

Symposium title: The XXI century Mountains: Sustainable management of mountainous areas based on animal traction

Proponent(s) and affiliation:

- João B. Rodrigues (APTRAN – Associação Portuguesa de Tracção Animal)

- Pit Schlechter (FECTU - Fédération Européenne du Cheval de Trait pour la promotion de son Utilisation)

Abstract outlining the theme and relevance of the symposium:

According to the *DAD-IS* of the *FAO*, there are nowadays around 300 million working animals worldwide, including 50 million donkeys, 11 million mules and hinnies and 59 million horses, with the vast majority of these animals acting in developing countries.

Working animals play a fundamental role in human livelihoods through their contribution to financial, human and social capital, supporting between 300 and 600 million people globally, particularly in areas of limited income, where animal energy represents a vast and extremely important sustainable power resource, even being suggested that animal energy supplies approximately 50% of global agricultural power needs. Yet the recognition of their role remains a neglected area in many programs of cooperation to development in important sectors such as agriculture, gender equity, food security and rural development. These animals remain largely invisible in the eyes of decision and policy makers and even civil society at all levels, which compromises their welfare, which should be central to responsible animal husbandry, being a core consideration in all working animal systems, mainly based on prophylactic actions.

On other hand, a collective ecological and economical consciousness and an increase in awareness of public opinion about the need to reduce the excessive industrialization and mechanization of agriculture and forestry has led some sectors of western society to consider the (re)use of animal traction as a valid modern source of energy.

Indeed, these animals are a clean source of energy, that optimally transforms the consumed biomass in energy and natural fertilizer, which avoids soil degradation and contributes to a durable management of arable lands, forests and sensitive areas. The need to maintain biodiversity, reduce carbon emissions, encourage self-reliance and reduce consumption of resources also contributes to this trend.

The emerging importance of animal traction as an alternative or complementary option to mechanical traction throughout Europe is highlighted by the increased use of such technology in small and medium sized mountain agro-forestry production systems, but also in urban surroundings where it has proved to be economically viable, always based on a responsible use of animals in terms of respecting their physical limits and their dignity.

The conservation of European native endangered breeds, whose preservation depends directly on the need to reinvent functionality, is also directly related with their use as draft animals, avoiding not only a major loss of biodiversity, but also the loss of historic, cultural and genetic heritage.

The preservation of livestock breed diversity should be seen as a genetic insurance policy when facing impending changes such as adaptation to an ever changing environment, resistance to diseases or market requirements.

Along with the reasons referenced above, the conservation of endangered local breeds comprises a sustainability value supporting the local economies and the fixation of human population in marginal areas, as well as an ecological value, allowing improvement and preservation of agro-biodiversity.

With this symposium, the APTRAN (Portuguese Association of Animal Traction), together with the FECTU – an international umbrella-organisation that brings together all European Associations involved in the promotion and advancement of the working draught animals - aims to elucidate about the European reality regarding animal traction, but also the potential of this technology in the promotion and sustainable development of mountain regions.

Speakers' names and affiliations

1. Pit Schlechter, FECTU - Fédération Européenne du Cheval de Trait pour la promotion de son Utilisation ;
2. João B. Rodrigues, APTRAN - Associação Portuguesa de Tracção Animal;
3. Henri Spsychiger, Swiss farmer;
4. Nuno Oliveira, Parques de Sintra - Monte da Lua, S.A;
5. Raffaele Spinelli, CNR IVALSA – National Research Council of Italy – Trees and Timber Institute;
6. Tomás de Figueiredo, CIMO -IPB – Mountain Research Center - Polytechnic Institute of Bragança;

Abstracts

The renaissance of draught animal power in Europe

Pit Schlechter

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At the beginning of the 1990ies young people in Northern and Western Europe started to show interest for a horse based technology that was about to completely disappear. They repaired old machinery and developed new items while relying largely on their own ideas and means. Some of them were part of the 68 generation. They draw inspiration from the "back to the countryside" movement, from remaining horse farmers refusing motorization, from the Amish in the US and from the animal traction evolution in developing countries. Working horse associations started almost simultaneously in

different countries and made contact, thus laying ground for a European network and a comeback of the working horse for a range of different uses.

