

FINE-TUNING THE OLD WAYS

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Long before recorded history, human beings learned to rely on animals for many of life's necessities—food, clothing, shelter, and transport. Originally people relied on animals captured from the wild, but eventually certain species were domesticated as society made the transition from hunting to pastoralism and agriculture.

It is believed that in Asia, Europe, and Africa, buffaloes, sheep, goats, and pigs were domesticated 7000 to 10 000 years ago. Goats and sheep may even predate the full development of crop-based agriculture.

In Latin America, although this process was probably more recent, the camelids (llama and alpaca) and guinea pigs are likewise believed to have served mankind for several millennia.

Worldwide, animals have remained an essential component of agriculture and can be found on almost every small farm in the tropics. In developing countries as a whole, they account for about 25 percent of the total value of all agricultural commodities and provide 20 percent of the protein in peoples' diets. In industrialized countries, by contrast, animals provide 60 percent of dietary protein.

In most societies, animal products are preferred foods and demand for them increases as incomes rise. The UN Food and Agriculture Organization has estimated that demand for meat and milk in developing countries will continue to expand by more than 3 percent a year over the next few decades. This will pose a strong challenge to farmers, policymakers, development workers, agricultural services, and researchers.

This article highlights some of the numerous opportunities for increasing livestock productivity, especially in the traditional farm sector which accounts for the large majority of domesticated animals in developing countries.

Among the many livestock species raised worldwide, ruminants are especially important. They are able to convert poor-quality feeds such as crop residues, agro-industrial by-products, and natural pasture into high-quality human food. Of the estimated global population of 1.27 billion cattle, 130 million buffaloes, 1.12 billion sheep, and 460 million goats, about 66, 99, 52, and 94 percent respectively are raised in developing countries.

Cattle, the world's most important source of meat and milk, are raised in a variety of systems. In the dry areas of Africa and Latin America, for example, ex-

tensive rangeland and pastures are commonly used. Semi-intensive systems, on the other hand, are typical of Southeast Asia and other more humid tropical regions.

Very intensive dairy and beef systems, using efficient breeds under high levels of management, have rarely proved successful in lowland tropical areas of developing countries. The inputs are often too expensive or unavailable, management skills insufficiently developed, and marketing systems inadequate. Nevertheless, much research and development effort continues to be spent on introducing these generally inappropriate technologies. As a result, the upgrading and development of more traditional systems is often neglected.

Buffaloes are also an important source of meat and milk in smallholder systems, especially in South and Southeast Asia. They have received considerably less attention from researchers than have cattle and much remains to be done.

Cattle and buffaloes are a major source of energy on farms. It has been estimated that in the developing countries as a whole, animals are used to cultivate half the arable area, and three-quarters of all animal power is provided by cattle and buffaloes.

Goats and sheep are vital to many pastoral systems and are also commonly found in semi-intensive systems in Asia, Africa, and parts of Latin America. (See p. 13.) They often thrive in areas too dry for cattle or, in the case of Africa, in areas infested by tsetse flies. Due to their small size, short generation interval, and larger number of offspring (compared with cattle), sheep and goats also provide farmers with considerable management flexibility and require only a small capital outlay.

Although resources for sheep and goat research have grown in recent years, in absolute terms they still fall far short of what is needed.

In specific regions of the world, other ruminants are important—the llama and alpaca in the Andes, the yak in the Himalayas, and the camel in the dry zones of Asia and Africa. While their secondary importance does not justify a major allocation of research resources, their contribution to agriculture in harsh environments certainly warrants greater research attention than they receive at present.

Nonruminants such as pigs are also important to many smallholders in the tropics. Pig rearing under traditional scavenging systems is generally regarded by farmers as a low-input, low-risk enterprise.

However, most pig research around the world has tended to concentrate on intensive, high-input systems. These may be successful on a large commercial scale, but are generally inappropriate for farmers with limited access to capital and other resources.

The situation is similar for poultry. Broiler chickens and eggs are now often produced in high-input, intensive, heavily capitalized systems. It is certainly hard to justify public financing of research on such systems in countries where farmers can't afford the necessary inputs.

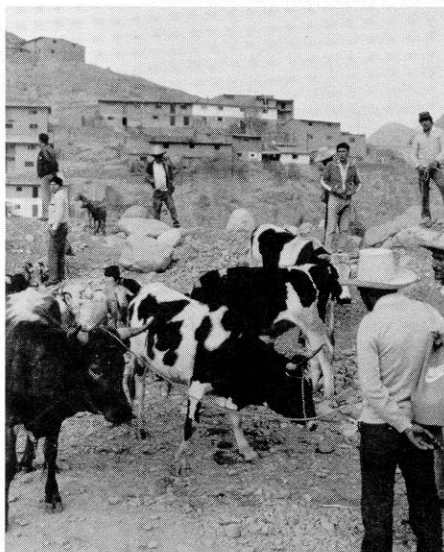
In recent years, "microlivestock" have caught the attention of both researchers and development workers. The term includes small species such as ducks, rabbits, and guinea pigs. They require little space and only minimal capital resources. They come in family meal sizes and a large part of their diet can be obtained from kitchen scraps and gathered fodder plants.

