Animal traction in Havana and Matanzas Provinces of Cuba

by

Félix Ponce Ceballos, Alfredo Pérez Sendín, Idalgelio Alvarez Rodríguez,

Gabriel Martínez Costas, José I Hernández Alonso and Yuris Hidalgo Hernández

Agricultural Mechanisation Faculty, Agricultural University of Havana, Cuba

Summary

Eighty-five farmers in the Provinces of Havana and Matanzas involved with animal traction were surveyed, and asked wide-ranging questions relating to their animals, implements and the agro-ecological and socio-economic environments of the region. It was found that 47% of farmers used tractors for initial soil preparation and then draft animals for secondary tillage operations. Seventy-five percent of farmers consider that the work of draft animals is very acceptable, although others considered that working with animals was slow and boring. Everyone questioned considered that draft animals were beneficial to both the soil and the crops.

Creole oxen are strong and well adapted for farm work in Cuba. At the present, horses are only used for transport. One key problem that limits draft animal use is security (89% of farmers surveyed reported this). Soil compaction is another serious problem. The availability and the quality of implements were not good, with many materials and parts considered weak. Seeders and fertiliser distributors are not used because they are not available in the market.

The standard of living of farm families is considered good and compares well with city living. Farmers using animal power are quite old (about 60% of farmers are over 50) and few young people are following in their footsteps.

There is need for participative research (involving farmers and implement manufacturers) in relation to animal-drawn seeders, implement availability and quality, use of alternative animals (such as horses) and the increased complementary use of animals and tractors. There is also need to incorporate animal traction into educational syllabuses at all levels.

Introduction and methods

A survey of 85 farmers and people involved with animal traction was undertaken between January and July 2000. Seven staff of the Mechanisation Faculty of the Agricultural University of Havana (UNAH) and seven students (fifth year, Agricultural Mechanisation) were involved as well as some teaching staff of the San Nicolás de Bari Mechanisation Polytechnic. In addition, 15 students from the Provinces of Havana, Matanzas and Pinar del Río and four teaching staff and a technician from the Agricultural Machinery Research Group (GIMA) also assisted. All participated in a training seminar on how to conduct the interviews. The university staff supervised the work of the students and assisted the preparations for the visits to the selected farmers. A guide was prepared, based on the participative methodology outlined by Starkey (2003).

Farmers were selected from nine municipalities of Havana Province, mostly in the municipalities of La Melena de Sur and San José de las Lajas which are important agricultural areas in easy reach of UNAH. Farmers were also visited in Matanzas Province. Due to transport constraints most farmers in Matanzas were in the municipalities of Cárdenas and Colón. A few farmers were also visited in the adjacent Pinar del Río Province.

Characteristics of the region

Havana Province (which does not include Havana city) has an area of 56,091 km^2 and a population of 621,700 giving a density of 109 inhabitants per square kilometre. The urban population (not including Havana city) is 494,800 inhabitants and the rural population of the 14 municipalities is 123,600, so that only 20% of the population lives in rural areas. Matanzas is

not dissimilar, with an area of 4739 km^2, a population of 589,041, a density of 124 inhabitants per square kilometre, with 459,064 urban inhabitants and 129,977 rural inhabitants in 14 municipalities. The topography of Havana and Matanzas Provinces is flat. Red ferralitic leached soils predominate. These are very fertile although many have been eroded and compacted by tractor tillage, resulting in a decline of fertility. Table 1 shows the land tenancy distribution.

Table 1. Land tenancy in Havana and Matanzas Provinces

Land tenancy	*Land area %*	
State Sector		32.7
Non-State Sector		
Basic Units of Cooperative Production (UBPC)	42.3	
Agricultural Production Cooperatives (CPA)	10.0	
Credit and Service Cooperatives (CCS)	11.6	
Private farmers	3.4	
Total of the non-State sector	**67.3**	67.3
Total agricultural area		**100**

Survey results and interpretation

Social context and farming systems

Most farmers interviewed were relatively small-scale farmers (70% of the farmers interviewed had less than 15 ha of land). Most farmers belonged to cooperatives (62% were from CCSs; 30% from CPAs; 15% from UBPCs and 8% had no cooperative affiliation). Most (79%) farmers surveyed owned their land, while some (20%) had usufruct rights on state land. A number of farmers (14%) also had employment away from the farm, generally in agricultural enterprises (machinery workshops, state farms, research stations).

