

Improving animal traction technology in Cuba

by

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Abstract

Over the past 25–30 years animal traction in Cuba has decayed due to the massive introduction of tractors, mainly of Soviet production. The number of tractors increased from less than 7000 in 1960 to more than 7000 in 1990, while oxen decreased from 500,000 to 163,000 in the same period. In recent years the decline of the socialist states in Europe has produced an acute shortage of fuel, spare parts and hard currency in Cuba. The government was concerned about maintaining food production and so various measures were taken, among them a drastic reduction in the number of tractors in operation, and consequently an increase in the use of animal traction.

Another important change has been conversion of the huge government-run collective farms into self-operated cooperatives and the encouragement of the existing private sector. To these small-scale farmers animal traction is much more attractive than tractor power, and a wide-ranging project has been undertaken to finance the introduction of 200,000 oxen, the training of draft animals and their handlers, and the fabrication of new and more productive implements.

Introduction

The Cuban economy is heavily dependent on agriculture which accounts for 14% of the Gross Domestic Product but 70% of export earnings. The main products are sugarcane (15% of the agricultural land), citrus (5%), roots (5%),

vegetables (4%), and rice (6%). Livestock are farmed on 55% of the agricultural land. Agriculture employs more than 22% of the country's population of about 11.2 million people. Only 16% of the population lives in the agricultural areas (CEE, 1994).

Cattle have been used as draft animals in Cuba since its discovery and colonisation five centuries ago, and agriculture was traditionally based on animal traction, mainly from oxen of rough races. Equines are not used for plowing, but horses are used for light carting and riding. In mountainous areas donkeys are commonly used as pack animals to carry coffee and other products.

In the years following the revolution, a massive introduction of tractors was undertaken as part of the government's strategy for transformation and modernisation of agriculture. Over the three decades from 1960 to 1990 the number of tractors increased ten fold from 7,000 to 70,000 (see table 1). The increase was not only in quantity but in quality, since the average power of the tractors grew from 40 to 75 HP. In the same period the number of oxen decreased from 500,000 to 163,000.

The growing adoption of tractor technology was encouraged by the concentration of agriculture following a socialist policy: the aim was that all farming would be carried out on mechanised collective or state farms. Only a limited

Table 1: Number of tractors and work animals in Cuba (1960–1995), figures in thousands

	1960	1970	1980	1990	1995
Tractors	7	52	68	70	40
Oxen	500	490	338	163	376
Horses	800	741	811	235	300
Donkeys	5	4	4	4	4
Mules	30	29	25	30	30

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cooperative and private sector remained. Soviet aid and soft credit backed the import and introduction of tractors, implements, spare parts and fuel at low prices. This contributed to a strong socialist sector, but with a weak long-term basis.

In recent years the decline of the socialist states in Europe has produced a dramatic shortage of fuel, spare parts and hard currency in Cuba which has made the high level of mechanisation achieved in agriculture unsustainable.

Maintaining food production at a reasonable level in such conditions became a huge problem. New agricultural policies and strategies were developed and these include:

- a drastic reduction in the number of tractors in operation
- rapid increase in the use of animal traction and its infrastructure
- transformation in the forms of land title.

Animal traction in the new conditions

To face the new conditions realistically, the most important measure taken was the turning of the state farms into cooperatives, putting the organisation of production under the control of the workers and operating under the principles of self-support. A part of the production is sold to official agencies under contract and the remaining part is offered on a free market.

The number of tractors in operation was reduced from 70,000 to 35,000 and the idle ones were dismantled or prepared for long conservation.

A vast programme was undertaken to encourage animal traction at the expense of tractor mechanisation, but the task was (and is) not easy, for many reasons. A farmer trained to operate a tractor, can only learn to handle a pair of oxen with difficulty. Not only farmers but technicians and many officers see tractorisation as a symbol of progress and animal traction as a 'backward step'.

Draft animal power, engine (tractor) power and human power should be seen as complementary power sources for agricultural production, not as mutually exclusive ones. The optimum mix will depend upon the requirements of each individual farm (Inns, 1994). The new smaller-scale cooperatives and their internal division into farms are much more suitable for the use of animal traction than the huge state farms.

In 1992, the Ministry of Agriculture established a set of recommendations to encourage the use of animal traction, backed with a serious control of the amount of fuel provided for use in tractors and in the distribution of the spare parts obtained with the government's scarce foreign exchange.