At the same time an opposing trend is to be seen in Central and Eastern Europe, where hundreds of thousands of small farmers would like to replace their draught animals with tractors. Although there are a number of constraints opposing a wider and faster development of a modern use of animal energy the poor profile of working animal technology, the lack of skilled horsemen, of new machinery and equipment, of public support etc. the societal surrounding has never been as favourable as today. A general awareness for sustainable energy sources, for sound techniques in agriculture, forestry, environment management and mobility lead to a growing interest amongst people outside of the closed circle of horse enthusiasts. Animal traction is reappearing in scientific research, in agricultural and forestry schools, in rural and urban development programs etc. Horses, mules and donkeys have always served in mountainous areas and they doubtlessly can compete with the most modern technical options.

Animal traction in the Portuguese mountain areas: challenges and opportunities towards sustainable production systems.

João B. Rodrigues

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Working animals represent a very important source of energy all around the world and still play a key role in agricultural and industrial activities, in rural areas but also in urban and peri urban areas in developing countries, supporting a large population who rely directly on them. Although there is little doubts about the importance of working animals as a source of renewable energy, less impact and economically viable, the recognition of their role remains a neglected area. When facing the Portuguese national reality, the farming sector (even that based in mountains areas) has undergone significant changes over the past few years, with a reduction of about 50% in the number of farms between 1989 and 2009 and the reduction of livestock, with the agricultural landscape to reorient to extensive production systems, leading to a slight increase in average farm size. However, Portugal has still very favourable conditions for the use of animal traction both in agriculture and forest sectors. It is important to mention that 75% of production units still operating less than 5 hectares or 80% of the agricultural workload is based on a family farming system, so Portugal should follow some of the good examples practiced in central Europe, leading to the emergence of competitive models of sustainable development, environmentally friendly and able to fixate population in the productive mountains areas. The (re) use of this technology also plays a key role in the preservation of our animal genetic resources, by promoting the use of native breeds with better aptitude for animal traction. Thus contributes to the preservation and expansion, while respecting their dignity, integrating them again in the farming model where animals are a key element.

The working horse in Swiss mountain agriculture

Henri Spychiger

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There are still some favourable predispositions for mountain agriculture in Switzerland, where the cavalry was abolished only in 1972. The army still can mobilize 300 horses

for transport operations in difficult mountainous surroundings. Ploughing with horses was part and parcel of final exams in agricultural schools up to 1960. Knowledge and experience linked to these facts are disappearing once and for all. In order to ensure the future of horse based agriculture this indispensable know how must be preserved and used. At the same time machinery and equipment of the 1950ies should be replaced with new items made of novel materials. The weight of equipment can be considerably reduced by using new steel chains, by replacing traditional cables, swingle trees and collars with newly developed synthetic items. Technical progress should be encouraged. For example the "doker", a horse drawn vehicle with electric energy assistance, recently developed in Switzerland. The energy produced by braking friction downhill is stored in a battery and assists the horses when going uphill or pulling heavy loads, thus reducing the input of external energy and improving animal welfare. Women should be welcomed in the working horse industry as they are far more interested in horses than men. Equipment should be adapted to their physical capacities. Their specific intuition and approach would certainly enrich the working horse community. On the other hand technical innovations like the "doker" could bring back young men to a world they now consider as backwards. We need a modern perception of environment and nature, new materials, revolutionary techniques and gender complementarity in order to ensure the inevitable come back of the working horse to modern society.

Ardennes horses in Sintra forests - tradition and sustainability

Nuno Oliveira

Parques de Sintra Monte da Lua, Sintra, Portugal

In 2010, Parques de Sintra (PSML) began a project designed to reintroduce traditional techniques and means of managing forested areas and thereby recovering the socio cultural heritage lost both in the Sintra hills and in Portugal in general. The most innovative component of this project consists in the utilization of the Ardennes breed of horse which, when trained for forestry work, respond to monosyllable voice commands and are led by but a single rein. The mechanization of forestry practices should be restricted whenever the local topography is highly irregular and there is a strong risk of soil erosion thus putting at risk values important to the preservation of natural and cultural heritage, as is the case in Sintra. With their strength and agility, these horses are a viable alternative and contribute to the environmental balance of forests. The horses are a renewable energetic resource, of low investment, without ecological impacts on the soil, safeguarding the natural regeneration and minimizing damages on trees, which remain on the stands after wood removal. Waste (manure) produced in this activity are composted and used to fertilize garden areas managed by

PSML. In addition to the environmental benefits, some studies demonstrate that the use of draft horses have high rates of productivity and profitability compared with machines. On the other hand, this project allows the revitalization of traditional occupations (attendants, farriers, manufacturers of leather straps) and job creation (new forest operators), as opposed to the use of machines that replace human work.