The principle crops grown by the small farmers who use animal traction were: maize, rice, beans, groundnuts, sesame, cassava, sweet potato, taro, squash, potatoes and various vegetables (tomato, cauliflower, garlic, onion). These were invariably farmed using crop rotations. The more permanent crops were plantains, bananas and sugar cane. Sugar cane was generally grown in large areas, using motor power. Generally cane producers are members of cooperatives that have the machinery required. Since there has been much use of heavy mechanical power in recent years, the soils are quite compact, and it is now difficult to use animal power for initial plowing in these circumstances. Farmers clearly had a great desire to maintain and improve the productivity of their farms, and they were very worried by the problems of soil compaction and degradation.

Most farmers lived in concrete houses (69%) or wooden houses (30%). Most farmers had electricity (93%) and owned a television (64%). All farmers had all-weather roads to access their farms, and there were no infrastructural constraints to obtaining inputs and getting their produce to market.

About 58% of the farmers surveyed were over 50 years old. Only 24% of farmers were under 40. Younger people find it easier to find other work. The relative scarcity of young farmers may be a cause for concern, particularly for the future use of animal traction. Despite the relatively old age of the farmers, the educational level seemed quite good. Only one farmer was illiterate, and most had been trained above 6th Grade. Several (23%) of the farmers had training at 12th grade or beyond. All farmers had learned to work with animals when they were young, and only 20% had received any subsequent training.

About one third of farmers reported that family members help them to work with the animals. These were generally fathers, sons, brothers, sons-in law or nephews. In none of the interviews did anyone mention that a wife or other female family member helped them, although their opinions on such a possibility seemed positive rather than negative. When additional labour was

required, just over half the farmers resolved the problem through inter-family arrangements, while 46% of farmers said they paid for hired labour when necessary.

Farmers and their views on animal traction

Most farmers were very positive about animal traction (76% thought it was very good and 80% thought it was not a backward technology). Many (40%) thought animal traction would increase if fuel remained a problem. Others thought it would remain the same (37%) or decline (23%). The great majority of farmers thought that both tractors and oxen would be working in harmony in the foreseeable future.

About half (48%) of the farmers interviewed were owners of tractors (including members of tractor-owning cooperatives). The area surveyed has large numbers of tractors, which are considered ideal for initial soil preparation and transport operations. However, for secondary tillage, weeding and other crop-care operations, animal traction is considered better as it does not damage soil structure. Farmers were generally of the opinion that once the soil has been heavily compacted through the use of motorised machinery, the subsequent use of oxen for soil preparation is made more difficult and their output is significantly reduced.

Farmers were asked about recent changes in technology and farming operations. Some commented on increased soil compaction and decrease in soil fertility, partly due to tractorisation. Farmers were planting more pasture for their animals. Irrigation was helping some farmers to combat the effects of drought. Farmers felt the climate was less predictable and there was more deforestation. Ninety percent of those interviewed, thought the climate was changing, and among the affects cited were droughts (making work with animal traction harder), abnormal rains, changed harvest times and changing patterns of crop pests and diseases.

Farmers said that oxen were strong work animals. They had little or no knowledge of the use of horses for agricultural operations. People gave the impression that there had been a gradual increase in the use of tractors and motorised transport, at the expense of oxen and horses. While 40% of farmers considered that there had been no significant change, 60% thought there had been more oxen and horses in use in the past.

There was a very clear consensus on the major problems that limited the development of animal traction. Problems of security and risk of animal theft was cited by 89% of the farmers interviewed. Horses were particularly prone to theft and were expensive to replace. Environmental degradation, drought and soil compaction was another important issue, noted by 35% of respondents. Other problems mentioned by a few people were the failure of young people to learn the skills of working with animals, the availability of tractors and the problems of acquiring work animals. A few people thought that the quality of oxen available from the State had declined, and this was probably because of the larger numbers of animals involved since the early 1990s.

Animals

Most farmers (89%) thought oxen were the most robust working animals. Most (60%) farmers bought their oxen from the State, and the price was about 600 Cuban Pesos. Others (34%) raised animals from their farms. A few (5%) bought animals privately, at a high ‘free-market’ price (about 4000 Cuban Pesos for trained animals). Half the farmers (51%) trained their animals themselves, while the others either bought them trained (21%) or used specialist ox trainers (28%). Most farmers (60%) had one pair of oxen, while 22% had two pairs. Two thirds of farmers (67%) had a horse used for riding or cart transport while 31% had no horse. All farmers fed their oxen through natural grazing, and only 6% claimed to feed supplements of molasses or conserved crop residues. The small farmers seldom reserved land for permanent pasture, but animals could graze on fallow land, crop residues and the field boundaries. Animals were all in reasonable body condition, suggesting that they were receiving sufficient feed for their workload.

