

Farming Systems Research Group
Michigan State University

PN - AAM - 631
ISN 27986

The Farming Systems Research Group at Michigan State University, supported by Title XII Strengthening Grant Funds from the U.S. Agency for International Development, and administered by the Institute of International Agriculture, has included Dr. Jay Artis, Department of Sociology; Dr. Robert J. Deans, Department of Animal Science; Dr. Merle Esmay (and Dr. Robert Wilkinson), Department of Agricultural Engineering; Dr. Eric Crawford, Department of Agricultural Economics; Dr. Russell Freed, Department of Crop and Soil Sciences (also representing Horticulture); Dr. Al Pearson, Department of Food Science and Human Nutrition; Dr. Tjaart Schillhorn van Veen, Department of Veterinary Medicine; with Dr. George Axinn, International Studies and Programs and Agricultural Economics, Chair, and Ms. Beverly Fleisher, graduate research assistant.

LIVESTOCK SYSTEMS AND ANIMAL HEALTH

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Working Paper No. 3

July, 1981

THE MICHIGAN STATE UNIVERSITY FARMING SYSTEMS RESEARCH GROUP

WORKING PAPER SERIES

<u>Paper No.</u>	<u>Title</u>	<u>Author</u>
1	Farming Systems Research and Agricultural Economics	Eric Crawford
2	Farming Systems Position Paper	Al Pearson
3	Livestock Systems and Animal Health	Tjaart Schillhorn van Veen
4	Issues in Farming Systems Research -- an Agronomist's Perspective	Russell Freed
5	Farming Systems Research As It Relates To The Animal Sciences	Robert J. Deans
6	Farming Systems Research Position Paper	Jay Artis
7	The Farming Systems Research Approach in the Agricultural Engineering Field	Merle L. Esmay
8	Issues in Farming Systems Research -- a Multidisciplinary Behavioral Science Perspective	George H. Axinn
9	Farming Systems Research and Agricultural Engineering	Robert H. Wilkinson
10	An M.S.U. Approach to Farming Systems Research	Beverly Fleisher and George H. Axinn
11	The M.S.U. Farming Systems Research Group Perspective	
12	A Working Bibliography on Farming Systems Research - August, 1981	
13	Social Impact, Economic Change, and Development -- with illustrations from Nepal	George H. Axinn and Nancy W. Axinn

LIVESTOCK SYSTEMS AND ANIMAL HEALTH

T. W. Schillhorn van Veen

The biological system

The biological processes involved in crop and livestock production are well known and do not, in their basic manifestations, appear to differ significantly in developed or developing countries. Cows are fed, give milk, provide manure and are affected by diseases and deficiencies; corn or rice are planted, fertilized, sprayed, but also affected by diseases, and harvested. Although the needs of breeds of cows or corn may be different, the basic process of production is the same. Basically they also do not differ when comparing a subsistence production system with a surplus production system.

Although the biological processes are similar, the technological approach has so far been considerably different; for various reasons which are all closely related to (and may as well be due to, as the cause of) different socio-economic goals.

The organizational system

The major differences between the systems in developed and in developing countries are related to the organizational structure in which these biological processes take place. The lowest level of an organization is the farm-worker, the highest level reaches government or even international institutions and relationships. In principle there is, and should be, some interaction between these levels and various structures have been developed to enable and implement such interactions. In the developed world this has led to government or state sponsored extension programs, cooperatives, or privately organized lines of communications. These interactions have, to some extent, developed naturally

and are adapted to local custom, facilities, educational levels and organization. In the USA, it has resulted in extension programs supported by land-grant universities or private industry. In some European countries it resulted in a system of cooperatives and farmer-owned industries supplemented by a government extension program.

It is unlikely that these systems can easily be transplanted to developing countries since the history and social organization in such countries differs from those in the technologically more developed world. Various examples exist of colonial organization systems which, after independence, lead to over-organization, often seriously hampering development. Many of these systems (marketing boards for instance) have been dissolved in recent years.

The organizational structure of a livestock system

In the livestock sector the discrepancy between the socio-economic goals of the western, and the third world producer may be less obvious than in the crop producing systems. In Europe as well as the U.S. there still exist livestock systems which are not fully commercialized and in which at least some of the decisions consider social as well as commercial criteria. This is to some extent intrinsic, as the decision-making process in livestock systems considers a multitude of criteria and factors, and is far more complicated and demanding than in a simple cropping system (Crotty, 1980). Such a multifactorial decision making system gives, relatively, more attention to smaller factors, and allows (or necessitates) for a high degree of flexibility.

