

The selection and use of animal draft technology

by

R. C. Gifford

*Agricultural Engineering Service, Agricultural Services Division,
Food and Agricultural Organization (FAO), Rome, Italy*

Introduction

The title of this paper is meant to establish a thought process which differs from that implied in the use of Draft Animal Power or its acronym - DAP. I believe we should all be thinking in terms of a total agricultural mechanization technology, a technology which is made up of components, each of which is dependent on the others in relation to the task which is to be accomplished. The term DAP carries a connotation of concern only for the source of power, which is only one element amongst all the interacting elements of the technology. This focus on the power source instead of the totality of the technology has, in numerous instances, led to the selection and introduction of animal draft technology into farming systems when it was completely inappropriate in technical, economic, social, or political terms. The same is equally true when the focus has been on tractors - the source of power for much of the mechanical technology in agriculture. The effort of the Farming Systems Support Project in this workshop is, to me, a welcome and refreshing contribution. It implies, at least, that the selection and use of animal draft technology will be in the context of the development situation in which it is to be applied. FSSP's efforts suggest that we are here to discuss firstly where, or in what circumstances, animal draft technology is the appropriate level of mechanization technology; and secondly how it can best be introduced into development situations where it will contribute to national development objectives. After all any level of mechanization technology - hand

tools, animal draft or mechanical power - is a means to an end: it is not an end in itself. I wish to stress, therefore, that the selection of a specific level of mechanization must be in the context of its contribution to the development of the farming system in which it will be used. I also wish to stress that the use of agricultural mechanization at any technological level cannot reach its potential contribution in isolation from other technologies which are important elements in farming systems. We have all seen improved land preparation nullified by failure to use improved seeds or failure to establish an appropriate plant population or to control weeds and other agricultural pests. Finally, animal draft technology, just as other mechanization technologies, can only contribute to development if it is seriously supported at the national level through research, training, credit, supply of operational inputs, and other institutional arrangements.

Selection of technology

This workshop focuses on the implications of animal draft technology at the farm level. While respecting this decision of the organizers, it is, nonetheless, necessary to point out that it is first necessary to determine that animal draft technology is the appropriate level of mechanization for the specific development situation being considered. Thus, we can only assume here that animal draft technology has been selected as the technology of choice after careful consideration of all three main mechanization technology alternatives. I would sug-

gest that this could be a dangerous assumption. FAO has found that few developing countries have formulated or implemented a national strategy for agricultural mechanization. Without such a strategy or plan, the chances are slim that a serious evaluation can be made of technical, economic, social, and political factors to determine appropriate mechanization technology for each category of farming systems.

At the farm level, selection of hardware for animal draft technology starts with the farmers' judgement on two key issues. First, the specification of the animal power available to them, either on hand or which can be obtained. How many animals are available, what size are the animals, and what will be their physical capability at the time they are needed? Second, the availability and cost of the harness and implements. The record shows that many attempts over the past twenty years to introduce improved harness and implements have failed because either appropriate models were not consistently available on the market, or the cost was beyond the means of the farmer.

With reference to draft animals, my personal experience is that there has been a relatively negligible adoption of improved species and breeds in spite of numerous efforts in research and development. Perhaps the reason is again the cost. In any event, farmers worldwide continue to use the draft animals which are traditionally available in their areas. Without minimizing the need for continued research and development on improving the quality of animals for draft purposes, the situation, as I see it, calls for a greater effort in helping the farmer - at the farm level - to develop ways of improving the capability of the animal power he already has. Improved feeding practices, for example, would go a long way towards ensuring that animals are fit for work when they are most needed. The answer is not to recommend the feeding of concentrates or supplements which carry a cash purchase requirement.

Ways must be found to introduce and sustain feeding regimes which are based on alternative crop production systems that the farmer could apply on his own farm. There has been much ado about the need for engineers to invent or design animal-drawn implements to fit the special circumstances of various country or regional situations. The statement is often made that implements for draft animals are old-fashioned and not efficient. If farmers are using a plow which was used 2000 years ago, it does not mean there are no better designs available. Rather it means farmers are not aware of better plows or it is beyond their ability to afford such plows. The technology shelf of animal-drawn implements which are technically appropriate for nearly every development situation is enormous. We, the international community, have done an abysmal job of making farmers aware of alternatives and ensuring that they have access to the ones which are appropriate to their individual situation. Here, I am speaking mainly of implement design. The material used for making the implement is a different matter. Too often implements of good design incorporate materials and production methods which are not readily available in most developing countries. The result is invariably that local manufacture, which is essential for the widespread introduction and maintenance of animal draft technology, cannot be sustained. There are numerous technical issues related to the design and quality of animal-drawn implements all of which are controversial and all of which have been debated many times. I do not believe this forum is the place to continue the debate. It is impossible to generalize whether, for example, a chain hitch or a beam hitch is technically better; it depends on the traditions and specific situations in which the implement will be used. I suggest we leave such issues to be decided at a more appropriate time and place.

Use of animal draft technology

FAO experience shows that the use of animal draft technology has generally been limited to

primary tillage and transport. Only isolated pockets exist where the full potential for using this technology has been exploited. Of course, in this situation the full benefit of the technology cannot be realized at the farm level and the oft made statement that draft animals are usually underutilized is quite true. Why this underexploitation of such a potentially beneficial technology? There is no single reason. I believe that, generally, the use of animal-drawn row-planters and inter-row cultivators, for example, has been constrained by a lack of farmer awareness of opportunities and potential benefits, limited availability on the local market of appropriate implements or equipment, inability of farmers to buy additional equipment, and the presence of field obstacles which inhibit the use of row-crop equipment. Some of these constraints can only be reduced by the natural course of events over time. It is obvious, however, that there is a need for increased effort to improve farmer awareness, increase his access to appropriate implements, and create an economic environment which will motivate farmers to expand the use of the technology.

Conclusions

I want to conclude this paper by reiterating the key points which I believe are crucial to the selection and use of animal draft technology:

- The appropriateness of the technology must be determined by the specific farming systems in which it will be applied.
- National agricultural mechanization strategies and plans are needed to put animal draft technology in perspective with regard to national development objectives and resources.
- The technological shelf to support animal draft technology is enormous and this should be exploited to the full before using scarce resources to mount further extensive research and development schemes.
- Greater efforts are needed to build the base for the technology on what the farmer already has, and on what is already feasible within a country. This implies actions such as improving the capacity of existing animals, encouraging local manufacture of appropriate equipment, and mounting programmes to improve farmer awareness of alternatives.