

## Livestock Production in Industrialized and Less Industrialized Countries

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### Livestock Systems and Products

The one thing that perhaps most distinguishes livestock systems in less industrialized or developed countries is that essentially the environment is in charge of events. In industrialized countries the environment can be buffered to a large extent so that the milk yield, growth rate etc. is similar in dry and wet seasons or in summer and winter. Concentrates can be liberally fed and high quality forage preserved. Cattle can be housed in winter and even kept in air-conditioned houses in hot seasons. Diseases can be kept at bay with medicine, management and good feeding and nutritional deficiencies identified and repaired. In less or non-industrialized countries the livestock and their owners must accept the environment i.e. climate, feed resources etc. The environment can be altered somewhat by providing shelter etc. the feed resources can be improved within limits but the environment on the whole cannot be buffered to the extent possible in industrialized countries.

This is illustrated by Figure 1 from Ørskov and Viglizzo (1994) in which it can be seen that the environmental control decreases and economic risk increases as livestock system move towards marked orientations.

### Animal Production in Industrialized Countries

The driving force or goal for animal production in industrialized countries is to maximise profit whereas that in less developed or industrialized countries must often be subordinated to a large extent to the need to minimize risk. Due to the large amount of capital investment in animals and equipment in intensive systems and in animals in extensive systems the consequence is that capital turnover is important. Added to high labour cost the net effect has been a selection of high milk yield from specialized milk cows and high growth rate from beef animals and sheep. Large conglomerates of animals in one place has led to labour saving. Feeding of large amounts of concentrates has led both to labour saving in feeding and transport and

permits the high intake demanded by rapid growth and copious milk yield. Market protection has ensured that concentrate could be fed economically to ruminants.

The goal of breeding therefore is homogeneity so that profits can be predicted as much as possible. This has in turn led to breeding technologies which to a large extent ensure homogeneity. Artificial insemination has led to use of only a small amount of superior male animals selected under environmentally controlled conditions. Recently the use of embryo transfer has led further to not only selections of superior males but also superior females as embryo from different parental stock can be nurtured in the uterus of inferior females. The technology of interuterine inseminations further increase the use of a few superior males for a very large population. A later component which further exasperate the situation is use of growth promoters and in particular use of Bovine Somatotrophine to further increase milk production.

The breeding for homogeneity also means breeding under environmentally controlled conditions including feed resources and climate. Such animals are extremely vulnerable and not very adaptable when they are exposed to different environments including climate feed quality and fluctuating supply of nutrients. The many failures of importing so called exotic or upgraded animals into different environments bear testimony to this.

The pressure of labour and capital has thus led to specialized animal production rather than dual or multipurpose animals. Extensive systems are supplying young cattle for fattening in large feedlots sometimes with several thousands generally fed on grain based diets.

### Animal Production in Less Developed or Less Industrialized Countries

*Contribution to meat and milk production.* In pastoralist societies animals supply the staple diet, providing an immense diversity of meat and milk products. In cropping areas, however, animals products are seldom of much importance as food, so