Livestock systems

In this world there exist a multitude of livestock production systems and various classifications are used, either determined by input (communal versus

individual grazing for instance) or by output (beef, milk, calves, etc.). The original, although not well understood, tropical livestock system, is found in the unit which is mainly, or even completely, dependent on livestock. The most extreme examples are probably the pastoral societies, often called "nomads" in southern Sudan, East Africa, Lapland and, until recently, in the middle East. These are societies with a high recycling ratio (Axinn and Axinn, 1980) and which are more or less independent of outside economies or social systems. In principle, these are very "capitalistic" entities as the family or unit lives from the fruits of their capital, i.e., their livestock. Their basic requirement is to maintain their working capital, and the greater the capital, the more secure they are about their dividend.

Land, however, is not considered to be capital in these societies. It is considered free "as the air you breathe" and their system only works when land tenure allows free access to land (and to some extent, water). The present population pressure and changes in land tenure seriously threaten this system and may force this group to change into the type of agri-pastoralists and agriculturists so commonly found in Africa, Asia and to some extent in the Americas. The Nandi in Kenya, the Galla in Ethiopia, the Fulani in certain parts of West Africa are gradually giving up their pastoral life in areas with a high population density. They become agriculturist as the pressure on land forces them to give up their less efficient* pastoral life. Although the majority of these agri-pastoralists were originally livestock owners, there are some who evolved from a farming background, and farmers could play a significant role in livestock production.

*Efficient only in terms of production per HA in areas with good soils and rainfall over 1250 mm.

Interdependence

Livestock production, however, is seldom an independent activity. Generally, there is a dependency on available grazing land, water, and markets. Various examples exist of the dependence of livestock producers on other livestock producing tribes (Haaland, 1980), on their own tribe (Cole, 1978), on farmers (Stenning, 1959) and on village markets. The level of specialization and cooperation between these groups varies, as adequately discussed by Brandstrom et al. (1979) who describe four examples of specialized and mixed systems in different ecological areas in East Africa.

In agri-pastoral and sedentary agricultural systems, temporary investment in livestock plays an important part in financing agricultural inputs such as labor or fertilizer in the next season. The system then changes from "capital" to "commodity"-oriented. Such developments, which originally started because of increased population pressure and demand for land, continue to lead to an increasing pressure on land and ultimately to ecological deterioration.

So far this discussion has concentrated on the African livestock situation. It seems possible that, with an increasing population density, the agripastoral systems in the humid savanna of Africa may become similar to the intensive systems commonly found in monsoonal Asia. In this area the topography or land pressure as well as the available demand for livestock products, have led to a labor and capital intensive system which uses a relatively small number of animals. In many areas the beef production system, and to some extent the dairy enterprise, are combined with a draft animal enterprise. However, a terminology of dairy-, beef-, and other enterprises may be inaccurate. Cattle, buffaloes

and small ruminants are kept for many other purposes including draft, manure production, hide and skins, production of offspring or recreation. In Africa they play an important social and spiritual role, and many animals in the tropics are at least dual or triple purpose animals. Livestock systems researchers should consider livestock enterprises from various angles based on the value from such viewpoints as economy (which is mainly done at present), energy-efficiency, recycling ratio, water efficiency, labor efficiency or labor provision, social relationship, etc. Scavenger type systems for small ruminants, pigs and poultry ensure a maximal utilization of crop and household residues but their importance is too often neglected.

Systems Research

Systems research in livestock production in the tropics is underdeveloped and still mainly in the descriptive stage. Some systems studies have been done by anthropologists, rural sociologists and economists. Animal scientists* were mainly concentrating on development of livestock systems based on a western model (e.g., range land development, fattening schemes, nutrition studies).

Constraints 1. A disadvantage of these studies by other than animal scientists is related to the fact that they often concentrate more on the peculiarities of the phenomenon of livestock raising, rather than on characteristics of the system they were studying. Many of the described aspects have been typical for livestock producers in general, whether in Africa or in the U.S., and not typical for the group or tribe studied as such. It would have been more useful if comparisons had been made with an average livestock owner in Europe or the U.S.

*My definition of animal scientist includes veterinarians, range specialists, dairy specialists, etc.

2. Another problem is the diversity of livestock in various systems as well as their interrelation. Cattle are often mixed with small ruminants (as they supplement each other in factors such as pasture utilization). Chickens are sometimes added because they still can utilize some of the leftovers from the food of ruminants and man. The use of such terms as "standard livestock unit" or even "standard farm unit" may facilitate the comparative study of animals in a mixed farming system, but these are rarely used. Most animal scientists, moreover, are species-specialists and rarely recognize the relationships.

