Part I

LIVESTOCK IN THE BALANCE

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1. Livestock in the balance

Livestock contribute 40 percent of the global value of agricultural output and support the livelihoods and food security of almost a billion people. The livestock sector is one of the fastest growing parts of the agricultural economy, driven by income growth and supported by technological and structural change. The growth and transformation of the sector offer opportunities for agricultural development, poverty reduction and food security gains, but the rapid pace of change risks marginalizing smallholders, and systemic risks to the environment and human health must be addressed to ensure sustainability.

In many developing countries, livestock keeping is a multifunctional activity. Beyond their direct role in generating food and income, livestock are a valuable asset, serving as a store of wealth, collateral for credit and an essential safety net during times of crisis. Livestock are also central to mixed farming systems. They consume waste products from crop and food production, help control insects and weeds, produce manure for fertilizing and conditioning fields and provide draught power for ploughing and transport. In some areas, livestock perform a public sanitation function by consuming waste products that would otherwise pose a serious pollution and public health problem.

At the global level, livestock contribute 15 percent of total food energy and 25 percent of dietary protein. Products from livestock provide essential micronutrients that are not easily obtained from plant-based foods.

Almost 80 percent of the world's undernourished people live in rural areas (UN Millennium Project, 2004) and most depend on agriculture, including livestock, for their livelihoods. Data from the FAO database on Rural Income Generating Activities (RIGA) show that, in a sample of 14 countries, 60 percent of rural households keep livestock (FAO, 2009a). A significant share of the livestock outputs of rural households is sold, making a sizeable contribution to household cash income. In some countries, the poorest rural households are more likely to hold livestock than wealthier ones; although the average number of livestock per household is quite small, this makes livestock an important entry point for poverty alleviation efforts.

Women and men typically face different livelihood opportunities and constraints in managing livestock. Small livestock keepers, particularly women, face many challenges, including: poor access to markets, goods, services and technical information; periodic drought and disease; competing resource uses; policies that favour larger-scale producers or external markets; and weak institutions. Knowledge about, and responsibilities for, various aspects of animal husbandry and livestock production commonly differ between women and men and between age groups. For example, a woman might be responsible for preventing or treating illness in the household's livestock, a man for milking or marketing, boys for grazing or watering, and girls for providing fodder to stall-fed animals.

Rural women are as likely as men to keep livestock, although the number of animals they keep tends to be lower and they are more likely to own poultry and small ruminants than large animals.

Evidence suggests that poor people, especially young children and their mothers in developing countries, are not consuming enough animal-based food (IFPRI, 2004), while other people, particularly in developed countries, are consuming too much (PAHO, 2006). However, high rates of undernourishment and micronutrient deficiency among the rural poor suggest that, despite often keeping livestock, the rural poor consume very little animal-based food. About 4–5 billion people in the world are deficient in iron, which is essential especially for the health of pregnant and lactating women and for the physical and cognitive development of young children (SCN, 2004). This and other important nutrients are more readily available in meat, milk and eggs than in plant-based foods (Neumann *et al*., 2003). Increasing access to affordable animal-based foods could thus significantly improve nutritional status and health for many poor people. However, excessive consumption of livestock products is associated with increased risk of obesity, heart disease and other non-communicable diseases (WHO/FAO, 2003). Furthermore, the rapid growth of the livestock sector means that competition for land and other productive resources puts upward pressure on prices for staple grains as well as negative pressures on the natural-resource base, potentially reducing food security.

Powerful forces of economic change are transforming the livestock sector in many rapidly growing developing countries. Production of livestock, especially pigs and poultry, is becoming more intensive, geographically concentrated, vertically integrated and linked with global supply chains. Higher animal-health and food-safety standards are improving public health, but are also widening the gap between small livestock keepers and large commercial producers. The "livestock ladder" – by which smallholders climb up the scale of production and out of poverty – is missing several rungs (Sones and Dijkman, 2008).

Case studies show that small commercial livestock producers can be competitive, even in a rapidly changing sector, if they have appropriate institutional support and the opportunity cost of their labour remains low (Delgado, Narrod and Tiongco, 2008). Historical experience from member countries of the Organisation for Economic Co-operation and Development (OECD) shows that policy support in the form of subsidies and trade protection is very costly and has limited success in preventing the exit of smallholders from livestock production. Policy interventions aimed at improving smallholder productivity, reducing transaction costs and overcoming technical market barriers can be very helpful, but direct subsidies and protection could be counterproductive.

As economies grow and employment opportunities increase, the concomitant rising opportunity costs for labour often induce smallholders to abandon livestock keeping in favour of more-productive, less-onerous work in other sectors. This is an integral part of the economic development process and should not be viewed as a negative trend. Concerns arise when the pace of change in the livestock sector exceeds the capacity of the rest of the economy to provide alternative employment opportunities. Appropriate policy responses in this situation involve measures to ease the transition out of the sector, including the provision of social safety nets, and broader rural development policies, such as investments in education, infrastructure and growth-oriented institutional reforms. Smallholder agriculture should be the starting point for development, not the end-point.