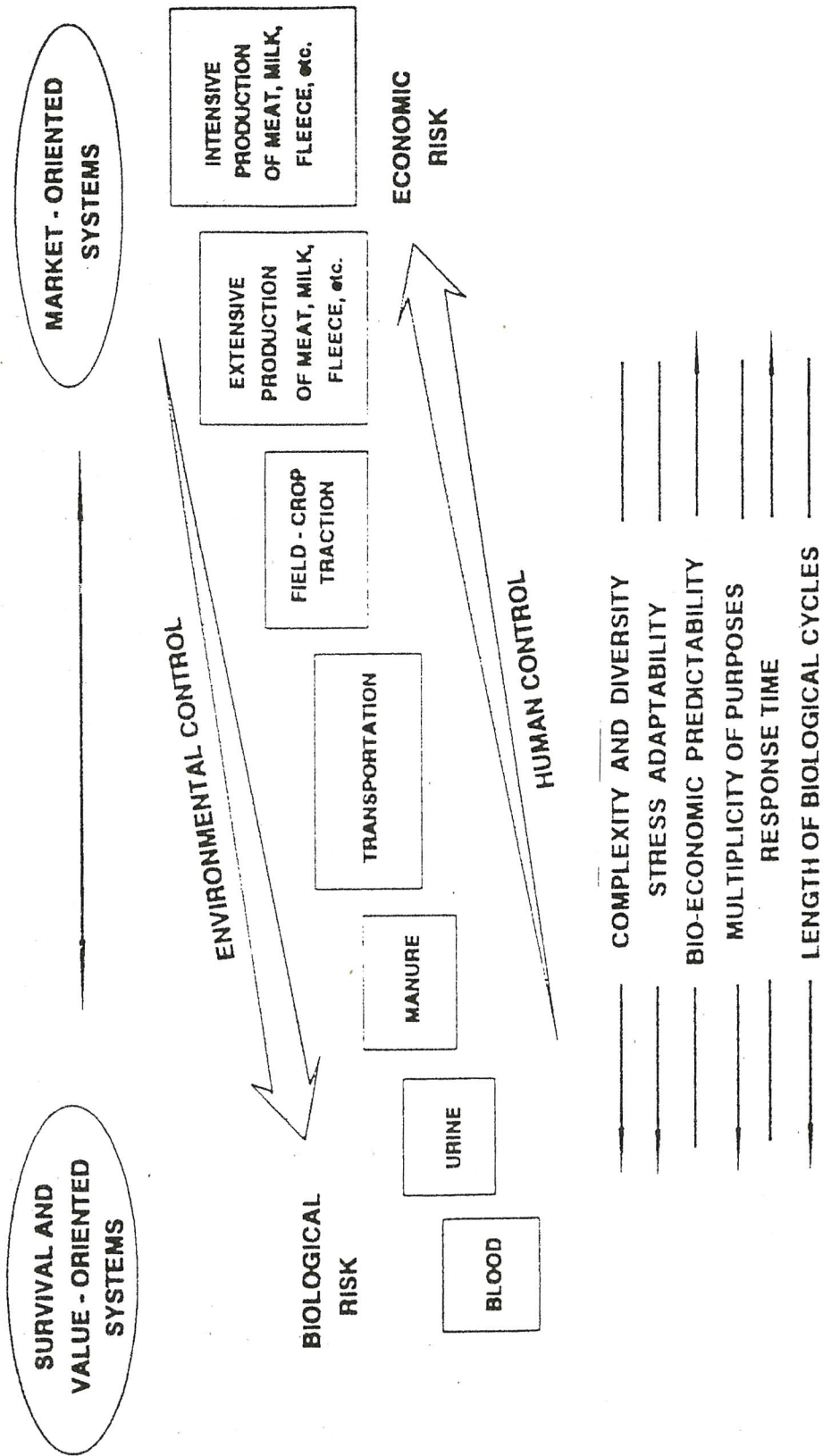


Figure 1. Relevant characteristics of traditional and modern farming systems and their livestock products

that some groups are almost or wholly vegetarian and lactose intolerance occurs where no milk is consumed.

*Contribution to draught power and transport.* In labour-intensive cropping areas the major contribution of livestock is probably their contribution to draught power and transport. This represents an indirect contribution to human food as it increase the area that can be cultivated and so increase the production of food crops. The Ethiopian Highlands is a good example. It would not be possible by human labour cultivate sufficient land to grow sufficient grain to support a family. Sometimes of course cattle maintained mainly as working animals produce important amounts of milk and meat. Camels and horses also extend the area that can be reached by human kind as they assist in migration by carrying the families tents, provisions etc.

*Contribution to comfort.* In many small farms the livestock contribute home comforts. The cattle for instance are often treated as family members. In cold areas they are stabled next to or under the living quarters and so help to keep them warm. They therefore extend the climatic range in which human

existence is possible e.g. yaks in Tibet and Mongolia. Reindeer in Lapland. Livestock also supply the wool and leather from which clothing is made, further aiding human survival in cold regions.

*Animals as a source of security.* The best security in many countries is investment in animals. Urban people sometimes own cattle grazed by pastoralists as it is a reliable investment even if the animals produce little. The livestock is the currency in pastoralists areas and this will not change until economic and political stability can show better securities than investment in animals. While this is the traditional form of capital and prestige and in many societies the currency as bridewealth etc. there is still very good reasons for it. Common land encourages maximum number of animals. In Ethiopia small ruminants are readily sold but if too much money is accumulated it will be invested in cattle. For this purpose the main product is maintenance. The root cause of overgrazing and sometimes erosion is often an economic instability. The Amazon forest is being felled in part to provide a short period of grazing for cattle as a hedge against inflation in Brazil. After that the land is degraded.

Table 1. The contrasting characteristics of research into market oriented and survival plus social value oriented animal husbandry systems (from Ørskov and Viglizzo, 1994).

