeding and transport, as do the larger farms in the region. With the introduction of large numbers of tractors in Cuban agriculture in the 1960s and following years, the number of draft animals employed in agricultural work decreased. At the beginning of the 1990s, Cuba experienced an economic crisis that was exacerbated by changes in the world order, especially the disappearance of the socialist bloc in Europe. The shortage of petroleum products was a catalyst for an increase in the use of draft animals by many types of cooperative and large-scale production units, as economic possibilities declined for using tractors in mechanised agriculture. Figure 1 shows the changes in the work oxen population in Cuba.

Figure 1. Population of oxen in Cuba



A similar pattern occurred in Pinar del Río. Figure 2 shows the effects on the numbers of oxen of the tractorisation process in the 1970s and 1980s. This resulted in a decline in the numbers of draft animals employed in agriculture. Since the 1990, the numbers of work oxen have been increasing.

Figure 2. Ox population in Pinar del Río Province



The current distribution of the most frequently used draft animals used in the agriculture of Pinar del Río, is shown in Table 1.

Table 1. Work animals by sector in Pinar del Río Province

	Oxen	*Horses*	*Mules*
Credit and Services Cooperatives (CCS)	48 000	4443	652
Agricultural Production Cooperatives (CPA)	2206	170	105
Basic Units of Cooperative Production (UBPC)	1716	839	232
Un-associated private farmers	26 175	3505	513
State enterprises	3204	1406	807
Total	**81 301**	**10 363**	**2363**

Animal species

Based on the information obtained from surveys, meetings and workshops, the main work animal types used by *campesinos* in Pinar del Río are bovines (86%) and equines (14%). In the case of bovines they use both *Bos taurus* ('European') and *Bos indicus* ('Asian' or zebu) breeds. All people surveyed and interviewed confirmed that they prefer oxen for field operations. The *campesinos* and larger farmers said their liking for oxen is due to the following characteristics:

- Oxen are tame and hard working
- Oxen present little danger to their drivers
- Oxen are willing to work hard for long periods.

There is less enthusiasm for using bulls for work. There is little motivation for the use of cows as work animals for pulling implements. They are normally only pressed into service when there is no ox available or when a *yunta* (team) is incomplete. Farmers argue that it is more important to leave cows for reproduction and milk production. Many farmers would like to own more than one *yunta* (pairs) for farm work. Farmers generally owned one, two or three *yuntas* of oxen or bulls. The practice of working with a single animal is not very common, although more than 70% respondents reported that they had employed a single animal at some stage. In mountain areas, all farmers said they used pairs of oxen for their hillside work, in spite of the difficulties of using *yuntas* in these conditions.

The equines most used are horses (*Equus caballus*) and mules (formed by crossing female horses with male donkeys, *Equus asinus*). Horses play an important role in pulling vehicles and for riding. There

does not exist any tradition of using horses as draft animals for farm implements. There appears little interest in using draft horses for cultivation, and the reasons given include:

- Limited draft force capacity.
- Lack of staying power if draft forces are large.
- The management and use of draft horses is more difficult than use of oxen.

Figures 3 and 4 show the relative acceptability by farmers for the use of different breeds and types of work animals.

Figure 3. Relative acceptability for farmers of bovines, horses and mules

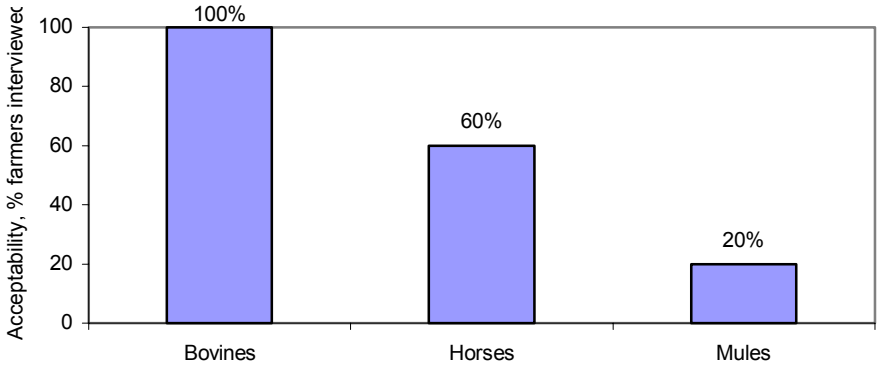
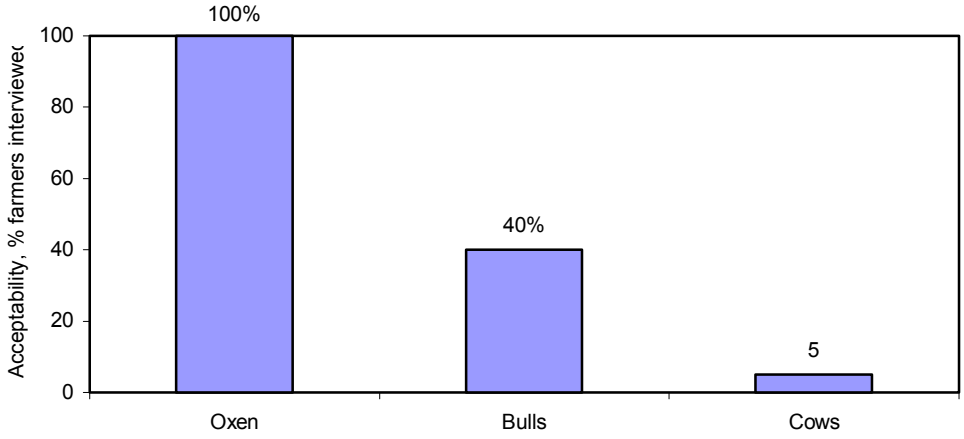