Most oxen (55%) were said to be of the local Creole breed, while 30% were Zebu and 8% were Zebu-Creole crossbreds. The preferences were similar, showing most people had the type of oxen they preferred. Creoles are preferred because they are more docile, robust, stronger and perform better in the rainy season. Zebus are said to be faster, stronger, more intelligent, resistant to the sun and unlikely to get sick. Creole crosses are said to be more docile than the Zebu, but strong and resistant to the sun. Animals that are described by farmers as Creole may well have blood from some of the other breeds.

Most work oxen animals were said to be in normal condition (68%) or fat (30%), with only one farmer claiming to have thin oxen. Animals were considered to be resistant to diseases and well-adapted to the climate and work regimes. The majority of farmers (72%) said their work oxen had not been sick. The main health problems reported were accidents and ticks, with some mention of parasites, colic and lack of calcium. Farmers reported there was good veterinary attention available from the State, with 73% of farmers using the services of state veterinarians, while some treated animals themselves (14%) or used private vets (13%). State veterinary services were considered cheap, with treatment varying between 5 and 60 Pesos.

Implements and harnesses for animal traction

Almost all farmers owned the basic animal traction package of mouldboard plow, wooden ard plow and a spike tooth harrow. Almost all (95%) of farmers used an ard, plow or ridger for planting, and a cultivator, ard plow or ridger for weeding. Only five percent of farmers used a *multiarado* toolbar or disc harrow and only 2.5% had a seeder or fertiliser distributor. Very few people either owned or commented on animal traction seeders or fertiliser spreaders. This was probably because they were little known and are not available to purchase.

Almost all farmers reported that they lent implements to their neighbours and borrowed others when required. Hiring for money was very unusual (2.5%). Most implements were made in state enterprises and most were bought from State enterprises. However about one third of implements were made on the farm (mainly wooden ards), or by local blacksmiths. Steel implements cost 150 to 300 Pesos, while wooden implements cost 50 to 150 Pesos. Many farmers (42%) said they repaired their own implements, with others using State workshops (37%) or private workshops (22%). About half the farmers obtained their spares from state workshops, and half from the private sector (including cooperatives). Only a small number of farmers reported modifying their implements. Adaptations included increasing the working width of wooden plows and modifying the ridger of the *multiarado*.

Only 10% of farmers made their harnesses themselves. Others mainly bought from State enterprises or the small-farm sector (CCS, CPA) where prices were considered cheap. Yokes cost from 150 Pesos each, forehead pads were 12-25 Pesos each, ropes were 2 Pesos per metre while horse collars cost 500 Pesos each. A few farmers bought harnesses from individual artisans, arguing that although the price was higher, the quality was better.

Half the farmers regularly used four-wheel animal drawn carts (*carretón*). One quarter of the farmers used wooden sledges pulled by oxen and one quarter used a tractor and trailer regularly. Horse drawn passenger carts (*araña*) were owned by about 13% of the farmers.

Farmers were asked about problems encountered with animal drawn implements. There were problems with implement strength. Some steel was too mild or of poor quality. Some designs were heavy while other were weak and broke easily. There were problems obtaining good quality replacement parts. Some implements (notably the *multiarado* toolbar) were difficult to find or unavailable. Some yokes and forehead pads were not well made.

Views of university staff and students

In addition to the on-farm survey, staff and students at the university were asked for their own opinions about the future of animal traction and how the topic should be included in educational establishments, such as the UNAH.

Among university staff and students there was a consensus that animal traction would continue to be important, although tractors would be increasingly used, particularly on larger farms. Animal traction is not backward and should be considered a valuable technology that is appropriate in terms of fuel consumption, environmental impact, soil quality and suitability to small plots. In many situations (concerning soil conditions, operations, access, cost) animal power may be more suitable than tractor-based alternatives. However the future should involve both tractors and animal power.

Most university staff considered that the principle problem of owning work animals related to their feeding and health (although this was not what the farmers had said). Other issues were poor harnesses and lack of available, good implements. The students thought the main problems related to the implements, rather than animals.

Most of the university staff interviewed felt they had recently received relevant information relating to animal power, through participation in conferences and workshops (including events linked to this survey). In contrast the nearly all students felt they had not received recent information relating to animal power. Some thought it should be covered in the syllabus from the first year.

Almost all the teaching staff thought that the subject of animal traction did not motivate the students. This was principally due to the lack of knowledge and awareness of its use. Nevertheless, many students interviewed were positive about the use of work animals and their potential to complement the use of tractors.