Research on farm animals is complex and often long-term. Research should be targeted at those components of production systems with the greatest potential payoff.

To do this, animal researchers must be attuned to the farmer's perception of the role played by various species in the overall farm system. Are they a source of family food and income? Or a live "bank" for accumulating readily available capital? Or a means of obtaining social prestige?

Pertinent research demands an understanding of the links between crops and

Photo: R. Charbonneau / IDRC



Livestock market in northern Peru.

animals—for example, feeding animals with crop residues and specially grown fodder, grazing animals on stubble and pastures, and using manure and draught power for crop production. For the most part, these interactions are poorly understood and further research is needed.

Feeds: highest priority

Insufficient feed is the main factor limiting animal production in developing countries. Research on improving the quantity and quality of feeds should receive the highest priority.

Pastures and forages are the cheapest and most abundant source of feed. The quality is often poor, however, and availability can vary widely throughout the year and between years. Improvements can be achieved through better management and feed conservation practices, and by introducing new plant species and cultivars. (See article, page 11.)

Animal feed shortages and increased pressures on the land from population growth have led to severe over-grazing in many regions. Widespread soil degradation and erosion have been the result.

The situation is especially serious in areas where there is common access to grazing lands. In dry, marginal environments, this is believed to be a major factor in desertification. Agroforestry techniques, among others, hold promise of alleviating the situation.

In wetter environments, perennial species (trees and shrubs) can help to provide animal feed, as well as food, fuel, and timber. They also serve as windbreaks, provide shade, and reduce erosion. Alley cropping, whereby crops are grown between rows of trees or shrubs, is a particularly promising technique and has captured the attention of researchers in many regions.

Crop residues and agro-industrial by-products account for an estimated 25 percent of ruminant feed worldwide. During the dry season in Africa, 70 percent of ruminants depend on crop residues such as straw and husks. Putting farm resources to such use is an efficient and ecologically sound practice, especially when the feed is produced and consumed right on the farm.

The importance of by-products is growing as the number of animals increases and the amount of grazing land declines. Nevertheless, there are several problems associated with the use of by-products, including farmers' unwillingness to process or handle them. Further research is needed

to improve digestibility and nutritional value, and to overcome storage and transport difficulties.

Research is also needed on other aspects of animal husbandry related to productivity—for example, improved housing, grazing, weaning, and milking practices.

Animal breeding research has been given considerable attention worldwide. But it has generally failed to provide sustainable long-term benefits to smallholders in developing countries. The potential productivity of many indigenous breeds hasn't yet been fully exploited, and exotic breeds haven't always lived up to their full genetic potential, especially when introduced into low-management systems. Crossbreeding has been generally found to be a better method of genetic improvement than direct introduction of exotic breeds.

Animal diseases are a major constraint on smallholder productivity in the Third World. An estimated 40 to 50 percent of buffalo calves in Bangladesh die before six months of age, and in East Africa up to 30 percent of the calves born in traditional livestock systems die of East Coast Fever in their first year.

Around the world, both the public and private sectors allocate substantial resources to animal diseases research, especially the development of vaccines and veterinary medicines. Unfortunately, less attention is generally given to the effects of management techniques on animal health and to the economics of different treatment methods. It may be, for example, that strategic applications of a drug are an effective and economical way for a small farmer to control animals' internal parasites, while regular doses throughout the year are not. Research into the most economical management practices is of

limited interest to commercial chemical and drug companies.

Crops vs animals

In summary, much remains to be done in the area of livestock development. At the international level, crops research receives considerably more resources than animals research. Within the world research network operated by the Consultative Group on International Agricultural Research (CGIAR), for example, only two institutions are exclusively devoted to livestock and both are in Africa. Two others have animal-related research sub-programs.

The CGIAR system devotes less than 15 percent of its budget to animals research and this is unlikely to change in the near future.

Outside CGIAR, there are likewise few globally mandated institutions devoted to animal research. Several, however, such as the International Centre for Research in Agroforestry (ICRAF), in Kenya, are making important contributions to the field, and many regional organizations have animal research programs.

Within the agricultural research systems of individual countries, there is again a far greater emphasis on crops research than on animals. Donor organizations would do well to devote more resources to help strengthen animal research within national-level programs. ■

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Nepali women tending goats.

Photo: C. Devendra / IDRC