	Research objectives and characteristics	
	For market-oriented systems	For survival and social value-oriented systems
Overall goals	Profit maximization Cash generation Productivity	Risk minimization Family support Stability and sustainability
Scientists' role	Design of systems	Management of ecosystems
Intermediate targets	Genetic homogeneity Increased production potential Single-purpose animals Nutrient mobilization	Biological diversity Improved maintenance potential Multi-purpose animals Nutrient storage
Philosophical approach	Cartesian (specialistic)	Holistic
Scientific approach	Single discipline	Multi- and trans-disciplinary
Statistical emphasis	Mean Main effects	Variance Interactions

*Role of risk spreading.* Animals also serve to spread risk. This function is most important in areas in which crops are prone to drought, pests, flooding etc. Storage of nutrients in animals can help the owners to withstand crop failures. In this context smaller animals are preferred to large animals. Small ruminants are often preferable to large. Large milk cows concentrate risk rather than spread it. This aspect of security may not be used and the greatest product produced is that of maintenance. Animals can also in some areas help to absorb excess labour. Livestock are often fed best, particularly in cut and carry systems, when other farming activities such as harvesting and sowing are at the lowest.

The complexity of the system and the many diverse functions of livestock create many problems that need study. The extremes of the goals of research are indicated in Table 1. From an animals breeding point of view it is difficult to define goals when they are multi purpose. Animals under specialized systems in industrialized countries where environment and nutrition are well controlled, are selected for uniformity and genetic homogeneity. Animals selected in developed countries are often unsuitable for less industrialized countries. Genetic diversity is required in less industrialized countries. Their livestock have been selected an management systems developed mainly in regions that are tropical or sub-tropical humid or arid. It is no wonder that the introduction of so-called upgraded exotic cattle is seldom successful.

In short, livestock in less industrialized areas perform many functions. They are often referred to by people from industrialized countries as unproductive. When all their products are added together they probably produce more of human value than super-charged high producing dairy cows.

### **Towards Increasing Industrialization**

Having contrasted the two more extreme systems, what is the future of livestock and are we facing a period in which the livestock systems in less developed countries will be transformed wholesale into a cash generating economies. It is of course difficult to predict. If the word sustainability which is emphasized at this meeting, is taken into account then it could be argued that the livestock systems and products produced in less industrialized countries are more sustainable than those in industrialized countries. Many problems have occurred for instance in the Netherlands and Taiwan

where large conglomerates of animals fed on imported feeds are causing serious difficulties regarding manure disposal. There is an increasingly critical public attitude towards the ethics of industrialized animal production systems. The systems are very vulnerable in that they depend on fossil fuel, cheap concentrate etc. While industrial systems e.g. for pig and poultry rearing have occasionally been introduced into some developing countries with apparent success they are to a large extent dependant on import of exotic animals and feed resources.

Due to the large capital investment the animal are pushed to the limits for growth rate and milk yield. This also has the consequence that poor quality roughages such as crop residues are not being utilized as they cannot support satisfactory productivity by such animals. As a result the crop residues are wasted and are burned or buried.

On the other hand an increased demand for animals products will no doubt continue as industrialization increased in less industrialized countries. Should the systems from the west be copied as has been done uncritically in some Asian countries that are moving towards a market-oriented system. Well I personally hope not! No doubt the importance of risk spreading and security can be changed as people gain confidence in other means of security such as secure jobs, political and economic stability, social security systems, stable bank systems etc. The importance of supporting livestock at maintenance level could then be changed to feeding for milk and meat production without change in resource use. Working animals can be replaced using other energy sources if this sustainable. However the importance of animals for draught power in Asia will, I believe, continue for a very long time. There is in my opinion no doubt that feed resources in Asia, at least for ruminants, must depend largely on crop residues and on permanent pastures or rangelands. It is difficult to see that much arable land can be used in Asia for the production of ruminant feeds only. It is also difficult to perceive that potential human food such as grain or starch products will be fed in large amounts to animals given the density of human population. The feed resources therefore in the foreseeable future will be rough pasture, browse and crop residues. These forages cannot be used in any quantity in large industrialized feedlots and milk production systems since the density of these feeds makes transport too

expensive and their digestibility is too low to permit a sufficiently large intake of digestible nutrients.

Crop residues can be improved by genetic and appropriate technical means, but even then they will still be difficult to transport. My advice to emerging industrialized countries in Asia is not to repeat the mistakes of keeping animals in industrialized systems. I believe that both for the sake of avoiding urban slums in large cities as experienced particularly in South America, and for making good use of available feed resources there should be an encouragement for part time small farmers in which one or more members of the household has off-farm employment. This is already happening in some countries but it should be positively encouraged both

by helping to develop the best types of animal. Encouragement of industrialized animal production can lead to environmental degradation, poor resource utilization and the emigration of people from rural areas to the slum fringes of urban conglomerates. Encouragement of small part-time farmers can have the opposite effect of sustainable production from renewable local feed resources and at the same time maintain a large rural population.

#### **Literature Cited**

- Ørskov, E.R. and E. Viglizzo. 1994. The role of animals in spreading farmers risk. A new paradigm for animal science. *Outlook on Agriculture* 23 (2) 81.