Some livestock keepers are simply too poor, and their operations too small, to be able to overcome the economic and technical barriers that prevent their expansion into commercial production. Women typically face greater challenges than men, as they have poorer access to and control over livestock and other resources such as land, credit, labour, technology and services necessary to take advantage of growth opportunities. Most of the very poor depend on livestock as a safety net rather than using them as the basis of a commercial enterprise. Better access to animal-health services and a greater voice in livestock disease-control measures would improve their situation in the short run, but they would also benefit more from

the creation of alternative social safety nets that protect livelihoods from external shocks. The vulnerabilities and constraints facing the poorest livestock keepers, and the important safety-net function livestock play for them, should be borne in mind. Indeed, the multiple roles of livestock in the livelihoods of people living in poverty should be considered in any policy decisions that affect them.

The agriculture sector is the world's largest user and steward of natural resources and, like any productive activity, livestock production exacts an environmental cost. The livestock sector is also often associated with policy distortions and market failures, and therefore places burdens on the environment that are often out of proportion to its economic importance. For example, livestock contribute less than 2 percent of global gross domestic product (GDP) but produce 18 percent of global greenhouse gas (GHG) emissions (Steinfeld *et al*., 2006); it should be noted, however, that GDP underestimates the economic and social contribution of livestock as it does not capture the value of the numerous multifunctional contributions of livestock to livelihoods. There is thus an urgent need to improve the resource-use efficiency of livestock production and to reduce the negative environmental externalities produced by the sector.

Livestock grazing occupies 26 percent of the earth's ice-free land surface (Table 12, page 55), and the production of livestock feed uses 33 percent of agricultural cropland (Steinfeld *et al*., 2006). The expansion of land used for livestock development can contribute to deforestation in some countries, while intensification of livestock production can cause overgrazing in others. The increasing geographic concentration of livestock production means that the manure produced by animals often exceeds the absorptive capacity of the local area. Manure thus becomes a waste product rather than being the valuable resource it is in less-concentrated, mixed production systems. These wastes can become valuable resources again if proper incentives, regulations and technology, such as anaerobic digestion, are applied. More generally, the negative impacts of livestock on the environment can be mitigated, but appropriate policies must be implemented.

The concentration of animal production in close proximity to human population centres poses increasing risks for human health arising from livestock diseases. Livestock diseases have always interacted with human populations. Most strains of influenza, for example, are believed to have originated in animals. Furthermore, livestock pathogens have always posed a production challenge because, at the biological level, they compete with humans for the productive output of animals. Livestock diseases impose a heavy burden on the poor because poor livestock keepers live in closer proximity to their animals, they have less access to veterinary services, and the measures used to control certain disease outbreaks can threaten the basis of their livelihoods and the safety net they rely on in emergencies. Improving the management of livestock with a view to controlling diseases can provide significant economic, social and human-health benefits for poor people and society more broadly. This may require relocating livestock production away from human population centres in order to minimize the risk of disease transmission.

Livestock sector change

The State of Food and Agriculture last provided a comprehensive review of the livestock sector in 1982. Since then, the livestock sector has developed and changed rapidly in response to shifts in the global economy, rising incomes in many developing countries and changing societal expectations. The sector is increasingly expected to provide safe and plentiful food for growing urban populations as well as public goods related to poverty reduction and food security, environmental sustainability and public health. These trends and the challenges they entail were identified a decade ago by Delgado *et al.* (1999), who coined the term the "livestock revolution" to describe the process that is transforming the sector:

> *A revolution is taking place in global agriculture that has profound implications for human health, livelihoods, and the environment. Population growth, urbanization, and income growth in developing countries are fueling a massive increase in demand for food of animal*

origin. These changes in the diets of billions of people could significantly improve the well-being of many rural poor. Governments and industry must prepare for this continuing revolution with long-run policies and investments that will satisfy consumer demand, improve nutrition, direct income growth opportunities to those who need them most, and alleviate environmental and public health stress.

(Delgado *et al.*, 1999)

Rapid income growth and urbanization over the past three decades, combined with underlying population growth, are driving growth in demand for meat and other animal products in many developing countries. Supply-side factors, such as the globalization of supply chains for feed, genetic stock and other technology, are further transforming the structure of the sector. The sector is complex and differs according to location and species. A growing divide is emerging; large-scale industrial producers serve dynamic growing markets whereas traditional pastoralists and smallholders, while often continuing to support local livelihoods and provide food security, risk marginalization.

In many parts of the world, the transformation of the livestock sector is occurring in the absence of strong governance, resulting in market failures related to natural-resource use and public health. Interventions to correct market failures have been largely absent; in some cases, government actions have created market distortions. While the livestock sector is not alone in this regard, institutional and policy failures have led to opportunities presented by growth in the livestock sector being missed. As a result, the sector has not contributed as much as it might have to poverty alleviation and food security. Nor has growth in the sector been adequately managed to deal with the increasing pressures on natural resources or to provide control and management of animal disease. Correcting market failures is thus an important underlying rationale for public policy intervention.