Selection and supply of oxen

One of the greatest constraints to the adoption or increase of the use of animal power was the limited infrastructure in this field. For the Ministry of Agriculture a logistical problem had to be faced in obtaining oxen to be supplied to the cooperatives. This was especially difficult as cattle were not in abundance. For the cooperatives the problem was in training oxen, selecting and training ox handlers and creating basic but acceptable conditions for feeding, health care and protection of cattle.

Practically all healthy oxen in Cuba were selected and supplied to the cooperatives and the remaining state farms. The first programme in 1991–1992 involved the supply of 100,000 oxen and a second programme in 1993–1995 supplied some 100,000 more. The programme continues and now there are about 376,000 working oxen in Cuba, nearly 2.5 times the figure in 1990.

Selection and promotion of new implements

For a long time the most commonly used animal-drawn implements for crop production in Cuba were mouldboard plows and wooden ards similar to those widely used in other regions of the world. Harrows, cultivators, wooden sledges and a few basic models of two-wheeled carts were the only others available. No animal-drawn planters, fertilisers or wheeled toolcarriers were available.

A wide-ranging programme was started in 1992 for the development, selection and promotion of new, more suitable implements and the fabrication and supply of traditional and new models, also encouraging the adaptation of tractor-drawn implements such as sowers, fertilisers and sprayers to be used with animal traction.

The main change in the pattern was the development of a new model of plow patented by the Institute of Agricultural Mechanization Research (IIMA) under the name of *multiarado* (multiplow) in versions for tractors, a one-row

animal-drawn implement and independent elements for toolcarriers. The *multiarado* is designed for soil plowing, cultivation and weeding without inversion of the soil. With additional shares it can be used for ridging, pre-seeding, furrowing and for covering seeds or stacks with soil after planting.

Wheeled toolcarriers and other similar three-row implements have been promoted with a satisfactory adoption by the farmers, making a balance among the known advantages and constraints of these implements (Starkey, 1988). The recommended model is a version of the multicultor adapted to the working conditions of Cuban agriculture, with many improvements.

Regional workshops and on-farm demonstrations

In the initial stage of the implementation of the project of re-oxenisation it became evident that no satisfactory results could be achieved without an intense programme of on-farm, regional, provincial and national workshops and demonstrations. At these events the objectives to be achieved were:

- demonstrations of newly-designed or unknown implements
- selection of the most suitable implements for promotion
- training of ox-handlers, blacksmiths and artisans makers of yokes and harnesses
- discussions and interchange of experience on animal traction.

From 1993 to 1995 over 450 workshops were held which were attended by more than 30,000 farmers, technicians and others. A National Workshop was held in November 1994 and an International Congress on animal traction was held one month later.

Local manufacturing of implements

A group of implements has been selected for national promotion including a mouldboard plow, the *multiarado*, a tine harrow, an ox cart, the multicultor, a grain seeder and a yoke with width

regulation. In each of the 15 provinces a workshop for the local manufacture of the recommended implements was set up. This seems to be more convenient than centralised manufacture by the government, due to the possibility for the provinces to exploit unused reserves of steel and the ability to adapt the designs to local requirements and preferences.

Another important aspect has been the organisation and training of local blacksmiths equipped with forge, anvil and tools for repairing and even manufacturing non-complex implements and spare parts. In 1995 there were a total of 250 blacksmiths.

Conclusions and future directions

Animal traction is a suitable technology for Cuba, especially in the new conditions of an increasing number of small-scale cooperatives and as a means of saving scarce fuel. The Ministry of Agriculture and the Institute of Agricultural Mechanisation Research faced the task of improving animal traction on the basis of ensuring the manufacture of suitable implements at local or provincial level, supplying sufficient oxen, creating an infrastructure for repairing and maintaining the implements and the training of ox handlers, agricultural technicians and farmers. Much further work is required. Animal traction is not easily adopted by those familiarised with tractorisation and the constraints must be overcome to reach a sustainable balance between tractors and oxen.

References

- CEE, 1994. *Anuario estadístico de Cuba*. Comité Estatal de Estadísticas (CEE), La Habana, Cuba. 600p.
- Inns F M, 1994. Animal draft tillage systems: the need for an integrated approach. pp 214–217 in: Starkey P, Mwenya E and Stares J (eds), *Improving Animal Traction Technology*. Proceedings of the Animal Traction Network for Eastern and Southern Africa (ATNESA) held 18–23 January 1992, Lusaka, Zambia. Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands. 490p.
- Starkey P, 1988. *Perfected yet rejected: animal-drawn wheeled toolcarriers*. Vieweg for German Appropriate Technology Exchange, GTZ, Eschborn, Germany. 161p. ISBN 3-528-02053-9

Photo (opposite): Three men plowing with oxen as one man plants in the furrow in Western Zambia