Furthermore, the communication of practices and techniques of reduced environmental impact, allows to raise awareness and encourage the local populations, and the target audiences from the recreational and leisure activities developed by PSML, to adopt more sustainable behaviours and in harmony with the environment.

Animal and mechanical traction in forest operations: substitution or synergy?

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In most industrialized countries, the rapid mechanization of rural activities has brought animal power to the brink of extinction. However, there are still several reasons for resorting to animal power, and in particular to draught horses. Special opportunities could be offered by the current interest in mobilizing non industrial private forestry (NIPF) resources. NIPF ownership is often too small for cost effective mechanized harvesting, especially in mountain terrain. Here, draught horses are still somewhat popular, even in industrialized Europe and North America. Furthermore, animal power can be deployed with much benefit in protected areas, where it configures as a low impact alternative to conventional operations. Comparative studies have found that the percent of damaged trees drops to half and damage severity to one third when animals are used instead of tractors. However, the benefits can also be financial, not just environmental. The study presents two case studies where horse skidding is matched with tractor skidding, under the condition of mountain logging in close to nature forestry settings. In the first case, horse skidding is shown to be 30% cheaper if the extraction distance does not exceed incurs lower unit costs than tractor skidding, when the extraction distance is within 100 m and the cost of opening a tractor trail is included in the calculation. The cost efficiency of horse skidding is significantly increased by detaching two horses per driver, since the additional cost of the second horse is lower than the additional productivity it generates. The second study shows that teaming horse and tractor is a very effective strategy. If the horse pre bunches for subsequent tractor skidding, total extraction cost becomes half as high as if extraction was performed exclusively by horse, and three times as low as extraction was performed exclusively by tractor. As often, cooperation is better than competition!

Comparing effects of tillage treatments performed with animal traction on soil physical properties: preliminary experimental results

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Compaction is a reduction in the pore space in an aggregated soil structure.

Compacted soils provide inadequate space for air and water storage or movement. In addition, soil compaction is commonly regarded as the most difficult type of land degradation to locate and rationalise because it is a subsurface phenomenon.

Compaction results from compressive forces applied to compressible soil by machinery wheels, combined with some tillage operations, particularly when the soil is moist to wet and most prone to deformation. Human and draft animal pulled equipment may also cause soil compaction, but a huge gap exists on experimental data to adequately assess their impacts and, actually, animal traction is an option seen with increasing potential to contribute to sustainable agriculture, especially in (but not restricted to) mountain areas.

This study was conducted to assess the impacts on soil compaction of tillage operated with motor tractor and draft animals. In a farm plot (Vale de Frades, NE Portugal) treatments were applied in sub plots (30 m x 3 m), consisting in a two way tillage with tractor (T), pair of cows (C) and pair of donkeys (D). Undisturbed soil samples (120) were taken before and after operation for bulk density (BD) and saturated hydraulic conductivity (Ks). BD means before operation in T, D and C sub plots were $1.12 \text{ g cm}^3 \pm 0.145$; $1.06 \text{ g cm}^3 \pm 0.09$ and $1.11 \text{ g cm}^3 \pm 0.12$, respectively, while after operation BD means were $1.17 \text{ g cm}^3 \pm 0.13$ (T), $1.10 \text{ g cm}^3 \pm 0.08$ (D) and $1.09 \text{ g cm}^3 \pm 0.10$ (C). Before operation, Ks class was rapid in 60 % of the samples and after operation this value reduced to 33% in T, whereas it increased to 67% in C and D (assembled). These preliminary results confirm the potential of animal traction as an option for mountain agri environments, yet requiring much wider research to soundly ground its assets.