Staff responsible for the Agricultural Mechanisation Degree agreed that it was important to introduce animal traction, with several topics and in several different contexts (energy, implements, soil etc). Practical work was also important, including the special work of the 5th year. Agronomy Polytechnics should also offer modules on animal traction with practical activities and promotion through national competitions.

Conclusions

Most farmers interviewed had farms less than 15 ha. Most were also members of cooperatives that gave them good access to inputs and markets. Farmers considered that animal traction was important, and would continue to be so. The survey showed that farmers are relatively well educated, and have good housing and social amenities. However, the high average age of farmers (58% over 50 years old) and the low number of younger people in the countryside who seem willing to acquire and transmit knowledge about working animals is a threat that must be taken into account. Most farmers had received little or no information about modern animal traction methods.

The problem of animal security is a serious constraint to the ownership and use of work animals. Recent legislation with heavy penalties may have started to improve the situation.

Most farmers like well-adapted Creole animals or Zebus. The supply of suitable animals should be improved: at present the State supply is considered cheap but of poor quality, while the private sector offers better animals, but at a cost beyond the reach of many farmers. According to farmers, neither animal nutrition nor health appears to be a serious constraint (but some university staff cast doubt on this). Animals appear well adapted and resistant and can obtain sufficient feed from natural grazing. Disease does not seem a problem and state veterinary services are considered good. Horses are only used for transport: there was little enthusiasm for them to be used in agriculture due to little experience of this, compacted soils and the greater problem of feeding horses compared with oxen.

The numbers of tractors owned in the region is very high (47% of farmers interviewed owned tractors individually or as part of a cooperative). There is much scope for complementary use of tractors and animal power on the same farm. Studies in this area could help to define efficient systems of combining the technologies. Farmers seemed very worried about soil compaction and soil degradation and the effects of climate change. Farmers consider that compaction is

related to the use of heavy machinery for plowing, and so they try to use oxen for all secondary operations (harrowing, sowing, weeding and fertilising). This complementary use of tractors and animal power appears efficient. Reduced tillage systems could also be investigated.

Due to the large number of tractors available for plowing and the small size of many farms, it is often difficult to justify the year-round maintenance of oxen, simply for weeding and cultivation. People's concern about security and the risk of theft may also make farmers reluctant to keep oxen for a small number of operations each year. One solution is the hiring and lending of animals, which, as the survey showed, is already common. Unfortunately timely sowing and cultivation may not be possible as not everyone can have access to the animals at the same time. One way of achieving light work would be to use existing horses or cows for work. Horses may also be used for cultivation on large farms. This is not yet done, but people appeared interested in the possibility. Participative research should be undertaken to define the management and technical requirements of using equids and/or cows for crop cultivation, and if appropriate, promote these options.

The survey highlighted the problems of material quality for the making and repair of implements. Many implements are very heavy and have parts that break easily. There is need to improve access to affordable materials of appropriate quality. There were few new designs of implement in use, as these were either unknown or unavailable to purchase. There is need for on-farm testing and promotion of the new generation of alternative, durable designs in collaboration with farmers and manufacturers. New implements must be at least as durable as the traditional mouldboard plow (*arado americano*)

The survey showed that there is very little use of seeders or fertiliser distributors, even though these operations are very labour intensive and easy to mechanise. Participative research involving farmers and implement manufacturers is required to test and introduce animal-drawn seeders and fertiliser distributors. Any promotion of new equipment must be linked to a reliable local supply of implements and spare parts.

The survey highlighted the importance of animal traction, and also the need for further research, development and promotional initiatives. This makes it important that animal traction is given thorough and appropriate treatment in universities, agricultural colleges and schools.

Acknowlegements

The authors would like to thank the following students who helped with the survey.
Yorka Hernández Blanco, Jorge Michel Díaz Rodríguez, Yorbis González Sanamé, Yusniel Sosa Valdés, Alexander Roque Chávez, Maité Castillo Peña, Yosbel Jiménez Armelo, Yanosi Algudin Lozano, Bikely Merino La Rosa, Yorderkis Blanco Arteaga and Anabel Rodríguez Serrano.

Reference

Starkey P, 2003. Rapid appraisal methodologies for animal traction. In Starkey P and Sims B (eds), 2003. *Animal traction in Cuba*. (this publication).

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
The paper was translated by Brian Sims, Silsoe Research Institute, Wrest Park, Silsoe, Bedford MK45 4HS, UK
It was edited by Paul Starkey, Animal Traction Development, Oxgate, 64 Northcourt Avenue, Reading RG2 7HQ, UK