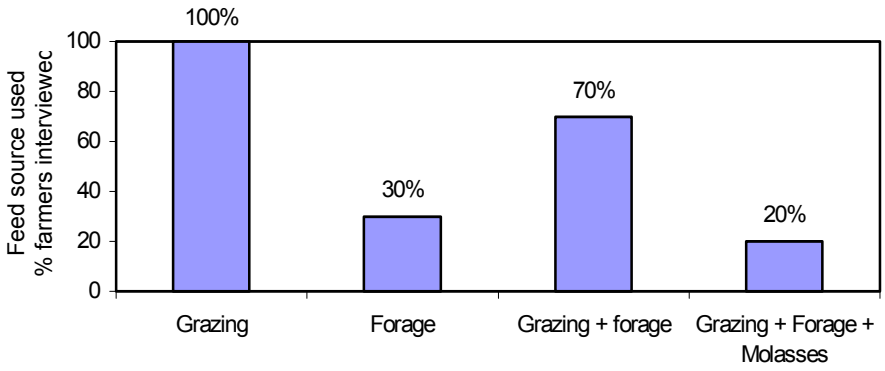
Figure 4. Relative acceptability for farmers of oxen, bulls and cows



Nutrition and quality of draft animals

There is an appropriate concern amongst farmers to ensure that their draft animals are correctly fed. The most common system for draft animal nutrition is direct grazing in fallow areas or marginal land, without establishing forage species of grasses in these areas. On some occasions, systems of forage production and crop residue use are observed. Most of the farmers interviewed made some effort to cut forage or use crop residues as feed sources (Figure 5). Oxen owners tended to do this sporadically, while horse owners reported a greater frequency of cutting forage for their animals.

Figure 5. Sources of nutrition for work animals



The traditional level of work animal care is generally good. When animals are tied, most farmers change their pasturing places, usually two or three times a day. During the day, animals generally have access to shade and water. Animals are generally corralled at night although there is no tradition of protection from the rain with roofs or stables.

Animal health

The main causes of ill-health in working animals were said to be parasitism, pneumonia, ticks and tick-borne diseases. This health care system provided by the Stated includes:

- Veterinary attention
- Preventive medicine via blood analysis
- Systematic vaccination
- Periodic parasite control

All farmers, large and small, expressed satisfaction with the existing animal health care system.

Animal traction implements

Most *campesinos* associated in service and credit cooperatives (CCSs) have a package of animal traction implements including:

- Mouldboard plow
- Traditional (ard) plow
- Spike-tooth harrow
- Cultivator
- Transport sledge
- Cart
- Earth moving scoop

Depending on their production systems, state farms, production cooperatives (CPAs), and basic cooperative units (UBPCs) may have all these implements, or may have smaller packages. Essentially all have at least one moldboard plow, ard plow, cultivator and spike-tooth harrow.

Moldboard plows are commonly used for primary tillage, with subsequent passes by spike-tooth harrows or disk harrows. Plowing generally involves soil inversion, which may damage the soil. More than 90% of those interviewed considered that their soils were being impoverished and had declining productive potential. Farmers associated this with the intensive use of the soil, mono-cropping without fallow and climatic conditions (intensive rainfall and high temperatures). In some cases they recognised that excessive tillage can cause the typically shallow and sandy soils to deteriorate.

The implements most used for secondary tillage and weed control activities are cultivators, ridgers and ard plows. Both large-scale farmers and campesinos commonly use these implements for animal powered secondary tillage. On large farms, it is common to do the initial soil preparation with a tractor-mounted plow and disk harrow, and perform subsequent tillage operations with animal power. More than 60% of interviewees mentioned this practice and indicated they thought it appropriate.

Equipment for seeding, fertilising and harvesting operations is not widespread. Sowing is usually done manually and there is no tradition of using seeders. In all interviews, people expressed interest in seeders and fertiliser applicators. In harvesting, the role of draft animals is basically confined to transport.

Transport

Transport occupies a large part of the time of draft animals. In 85% of the farms surveyed (large and small), draft oxen and/or horses are yoked or harnessed for transport work every day. The most common transport operations are carrying water, implements, fertilisers, seeds and other inputs, harvested crops and people. In mountainous regions, the transport equipment most used is the wooden sledge that provides security on steep slopes. Sledges are also commonly used during tobacco harvesting.

In Pinar del Río Province, there are at least 200 registered, horse-drawn public transport vehicles. The vehicles are a common sight in the cities and towns and are a response to the shortage of fuel for motorised means of transport. Although the public is very positive about this means of transport, at the moment, both the drivers and the users think that the practice will disappear when fuel becomes more available and affordable. The drivers of animal powered vehicles indicate the following limitations to their work:

- Limited sources of feed and animal care
- Lack of supplies for harnesses, collars, saddles canvasses and ropes
- Risk of theft of the animals
- Increasing cost of animal care and protection

A further use of urban animal-powered transport is the movement of produce and merchandise within the network of public supply centres. Animal powered transport is also important in urban cleaning and the transport of refuse.

Conclusions

The employment of animal traction is widespread in Pinar del Río Province. This energy source has established traditions and history in the west of Cuba, and it forms part of the regional culture. Both bovines and equines are widely employed. Oxen are the most frequently used draft animals in rural areas. Oxen and bulls are generally used in pairs (*yuntas)*, but occasionally they are used singly. Horses are an important alternative for the transport of people and loads, in both rural and urban areas. There is an appropriate system of animal health in place. Most work animals obtain their feed through grazing.

This paper was prepared as part of a national animal traction research programme supported by the British Department for International Development (DFID) and coordinated by the Instituto de Investigaciones de Mecanización Agropecuaria (IIMA). For further information see the website: http://www.recta.org
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