5 Discussion and conclusions

At the global and continental levels, what can be concluded from this analysis? Livestock production systems, and the households that operate them, face major changes in the next 5 decades. The spatial projections of human population growth, particularly in SSA, are quite startling. Equally startling are the predicted changes in length of growing period for SSA using the Hadley Global Circulation Model (GCM). (It should be remembered that temperature increases may be double what is simulated in the Hadley scenario; changes in LGP simulations using the most recent GCM outputs would, in all likelihood, be even more pronounced than those shown in Section 4.) Add these projections to the increases in demand for livestock products forecast globally, in SSA as well as in Asia and South America (Delgado et al., 1999), and the outlook is extremely dynamic.

In terms of the numbers of poor and, so far as the analysis is capable of distinguishing, the numbers of poor livestock keepers, the critical regions are SA and SSA. Our analysis indicates that while the rangeland systems contain relatively few poor (some 60 million), most of these households are dependent on livestock for their livelihoods. Almost half of the poor in rangeland systems are located in SSA. The mixed systems contain large numbers of poor (over 1 billion), and the numbers of poor who depend to some extent on livestock are considerable; the mixed irrigated systems contain approximately 103 million poor livestock keepers, and the mixed rainfed systems some 366 million poor livestock keepers. In terms of the magnitude of poverty and the importance of livestock to poor households in the developing world, this analysis suggests that there are at least 550 million poor livestock keepers globally.

Analysis using the global data sets as outlined above can be of value, not least as the first step in a two-tiered approach that involves identification of hot spots of rapid change, a second step then involving a zoom-in to these areas for more detail. At a global level, and even with relatively coarse data sets, we can already identify hot spots where system changes are likely to be substantial over the next 3–5 decades, as a result of population growth and climate change. The magnitude of these system changes, particularly in SSA, may be so large as to be potentially overwhelming.

At these broader scales, our knowledge of poor livestock keepers is still generally quite limited. At much higher resolutions, a great deal of survey work and data collection has been carried out at the community level. The data and maps for Kenya in Section 3 indicate that the conventional wisdom concerning livestock is not necessarily correct. Poor households often have access to land; they also often have cattle as well as smallstock—land and cattle are not just the prerogative of the non-poor in these systems.

A major issue remains: how can the links be made between such household survey data and case studies and the broader picture, so that reliable extrapolation and generalisation can be carried out, thereby providing information at levels of aggregation appropriate for making resource allocation decisions? While analyses based on global data sets are useful, they can go only so far. As noted above, methods based on small-area estimation (SAE) to produce poverty maps at the level of census enumeration areas have been and are being applied in various countries, but a concentrated effort is needed. ILRI, in collaboration with WRI, the World Bank, the Rockefeller Foundation, the International Food Policy Research Institute (IFPRI) and national poverty teams, is currently undertaking SAE poverty mapping in Kenya, Tanzania and Uganda. This may result in preliminary high-resolution poverty maps by the end of 2002 (Appendix 4). IFPRI is engaged in producing similar maps for Mozambique and Malawi. With the maps that were completed in 2000 in South Africa, this is a reasonable coverage of countries for East and Southern Africa, but more work is needed.

Potential sites where livestock research could be focused

How might poverty maps be used to prioritise and focus livestock research appropriately? The case for poverty alleviation as a (if not the) major research and development goal is given. But poverty is a difficult concept, largely because of its multidimensionality. Is it sufficient to locate poor livestock keepers, so that in DFID's target countries, for example, something can be said about the livestock systems where there are large percentages of poor livestock keepers? But which criteria should be used—absolute numbers of poor, or

5
Discussion and conclusions

systems with high poverty rates and where environmental issues are important? What about the links between poverty and natural resources management, and the nature of the interventions themselves—how likely are these to affect the poor? And so on.

What this indicates to us is the need for a consistent framework that can be used to set priorities. Any realistic and convincing attempt to answer the questions posed above will involve trade-offs between the criteria used. One of the major outcomes of the recent ILRI priority-setting exercise was that there are no 'wonder' livestock research solutions—that generate high returns to research investment, that can have a huge impact on poor people and that score highly on environmental-impact criteria. While in one way this is disappointing, in another it seems realistic, and a powerful validation of the entire process. Obtaining consensus on what such a framework should consist of, and the criteria used, is a difficult though necessary task, even if different agencies place different weights on the various criteria that are used to arrive at appropriate portfolios of activities.

However such a framework might be built, and whatever it might consist of, there are key ingredients that would include basic information on spatial and temporal distribution of crops and livestock; on the numbers, location and characteristics of the poor; and on the numbers, location and characteristics of highly vulnerable poor livestock keepers. Despite the crucial importance of such information, our databases are, by and large, very patchy and incomplete.

Assembling and maintaining such databases is not given a very high priority by most donors, although there are one or two exceptions. Co-ordinated and coherent joint efforts to develop and maintain these types of database would seem to be an obvious response to these data gaps, so that wheels are not continually reinvented and the existence of key baseline data is assured. Currently, there are no such co-ordinated efforts, but donor inputs to promote truly inclusive database development and maintenance could be a highly effective motor to drive the improvement of global and regional data sets, not only for priority setting but for a wide variety of other purposes.

Areas where the analysis could be improved, and further work

Several weaknesses can be identified in the map of global livestock production systems, and these are outlined in more detail in Appendix 3. In summary, the classification depends on data of land cover/land use that could certainly be improved. It should also be remembered that the category classified as 'other' contains ecosystems that range from arctic tundra to tropical rain forest to desert. There is also a great deal of variation within all of the production systems categories, particularly with respect to agricultural production potential. There are also likely to be differences in the level of poverty of livestock keepers within the same production system associated with differences in livestock production potential, but there is much that is unknown.

Despite various weaknesses, the poverty maps in this report represent a considerable step forward at the global level. We can identify several areas of work to improve these in the future, including the following:

- A simple model of migration patterns over the next 50 years should be developed, and this could then be used to refine the human population projections to 2050. At the continental and global levels, human population density is a very powerful proxy for a wide range of variables, and the benefits of refined, spatial projections of human population density could be expected to be considerable in many fields.
- Further refinement of production systems categories could be made by accounting for different levels of land-use intensity and different levels of productive potential caused by soil fertility.
- Further sub-country and country-level studies are needed to quantify rates of poverty between and within different production systems. These measures should attempt to associate different poverty rates with such geographic variables as market access, natural resource endowment and climate. These studies could usefully be at two levels: rapid broad-scale community assessments and studies based on SAE. Both types of study would greatly improve our understanding of the proportion of income people in different production systems derive from livestock, and thus the importance of livestock to their livelihoods.

5
Discussion and conclusions

- The conventional wisdom is that the poor are concentrated where natural resources are either poor or degraded, but whether this is correct or not is unknown. Better understanding of the relationships between poverty and natural resources would be of great value to development agencies in the design of livestock interventions that are more sustainable and that minimise adverse impacts. This work could usefully start with an analysis of poverty and soil degradation, biodiversity and carbon sequestration potential.
- It seems to us that a fruitful way to explicitly include the time dimension into studies of poverty is through a marriage of notions of poverty with vulnerability, perhaps partly in the context of marginal lands and marginal areas (CGIAR, 1997). Some of the poor are bound to be more vulnerable than others to such climatic shocks as drought, or such political shocks as revolution. For example, pastoral people who live in areas with 300 mm of reliable annual rainfall may be less vulnerable to other risks than those who live in areas characterised by similar amounts of rainfall that is highly erratic and unreliable. Global analyses of vulnerability combined with poverty maps could contribute greatly to refining the types of analyses attempted in this study.