3. The third problem is the complicated relationship between livestock and man. The closest association is probably found among the Nilotic tribes in southern Sudan where young men have their "song bull" as a pet animal (Evans-Pritchard, 1940). In other tribes the value of the animal also extends far beyond capital or commodity. The importance of livestock in the creation and maintenance of social relationships is often underestimated, in pastoral as well as in agricultural societies. The use of livestock as gifts or loans is to some extent related to the risks of livestock production: in some years there is a considerable surplus in other years a shortfall. The surplus is not marketed but is used as gifts, etc. to build relationships which may be useful in years of shortfall. Systems research should take all of these factors into consideration, instead of evaluating only productivity in terms of economic gain. Such evaluations require the cooperation of various disciplines.

However considering the general attitude of livestock owners and their concern with the well-being of their animals, it is doubtful whether multiple person/multiple discipline studies will be acceptable. St. Croix (personal

communication) who worked for 30 years as a livestock officer among the Fulani in West Africa narrates that he was not allowed by many owners to visit their herds after his retirement as he did not longer belong to the 'system' (although they would visit him at home or in markets).

Systems research therefore should be performed by scientists with considerable local experience. ILCA, which is probably the only large institution seriously involved in livestock systems research, has attracted, mainly non-African, a staff with decades of experience with African livestock. In the future, this expertise will have to be provided by locally educated staff. The efforts of the Faculty of Veterinary Medicine of the Ahmadu Bello University in Nigeria to include subjects such as rural sociology and economics in its curriculum has been mentioned in this context (Ema et al, 1971).

The Animal Health Viewpoint

In many developed countries the losses in the livestock industry due to animal disease still range between 5 and 20%. The majority of these are related to poor or incorrect management systems. In semi-nomadic systems the losses are often less, apart from occasional devastating epidemics, which is probably a reflection of the close relation of the (semi) nomadic livestock owner with his animals and his environment. It can be argued that the epidemics and droughts are part of the system and that the fairly successful eradication programs of diseases such as rinderpest, contagious bovine pleuropneumonia (CBPP) and trypanosomiasis could also lead to increased livestock numbers, overgrazing and may lead to a breakdown of traditional systems. It can also be argued that at least in Africa, major epidemics such as those caused by rinderpest and CBPP are a leftover of the colonial period: they were unknown in Africa before 1850.

At present however there are many other threats to these systems (land pressure, taxes, education, etc.). The livestock industry is changing but these changes are, so far, little influenced by foreign aid or innovation. Most projects, executed by foreign agencies, have been chosen for short-term success without a sufficient knowledge about the system. Fortunately, many projects were so poorly executed that little damage has yet been done (Dunbar, 1971; Jacobs, 1980). A major role in livestock development as well as in livestock systems research and implementation is to be played by the local veterinarians and husbandry officers. At present these are overwhelmed by foreign aid and foreign ideas at a time when they are trying to obtain some understanding of the problem. Moreover livestock owners are interested in some of the modern technologies which may, in the short term, increase their livestock numbers, and are pressing for developments in this direction without realizing the potential ecological risks. Ecologically sound long-term development plans, however, need thought and good understanding of the system.

In principle, the veterinarian has been exposed to systems (whether organ systems such as the digestive and respiratory system or husbandry systems) throughout his career, and should have a good understanding of the problems associated with radical change. On the other hand, he is trained (and slightly biased) to cure animals, and often uses the European or North American (small animal) practitioners as his role model. It is questionable whether such animal scientists or veterinarians are very useful, considering the costs of their education and practice. It may be justifiable to weigh their usefulness against that of the barefoot veterinarian (Halpin, 1981), who may be less well educated,

but has a good understanding of the systems and people with whom he has to work. Free veterinary services, commonly provided in many African countries, basically put the livestock owner in an awkward position; since he does not pay it is difficult for him to argue about the quality of the service given to him. Over the last two decades, animal health provisions in the tropics are concentrated on mass vaccination and treatment. Very little effort, either locally or by international and foreign aid organizations, is made to understand the system, and to study whether such an understanding provides means of innovation in disease control and in animal production in general.

At present there is only little evidence of a trend to place more emphasis on health management than on drug therapy. Some developments in the tropical livestock industry, however, (subjects such as genetically determined resistance to animal disease, ecology of animal disease, cooperation between animal and social scientists, etc.) are providing some innovative ideas. The feasibility of "pest-management" systems has been reviewed by Bawden (1978) who concluded that a greater awareness of the form, function and dynamics of agro-ecosystems are needed... "to be compatible with long-term stability and productivity". Most of these developments are very much related to the role of animals in their ecological niche and considerable information on livestock systems, either as such or as a part of the farming system, has to be obtained before such programs can be implemented.

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