Meeting society's expectations

The livestock sector, like much of agriculture, plays a complex economic, social and environmental role. Society expects the sector to continue to meet rising world demand for animal products cheaply, quickly and safely. It must do so in an environmentally sustainable way, while managing the incidence and consequences of animal diseases and providing opportunities for rural development, poverty reduction and food security. Given the large number of people who depend on livestock for their food security and livelihoods and the high environmental and human-health costs often associated with the sector, the challenge for policy-makers is to strike a fine balance among competing goals.

The livestock sector is one among many human activities contributing to the increasing pressure on ecosystems and natural resources: land, air, water and biodiversity. At the same time, the sector is increasingly constrained by this pressure on natural resources and the growing competition with other sectors for resources. There is also increasing awareness that climate change is creating a new set of conditions in which the sector must operate as well as imposing additional constraints on it. Climate change will alter what men and women do, exposing them to different risks and opportunities. For example, men may migrate for work while women and youth will take on new responsibilities. Women tend to be more vulnerable to external shocks owing to unequal access to resources, lower level of education, increased work burden and poorer health.

Growing international trade in livestock and livestock products and the increasing concentration of livestock production in close proximity to large human populations have increased the risks of animal disease outbreaks and the emergence of new animal-related human-health threats. At the same time, inadequate access to veterinary services jeopardizes the livelihoods and development prospects of many livestock holders throughout the developing world.

Livestock can provide a pathway out of poverty for some smallholders, and policy-makers need to consider the different roles that livestock play in supporting livelihoods. For those smallholders who have the potential to compete as commercial enterprises, judicious policy and institutional support is needed to help them access technology, information and markets to

improve their productivity. At the same time, the forces of economic change (to be discussed in Chapter 2) mean that some smallholders will need assistance to make the transition out of the sector. For others, especially the very poor, livestock primarily provide a safety-net function. The livestock sector requires renewed attention and investments from the agricultural research and development community and robust institutional and governance mechanisms that reflect the diversity within the sector. The livestock sector can contribute more effectively to improving food security and reducing poverty, but policy measures are required to ensure that it does so in ways that are environmentally sustainable and safe for human health.

This edition of *The State of Food and Agriculture* argues that the livestock sector could contribute more positively to society's goals, but significant policy and institutional changes are required. The rapid growth of the sector, in a setting of weak institutions and governance, has given rise to systemic risks that may have serious implications for livelihoods, human and animal health and the environment. Investments are required to improve livestock productivity and resource-use efficiency, both to meet growing consumer demand and to mitigate environmental and health concerns. Policies, institutions and technologies must consider the particular needs of poor smallholders, especially during times of crisis and change.

Structure of the report and key messages

Chapter 2 discusses trends in livestock, the underlying economic and social drivers, technological changes and consequent structural transformation of the sector, highlighting their impact on poverty and food security, the environment and human health. The social implications of the trends in the livestock sector, and the role of livestock in economic development, poverty alleviation and food security are the themes of Chapter 3. Chapter 4 focuses on the interrelationship of livestock with natural resources and ecosystems, including its role in climate change. Chapter 5 discusses the multiple challenges posed by animal diseases and their management. The final chapter addresses the policy and institutional reforms that are needed to improve the performance of the livestock sector in supporting food security and poverty reduction while ensuring environmental sustainability and protection of human health.

Key messages of the report

- The livestock sector is one of the most dynamic parts of the agricultural economy. The sector has expanded rapidly in recent decades and demand for livestock products is expected to continue growing strongly through the middle of this century, driven by population growth, rising affluence and urbanization. Decisive action is required if the sector is to satisfy this growth in ways that support society's goals for poverty reduction and food security, environmental sustainability and improved human health.
- The livestock sector makes important contributions to food security and poverty reduction. It, however, could do more given judicious policy and institutional reforms and significant public and private investments aimed at: (i) enhancing the ability of smallholders to take advantage of the opportunities offered by growth in the sector; (ii) protecting the poorest households for whom livestock serve as a crucial safety net; and (iii) enacting broader rural development policies to ease the transition of some livestock keepers out of the sector.
- Governance of the livestock sector should be strengthened to ensure that its development is environmentally sustainable. Livestock production is placing increasing pressures on land, air, water and biodiversity. Corrective action is needed to encourage the provision of public goods, such as valuable ecosystem services and environmental protection. This will involve addressing policy and market failures and developing and applying appropriate incentives and penalties. Livestock contribute to and are a victim of climate change. The sector can play a key role in mitigating climate change. For example, adoption

of improved technologies, encouraged by appropriate economic incentives, can lead to reduced emissions of GHGs by livestock.

- Some animal-health services are public goods in that they protect human and animal public health and thus benefit society as a whole. Animal diseases reduce production and productivity, disrupt local and national economies, threaten human health and exacerbate poverty, but producers face a range of risks and differ in the incentives they are offered and their capacities to respond. Animal-health systems have been neglected in many parts of the world, leading to institutional weaknesses and information gaps as well as inadequate investments in animal-health-related public goods. Producers at every level, including poor livestock keepers, must be engaged in the development of animal-disease and food-safety programmes.